

# ETHICS IN ASIA - PACIFIC

Regional Unit for Social and Human Sciences in Asia and the Pacific  
Asia and Pacific Regional Bureau for Education  
UNESCO Bangkok





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## **Ethics Preface**

Today, science and technology provide the knowledge and means to change the world around us. The ethical implications of recent and accelerated developments in science and technology, however, have added a major dimension to the debate on social policy and economic development. The critical role for ethics in this debate is to provide the wisdom and guidance such changes require for the general good of humanity and the natural world.

The 1999 World Conference of Science convened in Budapest, Hungary, declared ethics as being essential in determining how relevant and effective science is in addressing the needs and aspirations of society. As the United Nation's leading agency for ethical issues, UNESCO is mandated "to ensure that the ethical dimensions of the current scientific and technological evolution be fully addressed." Accordingly, UNESCO serves as an inter-disciplinary, multicultural and pluralistic forum for reflection on ethical issues, including the ethics of science and technology.

As part of its responsibility to fulfill this mandate, on 5-7 November 2003, UNESCO's Regional Unit for Social and Human Science (RUSHSAP) hosted a regional meeting on "The Ethics of Science and Technology in the Asia-Pacific Region." The purpose of the meeting was to inform RUSHSAP's agenda of action for the region in the field of science and technology ethics for the next two years and beyond, gauge opinions on how or whether to establish regional or sub-regional networks, and provide a forum for valuable face-to-face exchanges of ideas and discussion. The thirty participants in attendance represented many countries, academic disciplines, and experiences. This eclectic mix resulted in a rich tapestry of ethical perspectives and thought.

Issues highlighted at the meeting included: 1) the ethics of advanced technology, including biotechnology, 2) issues related to information communication technology (ICT), nanotechnology, etc., 3) the ethics of economics and development, including equity access, and intergenerational and environmental responsibilities, and 4) the ethics of intellectual property, including issues related to genetically modified foods, bio-prospecting, and ownership.

This volume contains four papers originally commissioned by RUSHSAP to lay the groundwork for discussions of the issues noted above. However, I believe that they are of value beyond the limited range of one meeting as they offer a compelling summary of the current state of ethics for science and technology throughout the region. They are also provocative in that they raise many difficult ethical problems and concerns that need to be considered and addressed.

The first paper, “Bioethics in the Asia-Pacific Region: Issues and Concerns,” is provided by Leonardo D. de Castro, Professor of Philosophy, and colleagues at the University of the Philippines. The paper presents an overview of biomedical ethical issues and concerns throughout the region. Specifically, it focuses on the threat from diseases, fertility and reproduction, biomedical research, HIV/AIDS, organ donation and transplantation, genetically modified organisms, cloning and stem-cell research. While it covers new “cutting-edge” bio-technological advances and their incumbent ethical concerns, it also deals with HIV/AIDS and abortion and tropical diseases that are not quite so ‘new’. Throughout, the authors offer various perspectives found throughout the region, including some divergent views.

The second paper, “Ethics of Economic Development” by the M.S. Swaminathan Research Foundation, Chennai, India was presented to the meeting by Ms. R.V. Bhavani. Recognizing that “science and technology activity in the contemporary world is the engine to economic development,” the paper offers a consideration of ethics as applied in the realm of contemporary economic development. Suggesting that the dangers associated with current advances in science and technology are even greater today than they were at the beginning of the Atomic Age and the onset of the Cold War, the paper offers a timely reminder of the Pugwash Movement of the 1950s. Started by Bertrand Russell and Albert Einstein, Pugwash sought to insert ethical reflection into the, then, new world of nuclear weaponry. The paper also reminds us that the Universal Declaration of Human Rights states that “everyone has the right freely...to share in scientific advancement and its benefits,” and that this tenet should inform ethical discussion in today’s world. Throughout, the paper addresses ethical aspects of economics, employment, ecology, energy, inequity, and intellectual property rights (IPR).

The third paper, “Ethics of Information Communication Technology (ICT)” by Tengku Mohd T. Sembok, Professor in Computer Science, Universiti Kebangsaan Malaysia, succinctly defines *ethics* as the “moral standards that help guide behaviour, actions and choices.” He continues to note that ethics are grounded in the notions of responsibility and accountability, suggesting that, as free moral agents, individuals, organizations, and societies are responsible for their actions. While acknowledging that information communication technology is impacting all walks of life all over the world, often with positive results, the paper notes some emerging ethical concerns related to the spread and influence of ICT, especially as related to the technological haves and have-nots. These concerns are related to unemployment, crime, loss of privacy, computer error, intellectual property, the freedom of speech and press, and the digital divide, in general. The paper presents initiatives and programmes undertaken at the local, national, regional, and international levels to address ICT-related ethical issues in Asia-Pacific, and concludes with recommendations for action.

The fourth and last paper, “Ethical Issues of Nanotechnology Development in the Asia-Pacific Region,” is offered by Professor Kyungchee Choi, from the Department of Science Education, Ewha Womans University in Seoul, Republic of Korea. Professor Choi notes that “ethical perspectives on the development of science and technology can be influenced by family values, educational background, social learning, professional activities, religious beliefs, individual needs.” He, then, presents an examination of what nanotechnology is, its related areas of development, the current status of its development, especially in the countries of Asia-Pacific, ethical considerations and possible negative outcomes of the technology, and efficient strategies and recommendations as to how to educate people about the associated risks and benefits. Ethical concerns include the equitable distribution of benefits and risks arising from research, environmental, social and legal impacts of new science and technology, and intellectual property rights issues.

These four papers, taken together, offer a comprehensive overview of ethics in science and technology in the Asia-Pacific region. They are offered here with the understanding that the most fruitful time to consider and debate ethical questions is now, before there is a crisis upon us. I believe this book will further the consideration of ethics already underway in the region. It will also have an impact on the ordering of UNESCO’s activities towards assisting in the promulgation of this dialogue and support for the actions that follow. I would like to thank the contributors to this book, as well as all the participants to the meeting, for helping to initiate this important discussion. I look forward to working together to expand this dialogue to include interested parties all across Asia and the Pacific.



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**BIOETHICS IN THE ASIA-PACIFIC REGION:  
ISSUES AND CONCERNS**

Paper prepared by Leonardo D. de Castro, Peter A. Sy,  
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University of the Philippines  
for the Regional Meeting on  
Ethics of Science and Technology  
5-7 November 2003, Bangkok

UNESCO  
Regional Unit for Social & Human Sciences in Asia and the Pacific  
(RUSHSAP)

## **BIOETHICS IN THE ASIA-PACIFIC REGION: ISSUES AND CONCERNS**

### **INTRODUCTION**

This paper discusses selected bioethics issues that arise within the Asia-Pacific context in relation to concerns that have been raised by people from the region. The primary intention is to illustrate characteristic features and emerging trends. There is no attempt to be comprehensive. However, the impact of the chosen issues is quite extensive in that the topics give rise to many ethical problems that have confronted ordinary people as well as medical practitioners, scientists and other health care professionals.

The coverage of issues and concerns is meant to call attention to gaps in the way that national governments or national and international agencies have addressed important questions. It also provides clues as to the nature and direction of actions that may be taken as part of an Asia-Pacific agenda for bioethics. The particular issues discussed have been selected on the basis of their bearing on the regional scene and the persistence with which they have left their mark on the consciousness of Asia-Pacific peoples.

To many, bioethics suggests cutting-edge biotechnology and the high-visibility controversies resulting from the failure of old conceptual paradigms to provide easy answers to ethical questions arising from the most recent developments. According to one view, bioethics is a form of technology assessment of modern scientific innovation (Sakamoto, 1999). However, the developments that have had the greatest impact on development and the lives of ordinary people do not necessarily have to do with rapid biotechnological advances. For example, tropical diseases, abortion and HIV/AIDS are concerns that have shaped and influenced the content and development of Asia-Pacific bioethics. Their impact on peoples' rights, interests and quality of life has been so widespread that they have always given rise to a lot of issues that bear also on many other topics and practices.

The Asia-Pacific is, in many ways, a melting pot. It has a mixture of rich and poor countries, fully developed as well as developing ones. The region includes two countries that have vast borders and the two largest populations in the world. At the same time, it covers tiny island countries with either large or small populations. There are countries that are very stable politically and others that have highly volatile governments. Some countries have experienced great difficulties in dealing with the challenges of HIV/AIDS while others have hardly been affected by the pandemic. It is also characteristic of the region that some of its countries have highly variable religious populations and others have a relatively

homogenous religious identity. The rich mix of characterizations accounts also for highly variable perspectives on bioethical issues and concerns.

Many of these perspectives are illustrated in this paper, which seeks to highlight the types of concerns that have captured the Asian imagination in the course of developments in biotechnology, health practices and health care.

Bioethics issues and controversies arise when biotechnology and the practice of medicine and the provision of health care involve conflicts with values held either by professionals and practitioners or by those who are affected in some way – directly or indirectly – by policies and practices in the field. Many of the conflicts have to do with innovative developments in medical biotechnology. For example, nuclear cell transfer cloning and embryonic stem cell research involve the exercise of unprecedented powers that challenge existing paradigms of reproduction and the beginning of life. Thus, they present questions with no ready answers. Other conflicts may not grow out of revolutionary biotechnology, but they also revolve around the exercise of unprecedented powers or the emergence of unprecedented forces.

This paper focuses on the following topics:

- The global threat of diseases and problems involving access to health care;
- Fertility and reproduction;
- Biomedical research;
- HIV/AIDS;
- Organ donation and transplantation;
- Genetically modified organisms; and
- Reproductive cloning and embryonic stem cell research.

The selection represents a complex cluster of bioethical issues that have troubled Asia-Pacific peoples for years. They also illustrate the diversity of responses that have been regionally generated.

In going through the selected topics, a survey of policies and practices in various countries in the region is undertaken. Where it is appropriate, the divergent positions that people have taken with respect to the ethical issues are compared. Hopefully, what emerges is a recognizable profile – though probably vague, ambiguous or even incoherent in places – that can provide the context for a structured bioethical reflection and agenda-setting. The latter exercises are indispensable requirements for meeting the challenges of globalization in medical practice, medical biotechnology and health care in general.

Towards the end, there is a section on the characterization of Asia-Pacific bioethics. The idea in that particular section is merely to present a number of snapshots rather than a holistic and integrated picture. The snapshots are meant to illustrate the

variety of theoretical considerations without having to impose a single worldview. After all, the Asia-Pacific is characterized by heterogeneity of cultures and very old traditions, a very broad variety of ethnic groups, a rich mixture of religious beliefs, and quite simply, a lot of difference.

## ACCESS TO HEALTH CARE AND THE GLOBAL THREAT OF DISEASES

### *The gap between rich and poor*

In the area of health care, the inequality between the rich and the poor has grown with the emergence of a globalizing world. In many poor Asian countries, access to health care and medicinal products has been very difficult. Bioethics needs to be focused on the allocation of health care resources and its impact on the rights of many people to basic human needs. Moreover, governments as well as researchers must face up to the responsibility to ensure that science and technology are put in the service of promoting public health and of equalizing access to healthcare and medicines.

One concrete indicator of the rich-poor gap in healthcare is the variation in life expectancies between countries. While life expectancies in the developed countries are in the 75-80 year range, in the least developed countries they are only around 40-50 years. People living in developing countries tend to have significantly higher rates of mortality and morbidity compared to people living in developed countries. Furthermore, countries with low GNP per capita income, especially those with GNP per capita incomes less than US\$1,000 also tend to have lower life expectancies (UNDP, 2001; WHO, 2002). Notwithstanding the substantial improvement in life expectancy in most countries over the last several decades, there have been very few changes in the relative differences in life expectancy among regions and countries, viewed at different levels of economic development (Nuffield Council on Bioethics, 2002).

**Table 1. Expenditures on health other indicators in selected developed and developing countries in Asia**

	<i>Annual health expenditure per capita (Int'l \$)</i>	<i>Health expenditure as % GNP</i>	<i>Life expectancy at birth Male/female</i>	<i>Doctors/10<sup>5</sup> popn</i>	<i>Nurses/10<sup>5</sup> popn</i>
Japan	1 759	7.1	77.6/84.3	193.2	744.9
Afghanistan	89	3.2	45.3/47.2	11.0	18.0
India	84	5.2	59.6/61.2	48.0	45.0
Sri Lanka	77	3.0	65.8/73.4	36.5	102.7

WHO statistics (1999) show that low- and middle-income countries account for 85% of the world's population, but bear 92% of the global disease burden. This kind of correlation is not likely to change in the near future. Instead, the gap is seen to be growing wider. Rare exceptions are certain countries or regions – among them Sri Lanka and some states in India – that have achieved improvements in health disproportionate to the development of their economy (Nuffield Council on Bioethics, 2002).

Developing nations suffer a much greater disease burden than developed nations. Similarly, poor and marginalized groups within countries have to deal with a disproportionately heavier burden of disease, ill health, and mortality. Looking at 47 countries, the life expectancy at birth and at five years of age was estimated to be 4.3-4.8 times higher for the poor compared to those living above the poverty level (WHO, 2002).

The rich-poor gap is also shown in variations in resources available for healthcare in various countries. Developing countries account for eighty percent (80%) of the world's population. In those countries, healthcare and related research are limited by (a) meager financial resources, (b) inadequate human resources, and (c) by the lack of infrastructure for delivery (Nuffield Council on Bioethics Report, 2002).

The amount of resources that different countries are willing to spend for healthcare also varies widely. Vastly different is the United States, which makes available 50% of the annual global expenditure on healthcare for approximately 5% of the world's population. Obviously, developing countries are able to devote a smaller proportion of their GNP to health than developed countries. One can see that the resources put at the service of the poor are substantially less in developing than in developed countries as we look at the number of physicians and nurses per 100,000 members of the population. The number of physicians ranges from over 100 in more developed countries to less than 10 physicians in the least developed countries, as seen in Table 1 (Nuffield Council on Bioethics, 2002).

The health of a population is highly dependent also on the amount of investment in other important determinants such as: education, nutrition, sanitation and communications infrastructure (Nuffield Council on Bioethics, 2002). Many areas in developing countries do not have a safe water supply. They also do not have an effective network of health centres to provide primary health care. When vaccines or drugs are available by foreign sources, many developing countries lack the health care delivery infrastructure to ensure that these health necessities are distributed among their communities (WHO, 2002). Also lacking are the means to develop a sustainable system of health care delivery. Moreover, government priorities get in the way of infrastructure development, as political leaders divert available resources to other sectors (Nuffield Council on Bioethics, 2002).

On the whole, the poorer countries have less know-how and fewer resources for healthcare. They also are less empowered on related matters. The poorer the country, the less it spends to protect and promote the health of its population (Global Forum for Health Research, 2002).

Proper health care access and equity can successfully be pursued only within the context of broader economic issues. In developing countries, the application of research and technology must go hand in hand with developmental efforts to support education, advance the status of women, and promote awareness of the need to provide health care to the poor part of the population (WHO, 2002).

As poverty gives rise to poor health, so does poor health increase poverty. Poverty diminishes the level of economic productivity and fuels the cycle of malnutrition, disease, unemployment or underemployment, low income, poor housing, low level of education, low productivity, lack of clean drinking water, minimal access to health care services, more children, unwanted pregnancies, and substance abuse. In addition, the poor are more vulnerable to discrimination and the degradation of the environment (Global Forum for Health Research, 2002).

According to some estimates, low-income countries must spend a minimum of US\$30-40 per person per year to cover essential health interventions. In comparison, the estimated present level of spending is US\$11 per person per year in the least developed and US\$25 per person per year in the low-income countries). If there is no massive infusion of additional resources, the level of health in these countries will continue to deteriorate in the coming years (Global Forum for Health Research, 2002).

In the absence of a clear foundation for further progress in the health field, development in general is being threatened: “Without progress in health and development, there will be no global security, and industrialized countries will in turn be confronted with all the negative consequences of preventable man-made disasters” (Global Forum for Health Research, 2002; Fust 2001).

The magnitude of the problems confronting Asian societies is truly immense. Their impact on people’s lives is great and many Asians have had to live with a sense of surrender and desperation. The situation has also proven to be enduring, making it a moral necessity that governments and international agencies take bold steps to minimize the prevailing injustices and ensure that poor people are not left at the mercy of the market forces that seem to have determined their fate even with respect to health care. Urgent initiatives guided by the ethical imperatives of justice, solidarity and beneficence need to be undertaken:

“Although health is widely understood to be both a central goal and an important outcome of development, the importance of investing in health to promote economic development and poverty reduction has been much less appreciated. We have found that extending the

coverage of crucial health services, including a relatively small number of specific interventions, to the world's poor could save millions of lives each year, reduce poverty, spur economic development, and promote global security. This report offers a new strategy for investing in health for economic development, especially in the world's poorest countries."

"Such an effort would require two important initiatives: a significant scaling up of the resources currently spent in the health sector by poor countries and donors alike; and tackling the non-financial obstacles that have limited the capacity of poor countries to deliver health services. We believe that the additional investments in health – requiring of donors roughly one-tenth of one percent of their national income – would be repaid many times over in millions of lives saved each year, enhanced economic development, and strengthened global security" (Global Forum for Health Research, 2002).

### ***Intellectual Property Rights and the Public Interest***

The problems posed by killer diseases pose a special challenge for poor Asian countries. A number of initiatives conceived in response to this challenge hold promise although they tend to be controversial – the infringement of drug patents in emergencies, the purchase of cheap counterparts of locally manufactured drugs and medical supplies from countries with permissive patent laws, or the licensing of local generic manufactured to make drugs more cheaply. Bioethical reflection should take these quandaries into account in the hope of providing urgent remedies to basic human concerns.

Some of the monopolies arising from patents awarded on novel chemicals have constituted a threat to public interest. This unsatisfactory consequence has far reaching implications for the health of peoples in developing countries. It has tended to weaken the contribution of the global research community to the creation and application of medical technology for these countries. In the long-term, it may jeopardize the grant of concessional prices for therapeutic agents (WHO, 2002).

The desperate nature of the situation is captured in this account:

Some of the reasons people die from diseases like AIDS, tuberculosis, sleeping sickness and other tropical diseases is that life-saving essential medicines are either too expensive because of patent protection or are not available because they are not seen as financially viable ("Orbinski, as quoted in Medicines Plea," 1999).

The Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement (1994), establishes standards for intellectual property that WTO member countries have to abide by within specified deadlines. It permits countries to license the

production of cheaper copies of patented drugs where this is necessary on public health grounds (WHO, 2002).

The prevailing agreement includes a clause permitting compulsory licensing of drugs. This enables developing countries to produce drugs locally if they are otherwise available only in insufficient quantities or at excessively high prices. But these countries often come under strong pressure from prosperous nations not to invoke compulsory licensing. In order to deal properly with these problems it has to be more generally recognized that intellectual property protection is not merely an issue of commerce or trade but an urgent health matter that is a crucial ethical concern for all.

The same issues may be seen to pervade the conduct and outcome of research at a more basic level. Many developing countries in Asia are a rich source of genetic biodiversity, and their populations often have knowledge of how to identify plants and animals that have medicinal or other uses. Notwithstanding their being the suppliers of genetic material, developing countries may end up having to pay high prices for the products that are eventually developed from these materials (WHO, 2002).

It is not just individuals who can lose out when big drug companies carry out their tests:

When industrialized countries do research in a developing country, the developing country can't afford the products of that research. The researchers pull out and the successful products then become available in the Western industrialized countries and the population in the countries where the research was done get nothing. So that's truly a question of justice, and we're beginning to see a movement to rectify that injustice (Macklin, as quoted in *The Bioethics of Drug Research*, 2000).

This also highlights the concern that such practices will endanger both exports and the livelihood of traditional farmers in developing countries. One possible solution that has been proposed to deal with these problems is benefit sharing (WHO, 2002). The concept needs to be thoroughly discussed at the highest levels in order that the details of an acceptable formulation could be spelled out together by rich and poor countries.

### ***Research Development Priorities***

Tropical diseases are a great burden to developing countries in the Asia-Pacific. However, only 1% of almost 1,400 new drugs approved for sale between 1975 and 1999 were developed specifically to combat the menace. These figures underline the predominantly commercial interests driving medical research and the need to consider innovative ways of drawing the attention of researchers to disease conditions affecting the large population of people in the Asia-Pacific Region.

It has been recognized that research is critical in the fight against disease. However, the limited resources available for relevant research cannot support all essential studies. Prioritization is essential; there must be a concerted effort to arrive at acceptable mechanisms for setting global priorities. For the diseases of the poor, this appears to have been a neglected activity (Remme, et al, 2002).

Although many of the urgent health needs of developing countries could be addressed by improved sanitation, adequate nutrition and clean water, the prevalence of diseases such as HIV/AIDS and malaria means that medical research remains a high priority for many of these countries (Nuffield Council on Bioethics, 1999). However, of the current estimated US\$70 billion spent annually on medical research by the global community, at least 90% is spent on the health needs of the richest 10% of the world's population. Only about 10% of health research funding therefore addresses the needs of 90% of the world's population. This was first pointed out by the Commission on Health Research for Development in 1990 and has since come to be known as the "10/90 gap." Since then, many efforts have been undertaken to help correct this serious misallocation of resources, including efforts to develop priority-setting methodologies and to better identify the priorities for health research. Correcting the 10/90 gap constitutes a major contribution to growth, development and the fight against poverty. Correcting the 10/90 gap is possible, but it requires the concerted efforts of many individuals and institutions worldwide (Global Forum for Health Research, 2002).

The concentration of research funding in the developed countries, as well as in the private sector, has severe implications for the determination of research priorities and for access to the products of research. Research priorities in the private sector are driven by market considerations and the profit motive (WHO, 2002).

For drug companies, money is a major issue. As a result, money-driven priorities negatively affect people who suffer most from lack of drugs and medical attention in many poor Asian countries.

Private business does not invest in research for diseases mainly to be found in developing countries, as afflicted populations in such countries do not have the needed purchasing power. Instead, research and development efforts on products aimed at diseases and health problems most prevalent among the populations of the developed countries (WHO, 2002). The pharmaceutical companies are perhaps well within their legal rights to do so. However, the general state of affairs demands more. As the International development secretary Clare Short (2000) puts it, "We live in an area of technical innovation that is bringing huge benefits, but the reality is that most of this effort is targeted at diseases that are only of relevance in the industrialized world."

Some researchers claim that US-based pharmaceutical companies are stopping production of many anti-parasitic drugs because their users, especially those from

developing countries, cannot afford to buy them. The US manufacturer of a drug used to treat schistosomiasis (parasitic disease that damages the liver) has stopped production. Allegedly it was losing money, even though the disease affects over 200 million people worldwide. Many other effective drugs for tropical diseases are no longer manufactured because they were not economically viable. While widely used to combat damage caused by liver flukes, Bithionol, for instance, has not been produced since 1979 (Siddle, 2000).

Public research funding, in theory, could be directed by other considerations, including the need to narrow the developed-developing country gap, as opposed to commercial factors. In practice, public research programmes also tend to be focused on diseases such as cancer and cardiovascular diseases that are priorities in developed countries. The reason lies partly in the fact that public funding, in general, is largely influenced by the concerns of industry on a global scale.

Thus, the research agenda that determines investigational initiatives in Asia appears to depend largely on the markets in the developed countries, rather than on the health needs of the developing world. It has been estimated, for example, that pneumonia, diarrhea, tuberculosis and malaria, which together account for more than 20% of the disease burden of the world, receive less than 1% of the total public and private funds devoted to health research (Global Forum for Health Research, 2000). In 1998, it was also estimated that out of the US\$70 billion global spending on health research, only US\$300 million was directed to vaccines for HIV/AIDS and US\$100 million to malarial research (UNDP, 2001). The situation is characterized by unacceptable inequities considering that India and Thailand, for example, have a very high incidence of these dread diseases. Pertinent ongoing research activities do not address the treatment needs in a proportionate way.

On the whole, the products of research are highly skewed in favour of the markets of the developed countries, to the detriment of developing country populations. For example, of the 1233 new drugs marketed between 1975 and 1999, only 13 were approved specifically for tropical diseases. Of these, six were developed by WHO, the United Nations Development Programme (UNDP) and the UNDP/World Bank/WHO-supported Special Programme for Research and Training in Tropical Diseases – TDR (WHO, 2002).

There is clearly a need for the private sector to recognize a moral responsibility to balance their commercial interests against the health needs of the population in general. After all, while they are directly dependent primarily on rich populations for their profits, their success depends also on the poor developing world in other ways. The commercial interdependence between the developing countries and the private pharmaceutical sector ought to be highlighted so that the latter can be convinced of the need to assume a greater responsibility with respect to research that caters to the interests of the greater part of the world's population.

Infectious diseases account for silent disasters, which often go unrecognized and unreported. They are unlike calamities brought about by hurricanes and earthquakes that attract the media spotlight and trigger the flow of donor dollars. At the same time, while infectious diseases claim the most lives, they are also the most preventable disasters. The World Disasters Report by the International Federation of Red Cross and Crescent Societies (2000) says that most of 1999's 13 million deaths from infectious disease could have been prevented at a cost of US\$5 per person ("Diseases are turning," 2000). From a certain standpoint, the realization of the preventable nature of such disasters puts a great share of the responsibility on those (agencies, governments, and individuals) who are in a position – and especially on those who have the authority – to take effective preventive measures or to do what is necessary to mitigate the effects of such disasters. A lot of these measures can be effective even when all that they involve is the allocation of health care resources in a way that considers an ethical assessment of the competing priorities.

The problem of redirecting global resources into research and development initiatives that address the health priorities of developing countries, and of making drugs and vaccines more accessible to developing country populations that need them, have been addressed in several international fora and reports. While they already constitute part of the primary agenda of several international committees and organizations, a lot more needs to be done in terms of public and private sector partnerships.

Besides public-private partnerships, the World Health Organization has also approached the issue of differential pricing of essential drugs, that is, for companies to charge different prices for drugs in different markets according to their purchasing power (WHO, 2002). Differential pricing mechanisms might not appear viable to pharmaceutical companies, especially because drugs meant for one market can easily find their way to others. Initiatives of this sort, therefore, can benefit from the prodding and intervention of international agencies that are big and powerful enough to be able to influence the decision-making of the private pharmaceutical sector. Perhaps, this should form part of the agenda for Asian bioethical reflection.

### *The Growing Global Threat of Diseases*

The world is facing a new wave of highly infectious diseases for which a direct cure is currently unavailable. Diseases that were once under control and almost unheard of are re-emerging, and are now posing a growing global threat. The importance of educating the public, and of being truthful to them, must be stressed. Moreover, the ethical issues pertaining to human interaction with the environment must come under closer scrutiny.

Access to affordable airfare has made traveling easier for a lot of people. However, some precautionary measures should be taken before going places. Chances are high that travelers could be infected by some communicable disease and end up bringing that infection back to their home countries, thus triggering a local epidemic (“Why Tropical Diseases,” 2002). This is what the region has experienced with respect to the most recent epidemic that has affected more than a dozen countries – Severe Acute Respiratory Syndrome (SARS).

Some of humankind’s rare diseases may have emerged from the forests of Africa where they have been sheltered for thousands of years by species that would previously not have come into contact with humans. However, these remote areas are increasingly being exploited by industries, thus increasing the risk that humans will be exposed to new types of diseases. Some experts are convinced that HIV is a prime example of this (“Why Tropical Diseases,” 2002).

Industrial activity is partly responsible also for the phenomenon of global warming that is another factor in increasing the threat of tropical diseases. In general, we have to be concerned about the link between environmental and disease factors. Thus, we have to be mindful also of the inevitable interconnection between environmental ethics and bioethics.

The impact of new technologies on human health may also have an unforeseen vital role to play. Legionnaires’ disease, which thrives in air conditioning systems, is one good example (“Why Tropical Diseases,” 2002).

Changes in human behaviour have also contributed to the worsening situation, in the same way that recent increases in the levels of sexually transmitted diseases, including HIV, have been directly attributed to changes in sexual behaviour. Many people have ignored the advice to use barrier contraception methods when having sexual intercourse, thus contributing to the transmission of these diseases.

The emergence of more virulent strains of bacteria and viruses has prevented the eradication of some diseases. For example, while the incidence of malaria has been largely contained, the majority of cases currently encountered involve the more lethal form of the disease. Furthermore, many bacterial organisms have a tremendous capacity for evolving into new forms that develop a growing resistance or immunity to current treatments. Increased antibiotic resistance has been observed in malarial research. Over-use of antibiotics in other areas, particularly in agriculture, has exacerbated this problem (“Why Tropical Diseases,” 2002).

While environmental ethics and biomedical ethics appear to be separate fields of specialization and investigation, the inevitable connections between environmental factors and biomedical conditions should convince us of the need to put environmental considerations high in the agenda for bioethical reflection in the Asia-Pacific Region.

### *Severe Acute Respiratory Syndrome (SARS)*

Severe Acute Respiratory Syndrome (SARS) is a potentially fatal new respiratory disease only recently recognized by scientists. Although the experience with the deadly virus has not been limited to Asia, its impact on the region has been extremely pronounced. The lessons that we have learned – and have yet to learn – from the deadly encounter have very important implications for Asian bioethics. They are also illustrative of bioethical issues that have arisen in other types of biomedical situations.

Researchers suspect that SARS is either a recently mutated strain of an animal coronavirus, or a more virulent form of one of the human coronaviruses. According to WHO, as of 10 May 2003, there were 7,296 known cases, 526 deaths and 3,087 recovered patients from the new disease (“Cumulative Number,” 2003).

SARS is said to have originated in Guangdong province of southern China, a major manufacturing and export region. In the textile town of Foshan, villagers practice traditional and efficient farming techniques; but these same techniques also make the area vulnerable to the emergence of diseases. Chickens, pigs, and other animals are farmed together and live close to people, providing ideal opportunities for lethal strains of viruses and bacteria to breed and jump between species (Horstman, 2003).

In November 2002, an atypical pneumonia swept through Guangdong. A few months later, nearly 2,800 people were infected in 19 countries across Asia, Europe and North America. Most of the deaths took place in China, but, initially, Chinese officials suppressed news of the outbreak (Horstman, 2003).

In contrast with that of AIDS, the onset of SARS came at a time of openness and, with the Internet, sharing of information. It took years to discover the causative agent of AIDS, while it only took months to uncover the “bug” for SARS. Many scientists and health care professionals in North America, Asia and Europe exchanged relevant information on the disease, thereby facilitating efficient epidemiological profiling and analysis.

However, the tight-lip approach of the Chinese government also contrasted with the openness in the world’s scientific community, the general public and the mass media. WHO personnel charged with the investigation of SARS in different global sites lamented China’s largely poor cooperation and even deliberate muting of information sources.

SARS exposed the lack of preparedness of governments and their health care systems to deal with epidemics. Especially vulnerable are the poor countries in Asia that lack adequate resources. But even rich countries and territories like Canada, Singapore and Hong Kong were stressed by the surge of both actual and suspected cases of SARS. While actual cases have not surpassed previous epidemic records, suspected cases have been more than enough to erode the confidence of

many people in their governments. In an attempt to demonstrate decisiveness and efficiency in containing the disease, some governments resorted to hard-handed approaches that compromised people's basic liberties.

On a number of occasions, people suspected of being infected with – or of having been exposed to – SARS have been held in mandatory quarantine. In the Philippines, an entire village was held in quarantine after one of its members died of the potent virus.

The SARS crisis has also produced its own heroes. Dr. Carlo Urbani, an Italian epidemiologist who headed the World Health Organization's Vietnam office, visited the French Hospital in Hanoi on 26 February 2003, to see a Chinese-American businessman with a strange pneumonia-like illness (Horstman, 2003). Urbani realized the risk he was taking. He realized that he was dealing with something new, and that it was an infectious disease. He identified and named the disease Severe Acute Respiratory Syndrome, and thus provided a warning to the world. But, because he chose to ignore the risks to his own safety, he died on 29 March 2003 as a martyr.

Bioethics is not only about moral villains. It is also about heroes who can be held up to the public as models of commendable and virtuous behaviour. It is partly the task of bioethics in the Asia-Pacific to seek heroes and to understand heroism better.

Faced with more than 150 cases by March 2003, the World Health Organization issued emergency guidelines for travelers and airlines. SARS had gained recognition as a global problem as well as an international bioethics controversy.

After suppressing information about the SARS cases in Guangdong, the Chinese government admitted there were actually thousands of cases of infections (double the number of cases previously reported) and more than 50 deaths, five times the reported number (Horstman, 2003). Now we know that that initial policy had negative consequences for the management of the disease. As the Far Eastern Economic Review reports:

The Chinese government's rigid control of information and its strict bureaucracy have hindered efforts to halt the deadly disease that seems to have originated in southern China and is threatening public health around the world and hurting economies across Asia.

Since the new and deadly pneumonia known as Severe Acute Respiratory Syndrome (SARS) first began to shake public confidence in early January, Chinese authorities have consistently sought to play down the numbers of people infected and its geographical range within China. Media coverage has been tightly controlled and doctors told not to speak to foreign or domestic reporters. The authorities

have repeatedly declared that the disease is under control, even as the number of cases continued to rise....

Access and openness are crucial if the disease is to be controlled and if future, more dangerous outbreaks are to be prevented, health experts say. One fear among experts is that Beijing's tendency to conceal bad news could have far more serious consequences if another lethal strain of influenza virus was to emerge from southern China (Lague, et al, 2003, p. 13).

Chinese authorities later apologized for 'poor coordination' and agreed to cooperate with the WHO to create a disease warning system for the public (Horstman, 2003).

In the course of the crisis, the World Health Organization (WHO) suggested that essential travel to Guangdong and Hong Kong be deferred. It advised those departing Guangdong, Hong Kong, Vietnam, Singapore and Toronto be screened for SARS and – if found to have symptoms – to see a doctor or consider deferring their trip. But it actually was not in a position to impose travel restrictions. On the contrary, the WHO declared that trade and tourism into the affected areas shouldn't be affected: "The purpose of the WHO's global alert is to heighten the awareness of travelers, health authorities and physicians, not to restrict travel" (Lavelle, 2003).

Nevertheless, the WHO's pronouncements were taken seriously by individuals and governments. Although some countries protested the bulletins that tended to have negative effects on their trade and tourism, the international community, by and large, supported the leadership role that the UN agency played. This fact must not be overlooked as we reflect on a bioethics agenda for Asia. Many poor nations are unable to assert their will on their own. Being poor and without much economic clout, they are hardly in a position to bargain with pharmaceutical giants, or even with smaller commercial enterprises. When they find themselves having to negotiate – e.g. for access to the products of biomedical research conducted in their communities – these countries find themselves helpless. Given the SARS experience, the WHO has indicated that it is willing to play the role of big brother. Provided that the agency is careful not to exceed its boundaries, it can play a meaningful part alongside the world's poor when they need an ally to assert their rights and welfare.

### *Tropical Diseases*

Many people living in the tropics suffer from poor nutrition, poor living conditions, poor environment, and from the poor health that such conditions bring. They, therefore, suffer most of the diseases that affect mankind throughout the world. But on top of this burden, they must endure the heavy consequences of diseases specific to their region: tropical diseases. These diseases cause tremendous pain and suffering, from deformities to blindness, brain damage and death.

The perception is still prevalent that tropical diseases are diseases of the rural poor. While it is still true that they mainly afflict the poor, they have also become diseases of development. They have become closely associated with the people's need to earn income, even in rich countries. The diseases have become "the diseases of the new frontier," the diseases which rob people of their hope (TDR, 1990).

As a consequence of globalization tropical diseases are no longer confined to the tropics. Tourism, trade, and immigration have brought cases of the diseases into the industrialized world, where health systems are not used to diagnosing them. Diagnoses often come too late, and case fatalities are unacceptably high. This development illustrates the need for the international community – both public and private sectors – to view tropical diseases as matters of universal concern having a more extensive economic and developmental impact, thus providing an incentive for pharmaceutical companies to engage in pertinent research.

Almost half a billion people still suffer from tropical diseases. Existing tools for treatment and control need to be more widely applied, and new tools need to be developed (TDR, 1990).

These health requirements are urgent imperatives of justice and morality. They should be high in the priorities of policy formulators and decision-makers not only because of the magnitude of their impact, but also because of the persistence with which they have affected the quality of lives of those who have unjustly been deprived access to basic human needs. Much of the inequities that are at the root of these conditions are outside the usual scope of health authorities. This should make it more urgent that they be addressed at a wider scale as ethical concerns requiring the attention of different departments or ministries and at various levels of government.

## **FERTILITY & REPRODUCTION**

### ***Abortion and Contraception***

The poorest communities in many Asian countries have provided the setting for some of the most troubling controversies concerning abortion and contraception. At stake, among other things, are deep-seated values relating to the status of the human embryo, equality between the sexes, and the right of individuals to exercise control over their bodies. Different countries have taken different approaches, but there are common concerns that can profit from broader bioethical reflection that transcends national boundaries.

The United Nations Population Division's *Abortion Policies: A Global Review* (2002) reported that in some Asian countries abortion is generally illegal but may be allowed when the pregnancy poses a risk to the life of the mother. Included are countries in South Central Asia (Afghanistan, Sri Lanka, Maldives), Western Asia (the Islamic Republic of Iran, Lebanon, Nepal, Oman, the Syrian Arab

Republic, the United Arab Emirates, Yemen), and Southeast Asia (Brunei Darussalam, Indonesia, the Lao People's Democratic Republic, Myanmar, the Philippines). The policies that are in place in Asian countries with respect to cases where pregnancy endangers the mother's life illustrate the variety of ethical perspectives that are brought to bear on issues of this sort.

Afghan Law stipulates that abortion is illegal except to save the life of the mother.

In Sri Lanka, the mother's consent is required.

In Maldives, abortion is legal only when performed for the purpose of saving the life of the woman, as well as protecting her physical health. The consent of the woman's spouse is required for abortion.

In the Islamic Republic of Iran, the law expresses a general prohibition against abortion. However, there are sections that exempt persons who performed an abortion from criminal punishment if they did so to save the life of another person. This can be presumed to allow abortion for the purpose of saving the life of a pregnant woman.

Lebanese Law requires the consent of the woman, and the certification by two physicians in addition to the one from the physician who will administer the abortion.

Nepal used to be part of the 4% of nations of the world where abortion was absolutely illegal, even if a risk was posed to the life of the mother (Uprety, 1998). Women were forced towards illegal, unsafe abortions, as hospitals in Nepal did not offer the service as a result of the law. The law provided that a woman guilty of abortion was to be put in jail, and possibly even have her property confiscated. The law stated that if a woman killed her rapist, she could be given immunity, but if she terminated the pregnancy that resulted from the same attack, she would be imprisoned (Uprety, 1998). Often forced to turn to illegal abortions were women pregnant from adulterous relationships, widows who became pregnant, and single pregnant women, all of whom were shamed in Nepalese society (Upadhaya, 1998). About four thousand Nepali women die each year from illegal abortions (Uprety, 1998). Nepal liberalized its abortion laws only in September 2002 (International Sexual & Reproductive Rights Coalition, 2002), giving way to safe abortion when a pregnancy endangered the mother's life. The reform in abortion law in Nepal allows women access to safer methods of abortion (Uprety, 1998).

In Syria, the written consent of the woman and her spouse is required, along with an authorization for the abortion issued by two physicians.

In the United Arab Emirates, the written consent of the woman's spouse or guardian is required, along with the approval of the physician who declared the abortion necessary.

In Indonesia, the consent of the mother, her spouse or her family for the termination of the pregnancy is required and the abortion must be performed in an approved medical facility by a skilled health worker with the guidance of an expert team. Like Bangladesh, Indonesian authorities do permit menstrual regulation (Goodenough, 2002).

A special approval from the Ministry of Health is required in the Lao People's Democratic Republic.

Abortion in Myanmar is illegal, but a significant number of abortions apparently have been performed. Because the country experienced rising abortion rates and high maternal mortality in the 1990s, health officials have attempted to persuade the Government to introduce a more liberal policy with regard to contraception.

The Philippine Penal Code does not list specific exceptions to the general prohibition on abortion, but under the general criminal law principles of necessity of the same Code (article 11.4) an abortion may be legally performed to save the pregnant woman's life.

Some countries take on considerations other than endangering the life of a pregnant woman in making decisions to allow abortion.

In Iraq, abortion is allowed not only to save the life of the mother, but also in cases where fetal impairment is detected. A legal abortion may be obtained upon approval by two physicians and consent from the woman's spouse.

In Cyprus, Israel and New Zealand, pregnancy may be terminated legally to save the mother's life, preserve her physical or mental health, in cases of rape or incest, or in cases of fetal impairment.

Laws in Cyprus require the approval of two physicians except in cases of rape, where police certification, supported by medical certificates, is required for an abortion, which can be performed by a registered medical practitioner.

In Israel, abortion requires the approval of a committee composed of physicians and a health worker and the written consent of the woman. It can only be performed by a physician in a recognized medical facility.

In Kuwait, the consent of both the woman and her husband are required for an abortion, which may only push through upon approval by a medical committee.

In Qatar, medical specialists are required to recommend the procedure, and the consent of the woman and her husband are needed.

In both Kuwait and Qatar, an abortion performed for reasons of saving the mother's life, preserving her physical or mental health, or detection of abnormalities in the fetus is allowed.

In Jordan, Malaysia, and Pakistan, an abortion is deemed legal when it is done to save the life of the mother, or to preserve the physical or mental health of the woman.

Additionally, a legal abortion in Jordan needs to be approved by two licensed physicians and be performed in a licensed facility upon the approval of the woman.

In Japan, abortion is permitted in cases where it will save the life or preserve the physical health of the woman, in cases of rape or incest, or for social or economic reasons. Induced abortions are permitted within the first 24 weeks of pregnancy. The consent of the woman or her spouse is needed, except in cases of rape where abortion may be performed without the consent of the woman.

Bangladesh requires that abortions be performed in a hospital by a qualified physician, upon the approval of two other physicians. However, menstrual regulation, which is effectively an early abortion without confirmation of the pregnancy, may be performed within 2 months of the last menstrual period (Patrick Goodenough, 2002).

In India, although abortion is not given on request, any of the following reasons would be accepted: saving the mother's life, preserving the physical or mental health of the mother, rape or incest, fetal impairment, or economic or social reasons. An abortion is legal if performed within the first 20 weeks of pregnancy by a registered physician in a government hospital. When the pregnancy is between 12 and 20 weeks, a second opinion is required. The consent of the woman is required before the abortion, while a written consent from a guardian is required in cases where the woman is a minor or is mentally retarded. The Indian situation, however, shows that legalization of abortion does not necessarily mean it is made more accessible (Upriety, 1998).

In Thailand, abortions are legally done to save the mother's life, preserve her physical or mental health, or in rape or incest cases. Only a physician may perform such abortions.

Malaysia only allows an abortion within the first 120 days of pregnancy, upon consent of the woman and by a third-party medical professional.

Other countries appear to give added importance to a pregnant woman's choice. The United Nations Population Division has reported that in some countries in South Central Asia (the Russian Federation, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan), Western Asia (Armenia, Azerbaijan, Bahrain, Turkey), Eastern Asia (China, the Democratic People's Republic of Korea, the Republic of Korea, Mongolia,) South Eastern Asia (Cambodia, Vietnam), and Australia, abortion is generally legal and provided upon request.

The laws in the former Soviet States, namely Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, the Russian Federation, Tajikistan, Turkmenistan, and Uzbekistan,

require the consent of the woman, and that abortions be performed by a licensed physician in a recognized medical institution. An abortion may be granted upon request in the first 12 weeks of pregnancy, after which induced abortion is made available within 7 months from conception on judicial, genetic, vital, medical, social or personal reasons if granted by a committee of physicians.

Information regarding the abortion law in Bhutan is not clear, although, as the state religion is Buddhism, the assumption is that abortion would only be permitted in cases where it would save the life of the mother.

Only a licensed physician may perform an abortion in Bahrain, upon authorization by a panel of physicians.

In Turkey, abortion is available upon request only in the first 10 weeks of pregnancy, after which, abortion is only permitted to save the life or health of the mother, or in cases of fetal impairment. The consent of the pregnant woman, or her parent or guardian in cases where she is a minor or mentally retarded, and her spouse if she is married.

In China, a woman is granted 14 days of paid sick leave for abortions initiated in the first trimester, or 30 days if initiated beyond the first trimester (US Committee for Refugees, 1999). Medical personnel carry out abortions in clinics through vacuum aspiration. Easy access to a supposedly prescription abortion pill, RU-486, has been reported in China and Taiwan, leading to an increase in abortion among single Chinese women (Pro-life Infonet, 2000). The drug works by causing the fetus to starve to death in the womb, and is often followed by a second drug, Misoprostol, which will cause the miscarriage of the unborn fetus (French Associated Press, 2000).

In Mongolia, approval of the family or of the spouse is required, and an abortion may only be performed beyond the first three months of pregnancy if the woman incurs an illness that poses a serious threat to her life.

The Republic of Korea requires the consent of the woman and her spouse, if she is married, and the abortion is to be performed by a physician within the first 7 months of pregnancy.

In Cambodia, only medical doctors, assistants, or secondary midwives are allowed to perform the abortions in medical health centres authorized by the Ministry of Health.

In Vietnam, the abortion needs to be performed by a physician, thus giving the practice a stamp of legitimacy.

In all territories of Australia, the woman's consent is required, as well as the consent of two physicians in some regions.

In New Zealand, pregnancy must be terminated by a physician in a licensed facility, but a pregnancy beyond 12 weeks must be performed in a facility with a “full license.”

In these Asian countries therefore, and within countries characterized by the existence of different religions or faiths, one may observe differing stands on the relative morality of abortion. These views often stem from differing beliefs regarding life, the status of the fetus, and the rights of women.

Buddhists believe in reincarnation. They also hold the view that one’s destiny in the next life is based on the good and bad he has done in this life, basically karma. Thus, certain rituals must be done by a woman who has had an abortion in order to counter the bad karma of the killing.

Like Buddhists, Hindus believe in reincarnation, and also in non-violence, which goes against the killing performed in an abortion. However, medically therapeutic abortions are acceptable.

The Muslim faith permits abortion, although it must be noted that an abortion in early stages of pregnancy is considered less serious than that done in later stages. Islam, though only one of the many religions observed in the Middle East, is the guiding principle in many constitutions of countries in the region.

In Judaism, the life of the mother is valued over the potential life of the fetus. Some believe the unborn fetus to have a status similar to that of a person while others believe it to become a person only after the forehead emerges. Therapeutic abortions are obligatory when the woman’s life is in danger.

Sikhism, based mainly in India, encourages abortion as long as it is medically safe. The fetus is not given the status of a human person.

The Roman Catholic faith holds very conservative views on abortion. The Church basically holds firm that abortion, or contraception for that matter, for any reason, is evil. At the individual level, the debate between pro-life and pro-choice is a continuing one among Catholics. The Catholic Church’s stand against contraception and abortion has had great influence on Philippine society and government.

Although the Jehovah’s Witnesses believe that the Creator considers it a sin to conceive a life that one has no capacity to care for, they consider it a much graver sin to have an abortion.

In Indonesia, Muslim, Christian, Hindu, Buddhist and other religious leaders have worked together to oppose plans to amend the Health Law. The proposed amendments are inclined to more liberal abortion regulations (CNNNews, 2003).

Contraception is generally held to be more acceptable than abortion, although some groups may equally resist it, especially if it is done using artificial as opposed to “natural” means. Opposition to artificial contraception in the Philippines by the Catholic Church is one good example.

It is commonly held that abortion should not be used as a method of birth control. However, many countries that prohibit abortion have also not made safer forms of contraception widely available and affordable. This has been thought to be the reason why women have opted for unsafe, illegal abortions that put them at the mercy of untrained and unscrupulous operators of underground facilities.

Ironically, in countries where there are legal avenues for abortion (India, for example) the incidence of illegal abortions remains high. It appears then that legalization has not ensured the accessibility of abortions. In the countries where abortion has been legalized, governments must do more to ensure that women truly have ready access to safe abortions and that any risks to them in this regard are minimized.

There are strongly held values and beliefs that tend to come into conflict in policy deliberations pertaining to contraception and abortion. Among the factors that come into play are the promotion of the public good and welfare through the effective management of population growth in light of limited resources; respect for beliefs and traditions that are often founded on faith and religion; and respect for the right of women to exercise control over their bodies and to determine the risks that they are willing to take.

Beliefs and traditions can be understood as ways to promote individual, as well as collective good, and can be harmonized with the intentions behind legislation. Such harmonization requires an open and broad dialogue between proponents of varying positions rather than a contest in the political arena to establish the superiority of one’s way of thinking to that of others. Open dialogue ought to be characterized by ethical reflection that seeks both to clarify values and help identify common concerns. Dialogue and reflection among peoples within a nation and from different nations can pave the way to common ground that can eventually lead to consensus and agreement. Complete agreement may not be readily attainable, but promoting mutual understanding can open opportunities for cooperation and refocus energies to activities that really promote the good for the needy populations in Asia. In this manner, it could be possible to harmonize the concern for the life of the unborn with population management initiatives. Bioethical reflection could promote a more holistic perspective that does not get bogged down in the common tensions of advocates who are so single-minded in their approach that they refuse to accept the pluralistic character of the current global setting.

## *Sex Selection*

The practice of sex selection carries great importance in a region that includes the two most populous countries in the whole world. The implications for sexual equality are deeply disturbing, and the consequences for gender balance require urgent attention.

We are well aware of the policy in many countries to try to slow down population growth in order to remove what many consider to be a hindrance to socio-economic development. However, the mandatory control of family size has given rise to gender preferences that, more often than not, have been manifested in a desire to have male children. This may be observed in Confucian societies, such as Japan, China, and the Republic of Korea, as well as in India Bangladesh, India, Pakistan and Vietnam. Sex selection usually stems from the cultural climate and societal pressure of the nation, rather than the individual mindsets of the parents themselves (Ruffolo & Wongboonsin, 1995).

The ability to determine the sex of an individual before birth has been abused as a tool for the pre-selection of children by gender while still in the womb. This preference for children of a certain gender, usually male, will lead to sex discrimination, sex-selective abortions, female infanticide, deterioration of the quality of life for females, and may even have effects on the future fertility and gender balance of the nation (Ruffolo & Wongboonsin, 1995).

In India, it is the tradition of dowry that is said to be the culprit behind gender bias against females (China Daily, 2001). In the event of marriage, a bride's parents are expected to offer dowry in the form of money, property, or goods, to the groom's family. In effect, this is a price tag that is placed on a female's head from birth. The use of ultrasound technology to identify a baby's gender before birth has given parents a choice: to pay a thousand rupees today for the sex determination of their baby, or pay hundreds of thousands more come a daughter's wedding day. This practice in India has led to the decline in the number of female babies, thanks to sex selective abortions and even female infanticide. Laws prohibiting the dowry tradition that have been enacted have failed to stop the tradition, which is deeply rooted in Indian culture (Rajan, n.d.).

In 1973, the Chinese government started to implement a one-child policy. Since then, each family has been limited to only one child and fines have been imposed on violators. This policy has been associated with the rise in the practice of sex-selective abortion in the country.

With the onset of the one-child policy, sex-selective abortions and female infanticide have become rampant, as the elderly are expected to turn to their sons for economic support. The one-child policy is blamed for encouraging sex-selective abortions and female infanticide. Some baby girls are abandoned at orphanages and churches (Pro-life Infonet, n.d.).

China has one of the most liberal abortion policies in the world. Abortion is not only allowed, but is forced upon mothers who have violated the one-child policy. Women in China can also be forced to undergo sterilization, to make sure they can no longer go beyond the one-child rule. Other women are known to go into hiding to bear second children secretly. Midwives caught helping bear second children secretly have had their licenses cancelled. Exemptions to the one-child policy are given in cases where a man remarries, or when a first child is handicapped. Second children born without permission of the government cannot be registered, and thus do not legally exist. He or she has no access to education, and may have more difficulty when marrying or relocating. Mandating that women of childbearing age visit a family-planning inspection centre thrice a year, further reinforces the one-child policy (Thomas, n.d.) If a woman who is already recorded to have one child is found pregnant again, she is forced to undergo an abortion. Some women caught in their eighth or ninth months, the child already fully formed, are still forced to undergo abortions (US Committee on Refugees, 1999).

In 1988, the Vietnamese government declared a two-child policy, which imposes fines on births beyond the second. Although this move was made to help control population growth in Vietnam, the country does not have plans to instill a more drastic plan, like the one-child policy of China. Still, some accounts of the situation in Vietnam have been very highly critical, claiming that abortion has been elevated to a form of fertility regulation. Vietnam's abortion rate is the highest in Asia, 2.5 per woman (Pro-life Infonet, n.d.).

Other accounts are more sympathetic, while acknowledging that male babies are prized by Vietnamese family tradition. Abortions are reported to be less generally used if an ultrasound shows an unborn child to be female. Families instead continue to try for a male child if a first child turns out to be female, often even trying further for more than one male child in the family, to ensure continuance in the family line.

In some countries, legal avenues have been tried in order to control sex-discriminatory abortion practices. However, laws against sex-selective abortions can slow the problem down only temporarily. It is the attitudes and beliefs encouraged by the cultural setting that must be changed in order to wipe the problem out altogether (Ruffolo & Wongboonsin, 1995). Efforts must be accelerated to raise awareness of the issues and empower women to make independent reproductive health decisions.

Sex selection is only one of the factors that give rise to the phenomenon of "missing women." In Europe and North America, women tend to outnumber men. In UK, France and the US, for instance, the ratio of women to men exceeds 1.05. The situation is different in Asia where female-male ration can be as low as 0.94 (Bangladesh, China, West Asia), 0.93 (India), or even 0.90 (Pakistan). This has happened even if more boys than girls are being born everywhere (about 5 percent more) and female fetuses have a higher survival rate than male fetuses (Sen, 2000).

By Amartya Sen's calculations, the number of missing women could range from 29 million to more than 50 million in China alone. For India, the estimate is 23 million (Sen, 2000). There is a need to try to understand the social factors that could account for the fact that women have been missing – not only in the sense of numbers but also in the sense of having been left out in the distribution of health care and other necessities.

## **BIOMEDICAL RESEARCH**

### ***International research in resource poor communities***

Resource poor countries require a lot of attention from the medical research establishment in order to sustain the quest for treatments and remedies for diseases and other health-threatening conditions. However, the collaboration between rich countries and well-endowed agencies, on the one-hand, and economically constrained research communities, on the other, requires a careful assessment of responsibilities and options for researchers and research subjects alike.

A recent involvement of Harvard University researchers in China is illustrative of the acuteness of this issue. In December 2000, the Washington Post published a highly critical investigative report about the pervasive financial conflicts of interest that were undermining the safety of subjects in the University's researches in China. Dr. Xiping Xu, an associate professor of occupational epidemiology spearheaded studies conducted to seek genetic and environmental causes for ailments that included asthma, obesity, miscarriage, and schizophrenia. Funds for these researches came from Pharmaceutical companies such as Millennium (for asthma research), Astra AB (for genetic research into respiratory disease), and Hoffmann-LaRoche (for obesity and diabetes research).

In March 2002, after two years of investigation, the Office for Human Research Protection (OHRP) under the US Department of Health and Human Services Office of Public Health and Science announced that 15 Harvard-affiliated genetic studies on diseases were faulty because the rights of thousands of Chinese farmer-participants were ignored and violated by the American researchers (*People Daily*, April 5, 2002, *Research by Harvard University in China Suspended*). "OHRP finds that the [hospital ethics board] lacked the background and expertise to review the research because of its apparent failure to consider the cultural conditions, including the social, economic and political status of the subject population" (*Washington Post*, 2002). The options available to the Chinese participants might have well been systematically limited by the nature and conduct of the Harvard research in resource-poor areas in China.

The irregularities mentioned in the reports by the "Human Beings Study and Protection Office" within the Federal Bureau of Investigation included the failure of the researchers to inform the participants of the possible uncomfortable

symptoms that emerged during the test, and the use of a highly complicated language in the contract signed between the researcher and the participants. The contract was so barely comprehensible to Chinese farmers that its use effectively violated the participants' rights to know the facts (*People Daily*, 2002).

Officials at the federal Office for Human Research Protection found that participants risked not being treated for health problems that might be diagnosed in the studies, that they faced job discrimination if medical problems were discovered by the subjects' employers, and that some consent forms were too complex for rural Chinese:

“Impoverished Chinese people were used in genetic experiments that disregarded their human rights to informed consent, and put them at risk of losing their livelihoods by a regime that discriminates against people with a genetic disposition to illness.”

In addition, significant changes to the studies were made without necessary approval.

Subsequently, Harvard President Lawrence Summers, in a speech delivered to Chinese students in Beijing, said the University had since changed the way it handles studies of human illnesses:

We have revised in a drastic way all our procedures for research at the public health school... The interests of individual human beings should never be sacrificed to some concept of abstract scientific inquiry (*Boston Globe*, 2002).

Major players in international research also include big pharmaceutical companies who seek people living in developing countries as subjects. Safety and standard of care for human volunteers are also major issues: “I had not been exploring Big Pharma for more than a couple of days before I was hearing of the frantic recruitment of third world ‘volunteers’ as cheap guinea pigs, observes writer John le Carre (2001). “Their role, though they may not ever know this, is to test drugs, not yet approved for testing in the US, which they themselves will never be able to afford even if the tests turn out reasonably safe” (le Carre, 2001).

In the US, it costs on average \$10,000 per patient to conduct a clinical trial, in Russia \$3,000, and in the poorest parts of the world, much less. This is one of the strong reasons why clinical trials are now a Third World growth industry. In the end, the drugs under trial are for Western markets.

In its May 2000 edition, CenterWatch, a newsletter for the burgeoning clinical trials business, published an exuberant article under the title Latin American Fever in which it said the continent ‘may offer a unique opportunity to reach much larger numbers of study subjects.’ Eli Lilly tested 590 patients, in 1994, across Africa, the Middle East and Central and Eastern Europe. In 2001, the company expected

to run tests in those regions on 7,309 patients. It is not only the human subjects who are at risk. In the rush to market, poorly constructed, weakly monitored trials are releasing untried and untested drugs for consumption (le Carre, 2001).

***Evolving forms of exploitation in research practice***

The contemporary practice of biomedical research on a global scale has given rise to evolving forms of exploitation. Standards of justice and equality tend to be put in question in the face of research practices that often put heavy burdens on poor people and poor communities in poor countries. There is a need to remain vigilant in the prior review of these activities and the monitoring of their implementation in order to ensure that biomedical research is conducted in accordance with universally acceptable standards.

One of the most important requirements for the conduct of research in developing countries is emphasized in the WHO-Council for International Organizations of Medical Sciences' Guidelines for Biomedical Research Involving Human Subjects: to guarantee that those communities where these new drugs have been tested will be given affordable access to the newly developed and approved drugs. Otherwise, one might rightly argue that people in developing countries have yet again been exploited by Western researchers without benefiting from the positive results their risk-taking has yielded (Del Río, Kamarulzaman, & Schüklenk, n.d.).

Ruth Macklin observes that it is not just individuals who can lose out when big drug companies carry out their tests:

When industrialized countries do research in a developing country, the developing country can't afford the products of that research. The researchers pull out and the successful products then become available in the Western industrialized countries and the population in the countries where the research was done get nothing. So that's truly a question of justice, and we're beginning to see a movement to rectify that injustice (2000).

A recent Johns Hopkins University research on a cancer drug in India is illustrative of the complexity of this issue. A study of two experimental cancer drugs was conducted and led by Hopkins biologist Ru Chih Huang, in collaboration with Indian Regional Cancer Centre (RCC) director M. Krishnan Nair. The trials at the RCC in the southern India state of Kerala, involving 26 oral cancer patients, ran from November 1999 to April 2000. Initial reports of patients responding within days to the injections led Huang to conclude that "this is a wonderful drug, and it's not toxic in humans" (*Science*, 2001: 1024).

In July 2001, reports appeared in the Indian news media of complaints by RCC radiobiologist V. Narayaman Bhattathiri that the trial had been improperly conducted. Bhattathiri said that he had alleged that the patients did not give proper

informed consent, did not receive timely standard therapy, and were exposed to a potentially toxic substance. He also challenged the trial after seeing some of the patients. “I asked for details of the study, and they were not given to me,” he says. “Then I complained to the ethical committee: No action. Two months passed, and then I complained to the Human Rights Commission” (*Science*, 2001: 1024). The charges by Bhattathiri that patients in India were being used as “guinea pigs” had prompted the Indian health ministry and Johns Hopkins to launch independent investigations of the trials.

Hopkins appointed a three-member panel of experts “to develop the facts.” The Johns Hopkins faculty committee found that:

- \* The scientist was negligent for failing to submit a proposal for the clinical trial to a Johns Hopkins University Institutional Review Board (IRB). Under university policy and federally mandated procedures, faculty experiments involving human subjects must have prior IRB approval, whether conducted in the United States or abroad.
- \* The trial did not meet Johns Hopkins standards for research with human subjects. For example, the committee found there was inadequate safety testing of the drugs in animals before they were injected into human patients. The committee also said that consent forms used to recruit patients for the study were inadequate.
- \* The scientist carried drugs used in the study to India without either an “investigative new drug” approval from the Food and Drug Administration or explicit FDA export permission.
- \* The scientist, without authority, signed several versions of a document committing the university to collaboration with the RCC.

The committee also found no evidence that any patient had been harmed or that any patient’s conventional treatment was delayed by the clinical trial. However, the report criticized the university’s initial handling of the case. It said that an inquiry should have begun in March 2001, when the university, which had earlier been aware of the 1999-2000 trial, first learned that the scientist had run it without university IRB approval. Assured by the scientist that ethics committee approval had been received in India, the university did not begin an inquiry then, but instead counseled the scientist that all future human studies had to be submitted to a Hopkins IRB (*John Hopkins News Releases*, 2001).

Charges of making “guinea pigs” out of the Indian participants, inadequate safety measures, and dubious ethics review of the research figured in the context of evolving exploitation in research. Even in the context of international research that appears legitimate, new forms of such exploitation could arise.

There are many ways by which researchers can take advantage of people who participate in their investigations. The most obvious ones are those that fail to secure the informed consent of the people who have to undertake the risks involved. However, the single-minded focus on informed consent tends to take attention away from equally atrocious forms of exploitation. For example, people belonging to a community where biomedical research is being conducted can be taken advantage of when the aims of the study are not relevant to their own needs and interests; when the research does not take into account the self-determined priorities (whether medical or otherwise) of the participating community; when the community's own researchers are not given the chance to participate; or when their participation is limited to non-essential roles that open no opportunity for the transfer of technology.

*Upgrading research partnerships.* The wide disparities in resources that are available for biomedical research in developed and developing countries give rise to ethically relevant issues of research prioritisation and collaboration. The international research community has to accelerate the shift to an environment where researchers from developing countries are recognized as full and equal partners in biomedical studies; where the technologies of developed and developing countries are integrated and made widely available; and where the benefits of biomedical research for participant communities can be ensured.

## **HIV/AIDS**

*The Asian Condition.* The prevalence of HIV/AIDS in Asia ranges from high, to moderate, to low. With more than 2.5 billion people, equivalent to more than 60% of the world's population, any regional trends in Asia-Pacific will greatly affect the global Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) pandemic (Monitoring the Aids Pandemic Network, 1997).

The trends of HIV infection in the Asia-Pacific are generally correlated with sex work, the rate of access of commercial sex by men, and the regularity of condom use for both sex worker and client. Groups of female sex workers (FSWs) are also found to contribute to transmission across international borders. Increases in international trade, accompanied by the construction of international highways and bridges have provided routes for the transport of goods between mainland countries. For example, more than 3,000 trucks cross the borders between India and Nepal daily. This crossing of land or sea borders usually involves overnight stays, allowing visits to drinking and gambling establishments, as well as to brothels, providing opportunities for casual sex. HIV surveillance data among FSW, male sexually transmitted disease (STD) patients, and young males in Thailand, Myanmar, Cambodia and Vietnam show sites of high prevalence located around international borders and ports (Monitoring the Aids Pandemic Network, 1997).

It is useful to recall the association of HIV/AIDS prevalence rates with sex workers because this has triggered emotional positions affecting the ethical reflection on

related issues. On the other hand, many people have also come to recognize the helplessness of those who have been afflicted. After all, many dying patients have been the innocent victims of circumstances totally out of their control. It is also worth noting that the primary reason for the success of Thailand's 100% Condom Programme was its strict limitation to promoting the use of condoms in commercial sex, rather than the elimination of commercial sex itself (Hananberg & Rojanapithayakorn, 1996).

The HIV trends among FSWs now threaten even women who have sex only with their husbands. Some people say that in India, for example, men who have sex outside marriage are more socially acceptable compared to women who demand the use of condoms from their husbands who have been exposed to risks of sexually transmitted infections (Seshu & Csete, 2002). In a society where condoms are associated with forbidden sex and STD, women who suggest their use run the risk of insulting their partners, or of being perceived as unfaithful or paranoid. Condoms are also perceived to reduce pleasure and intimacy during sex, as well as hinder any desire to conceive (United Nations Development Fund for Women, 2001). Although still inadequate, surveillance of sexually transmitted infections (STI) other than HIV is important and must be developed (Monitoring the Aids Pandemic Network, 1997).

Thus, there clearly are attitudinal issues that need to be taken into account in any reckoning of the AIDS situation. These attitudinal – as well as other social, economic and political – components of disease control and health care are an integral part of bioethical reflection and require thoughtful consideration in agenda setting.

The spread of HIV among injecting drug users (IDU) is usually restricted to those who share contaminated needles and their sex partners, limited by the existing social isolation and stigma against IDU populations. The widespread availability of amphetamines in Thailand from China and Myanmar, as well as the opium production in China and Afghanistan, has contributed to the HIV infections among IDU populations in these countries. In India, Thailand, Hong Kong, and Laos, attempts to control drug use through legislation of anti-opium laws have led to increases in heroin use (Monitoring the Aids Pandemic Network, 1997).

The countries that have been determined to have a high HIV prevalence in the 15-49-year-old population are those where extensive heterosexual transmission of HIV has occurred. Included are: Cambodia, India, Myanmar, and Thailand, with HIV prevalence of above 1% (World Health Organization, 2001).

In India, with a population of 1 billion, second largest in the world, the HIV epidemic will have a huge impact on global trends of HIV. HIV epidemics in India are primarily focused in a few southern States, with most of India, 21 out of the 31 States, having extremely low rates of HIV infection, 4% of the national AIDS cases reported. Heterosexually transmitted infections dominate in Maharashtra and

Tamil Nadu, while infections among IDUs and their partners are common in Manipur. Based on existing HSS data, high HIV prevalence States include Maharashtra, Tamil Nadu, Karnataka, Andhra Pradesh and Manipur, where prevalence rates were 1% or more in antenatal women. Moderate HIV prevalence States include Gujarat, Goa, Kerala, West Bengal and Nagaland, where HIV prevalence rates were 5% or greater among high HIV-risk behaviour groups, but less than 1% in antenatal women. The rest of the remaining States fall under low HIV prevalence, meaning high HIV-risk behaviour groups maintained a prevalence rate below 5% (World Health Organization, 2001).

Given this background, it is also relevant to study the role that religion and religious authorities have played in relation to HIV/AIDS.

Buddhist monks in Thailand have undergone training on care and support for people living with HIV/AIDS, which includes conducting fund raising projects for people living with HIV/AIDS (PLWHA), caring and providing scholarships for orphans, and similarly caring for older people who had lost family members to AIDS (United Nations Children's Fund, 2001).

Islamic leaders in Indonesia acknowledge that PLWHAs must be granted full rights, receive proper support and treatment, and be allowed access to preventive information. Training of Ulama, religious leaders in Indonesia, has increased awareness about HIV and AIDS and also promoted the role of women, empowering them and encouraging participation in several community issues (United Nations Children's Fund, 2001).

Catholic Bishops in Papua New Guinea have accepted the responsibility to respond to HIV cases in the country. This Catholic mission works to reduce stigma and discrimination against PLWHAs (United Nations Children's Fund, 2001).

In the earlier section on SARS, it was noted that bioethics is as much about moral heroes as it is about villains. The HIV/AIDS pandemic has provided an appropriate context for the cultivation of heroism among various sectors in the Asia-Pacific Region. For example, some religious authorities have risen to the challenge through their advocacy of the rights and welfare of HIV/AIDS patients.

The ethical issues concerning testing, monitoring and surveillance have persisted in many countries. These issues have to do with privacy, confidentiality, discrimination and stigmatization:

“Surveillance of sex workers could place an emphasis on sex workers as the cause of an HIV epidemic”...“surveillance should be accompanied by clear policies on non-discrimination and supportive prevention interventions” (Monitoring the Aids Pandemic Network, 1997).

The possible benefits from HIV testing cannot be denied. It may serve the purpose of (1) screening donors of blood and blood products, tissues, sperm and ova, ensuring safe blood transfusion and organ transplant, (2) anonymous testing to monitor HIV prevalence in a given population at a given time, and, (3) to enable interested individuals to know their serostatus. However, the process is open to abuse and care must be exercised to ensure that public health surveillance activities ensure the confidentiality and privacy of the test subjects involved.

*The use of placebo in research involving infected HIV/AIDS patients.* The varying prevalence rates of HIV/AIDS in Asian countries provide the backdrop for ethically controversial practices. One such practice involves the use of placebo in clinical trials involving HIV/AIDS patients. In clinical experimentation comparing trial drugs to a placebo, HIV/AIDS research subjects are assigned to a placebo arm even if it is possible for them to derive protection from already available medication that can serve as comparator drug in the trial. The practice raises important issues concerning standards of care in general since the patients are asked to participate in medical researches that put them at risk without direct benefits being intended for them.

The controversies have arisen within the context of efforts to find more affordable HIV/AIDS treatment. Researchers have been turning to poor countries as a venue to conduct clinical trials on drugs. Developed countries have access to more effective treatments. They also have stricter regulations regarding trials on human subjects. Amidst criticism, medical experts have had to defend the use of placebo for HIV/AIDS patients in clinical trials. One justification given is that the subjects are not thereby put at a disadvantage because they would not ordinarily have access to anything better considering their, as well as their country's economic situation. As a matter of fact, so the claim goes, the patients are made better off because they are put under the care of specialists in the process and their health status is carefully monitored. Thus, although they do not get the highest standard of care that patients can be given, they are at least offered a kind of attention that is better than that which they can afford or which their government can provide.

On the other hand, critics do not approve of the use of placebos, citing the risk to life in a situation where proven treatments are already available. They argue that experimental treatments should instead be compared with the highest standard of care.

These opposing positions came into play in Asian and African trials of AZT for use in preventing transmission of the HIV virus from mother to child. Half of the women in the trials were given placebo. In a statement shortly after the trials, international experts including researchers, ethicists, and public health and policy experts reached the consensus that there were situations that justified the need for a comparison with a non-antiretroviral or a placebo (Reuters, 1999).

Clinical trials conducted in some countries, including Thailand, aimed to prevent mother-to-child transmission of HIV during the final stages of pregnancy by intervention with a short treatment of AZT. Funded by the US vaccine creator VaxGen, and assisted by the Bangkok Metropolitan Administration, Mahidol University, and the Thai Centre for Disease Control, the first and only large-scale trial of a vaccine was conducted in Thailand. It aimed at protecting against two strains of HIV, Subtype B, prevalent in West and Southeast Asia, and Subtype E, common in Southeast Asia. AidsVax aims to stimulate an antibody response against the virus. Of the 2,500 HIV-negative IDU enrolled in the study, half received seven injections of AidsVax over three years, while the other half were given placebo.

Standards of care vary from country to country and from community to community. It can often happen that the standard of care in the country of the researcher or the sponsor is different from the standard of care in the country where the research is taking place. While existing international guidelines for the conduct of research involving human subjects have something to say about the standard of care that ought to be observed in clinical trials, the research subjects themselves, and the communities to which they belong ought to assert the terms of their participation. Such participation should be compatible not only with their individual interests but also with the traditions and practices that they consider valuable for their respective communities.

The Hippocratic Oath, based on the presumption that both the doctor and the patient are committed to a desire for wellness, states that the doctor acts in the best interest of the patient on the maxim of “do no harm.” The Nuremberg Code extends assumptions so that the relationship between doctor and patient is based on both mutual competence and consent (Boyd & Ratanakul, 2000). The doctor-patient relationship ought to encompass cases where the patients participate as human subjects in clinical trials. On this basis, some critics go on to argue that the use of placebo could not be regarded as an ethical form of treatment.

There is another sense in which these clinical trials conducted on patients in poor nations leave them void of treatment. Due to the limited nature of the trials, the procedures to which the patients consent allow treatment to be taken away once the trials are completed. In the Philippines, the National Ethics Committee felt compelled to reject a proposal from one pharmaceutical company to run a 3-month trial on HIV/AIDS patients. The latter were unreasonably led to believe that their involvement directly offered a chance to be cured even when the protocol would have left them to fend for themselves after their brief period of participation.

AIDS experts say the only effective solution to the rapid spread of the epidemic would be an effective AIDS vaccine. However, because an AIDS vaccine would yield lower profit compared to therapeutic drugs (drugs that treat rather than prevent infection) already in the market in developed countries, private sector investments have not been going in the right direction. The situation is not getting any better

because, according to some observers, even rich developed countries have not done enough.

According to the National Institutes of Health of the United States, almost \$3 billion was allotted to HIV research and development in 1999, most of which went to developing expensive anti-retroviral drugs that already existed. Less than 10% went to the development of preventative measures like vaccines. And even less went to HIV research in Asia. Funds to conduct clinical trials in the region, which consists of a large population of untreated patients, come from developing nations in Asia. Several new therapy and vaccine treatments are under trial in Asia (Bickers & Crispin, 2000).

When conducting clinical efficacy trials for HIV vaccines, however, a new ethical issue arises. If test subjects, thinking that they are protected by a vaccine, develop a false sense of security, thus engaging in activities that increase their risk of getting HIV-infections, it would be very dangerous to offer the trial to them (Boyd & Ratanakul, 2000).

While these ethical controversies have been taking place, new researches of a more productive nature have proceeded in other Asian countries. New findings indicate that, more than antibody response, the body needs help from blood cells called cytotoxic T-cells, which attack and destroy virus-infected cells. Melbourne Professor Ian Ramshaw developed the technique that involves HIV-specific killer T-cells and antibodies simultaneously attacking the virus. Genetic material to trigger these two weapons is spliced onto the DNA of a fowlpox virus to be injected into the body. The technology is licensed to the Australian biotech company Virax. With a US\$13.9 million contract from the US National Institute of Health, trials involving a therapeutic vaccine were to be held in Australia in January 2001, with further trials for a preventive vaccine to be held in Southeast Asia in 2003 (Bickers & Crispin, 2000).

These parallel developments are being cited to serve as a reminder that the ethical controversies have arisen amidst hopeful surroundings. The controversies should not be allowed to lead poor Asian peoples to desperation. These should instead be regarded as a call for more determined efforts not only in the matter of undertaking pertinent clinical research but also in the matter of asserting peoples' capabilities and rights to dictate their own agenda and the manner in which these ought to be pursued, even if this will occasionally involve the putting forward of challenges to the established order.

*Patents and access to HIV/AIDS drugs* The production of generic counterparts of HIV/AIDS drugs by local manufacturers has brought to the fore a seething conflict between the need to protect intellectual property rights and the urgency of putting a stop to the AIDS pandemic. The resolution of this conflict will go a long way in ensuring equitable access to the fruits of biomedical research without undermining incentives that encourage much needed research initiatives.

Infectious diseases claim millions of lives each year, especially in developing countries where there is no access to effective and affordable medicines. Patents on both pharmaceutical products and processes eliminate competition from generic pharmaceutical producers and give monopolies to drug companies over the production and marketing of medicines, allowing them opportunities to maximize profits by selling the drugs at high prices. Patent rights are enforced throughout the world by the stipulations of the World Trade Organization (WTO) Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). The TRIPS Agreement obliges WTO member states to adopt and enforce high standards of intellectual property rights protection for a minimum term of 20 years. As a consequence, patients are denied access to cheaper drug alternatives since no generic equivalent can come into the market until the expiry of the 20-year patent protection TRIPS provides (Third World Network, 2001).

AIDS deaths have decreased dramatically because of the emergence of life-saving medicines. However, the initial successes have been dampened by the huge costs. The standard treatment, a combination of three antiretroviral drugs, is estimated at US\$10,000 to US\$15,000 annually, making it highly inaccessible to people in developing nations, where 95% of the world's HIV patients reside (Third World Network, 2001).

There is much apprehension about giving patents to the original inventors, especially in the field of pharmaceuticals, because once the Intellectual Property Rights are in place, developing countries will have difficulty with their national healthcare systems considering the likely rise in drug prices. One capsule of the AIDS drug AZT, for example, costs US\$0.40 to produce, but costs US\$1.50 to buy, which seems far beyond the need to recover R&D expenses.

Pharmaceutical companies point out that there are so many steps that they have to hurdle before they get the approval of the Food and Drugs Administration (FDA) or equivalent agencies. Considering the fact that approximately only one out of every 4,000 drugs proposed makes it to the market, the high prices at which end products are sold also cover the costs to develop the 3,999 failed drugs. Advocates defend the TRIPS agreement by saying that it is necessary to promote research and development, as well as stimulate innovation (Third World Network, 2001). The claim is that, without the guarantee of intellectual property protection, scientists and researchers will not be sufficiently motivated to try to discover and invent new ways of dealing with diseases and other human problems.

One also has to look at the matter of reverse engineering and its implications for intellectual property conflicts. A number of countries in Asia-Pacific try to discover new processes to manufacture an existing drug. Reverse engineering is only possible in countries where patent laws protect processes and not products. The TRIPS agreement has provided patents the ability to cover both processes and products (Third World Network, 2001). Some countries, however, allow companies

the use of patented products for research without liabilities of infringement. For example, in Japan, companies are allowed to use a patented product as a raw material for their own invention, given that any new discovery cannot be sold until the patent expires (Ziker, 2001).

The TRIPS Agreement contains provisions that could be used to control patent rights and prevent abuse of intellectual property rights and anti-competitive practices. Two of these provisions are the right to grant compulsory licenses, and the option for parallel importation.

Compulsory Licensing authorizes a government to issue a license to a third party allowing it to utilize a patent without needing the consent of the patent holder. The TRIPS Agreement allows issuance of a Compulsory License on the following grounds: in cases of refusal to deal, in situations of national emergency and extreme urgency, to discourage anti-competitive practices, in cases of public non-commercial use, and to facilitate the use of dependent patents. Compulsory Licenses may also be issued when an existing patent fails to work or when a patent does not work sufficiently. Compensation is given to patent holders as remuneration. The system promotes competition and increases drug availability, even as it provides the patent holder compensation amounting to about 7% on all sales of the generic product. However, among countries in this region, only China, India and Korea have national pharmaceutical sectors that are empowered to take advantage of the provisions of compulsory licensing. Other countries do not have enough capability to manufacture patented drugs (Third World Network, 2001).

The relative industrial strength of these countries' pharmaceutical sectors has enabled them to use compulsory licensing as an instrument of distributive justice. Nevertheless, their health care gaps have been too large for this type of remedy to fill.

Parallel importation is the import of products – already available locally – from another country for the purpose of promoting local access. It involves the import and resale of a patented product, without the consent of the patent holder, outside the country where the patent holder put the product on the market. The patent holder is assumed no longer to have rights over the further use, resale or circulation of a product beyond the first sale or distribution of the product. Parallel imports will prevent price discrimination by patent holders on a regional scale. More importantly, they will provide patients access to drugs from countries where the medicines are sold at lower prices, without preventing the patent owner from receiving compensation. On the other hand, the patent holder could then charge a single price worldwide, leading to an increase in price in low-income countries where prices would have otherwise been lower (Third World Network, 2001).

At a meeting of members of the World Trade Organization in 2001, some 50 countries in Asia, Africa and Latin America expressed the view that patent rules governed by TRIPS should not trample upon the right of WTO members to

formulate and implement their own health systems. Their position went against those of Western countries that warned that weakened patent rules would threaten research into new drugs (Cable News Network, 2001).

In Bangkok, chemist Krisana Kraisintu has created one of the world's most affordable AIDS drugs, a combination of stavudine, lamivudine, and nevirapine, three popular AIDS drugs, each of which costs about US\$4 per pill in the United States. The drug combines Glaxo-SmithKline PLC's Epivir, Bristol-Myers Squibb Co.'s Zerit, and Boehringer-Ingelheim GmbH's Viramune into a single drug. These drug companies do not have existing patents for their drugs in Thailand. The combination drug is expected to cut the cost for AIDS drugs to about US\$27.66 a month, or about US\$330 a year, although it is initially intended to be sold only in Thailand.

In India, two generics makers, Cipla Ltd. and Ranbaxy Laboratories Ltd. are selling similar pills, costing US\$350 and US\$338, respectively. Dr. Krisana took four months to develop the product starting January of 2001. She obtained a patent for the drug in May. Officials in Nigeria, Uganda and other countries have expressed their intent to buy the drugs. However, Dr. Krisana has speculated on the possibility of exports initially to neighbouring Southeast Asian countries including Cambodia, Vietnam, Laos and Myanmar (Zimmerman & Frank, 2002).

While there is a tendency on the part of some sectors to view these initiatives merely in terms of trade opportunities and commercial gain, there is greater reason to see them as they truly are – as ethical imperatives brought about by the need to reduce human suffering and improve the quality of life of vast numbers of people. It is a reality of *laissez faire* economics that commercial interests dictate the options and alternatives open to various sectors. Moreover, access to these alternatives is a major ethical concern that ought to be high in the agenda of bioethics in the Asia-Pacific.

The table below illustrates the effect of patents on prices, comparing the US drug prices to the prices of the same drugs produced by generic manufacturers in

<i>Drug</i>	<i>US Manufacturer &amp; Patent Holder</i>	<i>Price</i>	<i>Indian Generic Manufacturer</i>	
			<i>Cipla Ltd.</i>	<i>Hetero Drugs Ltd.</i>
Lamivudine	Glaxo SmithKline (Epivir)	US\$3,271	US\$190	US\$98
Stavudine	Bristol-Myers Squibb (Zerit)	US\$3,589	US\$70	US\$47
Nevirapine	Boehringer Ingelheim (Viramune)	US\$3,508	US\$340	US\$202

*Source:* Third World Network, 2001.

India. Similarly, the drug fluconazole is sold by generic companies in Thailand for US\$0.29 and in India for US\$0.64, compared to market prices of brand name forms at US\$10.50 in Kenya and US\$27 in Guatemala (Third World Network, 2001).

In a similar clamor for lower drug prices, China threatened to embark on a programme that transcends drug patents in order to be able to deliver proper treatment to around 1 million of its people infected with HIV. The country has been negotiating with Glaxo-SmithKline PLC, Bristol-Myers Squibb Co., and Merck Co. Inc. for the purchase of AIDS drugs at prices that were reduced by more than the 80% from the previous year. For China, it meant a choice between profit and the lives of their people. The Chinese government has effectively hurdled accusations of patent violations because the protection Glaxo-SmithKline PLC held over AZT expired in 2001, encouraging the Chinese government to allow state-owned drug manufacturer Northeast General Pharmaceutical Factory the production and sale of cheaper AZT in China (Chang, 2002).

In other developments, Indian generic drug companies Cipla Ltd., Aurobindo Pharma, Hetero Drugs Ltd., and Ranbaxy Laboratories Ltd. have all been experiencing a lack of demand for anti-retroviral drugs. Cipla markets a combination anti-retroviral therapy that would cost less than \$1 a day. Nevertheless, it has been forced to shift production to other types of drugs. The reason is that developing countries, the intended buyers of the generic anti-retrovirals, cannot afford to buy such drugs, even at such a low price. They could only afford a budget of less than \$2 per person per year (Reuters, 2003).

In the Philippines, the national drug policy committee approved in February 2003 the inclusion of Anti-Retroviral (ARV) drugs among those that the government may buy directly. The local Department of Health was authorized to order PhP 750,000 worth of ARVs from India, aiming to maintain the low HIV prevalence in the country. The monthly doses of ARVs, which private firms sell at PhP 30,000 to PhP 40,000 each, will cost only PhP 2,000 each due to the government's direct purchase (Rivera, 2003).

While different countries obviously require different ways of overcoming their difficulties, it would be very useful for them to share common mechanisms for discussing the ethical issues concerned and taking consensual initiatives towards the resolution of those issues. The willingness of commercial giants to negotiate their patent protections and accommodate the contrary interests of poor people from "non-viable markets" is something that can be cultivated with the mediation of international agencies and regulatory authorities, provided that the necessary infrastructures are put in place. The setting up of these infrastructures ought to be part of the agenda for bioethical reflection in the Asia-Pacific.

*Mother-to-child transmission and breastfeeding.* The critical importance of breastfeeding in promoting child health is generally recognized. However,

problems have arisen in the case of Asian countries where many mothers have tested positive for the AIDS virus. There is a need to cope with the consequences of the practice in the context of countries and communities where the mother-to-child transmission of the disease has left large numbers of infected children. Ethical complications further arise in situations where safe water for the preparation of infant formula is not widely available. An examination of the general situation in some Asian countries illustrates ethical dilemmas that arise in situations of great economic need and even desperation.

HIV can be transmitted by an infected mother to her child in the course of pregnancy, childbirth, or breastfeeding. For this reason, HIV infected women are advised not to breastfeed. Others make the decision by themselves. Thus, there arises a situation that mitigates against the cultivation of the natural bond between mother and child. If the HIV infected mothers are not properly cautioned and provided with sufficient infant formula, their babies are likely to acquire the infection. On the other hand, if they use infant formula, but have no access to sterilized water, the children are likely to die of diarrhea or other infectious diseases. Thus, it is a matter of great urgency, and of distributive justice, that the poor be provided prenatal counseling and testing. In order to safeguard their interests, such counseling and testing has to proceed on a voluntary and confidential basis. It is also a matter of social justice that the vulnerable poor gain access to anti-retroviral prophylaxis, infant formula, and further care for both mother and child. It is worthwhile noting that India, Cambodia, Myanmar, Vietnam, Papua New Guinea and China have separately begun pilot studies for implementation of similar programmes. The *three-pronged strategy* recommended by a task force of the World Health Organization includes prevention of HIV infection among youth and women of childbearing age, avoidance of unwanted pregnancies among HIV infected women, and intervention to hinder HIV transmission from infected mothers to their babies.

The United Nations Children's Fund (UNICEF) has been known to support the efforts of East Asian and Pacific countries to prevent mother-to-child transmission of HIV by supplying HIV testing kits and counselor training. Its regional initiatives have included (1) the purchase of anti-retroviral drugs for the prevention of mother-to-child transmission (PMCT) pilot programmes in Cambodia, China, Myanmar and Papua New Guinea, (2) the integration of PMCT services into prenatal care services of public hospitals in Cambodia, (3) the conduct of training programmes and development of training manuals for counselors in Papua New Guinea and (4) the provision of HIV testing kits, nevirapine, emergency obstetric care instruments for hospitals and clean delivery kits for community midwives in Myanmar, as part of cooperative undertakings with women's health projects (United Nations Children's Fund, 2002).

The situation, insofar as breastfeeding and mother-to-child transmission is concerned, illustrates the crucial role that women play in health care situations and

the greater burden that they often have to bear relative to men in society. In desperate situations in India, for example, women have been told to refrain from breastfeeding their children even when they had no other means of providing milk or food for the infants. The experiences have been particularly tough because of a policy to encourage breastfeeding, in general, by refraining from making infant formula routinely available. HIV positive mothers have a 25-35% chance of transmitting their infections to their babies during childbirth or through breastfeeding. Even when a mother-to-child intervention package is introduced, transmission of HIV from mother to child is reduced only by 50%. Hence, there is tremendous pressure on women not to get pregnant, to abort, or to refrain from breastfeeding. Bioethical reflections need to be undertaken on the problems that uniquely face women in society, especially in a setting where they have traditionally been relegated to a supportive rather than an assertive role.

## **ORGAN DONATION AND TRANSPLANTATION**

*Conceptual issues that emerge from transplantation technology.* Transplantation technology has provided immense hopes for people suffering from organ failure. Concepts such as death and consent have had to be re-thought in light of this technology, as well as in view of the beliefs and traditions of peoples in Asia.

Contemporary successes in organ transplantation have provided many important milestones for medical history, even as ancient Indian and Chinese medical literature already described some forms of operative procedure. Alexis Carrel, a French surgeon, initiated the development of transplant techniques when he experimented on animals in 1902. The human kidney was first transplanted in 1946. A human liver transplant was performed in 1963. The first heart transplant took place in 1967. Thereafter, transplants of the lung, pancreas and intestines followed. Organ transplantation is now a well-established form of therapy that is recognized by the World Health Organization (Grunfeld & Rappaport, 1996).

The development of Cyclosporine to control the rejection of a transplanted organ in a patient's body (The American University, 2001) presaged higher success rates for transplantation in general. With the development of new medicines, life-sustaining equipment, and accurate tissue typing, it appears that only the limited supply of donated organs has gotten in the way of more organ transplantation (Tharien, 1996).

Given the rapid advances in transplant technology, the capacity of doctors to perform successful transplants has also improved considerably. This has led to even greater demand, thereby putting a lot of pressure on the supply. Many medical qualifications that previously limited the number of people who could serve as organ donors have now been overcome. The situation has made it possible for living and non-related donors to qualify. Many have been subjected to coercive

pressures that threaten the requirement for autonomous decision-making. As a consequence, the illegal sale of human organs has also flourished.

### ***Brain Death***

In organ transplantation from cadaver donors, the usual recommendation is for the removal of organs from dead donors to be performed immediately, as the suitability of several organs meant for transplant is affected by lapse of time. Thus, the definition and criteria of death have become highly controversial subjects. It used to be sufficient to define death as the absence of cardiac and respiratory activity. However, the definition prevented the harvest of organs from patients who were being sustained by life support systems that maintain respiration and circulation even when brain function is lost.

Taking the cue from recommendations made by a Harvard Medical School Committee in 1968, many Asia-Pacific countries now accept brain-based criteria of death, paving the way for increased organ transplant activity.

In Japan, the transplantation of human organs has had to confront the inability of the Japanese to accept the concept of brain death. The Japanese medical community has been pushing for the recognition of brain death as it makes heart, lung and liver transplants feasible. But, critics have claimed that this would have given rise to the harvest of organs rather than to efforts to save dying patients. Some were uneasy about the idea for reasons of religion or superstition. As a result of the refusal to accept the concept of brain death, for a long time, only organs from live donors could be used in Japan. Sourcing organs from other countries remained the only other option for many Japanese who needed them (Talmadge, 1998). The law that recognized brain death as a valid condition for the removal of organs for transplant purposes was passed only in 1997.

The passage of the law did not silence all critics. For instance:

“Most brain death laws are discrete from laws governing transplantation. They are designed to free terminal patients from tubes and respirators, allowing a more natural death – the Japanese law does not. They free doctors from liability for terminating brain-dead patients, and free hospital resources for use by other patients – the Japanese law does not. They reduce costs to society and insurance companies – the Japanese law does not. They accord with the popular will that brain dead patients need not be prolonged. The Japanese law is not grounded upon any popular understanding. It refuses to recognize as brain dead anyone but organ donors” (Becker, 1999, p. 238).

Moreover:

“So, full of contradictions, this Japanese ‘brain death’ law is welcomed by Japanese hospitals and ridiculed by other countries. It does not respect Japanese people’s desire to die naturally, nor Japanese people’s desire to reduce the tax burden for indefinite prolongation of brain-dead patients. It opens the door to legal organ transplantation from warm pulsing cadavers. External second opinions and whistle-blowing are still unthinkable in the Japanese hospital context, but this law provides no safeguards against the Japanese fears that donors may be prematurely pronounced brain-dead.” (Becker, 1999, p. 238)

What the author sought to highlight was the conflict between culture and tradition, on the one hand, and the law, on the other. There are some things that cannot be legislated away. What death means to people cannot be so easily obliterated by a process of legal definition.

On the other hand, the process of cultural change can be facilitated if there are no serious conflicts with a people’s deeply held beliefs. Jewish law did not previously recognize the concept of brain death, considering death to be the absence of respiration and circulation. However, rabbinic authorities have formulated firm criteria for brain death, creating an opportunity to harvest organs from the body (Israel, 1996).

China currently considers the absence of heartbeat as its legal standard for marking the time of death. Since heart death is not the best standard to use for the purpose of harvesting organs, Chinese medical professionals have called for the legalization of brain death criteria. In the meantime, current practice has implicitly and explicitly recognized the standard.

In contrast, Taiwan has officially adopted the brain death standard. The country has allowed a first diagnosis of brain death to be made at the site of execution. The new rules require doctors to wait twenty minutes before declaring a prisoner brain dead. These rules, however, also allow doctors to administer anesthesia to prisoners prior to execution, making it more difficult to diagnose brain death. Taiwan’s medical community criticized the move to apply the brain death standard to executed prisoners because of the temptation to falsify death certificates in order to assist successful organ removal.

In South Korea, before brain death was recognized, organ swapping was used to help meet the demand for organs. Patients in need of organs, who had relatives willing to donate, but were incompatible with the patient, could exchange kidneys with other families facing the same situation, provided that the exchange would yield equally good blood and antigen matches (Cohen & Wight, 1999).

There used to be no legal definition of brain death in India. This meant that only corneas, skin and bones were available for transplant from cadavers. There were also no laws on the collection of kidneys from living donors, making organ selling possible. In 1995, a law was passed that allowed cadaveric organ donation while prohibiting unrelated living donors and transplantation of organs into foreigners (Cohen & Wight, 1999).

In Vietnam, the deeply-rooted belief that a dead body must be left intact has meant that only organs from living donors could be transplanted. This has also had the consequence that a kidney could be donated and transplanted, but never a heart (Vietnam News, 2002).

### ***Donor Consent***

The removal of organs from cadavers may be obtained either on the basis of informed consent, or presumed consent. Informed consent refers to the autonomous decision of the donor to give up an organ upon death. On the other hand, consent may be “presumed” in the absence of objections expressed before death, or by family members.

The practice in most countries in the 60s and 70s was to observe the “opting-in” policy for donors. Informed consent was required. Donors had to clearly and explicitly express their intention to donate. (Many Asian countries still use such a system.) When people started to lament the inability to use eligible organs because of the absence of a clear intent to donate, several nations implemented an “opting-out” system that involved presumed consent. Presumed consent allows the removal of an individual’s organs and tissues unless the donor had clearly stated he had no desire to donate his organs before death.

A strict version of the “opting-out” scheme does not allow the family of the donor to interfere with the removal of the organs. A less strict version requires the consent of the donor’s family – if they can be contacted – before any removal of organs or tissues can take place. Singapore was the first nation to adopt this scheme of pure consent, which was later adopted by several European countries. A third option involving “pure presumed consent” comes in the form of a law, which requires that an individual register at a courthouse and confirm that he has no intention to donate his organs. Under this scheme, a person who has “opted out” is to be given least priority should she ever require a transplant. The idea is to ensure that organ recipients must themselves have been willing to donate (Hartwell, 1999).

In most Asia-Pacific countries, customs and heritage hand authority to the family to donate the organs of the deceased (Chockalingam, Mohan & Rajan, 2001). Thus, there is no effective difference between an “opting out” and an “opting in” scheme. The family members eventually have their say.

Middle Eastern countries often turn away from cadaveric organ donations, even though religious leaders such as Ayatollah Khomeini and the chief rabbinate of Israel have made pronouncements allowing post-death organ donations. Presumed consent is not enforced in Middle East nations (Cohen & Wight, 1999).

In Indonesia and Pakistan, the claim has been made that absolutely no cadaveric donors are used (Cohen & Wight, 1999). Pakistan has also been reported to be tolerant of kidney trade:

Health experts are concerned about Pakistan's unregulated and fast growing kidney transplant trade, where foreigners can buy kidneys from impoverished Pakistanis in contravention of established medical norms.

With more than a dozen hospitals across the country involved in this unscrupulous trade, Pakistan has become the new Mecca for people seeking kidney transplants from across the world.

Transplants are a lucrative business for Pakistani doctors, hospital staff and 'fixers' who exploit the gullible and the needy. In some Pakistani villages, most people survive on one kidney.

In Mominpura village in central Punjab, nearly 80 percent of the residents have sold one of their two kidneys. Only children, the old and the sick have been spared the scalpel. "Anyone above 16 is taken to a hospital for a possible transplant," claims a villager (PakistanLink, 2003).

This kind of experience is actually not unique to Pakistan. Similar wholesale organ donations have been reported in the Philippines and other Asian countries. The similarities in experience should motivate the authorities in the countries concerned to engage in common bioethical reflection that can lead to more enlightened and harmonized responses to the controversies.

In Singapore, two laws control organ donation. The Medical (Therapy, Education and Research) Act 1972 (MTERA) is basically an opt-in system where people volunteer their organs for use in transplantation, education or research upon their demise. The family of the deceased may also have the authority to donate the organs of an individual post mortem. The Human Organ Transplant Act 1987 (HOTA) is an opt-out system allowing the use of kidneys of people who die in accidents, unless a person has indicated that he has no desire to donate his/her organs. HOTA applies to Citizens and Permanent Residents of Singapore between the ages of 21 and 60 years, excluding Muslims and those who are mentally incapacitated (Ministry of Health, 2003).

Several amendments to the HOTA have been proposed. These include (1) the expansion of the law to include non-accidental deaths, (2) inclusion of organs such

as corneas and livers, and (3) the regulation of living organ donor transplants under HOTA (Ministry of Health, 2003).

In Israel, the willingness of the public to donate organs dropped 25% in 1995, leading to its worst shortage in available organs for transplant. Israel has not implemented the system of presumed consent for organ donations from cadavers. Presently, the country requires the consent of the family before the organs of the patient may be used. The Israeli Ministry of Health manages a central registry of people with donor cards, although only about 79,000 out of the 5 million population of Israel have these cards (Tharien, 1996).

The Israeli Anatomy and Pathology Law permits the use of a part of a corpse for the purpose of saving the life of a person without requiring consent. However, the harvesting of organs from a corpse without consent has not been done since the public was outraged by the transplant of the heart, liver, lungs and kidneys from an anonymous accident victim in Beersheba to five Israeli patients who needed them (Tharien, 1996).

### ***Religion and organ transplantation***

The religious outlook of the people in communities where organ transplants are performed has to be given importance. Jewish tradition puts a lot of weight on the obligation to save a person's life if it is in one's capacity to do so. A Rabbinical Assembly has considered organ donation as an obligation of all Jews. However, the donation of organs is not permitted for research purposes, though an exception is allowed if the organ is to be used for a specific research on a rare condition, making it a prerequisite for future life saving. The donation of other organs, such as corneas, which are not exactly life saving is also permitted. The effort to regain eyesight is given special treatment because Jewish law regularly related blindness with death (Israel, 1996). On the other hand, strong cultural and religious beliefs in other parts of Asia regarding rebirth and reincarnation have had a negative influence on eye donation, although it appears that no major religion prohibits it directly (Chockalingam, Mohan & Rajan, 2001).

For Hindus, Muslims and Christians, organ donation is an act of charity that needs to be encouraged. And while Jewish law prohibits the beneficial mutilation or delaying of the burial of the dead, organ transplants may be performed to save a life (Grunfeld & Rappaport, 1996). However, the Jewish Halacha prohibits the selling or buying of organs from the living, even if the seller is poor or in debt (Tharien, 1996).

### ***Organ Procurement and Access***

The gap between organ supply and demand has given rise to ethical issues that many countries in the region have had to contend with. While there are more than 2,000 Israeli patients dependent on dialysis and more than 700 patients waiting

for transplantation, only 100 kidney transplants are performed annually (Tharien, 1996). The situation as regards cornea donations is not any different. In India, about 190,000 are blind in both eyes. About 590,000 are blind in one eye with corneal disorders. To deal with the problem, only about 8,000 corneal implants are performed annually. As early as 1945, the first Indian eye bank was established in Chennai in 1945. Although, there are now more than 150 eye banks, only 27 are able to collect more than 50 eyes a year (Chockalingam, Mohan & Rajan, 2001).

The situation as regards the availability of organs for transplant has been so disappointing that many people find the need for more successful organ procurement schemes to be set in motion as soon as possible.

Favourable developments in organ transplant technology have reduced risks to minimal levels and greatly enhanced success rates, thereby creating strong pressure to accelerate organ procurement programmes. Initiatives to respond to such pressures have generated ethical controversies, especially when these involve the use of prisoners and other vulnerable individuals as sources of transplantable organs, the use of monetary and other valuable considerations as incentives, and the involvement of commercial agents in organ procurement.

It has been claimed that Chinese doctors have taken human organs from executed prisoners to sell for profit (The American University, 2001). After Cyclosporine made it possible to cope more easily with transplant rejection in 1984, China introduced a law allowing organ donation from executed prisoners. The law allows organs and tissues to be taken from an executed prisoner if the body is not claimed, or if the prisoner or his family consents to the donation of his organs. Amnesty International alleged that the Chinese government performed executions to further the organ trade from executed prisoners. Eyewitnesses have also made allegations that prisoners are constantly examined to determine matches for waiting patients. Before an execution, blood samples are taken from the prisoner for this purpose (The American University, 2001).

In a stinging criticism of Chinese policy, Becker holds that:

“Growing evidence indicates that this state execution machine is driven increasingly by motives of economics rather than criminal justice or law enforcement. In 1996, a new ‘Strike Hard’ death penalty campaign was instituted and documented death sentences rose from some 3000 in 1995 to over 6100 in 1996, three times more than the executions of the entire rest of the world put together, including African and Islamic police states. The death sentence can be imposed for more than 70 crimes including hooliganism, bribery and political deviance” (Becker, 1999, p. 241).

However, Chinese authorities have denied manipulating their penal system to take advantage of death convicts for organ donations. They point out that decisions to

impose the death penalty have been made on an individual basis by judges who have the autonomous responsibility to evaluate the claims of the litigants. Significant efforts have also been undertaken to formulate laws in various provinces providing for stricter regulation of organ donation. The Shanghai Municipal People's Congress promulgated the "Regulation on Corpse Organ Donation" that began to be enforced on March 1, 2001. The Shenzhen Municipal People's Congress passed the Regulation on Human Organ Donation and Transplantation on August 22, 2003. The Hunan Province's Regulation on Human Organ Donation and Transplantation is scheduled for promulgation in 2004. Moreover, the Ministry of Health has formulated a Draft Regulation on the Determination of Brain Death and a Draft Regulation on Human Organ Transplantation. According to Zhai Xiaomei, these regulations "emphasize the principle of voluntary consent and non-commercialization." She also asserts that organ selling and buying are prohibited (Xiaomei, 2003).

### *Fair and equitable access to available organs*

The selection of beneficiaries of transplantable organs is a matter of justice and related ethical concerns. There is a need for objective and transparent criteria to promote fair access and avoid unwarranted discrimination both against donors and against recipients. It would also be useful to review policies governing the transport of organs, donors, patients and transplant doctors across national boundaries. In the meantime, prevailing practice has allowed the circumvention of ineffective national regulations.

The World Health Organization has declared that the human body and its parts cannot be the subject of commercial transactions. Similarly, the World Medical Association considers the sale of human organs as inhuman and unethical. The offshoot is that the giving or receiving of payment for organs should be prohibited. However, the supply of available organs cannot meet the demand for these organs, leading to increased illegal sales (The American University, 2001).

The trade of smuggled organs takes place in countries where laws are not as strict (Grunfeld & Rappaport, 1996). There are numerous accounts of such practices. The sale of human kidneys for as little as \$1,000 has been reported in the Philippines, India and Pakistan.

Because of the shortage of human organs, Israelis are forced to travel to nearby countries, especially Egypt, to buy kidneys from poor immigrant workers for transplantation (Tharien, 1996).

Nancy Scheper-Hughes has written of individuals from Middle Eastern countries such as Kuwait, Saudi Arabia, Oman, and the United Arab Emirates who go to India to acquire human organs, and of persons from the rest of Asia who get their organs from China (The American University, 2001). Citizens in Oman also offer to shoulder expatriation expenses of migrant workers who die in their country in exchange for removal of organs for transplantation (Cohen & Wight, 1999).

Wealthy patients from Saudi Arabia and Israel also travel to countries like Turkey, India, and the Philippines where kidney sellers are recruited from prisons, unemployment offices, and urban-poor areas. As regards organs from prisoners, a scheme called “Kidneys for Life” has been proposed in the Philippines (de Castro, 2003b).

India has experienced the problem of commercialization of organs, whereby wealthy Indian and foreign buyers buy kidneys and other organs from poor slum dwellers and people from rural areas. Many people find it easy to make a decision to sell a kidney when faced with the choice to either keep both kidneys or run the risk of dying of poverty and starvation. The poor’s involvement appears to be so risky that some donors did not even live to receive the compensation they were promised. Indian fathers find themselves having to sell their own kidneys in order to have money for their daughter’s dowry (Hartwell, 1999).

The laws that require a donor to be a relative or spouse have encountered loopholes in “kidney marriages” whereby rich Gulf country men marry healthy women before the operation and divorce shortly after surgery (Grunfeld & Rappaport, 1996), making the procedure legal as a non-biological related living donor transplant, rather than an unrelated paid living donation (Cohen & Wight, 1999).

In the guise of performing an appendectomy or removing kidney stones, some kidneys have been stolen from patients (Grunfeld & Rappaport, 1996).

Though India is known to be the place to go for transplants from paid donors, incidents of organ selling have similarly been reported in Israel, Iran and Iraq, among others (Cohen & Wight, 1999).

The Indian Parliament, in an attempt to control the trade of organs, passed a bill in 1994 that would deem commercialized organ donation illegal. The law prohibited the removal and transplant of organs, unless it was going to be done for therapeutic reasons. Surgery would only be performed upon explaining the risks and effects of the operation to both the donor and recipient (Grunfeld & Rappaport, 1996).

Concerning the allocation of available organs. One dilemma has to do with whether organs are to be given to the ones who most need it, or to relatively healthier ones who may stand a better chance of survival. Factors of money, race and religion also come into play when discussing distribution (Grunfeld & Rappaport, 1996).

Because of reports of organ selling, some observers have argued that the use of the term “donor” may no longer be applicable, as donation should not require compensation (Hartwell, 1999). On the other hand, others have argued that the grant of compensation to organ donors should be institutionalized in order to flush out the illegal trade and enable authorities to monitor the procedures. Citing the failure of responsible agencies to put a stop to the underground market, they contend

that poor organ donors are subjected to greater exploitation when they are forced to offer their bodies and services in secret, thus preventing them from availing of the opportunity to receive sound advice and proper preoperative and postoperative care (de Castro, 2003a).

In developing countries, such as India, China and the Philippines, where the expertise to carry out organ transplants is available, but the resources needed are badly lacking, the propriety of providing such services to prolong the lives of a few has been assailed in view of the fact that basic health needs are barely provided for the many (Grunfeld & Rappaport, 1996).

The “portability” of human organs is a very strong argument for broad bioethical reflection that transcends national boundaries. Regulations that pertain to one country have easily been circumvented in practice because of the ease with which doctors are able to bring their skills and patients are able to move – with their organs – beyond the reach of particular authorities.

## **GENETICALLY MODIFIED ORGANISMS**

### ***Balancing benefits and possible dangers***

Advocates of biotechnology involving genetically modified organisms continue to invoke the need radically to accelerate food production in the wake of lingering poverty and hunger in many areas of the world. Research is going on at a frantic pace to find ways of using the genetic modification of organisms to increase the yield of various crops, to address pest resistance, to make the use of marginalized land possible, to enhance nutritional benefits, to reduce the cost of production, and to avoid the negative environmental impact of other forms of agricultural biotechnology. In addition, there are prospects that pharmaceuticals and vaccines can be derived from transgenic forms.

On the other hand, detractors invoke the precautionary principle as they point to the threat to biodiversity and the dangers that may arise from highly innovative procedures and the release into the environment of untested plants and products. Some critics have also expressed an unwillingness to pose what they see as a challenge to the integrity of nature and an intrusion into exclusively divine prerogatives.

It is commonly argued that GM crops are essential to the future of world food production. They have a major role to play in feeding the hungry. However, the institutional voices carrying this message have come largely from the developed world. Some influential Asia-Pacific organizations have expressed doubts that GM crops can truly alleviate hunger and malnutrition. NGOs such as the Third World Network and the Research Foundation for Science, Technology and Natural Resource Policy in India also claim that “hunger is caused because the poor are unable to get access to food, and not necessarily because of a shortage of

production” (“Time to Grasp,” 1999). The debate along these lines has not diminished in intensity in the face of the increasing number of products that have been developed.

Reactions in Asia have been mixed.

The three most populous countries in the region – China, India, and Indonesia – are already planting millions of acres of genetically modified cotton. Several other large Asian countries, including Japan, Thailand, the Philippines and Malaysia, are allocating billions of dollars for private and government-sponsored research on biotech crops (Barboza, 2001).

Aware of food safety concerns, especially among Europeans, many governments in Asia have tended to move conservatively before approving the use of genetically modified food crops. For obvious reasons, these are much more controversial than non-food crops like cotton and flowers.

For the moment, China has acted cautiously in the matter of letting farmers plant biotech food crops. However, tests are continuing. Other Asia-Pacific countries are playing catch up with their fast-moving counterparts from the Americas. Major Indian universities are deep into biotechnology research. Japan and Republic of Korea expect to spend huge outlays for this field of investigation. Malaysia is engineering palm oil trees genetically to produce special plastics. Vietnam and Singapore also are exploring their own niches in this area (Barboza, 2001).

### ***Labeling and Warning***

Thus, the response of Asian countries to GMO biotechnology has been variable (See Appendix M: “Regulations on Labelling of Genetically Engineered Foods in Some Asian Countries). While some countries have opted for labelling and warning, others have instituted policies regulating the importation and/or production of GMO food. There may be a need to harmonize regional responses in order to avoid tensions among countries and between consumers and producers. Even now, trade among Asia-Pacific countries involves products that could contain GMOs. Inevitably, the benefits as well as the risks of GMO use will be jointly shouldered by trading partners the Asia-Pacific.

Some governments in the Asia-Pacific have developed, or are developing, regulations to stop the importation of GM seeds and GM food across their borders. Others have taken positions on labeling, traceability and producer liability. Banning the importation of GM food by the Sri Lankan government has been described as one of the toughest actions of its kind against GM food in the world (Pesticide Action Network Asia and the Pacific, 2001). Asia has a US\$1,000 billion a year food market and regulations to govern GMOs have begun to threaten exports worth billions of dollars from the United States. The spread of the now-global battle

over the use and consumption of GMOs in this region has been triggered by Japan, Republic of Korea, Australia and New Zealand. All of these countries decided to enact laws requiring the labeling of GM foods “With one-third of its corn and half of its soybeans and cotton genetically modified, the United States’ US\$51.7 billion worth of agricultural food exports each year is the biggest potential loser in the global GMO fight” (Byrnes, 1999). Strict labeling laws and transgenic crop controls make it so difficult for exporters to comply or to penetrate markets that they may tip multi-billion dollar trade balances against GMO foods. Obviously, the global trade picture has come under steady assault from the continuing introduction of GM products. Unfortunately, an offshoot of this could be that the ethical issues are simply swept under the carpet by the trade wars that have emerged. These trade wars between exporters of GM foods and producers of more traditional produce are more about establishing global dominance in trade rather than about justice or food security for the world’s poor.

It remains to be seen whether the governments that have enacted cautious laws are truly concerned about the human and environmental impact of GMOs or they are merely lying low as they try to ride out the heat of public sentiment. About 5 years ago, the National Farmers’ Federation of Australia speculated that “In about five years time the heat will have gone out of this debate, ... countries like Japan will just gradually start to take it [GM food].” A Monsanto spokesman expressed a similar view: “We’re pretty optimistic that given good labeling and good consumer knowledge this whole thing will settle down pretty well” (Byrnes, 1999).

### ***Patents and Ancestral Patrimony***

Other than benefit-risk issues, there are important questions that need to be answered regarding the patenting and access to the benefits of GMO biotechnology. In some cases, the genetic alteration of time-honoured food sources has resulted in its alienation from people who have long regarded them as part of their ancestral patrimony. The control over GMO food products is, thus, an issue that can hardly be separated from the preoccupation with safety and integrity. As we seek to promote safe standards for research and consumption, we also need to guarantee equitable access to the technologies developed and the benefits derived.

Farmer NGOs in South Asia have been involved in a campaign of resistance to corporations engaged in genetic engineering. They have also started a seed-saving campaign to preserve traditional seeds (Ho, 1999). In other parts of the Asia-Pacific, some groups of farmers, agricultural workers, consumer groups, fisher folk, scientists, and indigenous peoples have shown their active opposition to genetic engineering:

The Kilusang Magbubukid ng Pilipinas (KMP), a peasant group in the Philippines, has been actively protesting the development of genetically engineered (GE) rice by the International Rice Research

Institute (IRRI) as well as the field-testing of other GE crops in the country.

In Indonesia, some 800 anti-GE farmers and advocates rallied on April 17, 2001, in front of Monsanto and the Ministry of Agriculture in Jakarta. They called for an end to Indonesia's GMO field trials of Monsanto's Bt cotton and other GE products in the country.

In Thailand, thousands of anti-GE farmers and advocates participated in the Long March for Biodiversity, principally against GE rice. Farmers in the Thung Kula Ronghai area, known for the cultivation of jasmine rice, claimed that the introduction of GE crops into Thailand would adversely affect them.

(Pesticide Action Network Asia and the Pacific 2001)

Monsanto and the State Government of Karnataka, India, conducted experiments on genetically engineered crops in 1998. The activity initially was kept secret but when word got around, thousands of farmers occupied three fields and burned the crops in what was to be the beginning of a campaign of civil disobedience called Operation 'Cremate Monsanto.' From Karnataka, the campaign spread and was followed by the "Monsanto Quit India" campaign (Ho, 1999).

In addition to raising issues about health and environmental matters, GM food draws attention to more important concerns about control of agricultural biotechnology. Because GM technology is patented, patent holders control the use seeds from existing GM crops. This makes farming more expensive for poor countries where farmers depend on saving seeds and replanting them.

Navdanya is the name given to an Indian movement to save farmers' seeds. The farmers share seeds freely and promote low cost organic farming. The movement aims to protect biodiversity, increase farmers' incomes, and improve farm productivity compared to the industrial agricultural technologies (Shiva, 2001).

Price, however, is not the only issue. There are only a few trans-national companies that control GM technology. These companies exercise power over the food chain:

"Diversity as a pattern of production, not merely of conservation, ensures pluralism and decentralization. It prevents the dichotomizing of biological systems into 'primitive' and 'advanced'... Biodiversity based, resource efficient, non-violent farming technologies rather than capital intensive, external input based violent industrial monocultures are the best way forward for the poor and fragile ecosystems."

(Shiva, 2001)

The idea is that if the aim is truly to provide new options for global food security, ownership and control of agricultural biotechnology cannot be concentrated in a few pharmaceutical or agricultural companies. The food supply must not be overly dependent on the existence of a few varieties of crops. Biodiversity has to be promoted aggressively. Yet, transgenic crops are increasingly popular. In 2001, approximately 44.2 million hectares were planted to it worldwide. The International Service for the Acquisition of Agri-Biotech Applications (ISAAA), estimated an increase of 51% in developing countries in that year. As much as 36% of world soybean crops were already transgenic (Lambert, 2001).

Notwithstanding the continuing objections and protests, the trend towards greater GMO use appears to be unstoppable. This does not mean that the protests have not been effective, or that there is no point in engaging in criticism and dialogue. Perhaps it is necessary to examine what the opposition to the use of GMOs in different Asian countries has accomplished in terms of institutionalized consultative processes and democratically oriented policies, as well as regulatory mechanisms.

## **REPRODUCTIVE CLONING AND EMBRYONIC STEM CELLS**

### ***Reproductive Cloning***

For many people, reproductive cloning represents the ultimate in the use of biotechnology to explore the frontiers of human creation. A number of Asian countries have undertaken pioneering research in this field and the ethical implications are worthy of examination if only because of the possible use of the technology for the reproduction of human beings.

Mixed reactions of disbelief and amazement greeted the initial report that a mammal had been cloned from an adult cell. Even Nobel Prize scientists like James Watson and Francis Crick went on record as stating that the feat was likely impossible. Ian Wilmut and his team at the Roslin Institute outside Edinburgh showed that it was possible with the birth of Dolly, the sheep (Thompson and Harrub, 2001).

Following the success of Ian Wilmut and the Roslin Institute, other scientists announced the results of similar projects involving other mammals and using the same or similar procedures. Among those who reported successes were scientists from Asian countries like Republic of Korea and China.

A few years later, French company Clonaid announced the cloning of a human being. The claim was met with a lot of skepticism, but it managed to revive the controversies regarding the ethical issues involved.

The possible use of somatic cell nuclear transfer (as in the case of Dolly) for human reproduction may be seen as a challenge to the sanctity of life. If successful, it is going to provide human beings with an opportunity to exercise discretion over the process of reproduction that have been thought to be reserved for an omniscient

and almighty Creator. It could also open the floodgates to abuses in the form of genetic modifications that could be introduced in a highly manipulative reproductive process.

There are other ways by which human reproductive cloning can be regarded as unethical. Reference can be made to two principles concerning experimentation on human beings. One principle requires the experiment be to the benefit of the subject being used. A second principle holds that in any experiment performed on a human being, the subject must know the risks beforehand and give “informed consent.” In the case of human cloning, however, the embryo being produced can not give such consent, even if the experimentation itself is legal (Thompson and Harrub, 2001).

Another main objection to reproductive cloning cites the risks and inevitability of mistakes. Before Wilmut succeeded in achieving the birth of Dolly he was confronted with many experimental pregnancies resulting in anomalies that are too horrible to take chances with in the reproduction of human beings.

Critics cite many other reasons for rejecting human reproductive cloning. These include the loss of dignity of the clone that comes with being “produced” rather than being the “mysterious” outcome of a loving union between husband and wife; the absurdity of living through a life that has, in a way, already been lived by an older “twin” (the person that the clone is a clone of); the loss of identity and personal uniqueness resulting from being a copy of someone else; and the eugenic implications of the genetic manipulation that could be introduced into the cloning process.

On the other hand, some scientists find in somatic cell nuclear transfer cloning not only an additional option that can be exercised in aid of a couple’s desire to procreate and build a family when they would otherwise fail, but a crucial step in the search for solutions to lingering disease problems. Depending on the success of related experiments, cloning can help to reduce human suffering and extend human life. Scientists are optimistic that cloning could give them vital insights into cell differentiation and reproduction, thereby enabling them to find medical remedies for cancer or birth anomalies. Surely, such a revolutionary procedure could lead to many other benefits beyond those that have been anticipated at this point. Many scientific successes have been achieved following a purely speculative initiative. Without the speculative thirst for invention and discovery, the world will not be even close to where it is now in the effort to combat diseases and suffering.

The freedom of research and discovery must also be reckoned with in the reproductive cloning equation. While scientific adventurism needs to be held in check, the freedom of researchers to pursue innovative studies must be respected. A balance needs to be struck that does not compromise the freedom of thought and the need to find urgent responses to the problems that threaten mankind. The

burden of proof for proposals to put a halt to researches that appear to have a beneficial outlook for humankind must be taken seriously and responsibility.

Most countries in the Asia-Pacific region have either passed laws prohibiting the implantation of a cloned human embryo for reproductive purposes or issued equivalent policy statements. At the same time, there seems to be recognition of the importance of undertaking related scientific investigations. The Australian Academy of Science has spoken in favour of cloning research: “We do believe this sort of research should be done, but under strictly regulated conditions” (Kingsley, 2001).

Taking a more liberal position, Republic of Korea scientists have actually been involved in the race to achieve reproductive cloning success. According to the latest reports, a team consisting of scientists from various institutions in that country has derived a pluripotent embryonic stem cell line from a cloned human blastocyst (Scienceexpress, 2004). This development will inevitably reignite controversy both inside and outside the scientific community. While some people will be recalling the need to regulate scientific research, others are likely to invoke the importance of scientific discovery and the recognition of research and scientific freedom.

Cloning is another scientific breakthrough, following on the heels of frozen embryos, in-vitro fertilization and test-tube babies, that has challenged humanity to rethink and consider a redrawing of moral boundaries. It will not come as surprise if, in the end, even reproductive human cloning gains acceptability under certain circumstances (“Nature’s Double Take,” n.d.).

### ***Human Cloning and Religion***

Religious institutions have expressed various views regarding human cloning and, even within the same institution, experts occasionally disagree.

Here are some examples of religious views that have been reported:

The Vatican: reproductive cloning is “an expression of a brutal mentality that lacked all ethical and human consideration.”

Rifaat Fawzi Abdul Mutalib, professor of Islamic Sharia law at Cairo University: cloning to create a fetus is, in Islam, a disfigurement of God’s creation.

Israeli Chief Ashkenazi rabbi, Rabbi Ysrael Meir Lau: We need to support technological developments that have helped save lives. However, the “moment that a medical treatment intends to take on roles in areas it is not responsible for, such as the shortening of life, cloning and forming life in an unnatural way, we must set restrictions

so that the basic faith we have in God with regards to life and death are in His hands.”

(Thorny Ethical Issues, 2003)

While some people have argued against reproductive cloning on the grounds that it is “unnatural,” there are those who point out that clones, in the form of identical twins, have been part and parcel of nature. If only for this reason, it cannot be claimed that Buddhism prohibits reproductive cloning. Moreover: “Buddhism considers ethical phenomena independently... [of] the concept of being natural because according to Buddhist teaching... [it] seems to be impossible to say that such and such phenomenon is unnatural... Natural things ... [from] the Buddhist perspective include both what is given by nature and what is created by human beings” (Somparn, 2004).

Islamic clerics in Malaysia, through the National Fatwa Council, have said that the cloning of a human embryo is ethically acceptable as long as it is destroyed before turning 120 days old (enough time for researchers to harvest the early-stage human embryo for stem cells). Scientists are optimistic that embryonic stem cells will someday help provide treatments for disease. The Fatwa Council clarified that the ruling on the 120-day cut-off point was in keeping with the Islamic view that a fetus has no soul until it reaches that age, and therefore can be aborted. However, some Muslim scholars disagree with this opinion, which they claim to lack clear basis in the Quran (Goodenough, 2003). The main reason they cite is that it runs contrary to the Quran-stipulated basic rule of human reproduction – “a baby must be a result of a union between a man and a woman who are legally married” (Goodenough, 2003). Moreover, “Allah has given us such an amazing form of being able to create new life through sexual reproduction. As humans we have the ability to transfer some of our genes to our offspring. Therefore, there doesn’t seem to be any justification for humans to be cloned” (Active-Islam.com, 2001). This would have implications for other areas of Islamic law such as inheritance, alimony and the right to give away a daughter in marriage.

At the United Nations, an Ad Hoc Committee on Reproductive Cloning was organized to deal with a proposal initiated by the French and German delegations that seeks to ban human reproductive cloning throughout the world. The experience of the United Nations Committee in dealing with the Franco-German initiative teaches valuable lessons. While China, Japan, Malaysia and Republic of Korea endorsed the ban only on reproductive cloning, the Philippines, Fiji, Micronesia and other Pacific countries put themselves on the side of a comprehensive ban that would also prohibit reproductive cloning. After a second year of meetings, the result was a stand-off with neither party willing to give way to the other. In 2002, the Franco-German group insisted on a two-step process that would have banned only reproductive cloning initially, with the ban on therapeutic cloning being discussed for possible implementation at a subsequent stage. The American-led group also included countries from the Asia-Pacific Region. Thus far, it would

not budge from its position calling for a ban on both types of practices. The offshoot is a hiatus until the Ad Hoc Committee on Reproductive Cloning meets again in 2005, and it is not likely that the parties involved will be willing to shed their strong positions at that time.

Thus, the United Nations meetings have not been productive enough to lead to a position that is acceptable to all. Nevertheless, they have been fruitful in a different way: they have called the world's attention to issues facing the whole of mankind and forced the member countries to take the issues up in their respective territories, resulting in a very broad consultative process that ought to characterize bioethical reflection. The temporary setback owing to the failure to reach a compromise should not prevent people from going through similar attempts at consensus-building in the future.

### ***Embryonic Stem Cell Research***

A number of Asian countries have invested heavily in biotechnology and cutting-edge biomedical research. Part of such investments has gone into embryonic stem cell research that draws heavily on the promise of revolutionary treatment for persistent problem diseases. Some scientists are hopeful that, at a future stage, embryonic stem cells will be used to construct transplantable organs for human beings. Regulations regarding such researches have differed across Asia-Pacific countries. However, the issues involved have a great significance for our understanding of what it takes to be human. Hence, there appears to be a need for a harmonization of approaches taken by the countries that have shown interest in the developments.

The value of stem cells lies in their flexibility. Scientists are confident that, given the proper techniques, they can be grown to replace old cells in any part of the body and provide relief for many degenerative diseases. For instance, it is thought that embryonic stem cells have the potential to grow into heart muscles that could be used to repair the damage resulting from a heart attack; to regenerate skin cells to deal with burns; to develop into pancreatic cells to treat diabetics; or to grow into fresh new brain cells that might restore brain functions in conditions like Alzheimer's, Parkinson's, and Lou Gehrig's disease (Thompson and Harrub, 2001).

Organ engineering may eventually take the place of organ donation but it does not totally do away with the need for donors. Someone has to donate "stem cells." However, some stem cells, including those for the heart, lung and kidney, cannot be found in adults or children because these are already partly specialized. Since the experimentally useful stem cells come only from embryos, the process raises moral dilemmas (Mutsuko, n.d.).

Currently, leftover IVF embryos or aborted fetuses are the main sources of stem cells being used in research. As part of the process, some of the blastocyst's cells are isolated, harvested and allowed to grow. Special nourishment is then provided

to generate long-lasting stem cell lines. In this process, the embryo is destroyed (Goldberg, n.d.).

John Cloud summarized the issue quite well when he wrote in his July 23, 2001 *Time* article:

“Stem cells derived from human embryos could lead to cures for some of humanity’s most devastating illnesses – but to get to the little knots of magic tissue, we have to destroy the embryos, which might otherwise one day become babies” (J. Cloud, 158 [3]: 22 as cited in Thompson and Harrub, 2001).

This is the basic position that United States President George W. Bush took in his August 9, 2001 speech on the funding of stem-cell research by the federal government:

Research on embryonic stem cells raises profound ethical questions, because extracting the stem cell destroys the embryo, and thus destroys its potential for life. Like a snowflake, each of these embryos is unique, with the unique genetic potential of an individual human being....

At its core, this issue forces us to confront fundamental questions about the beginnings of life and the ends of science. It lies at a difficult moral intersection, juxtaposing the need to protect life in all its phases with the prospect of saving and improving life in all its stages.... Embryonic stem-cell research is at the leading edge of a series of moral hazards.... [W]hile we must devote enormous energy to conquering disease, it is equally important that we pay attention to the moral concerns raised by the new frontier of human embryo stem cell research. Even the most noble ends do not justify any means....

I also believe human life is a sacred gift from our Creator. I worry about a culture that devalues life, and believe as your President I have an important obligation to foster and encourage respect for life in America and throughout the world. And while we’re all hopeful about the potential of this research, no one can be certain that the science will live up to the hope it has generated.

Eight years ago, scientists believed fetal tissue research offered great hope for cures and treatment – yet, the progress to date has not lived up to its initial expectations. Embryonic stem-cell research offers both

great promise and great peril. So I have decided we must proceed with great care.

(G. Bush, 2001 as cited in Thompson and Harrub, 2001)

This subject has been referred to as a “bioethical minefield.” For, although many people are awed by the idea of taking command of human life in one’s experimental hands, there are those who are encouraged by the unique opportunity to contribute to local knowledge: “It’s a matter of taking advantage of the wonderful, regenerative capability of life” (Mutsuko, n.d.).

Studies are going on in some laboratories to find adult stem cells that could be harnessed to provide the same benefits for research as embryonic stem cells. If these studies do not meet with success soon enough, the debate concerning the status of embryonic stem cells is going to continue, as they have been raging in various countries in this region. In the meantime, embryonic research appears to be continuing aggressively at major Asian research institutions.

Although many governments and religious groups in the Asia-Pacific oppose cloning embryos to create babies, some governments – particularly Singapore, Japan and Malaysia – are more open to therapeutic cloning. Compared to that in the United States, opposition to therapeutic cloning in the Asia-Pacific has been muted (Asia Could Emerge, 2001).

Singapore’s *Straits Times* has called American reaction to reports of Clonaid’s success “hysterical and irrational.” The newspaper said the use of stem cells derived by cloning was “as natural as wearing dentures” (Asia Could Emerge, 2001). If this kind of attitude were to dominate regional policy, Western scientists could well be on the way to Asia-Pacific research institutions. True enough, China, Israel, and Singapore have been seen as potential research havens for Western scientists because their laws are more tolerant towards therapeutic cloning. And, within the Asia-Pacific, one also can expect the political and regulatory tightrope walking that results in the movement of scientists across national boundaries in order to avoid restrictive environments (Gay, 2001).

The need for collective bioethical reflection on the implications of embryonic stem cell research is indicated in the variability among guidelines adopted by some Asian countries as shown in the tabulation at the end of this section. To highlight that need, we only have to be reminded that the export and import of embryonic stem cells has been going on. The following account is only one example:

Technion and Rambam Hospital in Haifa have begun to export stem cells produced from human embryos to Germany. Stem cells, which are undifferentiated cells that can be converted into any type of the body’s cells, are used today in medical biological research.

Stem cells are produced from very young embryos. Already in 1988, researchers at Technion produced stem cells from 5-day old embryos. German researchers will attempt to convert the stem cells into nerve cells, in order to develop treatment making it possible to transplant new nerve cells in people suffering from diseases of the nervous system. Only five other countries produce stem cells from human embryos – Sweden, Republic of Korea, the US, India, and Singapore.

Many scientists and doctors, as well as medical ethics activists, praise this joint project, which will advance science and lead to the development of new medical treatments. At the same time, there are several attorneys and sociologists, particularly in Germany, who maintain that the production of human embryonic stem cells raises ethical problems, despite the fact that the export of stem cells is absolutely legal.

(Embryonic Stem Cells, 2003)

Here are official guidelines on stem cell research and cloning applicable in some Asian countries:

### **OFFICIAL GUIDELINES ON STEM CELL RESEARCH & CLONING IN SOME ASIAN COUNTRIES**

#### **Australia**

Australia bans all human cloning whether for reproduction or research. This includes a ban on embryo splitting and other techniques that might create a clone without fertilization. But, Australia does allow the use of embryos remaining after assisted reproduction, as long as those embryos were created before 5 April 2002. This federal law supersedes all previous state-level laws concerning embryonic stem cell and cloning research (*Research Involving Embryos and Prohibition of Human Cloning Bill, 2002*).

#### **China**

In January 2004, Ethical Guidance on Human Embryonic Stem Cells was promulgated jointly by the Ministry of Science and Technology and the Ministry of Health, the provisions of which include:

Article 4: Any research for human reproductive cloning shall be prohibited.

Article 5: The human embryonic stem cell used for research can be derived only by: (1) spared gamete or blastula after IVF; (2) fetal cells after natural or voluntarily selective abortion; (3) blastula or mono-sexual split blastula by somatic cell nucleus transfer technique; and (4) germ cells voluntarily donated.

Article 6: The conduct of human embryonic stem cell research must comply with the following norms: (1) when a blastula is obtained by IVF, somatic cell nucleus transfer technique, mono-sexual reproduction technique or genetic modification, the culture period in vitro cannot be more than 14 days since fertilization or nucleus transfer; (2) the implantation of the human blastula which has been used for research into human or other animal's reproductive system is prohibited; (3) the hybrid between human germ cells and germ cells of other species is prohibited (Zhai Xiaomei, 2003).

### **Hong Kong**

All human cloning is illegal.

### **India**

The Indian Council of Medical Research (ICMR) has issued the Consultative Document on Ethical Guidelines for Biomedical Research on Human Subjects (2000). The section dealing with genetics states: "Since its safety, success, utility and ethical acceptability is not yet established, research on cloning (through nuclear transplantation or embryo splitting) with intent to produce an identical human being, as of today, is prohibited." ICMR also issued the "Statement of Specific Principles on Human Genetics Research," 20 July 2000.

India is home to 10 of the 64 embryonic stem cell lines that are approved for use in US government research. Companies there are waiting until more research is done before sharing their lines.

### **Republic of Korea**

A Bioethics Bill, which would strictly prohibit reproductive cloning under any circumstances with criminal sanction and which regulates embryonic stem cell research, has been prepared by the Ministry of Welfare and Health together with the Ministry of Science and Technology. The public hearing is scheduled in September 2002, and the bill will subsequently be submitted to the National Assembly.

The Life, Ethics and Safety Measures bill also outlaws human cloning as part of embryonic stem cell (ESC) research, the genetic treatment of embryos and fetuses and the use of a person's genetic information in relation to education, employment or insurance.

### **Japan**

A law to strictly prohibit acts related to human cloning was passed in 2001. The "Law concerning Regulation Relating to Human Cloning Techniques and Other Similar Techniques" (November 2000) has been in effect since June 2001. It contains a prohibition on putting embryos into a human or animal uterus.

Guidelines for Derivation and Utilization of Human Embryonic Stem Cells released in September 2001 recognizes the human embryo as “the beginning of a human life.”

The Japanese law prohibits the transfer of embryos created by techniques of human cloning, and those created by xenotransplantation. However, it allows the application of these techniques and other similar ones for research purposes as long as the embryo created is not allowed to be transplanted in a human or an animal. It also imposes criminal sanctions.

### **Malaysia**

“Therapeutic” cloning of human embryos is ethically acceptable for research purposes so long as the embryo is destroyed before it reaches 120 days of age.

The Malaysian government has announced that legislation banning reproductive cloning would be drafted within the first half of 2003. Health Ministry Director-General Taha Ariff said a committee will first be getting ethical and other views from local and foreign experts.

### **Philippines**

In the predominantly Roman Catholic Philippines, President Gloria Arroyo said the government opposes all cloning and stem cell research.

### **Singapore**

On 18 July 2002, the government approved the BAC recommendations to ban reproductive cloning completely and permit therapeutic cloning under strict regulations.

Recommendation #7: “There should be a complete ban on the implantation of a human embryo, created by the application of cloning technology, into a womb, or any treatment of a human embryo intended to result in its development into a viable infant.”

The report also concluded that creation of human embryos, either by IVF or by SCNT, for research purposes, can only be justified (1) where there is strong scientific merit in, and potential medical benefit from, such research; (2) where no acceptable alternative exists, and (3) only on a highly selective, case-by-case basis, with specific approval from the proposed statutory body.

The new guidelines, which must still be passed into law, allow scientists in the city-state to withdraw stem cells from adult human tissues, aborted fetuses and surplus embryos from fertility treatment as long as the embryos are less than 14 days old.

The guidelines also allow scientists, under strict regulation, and on a case-by-case basis, to obtain stem cells by cloning technology. The technique, referred to as “therapeutic cloning,” is permitted to create human embryos for research purposes. The guidelines completely ban human reproductive cloning.

(Asia Genetic Resources, n.d.; Goodenough, 2003; “Asia Could Emerge,” 2001; Nowak, 2002; Thompson and Harrub, 2001; Berrigan, 2003; Goldberg, n.d.; and Saywell, 2002.)

## **CHARACTERIZING BIOETHICS IN THE ASIA-PACIFIC**

A lot of debate has gone on among scholars about the proper characterization of bioethics in this part of the world and the discussions have not died down. The focus mostly has been on attempts to distinguish the Oriental from the Western.

We raise this question at this point not so much to seek answers but to highlight its importance in agenda setting. Various attempts have been made to try to pin down the characteristic features of Asia-Pacific bioethics. It is useful to examine some snapshots of these characterizations in order to see the variety and heterogeneity that may be attributed to various factors and to emphasize the importance of the flourishing of unique traditions and cultural viewpoints.

On one account, “the essence of the Asian ethos is... ‘a holistic harmony’ in contrast to the modern European inclination to dualistic individualism.” (Sakamoto, 1999) More specifically, Asian worldviews are said to have the following characteristics:

- (a) They put a higher estimation on total and social ‘well-orderedness’ than on individual interests or individual rights and dignity, and this well-orderedness is considered to be accomplished by the good assignment of social roles to the people....
- (b) Ethics, as well as Social Justice, is interpreted in very realistic ways, as, for instance, a social tuning technique or the like....
- (c) Fundamental naturalism is pervasive in all Asian thought. According to Asian naturalism, our... non-natural and artificial human activities are ultimately included in nature as minor parts of it.... Thus, ‘to be natural’ and ‘to be artificial’ are not concepts that contradict each other at all....
- (d) The Asian way of thinking is inclined not to believe or pursue any state of ‘invariance’ or ‘eternity’.... In contrast, Western culture has always sought ‘invariance’ and ‘eternity’ which remain identical through every change.

(Sakamoto, 1999)

Other examples of efforts to characterize the Asian mind in more specific terms and applied ways are found below:

The standard [Western] ethical framework is inadequate in other aspects. It always talks about rights, but much less about responsibility, and the principles seem to be put forth a priori and applied to any cases, regardless of the context of their application. So the framework has to be improved, especially for shaping an effective and ethical policy to deter the HIV epidemic (Wang, 1997).

Wang finds a parallel between the ethics of care and Confucian ethics as she observes the contrast with a principle-based approach:

Care ethics is close to Confucian Ren (or Jen) ethics, in which the central principle, Ren, means ‘love and care for others’, and the concept of the independent person has never been developed. The focus is put on interdependent human relationships. Moreover, care ethics puts more emphasis on context than on principle. In my view, principlism still holds to a certain degree in addressing biomedical or social issues. So how to cope with the incompatibility between principlism and contextualism is one issue which remains to be solved (Wang, 1997).

The debate concerning abortion has also provided a context for comparing Western with Asian conceptions of bioethics, although the comparison does not always show a sharp contrast:

In contemporary Western bioethics discourse, the abortion debate has been closely associated with the discussion of personhood.... In summary, while Confucianism does not hold an absolute prohibition on abortion as does the Roman Catholic Church, the general attitude of Confucianism toward abortion is not as significantly different from those of other major world religious-moral traditions, such as Judeo-Christianity, Islam, and Buddhism, as is usually assumed. Yet, the ethical reasons for the Confucian “conservative” view may be very different from those of other religious-moral traditions (Nie, 2002, p. 24).

This view comes from the observation that:

The Confucian concept of *jen* and the Christian concept of *perichoresis* both have much to contribute to modify the narrowly psychological and individualistic understanding, and the rights-based ethics derived from it, currently prevalent in the West.... A relational understanding of personhood would question whether it would be entirely a matter of a woman’s right or autonomous choice to abort a foetus when the personhood of the foetus could very well have been established by the maternal-foetal relation (Hui, 2000, p. 116).

According to Nie, the concept of filial piety can be extended to subsume a parental obligation to the unborn:

In the Confucian moral and political tradition, filial piety is far from merely being a domestic virtue concerning parent-child relationship. As the *Xiao Jing* (The Classic of Filial Piety) emphasizes, filial piety is “the basis of all virtues and the source of culture” as well as “the basic principle of Heaven, the ultimate standard of earth, and the norm of conduct for the people.” Among the important moral duties filial piety requires individuals to fulfill is to maintain the integrity of the body for the reason that the body is given by parents. In the *Xiao Jing*’s words, “The body and limbs, the hair and the skin, are given to one by one’s parents, and to them no injury should come; this is where filial piety begins.” Another moral duty is to continue one’s family line. Confucianism considers having no offspring or heirs the most serious violation of filial piety.

...Before the foetus is formed into a human being, it is a part of the mother’s body. Filial piety requires that no one should injure his or her own body. When the foetus is formed into a human being, he or she becomes a member of the family and patri-lineage, who possesses physical and spiritual connection with ancestors. Induced abortion after the foetus is formed is thus a serious violation of the ancestral cult and of filial piety (Nie, 2002, p. 22).

Obviously, this discussion raises interesting questions regarding the official Chinese line on abortion and on more dominant interpretations of Chinese traditional texts. The differences are illustrative of some of the difficulties that we encounter in the effort to arrive at a coherent characterization of bioethics in the Asia-Pacific.

In another place, Fan draws a distinction between Western and Eastern concepts of autonomy:

The Western principle of autonomy is an individual-oriented principle. It requires that the patient, as long as being competent, have the final authority to make clinical decisions for himself. It is his own desires, preferences, and opinions of the good life that serve as basis for his decision-making. The principle promotes the value of individual differentiation and independence from the family, the physician, and the cultural group. Under this principle, the physician must disclose diagnosis, prognosis, and treatment options directly to the patient, no matter how harsh the information is. The exception is only justifiable either when substantial evidence shows that offering the truth will severely harm the patient or when the patient clearly expresses that he does not want to know the truth.

In contrast, the East Asian principle of autonomy is a family-centred principle. The principle implies that the entire family, rather than the individual patient, should have the final authority over clinical affairs. The family's decision should be made for the best interests of the patient in accordance with the objective conception of the good life adopted by the local cultural group. And it is the value of harmonious dependence between family members, rather than individual differentiation and independence, that this principle upholds (Fan, 1998).

Fan holds that the varying conceptions of autonomy affect peoples' conceptions of truthfulness. Hence, they tend to adopt different attitudes towards truth-telling in matters pertaining to the health conditions and treatment of family members:

In short, the East Asian principle of autonomy, with all its substantive content..., has profound implications for East Asian clinical ethics. It shapes the ways in which the practice of truth-telling, informed consent and advance directives are performed in the East Asian clinical setting (Fan, 1997).

Other philosophers have sought to distinguish Western from Asian ideas of human rights:

Recently, the debate between the Western idea of human rights and an 'Asian' one has flared, and is raging. But, there is no iron curtain or bamboo screen between these ideas. The Asian responses to the Western ideas are not monolithic, but rather complex and, I would like to add, more intriguing, showing the nimbleness and flexibility of the human mind (Hamano, 1997).

...paternalistic and hierarchy-oriented behaviour patterns are deeply ingrained in the Japanese medical system. A certain rhetoric drawn from Confucian tradition was used to make Japanese people receptive to that kind of behaviour, and so to reinforce that tendency in doctors. But, as Nakae Chomin noted about 100 years ago, a tradition can be modified and enriched, and Confucianism can be modified and used to realize and reinforce democratic and human rights among Japanese people.

...the Japanese bioethicist of today must make both theoretical and practical efforts to reinforce Japanese democratic and human rights tradition, and help it take root more deeply in Japanese society (Hamano, 1997).

Some writers have chosen to highlight the impact that Western ideas have had on Asian bioethics, especially with reference to more recent developments. Indeed,

bioethics as an academic discipline is of more recent origin and its growth in the Asia-Pacific can be attributed – to a certain extent – to local response to what has gone on in the West. For instance:

It is fair to say that biomedical ethics in Japan developed in the wake of the West, particularly that of the United States. The first phase of Japanese biomedical ethics, as we define it, was largely “an importation of Western biomedical ethics.” This took form in a number of dimensions – academic, clinical, political, and social. For example, one academic group from Chiba University enthusiastically started translating and introducing a selection of representative articles; the majority of these articles were written in English. At the same time, Japanese translations of well-known books written in English were published, such as Rothman’s *Stranger at the Bedside*, Beauchamp and Childress’s *Principles of Biomedical Ethics*, Engelhardt’s *The Foundation of Bioethics*, and Jonsen, Siegler, and Winslade’s *Clinical Ethics*. These works were the basis for future developments in the field of Japanese biomedical ethics both inside and outside academic circles (Akabayashi and Slingsby, 2003, p. 261).

Aside from publications, there were also structural changes as Japanese institutions saw the virtue in Western models of instruction and ethics committee review:

Educational institutions also instigated several internal reforms. All medical schools established ethics committees by the early 1990s; the majority of medical schools also commenced either mandatory or elective courses for biomedical ethics. Academic societies were also established, including the Japanese Society for Bioethics in 1988, concurrent to the launching of several Japanese academic journals and newsletters (Akabayashi and Slingsby, 2003, p. 261).

This account of a local response to foreign models of bioethics practice holds true not only for Japan but also for many other parts of the Asia-Pacific. Many countries in this region have now taken up the publication of Western books and journals in local languages. In hospitals and research institutions, ethics review or consultation committees have been established, and bioethics courses have been offered in academic institutions, taking after Western models. In the field of biomedical research, institutional ethics committees or national ethics committees based on Western models have been established in countries such as Thailand, the Philippines, Indonesia, India, Pakistan, Nepal, Malaysia, Fiji, Cambodia, the Lao Peoples’ Democratic Republic, Vietnam and South Korea. In this regard, one sees the danger that Asian values would get lost in the urban jungle of Western structures.

While some people may tend to look for something that is unique to the region, one also has to be mindful of the interactions that take place as part of historical developments in the effort to characterize Bioethics in the Asia-Pacific Region. These developments may be viewed as historical accidents that occur within, and are informed by a particular cultural context. As Akabayashi and Slingsby further point out as regards Japan:

In Japan, modern biomedical ethics emerged in the early 1980s. One of the main triggers was the nationwide debate on organ transplantation and brain death. A lengthy process of academic, religious, and political discussion concerning organ transplantation, lasting well over a few decades, resulted in the enactment of the Organ Transplantation Law in 1997. The defining of death and other bioethical issues, including death with dignity and euthanasia, were also stimulating topics throughout the latter end of the twentieth century. For instance, the death-with-dignity movement, which started around the late 1960s, developed into a hospice/palliative-care movement by the end of the 1980s.

The landmark euthanasia court case of 1991 concerning mercy killing by an attending physician further stimulated bioethical discussion throughout Japan. The decisive verdict found the physician, who administered potassium chloride (KCl) to a terminal cancer patient, guilty of homicide. The physician was sentenced to 2 years imprisonment and given a suspended sentence in 1995. The legal consciousness regarding bioethical issues exemplified by this case has continued to grow gradually stronger in recent years. The idea of historical accidents defining certain features of bioethics in the region is further illustrated in the following account of developments in Australia:

[One issue] goes to the core of the question of what bioethics is and what role professional societies should play in public policy. This question became particularly pressing in August 2001 when a Norwegian ship, the MV Tampa, rescued 430 refugees from an Indonesian boat sinking off the coast of Australia in international waters and entered Australian waters on humanitarian grounds hoping to be allowed to have them disembark on Christmas Island, but permission was refused by the Australian government (Ankeny, 244-245).

The official response of the Australian government was to look for other countries in the Asian region that were willing to take in the people seeking asylum. However, this did not sit well with bioethicists:

A number of Australia and New Zealand – based bioethicists became involved because they were very troubled by the way in which these asylum seekers were treated and the way in which the media and

politicians portrayed them, including accusations of throwing their children overboard as a form of political blackmail (accusations that were later found to be unsupportable at best, and at worst concocted for political purposes during an election period) (Ankeny, 244-245).

What can be highlighted here is the expansion in the perceived scope of bioethics. Bioethics is truly an expanding discipline. In this region, the expansion is resulting in the broadening, adaptation and even redefinition of bioethics:

There may seem to be no connection between this event and bioethics, but many bioethicists saw this as the deepest sort of bioethical dilemma, associated with fundamental human rights to life and health. The result was a statement signed by a number of Australasian bioethicists that is thought to have had considerable influence on the outcome in this case – notably, the willingness of the New Zealand government to take in some of the asylum seekers....

The health status of these and other refugees is viewed as of deep moral concern because particularly those within Australia or in its centres are in a sense part of our population but do not have the right to care through the public health system unless they hold valid visas. Thus, they are an especially vulnerable sector of the population. Issues are continually raised about providing appropriate healthcare within the detention centres, particularly at the Woomera Detention Centre in remote Southern Australia, which has become notorious because of concerns over the mental health status of refugees, including incidents of self-mutilation and suicide as well as poor access to care, inadequate staffing, and lack of cultural sensitivity of care.... As a result of these developments, there is a move in Australasia to actively re-conceptualize bioethics as really being about the flourishing of human life and to look beyond the hospital and clinic to these wider, global issues as a very real part of what we need to be doing as bioethicists, including “engaging with the political” (Ankeny, 244-245).

If globalization has resulted in Western influences on the growth of bioethics in the Asia-Pacific Region, it has also manifested in the pursuit of offshore activities by developed countries in this part of the world:

[Some] Australian researchers and biotechnology companies are going “offshore” to pursue genetic research, particularly in places with small, stable, and relatively genetically homogeneous populations with higher prevalence of certain diseases. Although these projects might be handled in a similar manner to the Iceland DeCODE project, there are clearly issues raised about “vulnerable” populations and the adequacy of community consent. For instance, there has been

a debate about the use of DNA samples from the Republic of Tonga to study diabetes. These sorts of research projects have prompted bioethicists and community representatives, among others, to urge Australian researchers and the government not only to consider responsibilities to our own population and within our boundaries, but also responsibilities beyond our shores where research is aimed at benefiting our populace (Ankeny, 243).

To a certain extent, the original popularity of bioethics provided people an outlet for ethical debate and deliberations without having to engage in legal tussles. However, there are limits to the capacity of philosophical discussions and extralegal remedies to settle disputes. Hence, there seems to be an emerging pressure to seek legal remedies. This pressure has given rise to the attempt in several Asian countries to enact laws on medical malpractice. Australia has also seen this emerging trend:

A third emerging issue is the increasing amount of legal action and litigation against medical practitioners and hospitals, coupled with exponential increases in the cost of malpractice insurance in the past few years. These developments have created not just political and legal issues but have fed into ethical considerations about the conditions for provision of care, particularly within certain medical specialties or certain rural or more isolated regional areas. These problems began in Australia before September 11, but were heightened afterward as a number of private health insurance companies (some of which are partially subsidized by the government) have had an increasingly difficult time staying in business. (Although all Australians have public health insurance called Medicare, many also take out supplemental private insurance, sometimes with employer assistance, particularly given that there are tax-based incentives to do so.) Some of the results have been that more physicians are choosing to leave private practice and there have been decreases in practitioners in particular areas of specialization that are very problematic and likely to result in reduction of availability of services. Additionally, there already have been decreases in the benefits available through private health insurance and increases in cost to the consumer. The likely outcomes are that people will choose not to continue private health insurance (which will result in increased pressures on the public system) and the availability of healthcare services will decrease in certain areas of specialization; for instance, obstetric and gynecology or certain kinds of surgery particularly at smaller health centres and in rural areas (Ankeny, 244).

Interestingly, this account of the trend towards more litigation cites possible outcomes that have been feared in countries where medical malpractice bills have

been debated. In the Philippines, for example, medical doctors and other health professionals have lobbied strongly against the passage of a medical malpractice law because they fear that the enactment of such a law will encourage a torrent of litigation against practitioners.

Adding to the diversity in the region is the large number of ethnic groups within the various countries. Here is, for example, an account of Maori views pertinent to organ transplantation:

In traditional Maori belief, at death the wairua (loosely translated as 'spirit') begins the process of leaving the body. The wairua of a deceased donor may be affected by actions taken after death, for example organ donation. There may be two explanations for this. During human life the body was the home of the wairua, and as such deserves respect. Metaphorically disrespect to the body might be said to be like disrespect to a place made holy by the past presence of a deity or saint. Taking organs from a cadaver may be construed as a failure to show the respect due to the body, as it is in effect 'stripped' or harvested of its organs. It may also be seen as putting the individual parts of the body before the whole.

The wairua may also be affected by organ transplantation in a second way. Traditional Maori belief is that death is not an instantaneous occurrence, but rather a progression from life to full death which does not cease at the point of physical death (however that might be physically established)... the wairua must undergo a transformation of understanding and go through a process of becoming part of the next world. This is reflected in the Maori Tangihanga, or funeral ceremonies, that often last three or more days (Lewis and Pickering, 2003).

Moreover:

The wairua is believed to leave the body upon death, but to come and go from the corpse as it slowly ventures out to explore the newly discovered spiritual realm (Rameka and Te Pania, 1990).

Here, one may observe that the approach taken deviates significantly from contemporary discussions of the ethical issues involved in organ procurement, donation and transplantation. The perspective hews closely to local beliefs that border on what some may mistakenly regard as superstition. However, to describe the beliefs as superstitious is to ignore the spirituality that is a natural part of lay people's views on what is going on around them. Spirituality refers to a natural dimension that does not necessarily take one to the level of superstitions.

In this regard, it has been pointed out that “the challenge that traditional medicine poses to biomedicine and consequently to bioethics is not just the avoidance of what Kleinman calls ‘categorical fallacy’ – i.e., ‘imposition of a classification scheme onto members of society for whom it holds no validity’ – but also the sheer philosophical space these medicines open up for us” (Sy, 1998, p. 105). The point is that traditional medicine is not, as some people still think, an outmoded precursor of modern medicine. Instead, traditional and modern medicine must be seen to be complementary modes of health care:

Needed... are ethical systems that respect this kind of medical pluralism. Forcing the biomedical discourse into the Filipino culture may do more harm than good. Some academics call for the integration of biomedicine and traditional/alternative medicine. But, more often than not, integration turns out to be a subsumption of the weak by the strong, of traditional medicine by biomedicine. The alternative to the integration model is “osmosis” – the mutual absorption of good qualities of both biomedicine and traditional medicine as well as their concomitant ethical discourses (Sy, 1998, pp. 105-106).

Other issues have come to the fore in discussions concerning the tension between modern medicine and traditional medicine in Thailand:

There is no doubt that Thai people benefited a lot from modern medicine. But by following American medical models, Thai modern medicine has created many ethical problems that are difficult to deal with, for example, hospital-orientated medicine, research and specialized training has become predominant over primary health care and public health. The complex ethical problems concerning euthanasia, human experimentation, organ transplantation and the new reproductive technologies are also emerging as a result of using hi-tech medicine (Ratanakul, 1998, p. 98).

While he acknowledges that “the replacement of traditional medicine by modern medicine” contributed to the birth of bioethics in Thailand, Ratanakul also sees the separation of modern medicine from morality and spiritual dimensions:

Thai traditional medicine has Buddhist values as its main component. Many Thai doctors who are practicing modern medicine were trained in America and/or Europe and they brought with them to Thailand not only knowledge of modern medicine, but also some of its accompanying values such as the free market ideology which values wealth over persons and human needs. If this tendency continues, modern medicine will create an equitable society where only the rich get quality health care. Doctors will be like businessmen pursuing

their own self-interest, and medicine would become a profit-making enterprise as in many countries in the West (Ratanakul, 1998, p. 98).

Thus, Ratanakul perceives a contrast that is a familiar concern among other regional writers as he outlines the task for Thai bioethics:

Modern medicine is analytic, i.e., it separates the physical from the mental, and the pathological part from the other parts of the human system. Modern medicine also lacks religious values and spiritual aspects. The main task of bioethics in Thailand is to coordinate a creative relationship between modern medicine, traditional medicine and Buddhism, so that medicine in Thailand could be holistic, scientific and humane and... serve the health needs of all people... rich or poor (Ratanakul, 1998, p. 98).

The task identified here is perhaps something that ought to be on the agenda of all countries in this region. We may not agree with the specific boundaries that are being drawn by others between Oriental bioethics and Western bioethics. Some of us may find the boundary between modern medicine and traditional medicine equally murky. However, it is not important where the lines are drawn exactly. As a minimum requirement, we only have to be mindful that such lines need to be drawn somewhere so that people from the Asia-Pacific Region can, as it were, develop the terms of their engagement with the non-Asian. That is an absolute necessity if they are to preserve, develop and promote the regional character of their bioethics as well as the “Asianness” of their identity.

This album of snapshots can go almost without limit. For, the Asia-Pacific mind is itself limitless. We may try to pin it down in some way, but we can only manage to capture one or another dimension. That is the way bioethics can also go. However, in this ever contracting, and ever expanding world of global dimensions, we all have to learn how to deal with bioethics issues, each in our own way, but also in a way that respects the views of others. That is the challenge that bioethical agenda-setting needs to face.

## **RECOMMENDATIONS**

Based on the observations made in the preceding sections, there is one need that seems to stand out – the need for continuing public dialogue on the emerging issues of bioethics. This is something that is clearly in the minds of many bioethicists speaking on these issues. For example:

The other task of bioethics is to makes doctors, nurses and the public aware of the involvement of modern medicine with bioethical problems. The public is emphasized because health care reform or improvement of the quality of health care services cannot be done without public participation. Bioethics not only brings bioethical

issues to the attention of the medical profession and the public, it also encourages them to solve these problems within the framework of Thai culture built upon Buddhism.... (Ratanakul, 1998, pp. 98-99).

Concerning the newly-emerging issues of genetics and biotechnology, the general sentiment is that “it is very important to have time for the discussions on new biotechnology and social psychological consequences, through these mass media in order to let the general public think about these problems” (Hirayama, 1998, p. 142).

But, it is not enough to have deliberations at an informal level. The dissemination of information and the education of the public has to be undertaken in a structured manner in order to ensure that messages are not distorted and that objectives are truly attained.

The structure of bioethics education itself has to be closely monitored. A study of bioethics education in Japan revealed a “lack of theoretical and organizational basis of interdisciplinary fields extending over medicine, humanities and the social sciences,” a weakness that has been explained in terms of “the gap between the structure of Japanese academic activity and the interdisciplinary character of bioethics” (Miyasaka, 1998, p. 146).

A structured educational programme has to be systematic. It has to enable a reflection within a regional bioethics framework, i.e., within the framework of the cultures of the region.

What is lacking in Thailand is a systematic reflection on these problems within Thai/Buddhist cultural framework (Ratanakul, 1998, pp. 98-99).

A systematic reflection has to be carried out that takes into account the diversity of cultures in the Asia-Pacific, taking care to avoid a general characterization of one “Asian” bioethics that would tend to dilute the identities of small countries or ethnic groups that have not had a dominant impact on international perceptions.

At the same time that we are citizens of the Asia-Pacific Region, we are also citizens of the world. We are all part of a larger world that defines for us a global citizenship. Hence, there is also a need to view bioethics education from a global perspective:

The biosciences and technology require us to develop a new force for education – a force that will need to be – in its own right – more powerful than the force of science, the force of politics, and the force of law. We require in bioethics the force of an education – an international education – that can redress with understanding the

border-lines between rapidly fading differences (Crawley, 1998, p. 139).

In general, what is thus required is democratic bioethics:

The mandate for bioethics education is a mandate for democratic bioethics. Bioethics education has to accommodate the ignorant and the under-empowered in the process of reflective conversation. The basic requirements are: (1) information that broadens and deepens knowledge concerning issues of bioethics by the masses, and (2) popular participation in decision-making and policy-formulation” (de Castro, 2000, p. 15).

In summary, Asia-Pacific bioethics needs to be democratic. It also needs to manifest a regional character. Bioethics in the Asia-Pacific must reflect the richness of perspectives characteristic of the region. At the same time, an Asian response calls for a coherent initiative to foreground bioethics as a public discourse. Such an initiative may involve:

1. the institutionalization of discussion and dialogue on the ethical, legal and social implications (ELSI) of health care and related developments and practices across the region. This component of the initiative should provide a venue for experts, bioethicists, organizations, and the general public to engage in meaningful bioethical reflection on a regular and structured basis.
2. the coordination of various initiatives among bodies like UNESCO that grapple with bioethical issues and concerns in the region, especially because many of them directly involve member governments and nationals. Such public discussion and dialogue will not only help promote people-to-people, government-to-government understanding and cooperation in matters of health and science but will also elevate public accountability to the regional level. The initiative will also help demonstrate the heightened level of confidence and readiness of Asian countries and regional organizations as mature members of the international community.
3. mechanisms to promote bioethics education and training in the region. In order to be sustainable, education and training in bioethics has to link up with established academic institutions that can be expected to offer courses regularly. The idea is to directly develop “public centres” of bioethical discourse. For instance, assistance to universities to develop bioethics programmes (including short term courses, seminars, training, and academic degrees) would certainly go a long way in reaching a critical mass of people who pay special attention to bioethical issues and concerns. The initiative may also involve fellowship programmes among Asian universities that allow the exchange of scholars and students who have special interests and competences in bioethics.

4. the bioethics training of media practitioners and opinion makers in the region. While media people generally have the responsibility to make plain to the public complicated bioethical issues, they sometimes contribute to misunderstanding and confusion. An educated media can be better prepared to help bring about an educated public discourse on bioethics.
5. the direct involvement of civil society organizations in the various components of the initiative, as outlined above.
6. multilateral, multi-sectoral working groups for the monitoring of developments that have bioethical implications. These working groups can discuss emerging issues upon the request of the UNESCO in Bangkok and make pertinent recommendations or prepare briefing papers.

## **APPENDICES**

### **Appendix A**

#### **Summary of Abortion Laws in Asia**

Adapted from Pregnant Pause, 2002

1. Some Asian countries have blanket prohibitions against abortion with no explicit exceptions, but in practice the legal system allows a defense that the abortion was necessary to save the life of the mother.
2. Some Asian countries have laws saying that abortion is legal when it is necessary to protect a woman's "health" (although it is contested whether this includes "mental health" or only physical health).
3. Perhaps the most common is a requirement that the woman's husband consent to the abortion. (Such laws usually say that if the girl is not married and under age, her parents must consent instead). Most Moslem countries have this restriction.
4. In a few cases – most notably Australia – different political subdivisions within the country have different laws. In such cases, we have tried to list the "typical" or "most common" law for that country.



## **Appendix B**

### **Estimated HIV prevalence and major mode(s) of HIV transmission in some Asia-Pacific countries, 2000**

Adapted from UNAIDS/WHO Global Report (June, 2000, estimated for the year 1999) – with more recent estimated numbers (for the year 2000) for Cambodia, China, India, Indonesia, Malaysia, Nepal, Papua New Guinea, the Philippines, Sri Lanka, Thailand and Vietnam, with prevalence rates based on the 15-49 year-old population of 2000 as the denominator – \* estimates in 2001

Country	Population 15-49	Number HIV+	HIV Prev (%)	HET	MSM	IDU	Comments
Cambodia	6 091 000	169 000	2.77	+++	-	-	* Extensive HIV spread among FSW and their male clients, but limited spread from infected clients to their sex partners.
Myanmar	25 768 000	510 000	1.99	+++	-	++	
Thailand*	36 241 000	671 000	1.85	+++	-	++	
India	522 862 000	3 900 000	0.75	++	-	+	* Major diversity among states.
Papua New Guinea	2 450 000	15 000	0.60	++	-	-	* Increasing heterosexual transmission.
Malaysia	11 654 000	42 000	0.36	-	-	++	* Extensive HIV spread among IDU cohorts, but limited spread to other high HI-risk behaviour cohorts.
Nepal	10 822 000	34 000	0.30	+	-	++	
Vietnam	42 275 000	122 000	0.29	+	-	++	
Singapore	2 027 000	3 900	0.19	-	+	-	* Initial MSM importations.
Australia	9 543 000	12 000	0.13	-	++	++	* Primarily MSM and IDU
Pakistan	72 468 000	73 000	0.10	-	-	++	* Diverse patterns and spread among IDU.
Indonesia	116 009 000	100 000	0.09	-	-	++	* Recent IDU epidemics
China	720 355 000	600 000	0.08	-	-	+++	* Primarily focal IDU epidemics
Sri Lanka	10 572 000	8 500	0.08	-	-	-	
Fiji	429 000	300	0.07	-	-	-	
Hong Kong	3 918 000	2 500	0.06	-	+	-	* Initial MSM importation
New Zealand	1 939 000	1 200	0.06	-	+	+	* Primarily MSM
Maldives	131 000	<100	0.05	-	-	-	* Low HIV prevalence among all HIV-risk behaviour cohorts. The vast majority of HIV infections are imported with some limited transmission from these imported infected persons to their steady or regular sex partners.
Lao PDR	2 402 000	1 300	0.05	-	-	-	
Philippines	38 428 000	10 000	0.03	-	-	-	
Bangladesh	68 021 000	13 000	0.02	-	-	-	
Japan	58 098 000	10 000	0.02	-	+	-	
Rep. of Korea	22 700 000	3 800	0.01	-	-	-	
DPR Korea	13 270 000	<100	<0.01	-	-	-	
Mongolia	1 411 000	<100	<0.01	-	-	-	
Bhutan	938 000	<100	<0.01	-	-	-	
Brunei Darussalam	178 000	<100	Low	-	-	-	
Other Pacific Island countries	1 300 000	1 300	<0.01	-	-	-	
<b>Total</b>	<b>1 692 300 000</b>	<b>6 304 300</b>	<b>&lt;0.1</b>				

(-) Unknown or minimal HIV transmission; (+) limited HIV transmission; (++) moderate HIV transmission; and (+++) major HIV transmission

## Appendix C

### HIV Penetration into some Asian and Pacific Countries

Adapted from Monitoring the AIDS Pandemic Network, 1997

<i>Countries with epidemic spread</i>	<i>Current HIV Epidemic Trends</i>		<i>Main Populations Affected</i>	<i>Projected HIV Epidemic Trends (3-5 Years)</i>
	<i>HIV incidence</i>	<i>HIV prevalence</i>		
Australia	Low and decreasing	Low and stable	MSM	Decline
Cambodia	High and increasing rapidly	High and increasing	Individuals with high and moderate risk heterosexual behaviour	Sustained upward trend
China	Low except in Yunnan	Low and increasing	IDU	Increasing
India	Moderate and increasing (significant regional variation)	Still low but increasing (significant regional variation)	Individuals with high-risk heterosexual behaviour and IDUs	Increasing
Malaysia	Moderate and increasing	Low and increasing	Principally IDUs but increasing among individuals with high-risk sexual behaviour	Increasing
Myanmar	High and increasing	High and increasing	Individuals with high-risk heterosexual behaviour, IDUs and their spouses	Increasing
New Zealand	Low and decreasing	Low and stable	MSM and IDU	Decline
Papua New Guinea	Moderate and increasing	Low but increasing	Individuals with high-risk heterosexual behaviour	Slowly increasing
Thailand	Moderate and stabilizing in specific groups	High but stabilizing	IDUs and individuals with high and moderate risk heterosexual behaviour	Tending to stabilize
Vietnam	Moderate and increasing	Still low but increasing	Principally IDUs but increasing among individuals with high-risk sexual behaviour	Increasing

<i>Countries w/low transmission</i>	<i>Current HIV Epidemic Trends</i>		<i>Main Populations Affected</i>	<i>Projected HIV Epidemic Trends (3-5 Years)</i>
	<i>HIV incidence</i>	<i>HIV prevalence</i>		
Bangladesh	Low	Low	Individuals with high-risk heterosexual behaviour	Slowly increasing
Indonesia	Low	Low	MSM, Bisexual and high-risk heterosexual behaviour	Slowly increasing
Japan	Low	Low	Previously blood product related, currently sexual	Slowly increasing
Hong Kong	Low	Low	MSM	Slowly increasing
Nepal	Low except in IDUs	Low except in IDUs	Individuals with high-risk heterosexual behaviour and IDUs	Slowly increasing
Philippines	Low	Low	Individuals with high-risk heterosexual behaviour	Slowly increasing
Singapore	Low	Low	MSM, IDUs	Slowly increasing
Sri Lanka	Low	Low	Individuals with high-risk heterosexual behaviour and MSM	Slowly increasing

## Appendix D

### HIV Distribution Among Selected Asian And Pacific Populations

Adapted from Monitoring the Aids Pandemic Network, 1997

<i>Country</i>	<i>IDU*</i>	<i>HET**</i>	<i>MSM***</i>	<i>Country</i>	<i>IDU*</i>	<i>HET**</i>	<i>MSM***</i>
Australia	+	+	++	Japan	+	+	+
Bangladesh	+	+	+	Lao PDR	+	+	+
Cambodia	+	+++	+	Malaysia	+++	++	++
China				Myanmar	+++	++	++
– Yunnan Prov.	+++	+	++	Nepal	+++	++	++
– Hong Kong	+	+	+	Philippines	+	+	+
– Rest of China	+	++	+	Republic of Korea	0	+	+
India				Sri Lanka	0	+	+
– West & South	+	+	+++	Thailand	+++	++	+
– Central & East	+++	+	+	Vietnam	+++	+	+
– Northeast	+	+	+				
Indonesia	+	+	++				

Chart legend:

+++ high or rapidly growing ++ relatively low or “plateauing” + not a major component 0 no evidence of spread.

\* IDU: Injecting drug users \*\* HET: Heterosexual men and women \*\*\* MSM: Men having sex with men.

**Appendix E**  
**The Number of Lung, Heart-Lung Transplantation**  
**(Asia and the Middle and Near East)**

Adapted from Transplant Communication, 2002

**Lung**

	'95	'96	'97	'98	'99	'00
Japan	0	0	0	1	0	7
India	0	0	0	0	1	1
Korea	0	2	0	0	3	1
Saudi Arabia	–	1	0	2	0	0
Thailand	4	1	3	2	3	2
Taiwan	3	11	10	4	4	3
P.R. China	0	2	0	1	8	0
Hong Kong	1	0	1	1	2	2

**Heart-lung**

	'95	'96	'97	'98	'99	'00
Korea	0	0	3	0	0	0
Thailand	5	6	2	3	2	3
Taiwan	0	0	0	0	1	3
P.R. China	1	0	0	0	2	0
Hong Kong	1	0	0	0	0	0

**Appendix F**  
**The Number of Heart Transplantation**  
**(Asia and the Middle and Near East)**

Adapted from Transplant Communication, 2002

	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00
Japan	0	0	0	0	0	0	0	0	0	0	3	3
U.A.E	0	0	0	0	0	0	0	0	0	0	0	–
India	0	0	0	0	0	0	4	7	2	22	14	8
Indonesia	–	–	0	0	0	0	0	0	0	0	0	–
Oman	0	0	0	0	0	0	0	0	0	0	0	0
Korea	0	0	0	1	1	26	21	20	29	30	28	14
Saudi Arabia	–	–	5	6	–	–	–	5	5	4	6	3
Singapore	0	1	5	1	3	3	0	0	2	1	5	–
Thailand	14	15	6	12	6	11	13	7	14	5	3	3
Taiwan	0	0	0	2	37	31	24	41	66	54	41	43
P.R. China	0	0	0	0	2	2	1	1	7	12	15	26
Pakistan	0	0	0	0	0	0	0	0	0	0	0	0
Bangladesh	0	0	0	0	0	0	0	0	0	0	0	0
Philippines	0	0	0	1	0	0	0	0	0	0	0	0
Hong Kong	0	0	0	1	0	1	4	3	7	2	6	6
Malaysia	0	0	0	0	0	0	0	0	1	3	2	3
Bahrain	–	–	0	0	0	0	0	–	–	–	–	–
Qatar	–	–	0	0	0	0	0	–	–	–	–	–

**Appendix G**  
**The Number of Liver Transplantation**  
**(Asia and the Middle and Near East)**

Adapted from Transplant Communication, 2002

	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00
Japan	1	10	30	31	51	82	112	119	157	207	241	320
U.A.E	0	0	0	0	9	7	0	0	0	0	0	–
India	0	0	0	0	9	12	0	0	4	14	6	17
Indonesia	–	–	0	0	0	0	0	0	0	0	0	–
Oman	0	0	0	0	0	0	9	0	0	0	0	0
Korea	0	0	0	7	0	0	25	48	64	100	196	227
Saudi Arabia	–	–	0	2	–	–	–	28	26	21	25	27
Singapore	0	1	2	1	4	7	1	9	15	11	17	–
Thailand	10	11	4	3	1	0	10	9	18	12	13	11
Taiwan	7	6	11	7	0	0	16	18	22	31	29	49
P.R. China	1	1	1	0	0	0	9	14	14	27	118	234
Pakistan	0	0	0	0	0	0	0	0	0	0	0	0
Bangladesh	0	0	0	0	0	0	0	0	0	0	17	0
Philippines	0	1	0	1	0	0	0	1	0	0	0	3
Hong Kong	0	0	3	2	0	0	23	27	15	27	36	54
Malaysia	0	0	0	0	8	28	9	5	0	0	0	3
Bahrain	–	–	0	0	0	0	0	–	–	–	–	–
Qatar	–	–	0	0	0	0	0	–	–	–	–	–

**Appendix H**  
**The Number of Pancreas (+kidney) Transplantation**  
**(Asia and the Middle and Near East)**

Adapted from Transplant Communication, 2002

	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00
Japan	0	1	6	4	0	0	0	-	-	-	-	1
U.A.E	0	0	0	0	0	0	0	-	-	-	-	-
India	0	0	0	0	0	0	0	-	-	-	-	-
Indonesia	-	-	0	0	0	0	0	-	-	-	-	-
Oman	0	0	0	0	0	0	0	-	-	-	-	-
Korea	0	0	0	0	2*	5*	0*	2	3*	9	9	10
Saudi Arabia	-	-	1	1	-	-	-	-	-	-	-	-
Singapore	0	0	0	0	0	0	0	-	-	-	-	-
Thailand	0	1	0	0	0*	0*	5*	0*	0*	0	0	0
Taiwan	1	0	0	0	0*	0*	0*	1*	0*	0*	0*	0*
China	1	2	15	6	0	0	0	1	1	8	22	33
Pakistan	0	0	0	0	0	0	0	-	-	-	-	-
Bangladesh	0	0	0	0	0	0	0	-	-	-	-	-
Philippines	1	0	0	0	0	0	0	-	-	-	-	-
Hong Kong	0	0	0	0	0	0	1	-	-	-	-	-
Malaysia	0	0	0	0	0	0	0	-	-	-	-	-
Bahrain	-	-	0	0	0	0	0	-	-	-	-	-
Qatar	-	-	0	0	0	0	0	-	-	-	-	-

**Appendix I**  
**The Number of Renal Transplantation**  
**(Asia and the Middle and Near East)**

Adapted from Transplant Communication, 2002

	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00
Japan	808	771	697	612	575	550	563	638	595	658	724	746
U.A.E	5	11	8	5	7	8	7	2	1	2	3	–
India	1 200	1 584	1 960	2 440	2 300	2 500	900	1 400	2 059	3 485	3 624	3 406
Indonesia	–	–	22	23	29	34	24	179	216	18	13	–
Oman	2	15	–	54	8	8	8	23	36	8	16	7
Korea	572	624	685	902	719	690	904	941	962	1 012	1 094	670
Saudi Arabia	–	–	201	268	–	–	–	230	262	244	264	254
Singapore	32	56	56	84	42	84	64	71	55	68	76	–
Thailand	74	88	72	69	110	100	120	170	87	90	265	91
Taiwan	103	97	162	148	188	145	117	132	191	144	96	135
P.R. China	1 049	1 670	1 746	1 906	1 849	1 621	2 382	2 792	2 552	3 379	4 265	5 501
Pakistan	69	79	–	–	150	160	175	182	626	624	725	1 186
Bangladesh	11	4	9	9	0	0	13	20	15	20	17	29
Philippines	120	128	97	110	126	124	112	133	143	230	499	–
Hong Kong	78	107	50	58	51	58	63	154	135	70	71	60
Malaysia	46	54	–	–	127	172	77	129	35	45	59	52
Bahrain	–	–	0	0	0	0	0	–	–	–	–	–
Qatar	–	–	–	–	1	0	1	–	–	–	–	–

**Appendix J**  
**Cornea Transplants in Singapore**

Adapted from Singaporean Ministry of Health, 2003

<i>Year</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>
Total number of cornea transplants	135	144	166	191	158	200
Corneas from Singapore	45	48	84	118	96	72
Corneas from USA	39	82	70	72	62	128
Corneas from Sri Lanka	49	14	12	1	0	0
Corneas from Australia	2	0	0	0	0	0

*Note:* The average number of patients on the waiting list at any one time is relatively small (about 30) because of the large number of transplants.

## Appendix K

### Kidney Transplants in Singapore

Adapted from Singaporean Ministry of Health, 2003

<i>Year</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>
Number of cadaveric kidney transplants with organs obtained under HOTA	16	9	10	18	10	18
Number of cadaveric kidney transplants with organs obtained under MTERA	28	16	32	36	34	28
Number of living donor kidney transplants	18	14	26	34	30	46
Number of patients on kidney transplant waiting list	528	553	574	607	639	650
Number of patients who died while waiting for kidney transplant	5	4	5	6	7	0

**Appendix L**  
**Liver Transplants in Singapore**

Adapted from Singaporean Ministry of Health, 2003

<i>Year</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>
Number of cadaveric liver transplants with organs obtained under MTERA	6	11	7	13	10	7
Number of living donor liver transplants	3	4	4	5	1	3
Number of patients on liver transplant waiting list	17	15	24	12	21	25
Number of patients who died waiting for liver transplant	13	24	18	21	12	8

## Appendix M

### Regulations on Labeling and Production of Genetically Engineered Foods in Some Asian Countries

China	China announced on June 7, 2001 a comprehensive labeling system on GMO seeds and food products. The new Bio-safety regulation on GMOs in Agriculture is the legislative framework safeguarding biodiversity, the environment and human health against the potential adverse effects of GMOs. It covers the GMO applications in the areas of research, field trials, production, food processing, management, as well as import and export. According to the new regulation, GMOs will be classified into four categories according to the seriousness of their potential impact on the environment and on living organisms. Their releases to the environment need to be approved by relevant authorities. The regulation outlines the mandatory labeling of all GMOs, including seeds, animal feed and food products containing GMOs. Unless GMOs are labeled, their sale will be illegal.
India	Under Indian law, it is illegal to import, produce or sell any GM food without governmental approval. Until now no such approval has been granted.
Japan	In April 2001 labeling of GM food came into force; some GM crops, including StarLink corn, have been banned.
Philippines	The President and Secretary of Agriculture have made GM labeling a government priority and are expected to publish details of GM labeling requirements soon.
Republic of Korea	In March 2001 labeling of GM foods came into force, with enforcement in September 2001.
Thailand	Banned field trials of all GM crops until GMOs are scientifically proven to be safe. Banned imports of 40 GM crops for commercial planting.
Taiwan	Require labeling of GM foods in 2001.
<b>Middle East</b>	
Israel	Israel is preparing regulations for the labeling of GM food, based on EU regulations.
Saudi Arabia	The government has banned animal products that are made from GMOs and has also implemented labeling requirements for GM foods in December 2001.
Sri Lanka	In April 2000, the government banned import of all GM foods.
<b>Oceania</b>	
Australia	In July 2001 labeling rules for GM food came into force.
New Zealand	Labeling rules for GM food in full force in July 2001.

*Sources:* Greenpeace, (n.d.), Cevallos (2003), and Toros (2002).

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## ORGAN DONATION AND TRANSPLANTATION

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## **ETHICS OF ECONOMIC DEVELOPMENT**

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## PREFACE

For long, it was considered that development per se is the answer to human problems like poverty, hunger and unemployment. Since the beginning of the first UN Development Decade forty years ago, this concept has proved to be an over-simplification in the context what is happening in real life in the areas of gender and economic equity, environmental degradation and jobless economic growth. The nineteen nineties witnessed excellent documentation, as well as identification of remedial measures, in various UN Conferences, starting with UN Conference on the Child organized by UNICEF at New York in 1990 and ending with the World Conference on Science and Development organized by UNESCO at Budapest in 1999. We now know the development maladies in ethical terms, as well as the potential remedies. The UN Millennium Development Goals in the areas of hunger, poverty, employment, equity and ecology provide some of the answers to the dilemmas confronting Governments today everywhere.

Bhutan, a small nation, has suggested a method to make development human and nature-centred. This country has proposed the concept of **Gross National Happiness (GNH)**, instead of Gross National Product (GNP), to measure the achievements and impact of development. GNH includes, in addition to the normal indicators of economic development and ecological security, cultural promotion, spiritual values and good governance as additional parameters to measure whether development enhances human happiness or increases human misery (Gross National Happiness, The Centre for Bhutan Studies, Thimphu, Bhutan, July 1999). In this connection, it may be useful to recall the pathway prescribed by the French Mathematician, Marquis de Condorcet, a contemporary of Thomas Malthus, for achieving population stabilization, which is an urgent imperative in most developing countries. Condorcet wrote, “population will stabilize itself, if children are born for happiness and not for mere existence.” An ethical mindset and work culture are pre-requisites for achieving a paradigm shift from mere existence to a productive and happy life.

We now see everywhere a growing violence in the human heart. A part of this violence is due to a feeling of social injustice and inequity. This leads to young men and women committing suicide to kill others. In 1955, Bertrand Russell and Albert Einstein launched the Pugwash movement to sensitise the scientific community about their ethical responsibility for the consequences of their inventions. At that time, their concerns related to nuclear wars. Now, we face the even greater threat of biological weapons, resulting from the unprecedented power conferred by genetic engineering, genomics and proteomics to create novel organisms not found in nature. It is, therefore, time to stress, as Russell and Einstein did 48 years ago, “Remember your humanity, and forget the rest. If you can do so, the way lies open to a new Paradise; if you cannot there lies before you the risk of universal death.”

The present paper is structured in a manner to not only articulate the ethical dimensions of development and management of environmental capital stocks, but also to indicate the pathway to an ethical and happy human future. The International Bioethics Committee of UNESCO has rendered a great service by getting a Universal Declaration on Human Genome and Human Rights adopted by Member States. We need a similar declaration on the Plant Genome and Farmers' Rights. There is also need for a more intensive debate and discussion on the ethical aspects of functional genomics, proteomics and nano-technology. Future economic and human development will become increasingly technology-driven. Unless the technology push is matched by an ethical pull, we will find, to quote Albert Einstein, "the products of our brain will become a curse rather than a blessing."

A useful benchmark for measuring the ethical dimensions of a development effort will be an assessment, whether it is *pro-poor, pro-nature or pro-women*. There should be mandatory introduction of an *ethical impact analysis* in the case of major development projects. The right to food and clean drinking water should be regarded as a fundamental human right, and not as charity. Only then, the urgently needed political priority to education, health care and employment will be forthcoming. The culture of ethics can be fostered rapidly if from early childhood, our education system will help to propagate the following message of Swami Vivekananda "This life is short, the vanities of the world are transient, but they alone live who live for others, the rest are more dead than alive."

*M.S. Swaminathan*

## 1. INTRODUCTION

*'Everyone has the right freely...to share in scientific advancement and its benefits' – The Universal Declaration of Human Rights (1948)<sup>1</sup>*

The Universal Declaration of Human Rights, and the spirit behind it, obliges all of us, whether in the public or the private sector or in civil society, to ensure that there is equitable distribution of benefits from development. It is the moral and ethical obligation of all societies to provide every child, woman, and man an opportunity for a productive and healthy life.

For this transformation to happen, a new social contract where domestic policy will still matter (ethics of sovereignty), which will encourage local level innovations, access to appropriate technologies and the development of skills, will have to prevail. Global and national level policies will have to accelerate the creation of institutional, social and economic enabling environments at the national and regional levels, which will enhance their capacities as partners in development and stewards for equitable growth.

There is an urgent need to develop a truly all-encompassing international code of ethical conduct wherein a range of issues, including the regulation of knowledge monopolies, will be addressed, and ethical commitments will be periodically reviewed and their appropriateness determined in the light of new knowledge and changes in circumstances. Public good partnerships will have to be promoted among governmental, non-governmental organizations and civil society-based organizations through cooperative activities directed toward major groups, such as youth, women, and indigenous populations, to overcome the growing divides in contemporary developmental pathways. For example, it will be necessary to address the rich-poor divide, gender inequity, unemployment, and environmental damage especially in the developing and least developing countries. Particular emphasis will have to be placed on the development of technology specific to this region, technology transfer, training, the development of techno-infrastructures and trade.

Quite a few conventions and declarations support this pathway and emphasize that the ethical issues should be taken seriously, like the 2001 Brussels Programme of Action for the Least Developed Countries<sup>2</sup> and the 2001 Doha Declaration on a new developmental round.<sup>3</sup>

One of the major lessons learnt since the 1992 UNCED<sup>4</sup> is that the transition towards sustainable development is inconceivable without science, engineering and technology. Building and maintaining adequate scientific and technological capacities in all countries and harnessing these capacities to address critical economic, social and environmental issues are essential prerequisites for the transition to sustainable equitable development. There is also a growing concern

about the need to strengthen the ethics and responsibility of science and the scientific community. The transition to sustainable equitable development requires integrity and objectivity in the practice of science and technology, founded on the principles of ethics.

This is why promoting the goals of sustainability, addressing immediate human and social needs and confronting the various challenges in the current developmental paradigm, while preserving the earth's fragile life support systems, has emerged as an increasing priority for the international S&T community. Recognizing the growing awareness of the role of S&T in development, UNESCO negotiated a 'social contract' for science for the 21<sup>st</sup> century in June 1999 in Budapest.<sup>5</sup> This initiative heralded a paradigm shift in prioritizing strategic investments in S&T worldwide. Thus, while Agenda 21 underscored the need for political commitment in the application of S&T, the agenda for science outlined specific commitments and recommendations for using S&T for sustainable development and for bridging the increasing divides in technological development and its application. A new contract is needed between science and society in which ethical dimensions play a central and guiding role to bridge the growing technological/digital/gender and genetic divides, among others. Much of the concern over the widening technological gap has focused on what is popularly known as the 'digital divide,' which is clearly brought out in the HDR 2001.<sup>6</sup> The era of intellectual property rights (IPR) regime has also focused increasing attention on the genetic divide.

The past two decades have witnessed growing efforts to assert and enforce intellectual property rights (IPR) over scientific and technological knowledge through the use of patents, copyrights and other more novel forms of legal protection. There is not much empirical evidence as to how altering the legal conditions and terms of IPR translates into change in the overall strengths of economic incentives for the producers, or about the effectiveness of bigger incentives in eliciting creative results. Nor, is it a straightforward matter to determine the way in which holders of a particular form of intellectual property right would choose to exploit it, and the consequent magnitude of the resultant social losses in economic welfare. A valid example for this argument is the recent public outrage at the exorbitant prices being levied in the developing world by patent-holding multinational drug companies for medicines for the treatment of HIV/AIDS.<sup>7,8</sup>

The recent assessment of the PFA<sup>9</sup> continues to reveal a gender divide, which also raises critical ethical issues. But beyond all the rhetoric, there persists the more fundamental issue of how to mobilize the world's scientific and technological knowledge to contribute to the welfare of the developing world and see that such benefits are distributed more equitably in the ever increasing knowledge-based economy. Much of the debate is based on ethical dimensions related to the Universal Human Rights Declaration, 1948. In the prevailing scenario, one must

not be deluded into supposing that appeals to principles of equity alone will be sufficient to decide such contests in the area of political economy.

These issues have a tremendous bearing on the Asia-Pacific region where a community of very divergent countries in terms of their culture and natural resources is located. The most populated countries of the world are found here, and small islands too. Prosperous countries co-exist with least developed ones, those that lack proper infrastructure in science and science education, but are rich in local and traditional knowledge (HDR, 2002<sup>10</sup>). In the long run, the growth prospects for the Asia-Pacific region, driven by the new opportunities offered by technological advances and globalization, are very positive, provided both sound macroeconomic policies are implemented and the necessary reforms in the financial and social sectors continue with tremendous mobilization through micro-planning at the local levels.

The chapters that follow deal with the various facets of the Ethics of Economic Development from the perspectives of Economics, Employment, Ecology, Energy, Inequity and Intellectual Property Rights. Chapter VIII, on Bridging the Divides, looks at means and ways of using technology to bridge the gap in development efforts and the ethical considerations that have to be kept in mind when doing so. Chapter IX sums up the approach needed and cites an example in the Indian context.

## Endnotes and References:

<sup>1</sup> Universal Declaration of Human Rights 1948 ...the peoples shall have the right to decide their own priorities for development as it affects their lives, beliefs, institutions and spiritual well-being and the lands they occupy or otherwise use, and to exercise control over their own economic, social and cultural development.

<sup>2</sup> 2001 Brussels Programme of Action for the Least Developed Countries, [www.uncdf.org/english/about\\_uncdf/least\\_developed\\_countries.html](http://www.uncdf.org/english/about_uncdf/least_developed_countries.html)

<sup>3</sup> 2001 Doha Declaration, [www.wto.org/english/thewto\\_e/minist\\_e/min01\\_e/mindecl\\_e.htm](http://www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_e.htm)

<sup>4</sup> United Nations. 1992. *Agenda 21: Report of the United Nations Conference on Environment and Development*, United Nations Division for Sustainable Development, New York.

<sup>5</sup> UNESCO. 2000. *Science for the Twenty-First Century: A New Commitment*, Banson, London.

<sup>6</sup> UNDP. 2001. *Human Development Report 2001*, Oxford University Press.

<sup>7</sup> [allafrica.com/stories/200103060130.html](http://allafrica.com/stories/200103060130.html) – 39 transnational pharmaceutical companies bowed to worldwide condemnation and pressure, and completely abandoned their court action against the South African government over legislation that could be used to make essential drugs affordable for millions of South Africans.

<sup>8</sup> Cecilia Oh, *et al.* TRIPS, Patents and Access to Medicines: Proposals for Clarification and Reform, [www.twinside.org.sg](http://www.twinside.org.sg)

<sup>9</sup> UNIFEM. *Progress of the World's Women 2000 Report*, [www.unifem.undp.org/progressww/2000](http://www.unifem.undp.org/progressww/2000)

<sup>10</sup> UNDP. 2002. *Human Development Report 2002*, Oxford University Press.

## 2. ETHICAL DIMENSIONS OF ECONOMIC DEVELOPMENT

“Modern high-tech warfare is designed to remove physical contact: dropping bombs from 50,000 feet ensures that one does not “feel” what one does. Modern economic management is similar:..from one’s luxury hotel, one can callously impose policies about which one would think twice if one knew the people whose lives one was destroying.”

*Joseph E. Stiglitz (2002), Globalization and its Discontents,  
Norton, New York*

### 2.1 Introduction: Ethics in Economic Development

In simple terms, by *ethics* we mean moral principles. Economic development deals with the welfare of the people in terms of higher incomes and better standards of living. This may not be equally distributed within nations and across nations. Ethical dimensions of economic development deal with the promotion of morally desirable outcomes, such as equality of opportunity to individuals within the country and across the countries. It implies, in short, more equitable distribution of income, elimination of poverty, hunger, and discrimination of all sorts based on caste, class and gender.

Many economists, starting with Adam Smith, have discussed the ethical dimensions of economic prosperity.<sup>1</sup> Karl Marx,<sup>2</sup> and A.C. Pigou<sup>3</sup> dealt extensively with the ethical dimensions of economic growth. However Simon Kuznets<sup>4</sup> was the first economist to theorize the link between income inequality and economic growth. The desirability of lower income inequalities is based on ethical considerations. Amartya Sen is another welfare economist who has brought out the ethical dimensions of economic development more explicitly in recent years. Starting with *The Theory of Social Choice*,<sup>5</sup> many of his writings argue that economic development should address the problems of deprivation of all kinds. He argues that, “welfare economics could be substantially enriched by paying more attention to ethics.”<sup>6</sup> However, as has been pointed out by him, it is difficult to explicitly

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<sup>1</sup> Smith, Adam. 1975. *The Theory of Moral Sentiments*, original reprinted in D.D. Raphael and A.L Macfie (Ed.), Oxford Clarendon Press.

<sup>2</sup> Marx, Karl. 1887. *Capital*, First English Edition, Progress Publishers.

<sup>3</sup> Pigou, A.C. 1952. *The Economics of Welfare*, 1952, Macmillan, London.

<sup>4</sup> Kuznets Simon. 1966. *Modern Economic Growth – Rate, Structure and Spread*, Yale University Press, New Haven.

<sup>5</sup> Sen, A.K. 1970. *Collective Choice and Social Welfare*, San Francisco, Holden Day.

<sup>6</sup> Sen, A.K. 1996. *On Ethics and Economics*, Oxford University Press.

separate the behaviour patterns of individuals that include ethical considerations from those which do not include them. These problems are inherently complex. Hence, we cannot assume that economic development automatically leads to the ethically desirable sharing of prosperity.

Equally important is the fact that economic prosperity has, on several occasions, led to desirable distribution of income and the elimination of extreme deprivation. The traditional theory of economic development is based on the premise that an increase in per capita income and an economic shift from primary sectors to secondary and tertiary sectors will increase labour productivity in both agriculture and industry sectors.<sup>7</sup> Another important aspect has been that agricultural development has either preceded the shift to industrial development, as in the West, or taken place simultaneously along with industrial growth, as in the case of some countries of Southeast Asia. Such a situation removes the constraint of food shortages in the economy. Keeping food prices low and making food affordable has been crucial to the success of economic development.<sup>8</sup> Broadly speaking, this was the experience of the West in the early nineteenth century and that of the Southeast Asian nations in the twentieth century.

With the exception of some island nations and ‘city states,’ the development of agriculture, bringing abundant and cheap food, has preceded industrial development in many countries, particularly the populous ones, including Japan.<sup>9</sup> Hence, economic development represented by growth in Gross Domestic Product (GDP) per capita was assumed to be ethically correct. As a country gets richer everyone is expected to share in the prosperity.

In the words of Mahbub ul Haq, “No sustainable improvement in human well being is possible without growth. But, it is also wrong to suggest that high economic growth rates will automatically translate into higher level of human development.”<sup>10</sup> Per capita income may increase, and the GDP growth might be impressive, but many people may still remain poor, hungry, malnourished, and live without the minimum basic amenities of housing, sanitation and safe drinking water. Sometimes only the rich benefit, as the poor do not get to participate in income generating economic activities. Lack of education, skills and assets are the major handicaps of the poor. In addition, discrimination by class, race, caste, community and gender, widen the income differentials and perpetuate poverty and hunger.

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<sup>7</sup> Fei, J.C.H. & Ranis. 1966. “Agrarianism, dualism and Economic Development” in Adelman I and Thorbeck E, (ed.) *The Theory and Design of Economic Development*, John Hopkins University Press, Baltimore.

<sup>8</sup> Hayami, Y. and Ruttan, V. 1985. *Agricultural Development – an international perspective*, The John Hopkins University Press, Baltimore.

<sup>9</sup> *ibid* 8.

<sup>10</sup> Mahbub ul Haq. Human Development Centre. 2003. *Human Development in South Asia 2002*, Oxford University Press.

However, there is no automatic built-in mechanism in the development process that reduces inequalities, and enables equitable sharing of the fruits of development. A close examination reveals that economic development in itself may not be the main force behind the reduction in income inequalities. A combination of economic development and deliberate policy efforts for re-distribution of incomes and removal of deprivation is called for.

A number of income transfers and social security measures, such as unemployment payments, free food, free housing, etc., which rich governments undertake on ethical grounds help in the reduction of income inequalities, poverty and hunger. Similarly, massive investments in conservation, and plantations of secondary forests, etc., take place to address problems of overexploitation of natural resources and environmental degradation. This has broadly been the experience so far.

Simon Kuznets was the first to examine the unethical impact of economic development and theorized that in the initial stages of development income inequalities first widen, and then narrow as economic development progresses.<sup>11</sup> This is shown in the famous inverted U-shaped curve that results when we plot income inequality on the “Y” axis and economic growth on the “X” axis for a cross section of data for several countries in the world in different time periods. Recently this theory was extended to environmental degradation, theorizing that in the initial stages of development environmental resources get degraded, but better conservation leads to better environmental resource bases in the developed countries compared to developing countries. When we plot concentration of pollutants on the ‘Y’ axis and income per capita on the “X” axis we get a similar inverted U-shaped curve which shows that in the initial stage of development, pollution increases and then comes down after reaching a certain threshold of development, or per capita income level. Several economists have applied this to cross section data.<sup>12</sup> While the curve seems to hold good for some nations, it may not hold good for others. The Asia-Pacific experience does not fully support the theory, as we shall elaborate on latter in the discussion.

It is often the policy direction of governments to reduce inequality, remove absolute poverty and hunger, and improve the environment we live in. By itself, pure economic growth in terms of Gross Domestic Product (GDP) is unable to take care of all the ethical dimensions of equity. The global economic development pattern has been significantly changing since the nineteenth century. In the nineteenth century, economies grew slowly and largely with their own internal strength and domestic market demand. For many small and big countries in Southeast Asia,

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<sup>11</sup> *ibid.* 4.

<sup>12</sup> Sen, Gupta, Ram, Prasad. 2001. *Ecology and Economics: An approach to Sustainable Development*, Oxford University Press.

export markets and the global economic situation became the engine of growth<sup>13</sup> for a significant part of the twentieth century. In the twenty-first century, as the economic growth of developed nations has slowed down, the factors of production have become more mobile. Capital has become mobile internationally, and industries have moved globally in search of cheap labour. Trans-national corporations have grown in strength. The ethical dimension of international trade has become important in the process.<sup>14</sup> Thus, besides the deliberate policy direction given to economic development internally, the protection against external exploitation by respective governments has come to matter.

The ethical balance sheet of economic development has, on the one side, reduction in poverty and inequality, improvement in living standards and larger freedom of mobility enjoyed by the factors of production, such as capital and labour, and the possibility of achieving growth and sustaining it despite a small domestic market demand. The other side of the balance sheet has growing inequalities within a country and across countries, absolute deprivation and poverty of some who cannot participate in the growth process, increasing risk of domestic jobs and incomes fluctuating along with the global economic fortunes, and the preoccupation of governments with the magnitude of growth and not so much with the quality of life of millions of people.

The nations of Asia-Pacific fall on both sides of the ethical balance sheet. Particularly interesting are the cases where high GDP per capita has resulted in an ethically desirable impact, such as in Singapore, Hong Kong and Taiwan. It has had ethically undesirable impacts in others, such as the Philippines and Indonesia. Some countries, such as India, have benefited only marginally. Some countries have had sustained development, while others had short-lived gains. Equally interesting are the cases where equality has been achieved despite low per capita income, as in the People's Republic of China.

The aim of this chapter is not to trace the reasons and analyse the governance issues, but to record the outcomes and analyse whether economic development has been largely based on ethical considerations, or not. This analysis is based on the assumption that economic development is desirable and that it has to be achieved along with ethical considerations of sharing and caring. We study the per capita income growth of various countries in the Asia-Pacific region along with some ethical parameters such as reduction in inequality, poverty, levels of hunger and gender inequality. The pattern of growth and international trade policies that have been perceived as ethically correct, along with those that have been largely perceived as ethically wrong, are briefly analysed.

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<sup>13</sup> World Bank. 1993. *The East Asian Miracle: Economic Growth and Public Policy*, Oxford University Press.

<sup>14</sup> World Trade Organization. 1995. *Results of the Uruguay round of Multilateral Trade negotiations – The legal texts*, WTO, Geneva.

Understandably, the fruits of growth are enjoyed by all in those countries where domestic governance spreads the fruits of development by giving opportunities to most people to participate in the growth process. Economic development has had positive ethical impact in the countries that have already achieved a considerable level of literacy and health. Countries that have wide ranging social security arrangements experienced widespread positive impact of economic growth and less of the negative impact of the economic slowdown. The adverse impact of economic growth has been experienced in those countries where governments give precedence to magnitude of growth over spreading the benefits of development and helping the removal of absolute poverty, reducing the risks of job loss and assisting in gaining bargaining strength.

Pure economic growth by itself may be neutral to rich and poor, but the way it is achieved, through domestic or export markets, the basic skill levels and educational endowments of the population, and the type of government interventions, could tilt the balance in favour of the poor, or away from the poor. Some countries have been pro entrepreneurs and others have been equally sensitive to labour problems. Some countries liberalized slowly and took maximum advantage of the international markets through a managed currency regime. Others followed complete liberalization without caution and suffered when the currency was left freely floating.

This chapter first examines the positive and negative impacts of economic growth on the nations of the Asia-Pacific region. Sometimes periods of economic growth may lead to increase in income inequalities, poverty and hunger, when prices of essential commodities go up and growth is highly localized. This chapter will try to present the measurable and ethically desirable dimensions of development revealed in reduction in income inequalities, poverty, hunger, and gender discrimination. These parameters are studied along with the annual compound rate of growth in Gross Domestic Product at the aggregate and per capita levels. The changing international economic environment of trade is also examined from the ethical perspective. Globalization that facilitates export-led growth, the financial crisis that hit Asia, and finally, the recent economic slowdown of the 21<sup>st</sup> century, form the backdrop of our analysis.

## ***2.2 The Positive Impact of Economic Growth and Development***

To segregate the achievers from non-achievers in the developing block, we can look at per capita income levels. The level of per capita income is normally used as a guideline of a country's economic performance, the larger the per capita income, the richer the country; and vice versa. Faster growth in Gross Domestic Product, and an increase in per capita income levels, normally leads to the economic well being of the population. This appears to be true for most rich nations where people enjoy higher standards of living. The Asia-Pacific region has a large number of countries in the developing block and a few countries, like Japan, Australia and New Zealand, in the developed block. (Table 2.1)

**Table 2.1. Basic statistics about countries in the Asia-Pacific region**

	<i>GDP per capita 2,000 US\$</i>	<i>Land Area km sq</i>	<i>Population 2000</i>	<i>Poverty %</i>	<i>HDI rank (out of 173 countries)</i>
Afghanistan	523	652 090	26 550 000		
Australia	23 838	7 682 300	19 182 000		5
Azerbaijan	506	86 600	8 049 000	68	88
Bangladesh	373	130 170	131 050 000	36	145
Bhutan	532	47 000	805 000		140
Brunei	13 719	5 270	338 000		32
Cambodia	297	176 520	12 021 230	36	130
China	824	9 327 420	1 262 460 032	5	96
Cook Islands	4 521	230	19		
East Timor		14 870	871 000		
Fiji	2 395	18 270	811 900	25	72
Guam		550	154 500		
Hong Kong, China	24 218	1 075	6 797 000		23
India	459	2 973 190	1 015 923 008	35	124
Indonesia	994	1 811 570	210 420 992	27	110
Iran, Islamic Rep.	1 649	1 622 000	63 664 000		98
Japan	44 830	364 500	126 870 000		9
Kazakhstan	1 512	2 699 700	14 869 000	35	79
Kiribati	561	730	90 700		
Korea, Dem. Rep.		120 410	22 268 000		
Korea, Rep.	13 062	98 730	47 275 000		27
Kyrgyz Republic	885	191 800	4 915 000	51	102
Laos PDR	450	230 800	5 279 000	46	143
Macao, China	15 244	20	438 000		
Malaysia	4 797	328 550	23 270 000		59
Maldives	1 933	300	276 000		84
Marshall Islands	1 602	180	52 000		
Micronesia, Fed. Sts.	1 735	702	118 100		
Mongolia	428	1 566 500	2 398 000	36	113
Myanmar		657 550	47 749 000		127
Nauru	2 829	20	11 000		
Nepal	241	143 000	23 043 000	42	142
New Zealand	17 548	267 990	3 830 800		19
Pakistan	516	770 880	138 080 000	34	138
Palau	6 726	460	19 000		
Papua New Guinea	927	452 860	5 130 000		133
Philippines	1 167	298 170	75 580 000	37	77
Samoa	1 440	2 830	170 000		101
Singapore	28 230	610	4 018 000		25
Solomon Islands	643	27 990	447 000		121
Sri Lanka	860	64 630	19 359 000	25	89
Tajikistan	386	140 600	6 170 000		112
Thailand	2 805	510 890	60 728 000	13	70
Tonga	1 768	720	100 200		
Turkmenistan	1 377	469 930	5 198 940		87
Uzbekistan	485	414 240	24 752 000		95
Tuvalu	1 931	30	11 000		
Vanuatu	1 177	12 190	197 000		131
Vietnam	356	325 490	78 522 704	51	109

Source: World Development Indicators, 2002, CDROM version; United Nations Statistical Yearbook 2001, CDROM version, Freedom House 2002; UNDP Human Development Report 2002.

The per capita income of Japan (in US dollars) is the highest in the region at 44,830, followed by USD 23,838 for Australia and USD 17,548 for New Zealand. Among the other Asia-Pacific countries, some like Singapore, Brunei, Hong Kong, Taiwan<sup>15</sup> and South Korea have per capita incomes higher than Australia and New Zealand, though they are not considered to be part of the developed block. Malaysia also enjoys fairly good levels of per capita income at USD 4,797. The rest of the countries in Asia-Pacific are mostly poor. At the upper end of the poor nation group are those with a per capita income ranging from USD 3,000 to 1,000. In 1999, the island nations, including Cook Islands, Fiji, Maldives, Marshall Islands, Federal states of Micronesia, Papua New Guinea, Nauru and Tonga, and countries such as Philippines in Southeast Asia and Kyrgyz Republic in Central Asia were in this range. Thailand, with USD 2,805 per capita income and Nauru with a per capita income of USD 2,829 are at the upper end in this group. The Philippines is at the lower end with a per capita income of USD 1,167 per annum. Australia and New Zealand have not been considered in our further analysis below.

At the lower end of the poor nations group are countries both big and small characterized by per capita incomes below USD 1,000. The range is from USD 170 in Tajikistan to USD 950 in Turkmenistan, and from USD 824 in China and USD 459 in India. Countries, such as Nepal, Cambodia and Bangladesh are at the bottom. Thus, with few exceptions, most of the countries in the Asia-Pacific region are poor. For most countries in Asia-Pacific the major contribution to GDP comes from the service and industrial sectors (over 60% in most cases). A few countries, such as Laos, Cambodia, Nepal, Bhutan, Kyrgyz Republic, derived more than 35 percent of their GDP from agriculture. With the exception of Bhutan, all the countries dependent on primary sector had low annual per capita incomes of less than USD 300. This clearly shows that the shift from agriculture to organized manufacturing or service sectors brings about development. However, there is also a shift that occurs between agriculture and the unorganized service sector. Due to high levels of urbanization with inadequate industrial base, this normally perpetuates poverty.

Most of the countries recording a per capita GDP of more than USD 1,000 did not have any poverty. However, the most notable exceptions were Thailand and the Philippines with per capita incomes of 2,805 and 1,167 USD, and 13 percent and 37 percent, respectively, of their population below the poverty line. Other notable exceptions were Fiji Islands and Kazakhstan. On the other hand, Mainland China achieved a poverty level as low as five percent with per capita income of just USD 824. With some exceptions, the levels of poverty are coming down with economic growth. Some countries, such as Thailand, have reduced poverty levels over

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<sup>15</sup> We have considered Hong Kong and Taiwan as separate entities from Mainland China as the path of economic development has been different from each other, though they may be considered as part of China.

a period of time, but this fall in poverty has been much slower than in the high-income countries of Southeast Asia mentioned above. We elaborate below on some of the success stories of Southeast Asia.

*The Asian Miracle of growth, equality and elimination of poverty*<sup>16</sup>

Eight countries of Asia-Pacific, referred to as High Performing Asian Economies up to mid-nineties, essentially benefited from linking themselves to Japan. They are: Singapore, Hong Kong, Taiwan, South Korea, Mainland China, Malaysia, Thailand and Indonesia. The performance of the first five of them is notable in that they had rapid and sustained growth rates for three decades or more before achieving high levels of income comparable to developed countries. These countries also achieved unusually low and declining levels of inequality during the period of rapid economic growth, contrary to the historical evidence of Kuznets. These economies were able to reduce levels of poverty substantially. Other benefits, such as declining infant mortality rates and improving life expectancy, also occurred along with the rapid economic growth prior to the mid-nineties. The share of agriculture, and the overall productivity in agriculture, also increased substantially over the three decades from the sixties to the nineties. This shift occurred much faster than it had in Western economies in the nineteenth century. (See Tables 2.2 and 2.3)

Exports grew rapidly and became the engine of growth. High rates of savings, 25 to 40 percent, and investment in physical capital on one hand, and heavy investment in free education and human capital formation on the other, helped in to promote equity and reduce poverty levels. (See Tables 2.4 and 2.5)

In these successful economies, not only was there an investment in education made as a percentage of GDP, (3-5 percent), the allocation of budget to primary education compared to secondary education was also higher. Enterprise and pre-employment on-the-job training was quite systematic in these countries and helped human capital formation and the reduction of income inequalities. In short, government policies systematically and successfully monitored all areas of economic growth starting from health and human capital formation to financial investment and the establishment of trade links. Thus, these eight countries of the region contributed to the Asian Miracle up to the mid-nineties.

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<sup>16</sup> This section is based on the findings of the World Bank publication, *The East Asian Miracle: Economic Growth and Public Policy* (World Bank Policy Research Reports) OUP, 1993.

**Table 2.2. Asia-Pacific Region – Growth Rate of Per Capita GDP  
(% per year)**

Sl. No.	Country	1997	1998	1999	2000	2001	2002	2003*	2004*	GNP, \$, 2001
1	<b>East Asia</b>	6.1	2.0	6.5	7.4	3.8	5.9	4.8	5.6	
2	China, People's Rep. of	7.8	6.8	6.2	7.3	6.8	7.2	6.7	7.0	890.0
3	Hong Kong, China	4.2	-5.8	2.4	9.2	-0.3	1.3	0.7	2.8	25 920.0
4	Korea, Rep. of	4.1	-7.4	10.2	8.5	2.4	5.7	3.4	4.7	9 400.0
5	Mongolia	2.5	3.9	1.9	-0.2	-0.1	3.1	4.2	4.4	400.0
6	Taipei, China	5.8	3.6	4.6	5.0	-2.9	4.0	2.6	3.3	13 380.0
7	<b>Southeast Asia</b>	2.4	-8.6	2.5	4.6	0.0	3.4	3.0	3.9	
8	Cambodia	-1.1	-2.4	4.2	5.0	3.7	2.0	2.4	2.9	270.0
9	Indonesia	3.2	-14.6	-0.7	3.3	1.9	2.2	–	–	680.0
10	Lao People's Dem. Rep.	4.3	0.9	2.6	3.9	3.8	3.8	4.1	4.6	310.0
11	Malaysia	5.0	-9.7	3.7	4.9	-1.7	2.1	2.3	3.1	3 640.0
12	Myanmar	3.9	2.0	8.9	11.7	9.1	–	–	–	–
13	Philippines	2.9	-2.8	1.2	2.3	1.1	2.4	2.2	2.3	1 050.0
14	Singapore	5.2	-3.5	5.7	7.7	-5.2	5.4	2.3	4.2	24 740.0
15	Thailand	-2.3	-11.5	3.4	4.5	1.2	4.1	3.9	4.6	1 970.0
16	Vietnam	4.1	2.2	2.3	5.1	4.8	5.3	5.8	5.9	410.0
17	<b>South Asia</b>	2.6	4.0	3.9	2.7	3.4	2.5	4.1	4.4	
18	Afghanistan	–	–	–	–	–	–	–	–	–
19	Bangladesh	3.5	3.4	3.6	4.6	5.8	2.8	3.8	4.2	370.0
20	Bhutan	4.2	3.5	4.4	2.4	3.0	4.6	–	–	640.0
21	India	2.9	4.5	4.2	2.6	3.8	2.6	4.4	4.7	460.0
22	Maldives	8.1	7.6	5.1	2.7	1.7	2.6	2.6	1.3	2 040.0
23	Nepal	2.7	0.8	2.2	3.7	1.5	-2.8	-0.6	1.4	250.0
24	Pakistan	-0.7	1.1	1.8	1.6	0.2	1.4	2.3	2.8	420.0
25	Sri Lanka	5.0	3.4	2.8	4.5	-2.8	1.8	3.8	4.3	830.0
26	<b>Central Asia</b>	2.3	2.0	4.3	7.6	13.2	9.1	6.6	6.7	
27	Azerbaijan	4.8	9.0	6.5	9.3	9.5	9.7	8.6	7.1	650.0
28	Kazakhstan	3.3	-0.2	3.7	10.2	13.8	9.6	6.1	6.6	1 360.0
29	Kyrgyz Republic	8.3	0.5	2.3	4.6	4.5	-1.3	–	–	280.0
30	Tajikistan	0.1	3.7	2.3	7.5	–	–	–	–	170.0
31	Turkmenistan	-14.1	4.0	12.4	13.9	16.9	–	–	–	950.0
32	Uzbekistan	3.3	2.8	2.9	2.6	–	–	–	–	550.0
33	<b>The Pacific</b>	-5.1	-3.0	3.5	-2.4	-1.9	-1.3	0.1	–	
34	Cook Islands	–	1.2	7.8	14.5	9.6	4.0	1.5	3.2	–
35	Dem. Rep. of Timor-Leste	2.8	0.0	-18.4	14.3	6.2	-8.8	-10.1	–	–
36	Fiji Islands	-2.6	0.3	8.2	-3.7	3.9	3.9	5.2	3.1	2 130.0
37	Kiribati	3.8	3.1	4.4	-1.1	-0.1	1.2	0.9	–	830.0
38	Marshall Island, Rep. of	-11.3	-0.6	-1.5	-0.7	0.7	2.6	1.6	–	2 190.0
39	Micronesia, Fed. States of	-4.8	-3.1	0.0	4.2	0.8	0.6	2.2	–	2 150.0
40	Nauru	–	–	–	–	–	–	–	–	–
41	Papua New Guinea	-7.8	-5.8	4.2	-4.3	-6.4	-3.6	-2.1	-1.2	580.0
42	Samoa	0.3	1.9	2.1	5.0	4.1	-0.7	1.6	–	1 520.0
43	Solomon Islands	-4.3	-2.6	-3.6	-15.6	-12.6	-6.7	-0.8	–	580.0
44	Tonga	-0.6	1.7	2.4	6.2	0.1	1.3	2.1	2.2	1 530.0
45	Tuvalu	2.1	13.5	1.7	1.7	2.7	0.7	0.7	–	–
46	Vanuatu	2.2	1.7	-5.6	0.0	-5.3	-2.8	-1.3	–	1 050.0
	Average	4.6	0.4	5.2	6.0	3.2	4.9	4.4	5.1	

Source: Asian Development Bank, Asian Development Outlook 2003.

Note: \* Estimates.

**Table 2.3. Asia-Pacific Region – Sectoral Shares of GDP**

Sl. No.	Country	Sector Share 2001 (% Per Year)		
		Agriculture	Industry	Services
1	<b>East Asia</b>			
2	China, People's Rep. of	11.3	64.5	24.1
3	Hong Kong, China	0.1	12.9	86.8
4	Korea, Rep. of	5.2	44.8	50.0
5	Mongolia	26.8	27.9	45.2
6	Taipei, China	2.5	33.3	64.3
7	<b>Southeast Asia</b>			
8	Cambodia	39.6	24.0	31.5
9	Indonesia	16.2	43.7	40.2
10	Lao People's Dem. Rep.	50.5	23.2	25.6
11	Malaysia	8.7	41.1	50.2
12	Myanmar	–	–	–
13	Philippines	20.0	34.0	46.0
14	Singapore	0.1	31.3	68.6
15	Thailand	10.4	44.2	45.4
16	Vietnam	22.7	36.9	40.4
17	<b>South Asia</b>			
18	Afghanistan	–	–	–
19	Bangladesh	24.1	25.2	47.0
20	Bhutan	32.9	30.7	36.4
21	India	23.9	26.7	49.5
22	Maldives	9.5	15.1	75.4
23	Nepal	38.0	23.4	38.6
24	Pakistan	24.6	25.2	50.2
25	Sri Lanka	20.1	27.4	52.4
26	<b>Central Asia</b>			
27	Azerbaijan	15.2	35.3	40.2
28	Kazakhstan	8.7	30.7	49.2
29	Kyrgyz Republic	50.2	18.7	31.1
30	Tajikistan	–	–	–
31	Turkmenistan	25.0	35.0	32.0
32	Uzbekistan	30.1	19.9	50.0
33	<b>The Pacific</b>			
34	Cook Islands	11.9	8.1	80.0
35	Dem. Rep. of Timor-Leste	–	–	–
36	Fiji Islands	16.6	26.6	56.8
37	Kiribati	–	–	–
38	Marshall Island, Rep. of	13.8	16.0	70.2
39	Micronesia, Fed. States of	–	–	–
40	Nauru	–	–	–
41	Papua New Guinea	31.3	35.0	33.8
42	Samoa	17.4	24.8	57.8
43	Solomon Islands	32.4	7.2	60.4
44	Tonga	28.0	15.0	57.0
45	Tuvalu	–	–	–
46	Vanuatu	17.9	9.1	73.0

Source: Asian Development Bank, Asian Development Outlook 2003.

**Table 2.4. Asia-Pacific Region – Gross Domestic Saving  
(% of GDP)**

Sl. No.	Country	1997	1998	1999	2000	2001	2002	2003*	2004*
1	<b>East Asia</b>								
2	China, People's Rep. of	41.5	39.8	39.4	38.0	38.6	38.7	38.2	38.6
3	Hong Kong, China	31.6	30.5	30.9	32.9	31.6	33.9	34.0	33.5
4	Korea, Rep. of	33.7	34.4	32.9	32.4	30.2	29.2	28.0	29.0
5	Mongolia	–	–	20.0	32.4	26.0	23.7	–	–
6	Taipei, China	26.4	26.0	26.1	25.4	23.9	25.4	25.7	25.8
7	<b>Southeast Asia</b>								
8	Cambodia	10.2	8.3	9.7	10.7	10.2	10.0	9.7	9.4
9	Indonesia	31.5	26.5	19.5	25.1	24.9	21.1	20.1	19.7
10	Lao People's Dem. Rep.	8.8	13.6	13.2	15.1	15.4	16.1	19.6	18.3
11	Malaysia	43.9	48.7	47.4	47.1	42.2	41.8	42.1	43.0
12	Myanmar	11.8	11.8	13.0	12.3	–	–	–	–
13	Philippines	18.7	21.6	26.5	24.8	17.0	17.3	19.5	21.0
14	Singapore	50.5	51.7	48.8	47.9	43.6	44.2	47.1	47.3
15	Thailand	33.6	36.1	32.8	31.0	30.0	30.5	28.7	29.6
16	Vietnam	21.4	17.8	26.3	25.5	27.4	29.2	28.3	25.8
17	<b>South Asia</b>								
18	Afghanistan	–	–	–	–	–	–	–	–
19	Bangladesh	18.6	20.4	20.8	22.1	20.8	23.6	22.7	23.0
20	Bhutan	21.3	12.5	12.9	16.8	20.2	20.0	–	–
21	India	23.1	21.5	24.1	23.4	24.0	24.5	24.1	25.2
22	Maldives	45.9	46.7	44.2	44.2	44.9	45.8	44.9	43.6
23	Nepal	16.0	16.2	17.1	18.8	19.0	17.4	17.0	17.0
24	Pakistan	11.8	14.7	11.7	14.1	13.9	15.4	15.2	16.0
25	Sri Lanka	17.3	19.1	19.5	17.4	15.3	15.8	16.5	17.0
26	<b>Central Asia</b>								
27	Azerbaijan	11.1	2.7	13.4	18.3	19.7	17.5	–	–
28	Kazakhstan	16.0	15.0	13.8	20.1	22.2	–	–	–
29	Kyrgyz Republic	14.3	-8.2	1.2	14.4	16.8	16.0	–	–
30	Tajikistan	–	23.3	19.4	–	–	–	–	–
31	Turkmenistan	–	–	–	–	–	–	–	–
32	Uzbekistan	14.9	9.9	10.5	16.5	–	–	–	–
33	<b>The Pacific</b>								
34	Cook Islands	–	–	–	–	–	–	–	–
35	Dem. Rep. of Timor-Leste	–	4.0	-13.0	-50.0	-49.0	-39.0	-29.0	–
36	Fiji Islands	7.6	4.2	12.4	8.6	–	–	–	–
37	Kiribati	–	–	–	–	–	–	–	–
38	Marshall Island, Rep. of	–	–	–	–	–	–	–	–
39	Micronesia, Fed. States of	–	–	–	–	–	–	–	–
40	Nauru	–	–	–	–	–	–	–	–
41	Papua New Guinea	21.5	22.6	13.3	25.3	–	–	–	–
42	Samoa	–	–	–	–	–	–	–	–
43	Solomon Islands	–	–	–	–	–	–	–	–
44	Tonga	-22.2	-29.6	-18.4	-10.6	–	–	–	–
45	Tuvalu	–	–	–	–	–	–	–	–
46	Vanuatu	19.5	21.3	19.2	19.3	19.1	–	–	–

Source: Asian Development Bank, "Asian Development Outlook 2003."

Note: \* Estimates.

**Table 2.5. Changes in Selected Indicators of Poverty**

<i>Economic</i>	<i>Year</i>	<i>Percentage of below the poverty</i>			<i>Number of poor</i>		
		<i>First</i>	<i>Last</i>	<i>Chang</i>	<i>First</i>	<i>Last</i>	<i>Percent Chang</i>
Indonesia	1972-82	58	17	-41	67.9	30.0	-56.0
Malaysia	1973-87	37	14	-23	4.1	2.2	-46.0
Singapore	1972-82	31	10	-21	0.7	0.2	-71.0
Thailand	1962-86	59	26	-30	16.7	13.6	-18.0
India	1972-83	54	43	-9	311.4	315.0	1.0
Pakistan	1962-84	54	23	-31	26.5	21.3	-19.0
Sri Lanka	1963-82	37	27	-10	3.9	4.1	5.0

Source: World Bank "East Asian Miracle" 1993.

### ***Financial crisis of Mid-Nineties and the Economic slowdown of 21<sup>st</sup> century***

In the mid-nineties, the economies of Asia-Pacific were booming with prosperity and growth and recording substantial gains in per capita income, while the rest of the world had low levels of growth. And, along with the Asian Miracle countries, some of the Central Asian countries of the former Soviet Union also experienced high levels of growth in the mid-nineties, ranging from 7 to 10 percent per annum.

However, this phenomenal growth was short-lived and problems started with the East Asian financial crisis in 1998. All the countries in Southeast Asia, including China, suffered. The major reason was excess investment beyond the expected increase in demand. The second reason was the excessive dependence on exports and less on domestic demand. The return on investment was low. Excess capacities built led to financial crises, banks that had lent to industry incurred massive losses, and currencies had to be devalued. Industries closed down, causing massive job losses and widespread unemployment in almost all the countries of Southeast Asia. Some of them, like Indonesia, could not recover because political problems accentuated the economic problems. China recovered soon and was again on the path of growth. The size of domestic markets and the capacity to internalize the shocks brought on by the crisis helped China to some extent. India was not affected by the financial crisis largely because of lesser dependence on exports, which is demonstrated by the changes in the annual rate of growth.

Because of its importance in the region, Japan's economy has an impact on the other high performing countries of Asia-Pacific. The GDP growth of Japan, the region's most developed country, was sluggish for quite some time throughout the nineties, the average rate of growth being no more than 1.1 percent. The economy became further sluggish by the turn of the century, and the growth rate fell to below one percent. The major problem plaguing Japan was weak domestic consumption growth and a strong yen that made the cost of production very high. Hence, Japan

shifted its export manufacturing to other countries with cheaper sources of labour in order to maintain its competitive edge. Then, Japan was indirectly hit by the Asian economic crisis as well as the downturn that set in since 2001. The financial institutions that had lent money for investment in neighbouring Southeast Asian countries incurred losses, forcing some of them into bankruptcy. The subsequent fall in demand made some of their overseas manufacturing units incur heavy losses. Unemployment rates increased to 5.5 percent in December 2001, a fifty-year high, and then declined later to 5.2 percent. The atmosphere of caution and saving continued as the fear of unemployment, previously unknown to the Japanese, gripped the nation.

In Japan, with the onset of the financial crisis, inflation was at its lowest and interest rates were zero, thus, benefiting consumers. Because social security measures were in place and public amenities such as education and health care were in place, the impact of the crisis was not too severe, though, at the bottom level, poverty might have deepened as in the case of all other developed countries of the world. However, there was no visible distress apparent in the standards of living of the majority of people. The case of Japan shows that even developed countries did not escape the crisis. A similar situation affected Australia as well as New Zealand, but Japan is more important to the economies of Asia-Pacific than the other two developed countries.

When the financial crisis occurred, some defective policies of Asian countries came to the fore. Economies such as Indonesia virtually disintegrated under pressure. The Philippines could not catch up with the rest despite its proximity and affinity to the fast growing countries in the region. The impact of the Asian crisis had heavy social costs even to the Asian tigers of yesteryear. One of the significant problems was a reduction in purchasing power and consumption expenditures of the average household. Earlier, safety nets provided by firms in Korea, and informal safety nets in Indonesia and Thailand via high levels of savings, took care of small downturns of the economy. However, the sudden drastic drop in income and the bankruptcy of many firms, undermined these safety nets. Even the high growth economies had not provided for long-term social security of their people. Food prices increased in many countries, particularly in Indonesia and Thailand, hurting the poor. Unemployment increased in all of the countries. It was not possible for governments to provide fiscally sustainable safety nets to all the affected persons. The budgetary cost of such programmes was estimated to be about 6 percent of the GDP.<sup>17</sup>

The recovery process after the financial crisis was also not without a price. In Southeast Asia, governments and public sector banks supported the growth prior to the financial crisis when expansion of production was given priority over

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<sup>17</sup> Gupta Sanjeev, C McDonald, et al. 1998. Mitigating the Social costs of economic costs of reform programmes in Asia, IMF, Washington.

sound economics. After the financial crisis and massive devaluation of currencies in 1998-99, many governments undertook financial restructuring. In the process, many banks went bankrupt and many companies closed down. The real economic factors at play were the existence of excess capacities and lack of demand. The fiscal factors were the imprudent lending by banks to the better performing companies, and government support to those with higher market share and not to those with better profitability and a sound financial base. The overall lack of financial transparency and fiscal indiscipline resulted in the crisis. Poor governance, imprudent lending practices, and some amount of corruption, aggravated it. There was unemployment. Imports became very expensive, hurting consumption. Labour unions were forced to accept wage cuts to keep jobs. Many countries shifted to a free floating exchange system that could act as watchdog of exchange rate imbalance. The recovery process was slower and more painful to the smaller economies such as Hong Kong, Singapore, South Korea, and Indonesia, the so-called tigers of the nineties, than for a big country like China. China recovered faster than others; it could easily reduce the wages in its State-owned industries. Also, export advantage could be restored through a managed exchange rate regime. Unemployment did not increase in China, but increased sharply in post devaluation Southeast Asia.<sup>18</sup> State controlled economy helped China tide over the crisis. The crisis also induced China to undertake some financial reforms that would help the country in the long run. (See Table 2.6)

The countries of Central Asia recorded strong and consistent growth trends, ranging from 7 to 10 percent. The State with lowest growth rate was Uzbekistan at 4.5 percent. The only exception was Kyrgyz Republic that has had wide fluctuations from 9 percent to -0.5 percent in the past 5 to 6 years.

The terrorist attacks in USA in 2001, and the Afghanistan and Iraq wars, destabilized the world economy further for several reasons, including a drop in tourism, restrictions on trade, and domestic job protection policies of the developed countries. Thus, exports declined in all the developing countries, hurting incomes. Though there has been recovery in recent years the unit value of exports has declined, even when the rate of growth of exports was not very low. The terms of trade have been unfavourable to developing countries. Compared to India, China could maintain better growth by making its exports more competitive. Again, the experience of the new millennium has been mixed for the countries of Asia-Pacific. The Pacific island nations have recorded very little growth, or even recorded negative growth, due to a decline in tourism and other factors that made imports more expensive.<sup>19</sup>

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<sup>18</sup> Asian Development Bank. 2003. Asian Development Outlook 2003, Oxford University Press.

<sup>19</sup> *ibid* 16.

**Table 2.6. Asia-Pacific Region – Growth Rate of Merchandise Exports  
(% per year)**

Sl. No.	Country	1997	1998	1999	2000	2001	2002	2003*	2004*
1	<b>East Asia</b>	10.1	-5.3	5.7	22.0	-5.8	12.0	8.3	9.2
2	China, People's Rep. of	20.9	0.5	6.1	27.9	6.8	22.3	10.0	12.0
3	Hong Kong, China	6.3	-8.5	-0.6	16.0	-5.8	4.9	6.5	6.2
4	Korea, Rep. of	6.7	-4.7	9.9	21.2	-14.0	7.5	8.0	8.0
5	Mongolia	34.5	-18.8	-1.7	18.0	-2.4	-3.9	8.0	8.0
6	Taipei, China	5.4	-9.5	9.9	21.8	-17.3	6.4	7.4	7.8
7	<b>Southeast Asia</b>	4.5	-7.4	9.2	19.5	-10.3	4.9	6.8	8.7
8	Cambodia	81.0	13.0	17.9	53.2	9.8	6.0	7.0	6.5
9	Indonesia	12.2	-10.5	1.7	27.6	-12.3	1.1	3.0	5.5
10	Lao People's Dem. Rep.	-1.4	6.4	1.5	2.6	-0.3	2.7	5.2	5.6
11	Malaysia	0.7	-7.3	17.2	17.0	-10.6	6.1	8.1	10.2
12	Myanmar	8.7	4.3	36.0	36.8	30.0	–	–	–
13	Philippines	22.8	16.9	19.1	9.0	-16.2	12.2	6.0	7.0
14	Singapore	-0.2	-12.0	5.4	20.0	-11.0	3.2	7.5	10.2
15	Thailand	3.8	-6.8	7.4	19.5	-6.9	5.8	6.6	7.5
16	Vietnam	24.6	2.4	23.2	25.2	6.5	7.4	9.1	8.4
17	<b>South Asia</b>	4.8	-0.1	4.4	17.2	1.1	7.0	13.6	14.7
18	Afghanistan	–	–	–	–	–	–	–	–
19	Bangladesh	14.0	16.8	2.9	8.2	11.4	-7.6	9.5	10.5
20	Bhutan	1.7	12.1	-5.9	9.1	-12.9	-1.8	–	–
21	India	4.5	-3.9	9.5	19.6	0.1	11.4	15.1	16.6
22	Maldives	12.3	6.6	-4.3	18.8	1.4	18.1	–	–
23	Nepal	10.2	11.9	18.2	37.5	4.6	-18.0	5.0	10.0
24	Pakistan	-2.6	4.2	-10.7	8.8	9.1	2.2	12.0	10.0
25	Sri Lanka	13.3	3.4	-3.9	19.8	-12.8	-2.4	6.5	9.0
26	<b>Central Asia</b>	4.7	-17.1	6.4	45.2	-1.3	8.2	6.5	2.8
27	Azerbaijan	2.4	-16.2	51.3	83.1	9.0	12.7	9.8	-5.9
28	Kazakhstan	9.7	-14.9	2.0	55.1	-2.8	12.0	5.1	4.3
29	Kyrgyz Republic	18.8	-15.2	-13.5	10.4	-6.0	3.7	13.9	–
30	Tajikistan	-3.1	-21.4	13.7	18.3	-17.3	11.0	11.3	10.5
31	Turkmenistan	-54.2	-20.7	93.3	111.7	4.7	8.9	–	–
32	Uzbekistan	-4.4	-19.6	-8.3	0.9	-2.9	-5.7	–	–
33	<b>The Pacific</b>	-14.8	-14.2	9.8	-0.6	-12.6	-9.7	–	–
34	Cook Islands	-39.5	-10.0	41.2	38.6	100.9	-39.1	–	–
35	Dem. Rep. of Timor-Leste	17.1	27.1	-14.8	-90.4	-20.0	25.0	20.0	16.7
36	Fiji Islands	-21.1	-13.4	19.2	-4.2	-8.4	3.6	9.2	8.3
37	Kiribati	16.2	-6.0	55.3	-31.5	-38.2	9.0	20.8	–
38	Marshall Island, Rep. of	-29.0	-47.2	-4.0	22.2	15.9	–	–	–
39	Micronesia, Fed. States of	-17.1	6.7	-9.4	-11.0	26.4	-1.2	–	–
40	Nauru	–	–	–	–	–	–	–	–
41	Papua New Guinea	-14.8	-16.1	9.1	7.3	-13.7	-14.7	–	–
42	Samoa	45.1	28.7	-3.5	-24.9	10.8	-9.4	–	–
43	Solomon Islands	-4.0	-9.7	6.5	-53.8	-32.6	7.7	7.8	–
44	Tonga	4.4	-10.1	1.6	-9.5	9.5	48.6	–	–
45	Tuvalu	–	–	–	–	–	–	–	–
46	Vanuatu	22.7	1.6	-24.0	2.0	-24.4	7.0	20.1	5.0
	Average	7.7	-5.9	6.8	21.1	-6.9	9.4	7.9	9.3

Source: Asian Development Bank, Asian Development Outlook 2003.

Note: \* Estimates.

### 2.3 Non Industrialized Economies of Asia Pacific and the negative impacts of Poverty

The ultra poor, with an income of less than a 1 USD a day, constitute a high percentage of the population (between 30-40 percent) in developing countries such as India, Nepal and Pakistan. Poverty is fairly high in Bangladesh and Laos, as well. The national estimates of poverty are different (See Table 2.7). They are high in countries like Bangladesh, Nepal, Philippines, Cambodia, Mongolia, Maldives, and Vietnam at 30 to 50 percent. Indonesia and Sri Lanka also show more than one-fifth of their populations below the poverty lines specific to their countries, though they do not fall in the category of countries having high level of population earning less than 1 USD a day. Official poverty is lower in India at 26 percent, whereas the international estimate is higher.

**Table 2.7. Poverty, illiteracy, and health in Asia-Pacific**

Sl. No.	Countries	Population below income poverty line (%)		Probability at birth of not surviving to age 40 (% of cohort) 1995-2000 <sup>a</sup>	Adult Illiteracy rate (% age 15 & above) 1999	Population not using improved water sources (%) 1999	Under-weight children under age five (%) 1995-2000 <sup>b</sup>
		\$1 <sup>a</sup> day (1993 PPP USD) 1983-99 <sup>b</sup>	National poverty line 1984-99 <sup>b</sup>				
1	Bangladesh	29.10	35.60	21.40	59.20	3.00	56.00
2	Bhutan	–	–	20.20	–	38.00	38 <sup>d</sup>
3	Brunei Darussalam	–	–	3.20	9.00	–	–
4	Cambodia	–	36.10	24.40	31.8 <sup>c</sup>	70.00	52.00
5	China Mainland	18.50	4.60	7.90	16.50	25.00	10.00
6	Taiwan	–	–	–	–	–	–
7	Hong Kong	–	–	2.00	6.70	–	–
8	India	44.20	35.00	16.70	43.50	12.00	53 <sup>b</sup>
9	Indonesia	7.70	27.10	12.80	13.70	24.00	34.00
10	Japan	–	–	–	–	–	–
11	Korea, DPR	–	–	–	–	–	–
12	Korea, Rep.	<2	–	4.00	2.40	8.00	–
13	Lao PDR	26.30	46.10	30.50	52.70	10.00	40 <sup>b</sup>
14	Malaysia	–	15.50	5.00	13.00	5.00	18.00
15	Maldives	–	–	12.50	3.80	0.00	43.00
16	Mongolia	13.90	36.30	15.00	37.70	40.00	10.00
17	Myanmar	–	–	26.00	15.60	32.00	39.00
18	Nepal	37.70	42.00	22.50	59.60	19.00	47.00
19	Pakistan	31.00	34.00	20.10	55.00	12.00	26 <sup>b</sup>
20	Philippines	–	36.80	8.90	4.90	13.00	28.00
21	Singapore	–	–	2.30	7.90	0.00	–
22	Sri Lanka	6.60	25.00	5.80	8.60	17.00	34.00
23	Thailand	<2	13.10	9.00	4.70	20.00	19 <sup>d</sup>
24	Vietnam	–	50.90	12.80	6.90	44.00	39.00

Source: UNDP – Human Development Report – 2001.

On the whole, poverty levels are high in South Asia compared to other parts of Asia-Pacific. The major problem is dependence on the primary sector. While the primary sector provides 20 to 30 percent of the GDP, the people dependent on the sector constitute as much as 60 to 70 percent of the population. Also, productivity in agriculture is low, with an average level compared to industry. The second reason for the high poverty levels is casual labour employment and self-employment in unskilled work. Literacy rates and skills are very low for poor people, so they cannot be easily shifted to more productive employment. Livelihood opportunities are limited in developing countries.<sup>20</sup>

Poverty is concentrated mostly in the South Asian region. When economic development and GDP growth largely encompass only the organized sector, a large majority of people are left out of the prosperity. Poverty and deprivation are mostly caused by the neglect of the governments to invest in human resource development to bring these people into the economic mainstream.<sup>21</sup> More rapid growth of industries, along with skill formation, could accelerate the shift into highly paid jobs and, thereby, reduce poverty. Other countries in South Asia, Central Asia and Pacific countries were largely unaffected by the financial crisis in 1998. Yet, since the downturn in the world economy started in 2001, things have changed and growth has slowed down in almost all counties, including India and China, the Central Asian countries and Pacific island nations. The Pacific island nations, such as the Cook Islands, showed high levels of growth (14 percent) in 2000. This eventually declined more recently. Still, most of the developing countries of the region, with the exception of Pacific islands, recorded growth rates between 5 to 9 percent, much higher than those experienced by developed countries. The countries of the Pacific islands have consistently suffered negative growth since the turn of the century mostly due to the downturn in tourism.

## **Inequality**

Income disparities prevailing within a country do not seem to have much of a bearing on the level of economic development of that country. Countries with higher levels of income disparities, (more than 0.40 in terms of Gini ratio), include Malaysia, with the highest disparity at 0.49, and Japan, with the lowest disparity at 0.24. The Philippines, Thailand, China, and others are in the range above 0.40, while India, Pakistan, Bangladesh and Sri Lanka are in the middle range between 0.30 and 0.40 (See Table 2.8). In recent years, inequities in consumption expenditures have increased compared to previous periods, in some of the low-income countries of the region. This is because of the problems related to the economic slowdown and the fall in price for agricultural commodities.

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<sup>20</sup> World Food Programme. 2001. *Enabling Development – Food Assistance in South Asia*, Oxford University Press.

<sup>21</sup> Dréze Jean and Amartya Sen 2002. *India Development and participation*, Oxford University Press.

### Gini Co-efficient trends in South Asia

<i>India</i>		<i>Pakistan</i>	
1992	0.338	1991	0.31
1997	0.378	1998-99	0.41
<i>Bangladesh</i>		<i>Sri Lanka</i>	
1992	0.283	1990	0.301
1996	0.367	1995	0.344

**Table 2.8. Income inequalities represented by shares and Gini ratio**

Sl. No.	<i>Countries</i>	<i>Inequality measures Richest 10% to poorest 10%</i>	<i>Inequality measures Richest 20% to poorest 20%</i>	<i>Inequality measures Gini index</i>
1	Bangladesh	7.30	4.90	33.60
2	Bhutan	-	-	-
3	Brunei Darussalam	-	-	-
4	Cambodia	11.60	6.90	40.40
5	China Mainland	12.70	8.00	40.30
6	China, Taiwan Province of			
7	China, Hong Kong SAR	-	-	-
8	India	9.50	5.70	37.80
9	Indonesia	6.60	4.60	31.70
10	Japan	4.50	3.40	24.90
11	Korea, Dem. People's Rep. of			
12	Korea, Rep. of	8.40	5.30	31.60
13	Lao PDR	9.70	6.00	37.00
14	Malaysia	22.10	12.40	49.20
15	Maldives	-	-	-
16	Mongolia	8.40	5.60	33.20
17	Myanmar	-	-	-
18	Nepal	9.30	5.90	36.70
19	Pakistan	6.70	4.30	31.20
20	Philippines	16.10	9.80	46.20
21	Singapore	-	-	-
22	Sri Lanka	7.90	5.30	34.40
23	Thailand	11.60	7.60	41.40
24	Vietnam	8.40	5.60	36.10

*Source:* UNDP – Human Development Report – 2001.

Inequality goes beyond the mere income distribution represented by the Gini ratio. Unequal access to food, nutrition, health facilities, education, skills formation and employment are far more important. Thus, the overall gap between the haves in industrialized countries and the have-nots in poor countries is glaring. It is well known that economic growth by itself cannot and does not benefit all. Hence, many countries often undertake programmes that involve income transfers to the poor.

Food subsidies, housing subsidies, unemployment dole and other social security measures, free health care, and educational provisions come under this category and help in alleviating poverty and reducing income disparities. Such safeguards are not available to the poor in Asia.

## Hunger

In the Asia-Pacific region, India, Bangladesh, Pakistan, Nepal, North Korea, Laos, Mongolia, are some of the countries that suffer from the problem of hunger. In the case of North Korea, not enough food is produced. The main problem in over-populated South Asia is the prevalence of hunger despite sufficient availability of food. Science and technology, with the support of the governments, has made many of these countries self-sufficient in food grain production. Still, South Asia has more people suffering from hunger than sub-Saharan Africa. However, the depth of hunger, measured as the deviation from the required level of calorie consumption, is not as bad as in Africa. The main reason for hunger in South Asia is the widespread poverty and lack of purchasing power.

FAO has estimated hunger based on the availability of food grains and levels of poverty. For all practical purposes, hunger is usually equated to a poverty stricken population. However, the true nature of hunger is different; it cannot be equated to poverty. Hunger is more transient in nature. It hits larger numbers of people in lean seasons without work and in the years of drought when very little is produced. In 1997-99, FAO estimated that more than 40 percent of populations were hungry in North Korea, Mongolia, and Tajikistan. Cambodia, Bangladesh, Azerbaijan seemed to have more than 30 percent hungry. Most of Asia-Pacific, with the exception of a few countries, had between 15-25 percent of the population suffering from hunger. South Asia topped the list with 300 million hungry people. India had the unfortunate distinction of having 225 million hungry followed by China with 116 million hungry.<sup>22</sup>

The major thrust to make this region hunger free should come from either making food available at affordable prices through food subsidies, or improvement in incomes through poverty alleviation programmes, or both. In some countries, vested interests and mismanagement also causes hunger amidst plenty, as in the case of India. Centralized systems of procurement have benefited a few big farmers in the prosperous states, leaving the produce of the poor in backward regions unsold. The shift to targeted public distribution of food grains at subsidised rates from a system of universal public distribution, in a bid to reduce the food subsidy, has hurt the poor in India. Inefficiency in the system and illegal diversion from the ration shops into the open market has made the safety net virtually useless to the hungry and poor.<sup>23</sup>

<sup>22</sup> FAO. 2002. The State of Food Security 2001, FAO Rome.

<sup>23</sup> MSSRF-WFP. 2001 and 2002. Food insecurity Atlas of Rural India and Food Insecurity Atlas of Urban India, MSSRF, Chennai.

The most unfortunate part of economic development of Asia-Pacific, including the phenomenal growth of some Asian tiger economies, is its failure to banish hunger altogether. The problem lies with the pattern of economic growth that excludes a large number of people from enjoying the bare minimum need of two square meals a day. Whenever economic growth fails to include all sections of the population, governments should undertake social security measures to provide food and shelter. Instead, governments, under the guise of liberalization and structural reforms, have withdrawn from this function. China is an exception in this respect. There, the underlying structure of equality and social security is more important to the goal of banishing hunger than the mere growth of per capita GDP. Though inequalities may have increased in China in the post-liberalization period as was observed earlier, poverty and hunger have been reduced substantially. Government investment on basic amenities has been declining in all Asian countries, including China. Unless a universal “right to food” becomes legislation that can be enforced, it will not be possible to banish hunger. This is a most urgent need in the Asia-Pacific region.

### **Gender Disparity**

While gender discrimination to some degree exists all over the world, gender disparity assumes added importance in the developing world. The discrimination that exists along with large levels of widespread deprivation can make women more vulnerable, subjecting them to silent suffering.<sup>24</sup> The authors of the Human Development Report<sup>25</sup> have regularly computed the gender disparity index. The index is less than 0.50 in Bangladesh, Laos, Pakistan and Nepal. It is better in India at 0.553, but this still falls far below the standards achieved in the more gender sensitive and/or socialistic countries like Japan at about 0.92 and China at 0.715. (See Table 2.9)

It is important to get the overall status of women elevated, and rights imparted in decision-making and asset ownership. Resulting in low levels of literacy and per capita income, gender discrimination is ingrained in social attitudes. Such attitudes lead to sex selective mortality and deprivation of access to food and health care that causes larger problems, like low birth weight children. Hence, gender disparity has to be studied from several angles, such as wage differentials, juvenile sex ratios, rights to property, and women’s participation in public life, including politics. Economic development by itself cannot help this situation. More and more property-related rights and society-related positions of responsibility would improve social awareness and women’s status.

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<sup>24</sup> Sen, A.K. 2001. “Gender equity and the population problem,” *International Journal of Health Services*, 31.

<sup>25</sup> UNDP. Human Development Report, various issues.

**Table 2.9. Gender Development Index**

<i>Sl. No.</i>	<i>Countries</i>	<i>Gender-related development index (GDI) Rank</i>	<i>Gender-related development index (GDI) Value</i>
1	Bangladesh	121	0.459
2	Bhutan	–	–
3	Brunei Darussalam	30	0.853
4	Cambodia	109	0.534
5	China, Mainland	76	0.715
6	China, Taiwan Province of		
7	China, Hong Kong SAR	23	0.877
8	India	105	0.553
9	Indonesia	92	0.671
10	Japan	11	0.921
11	Korea, Dem. People's Rep. of		
12	Korea, Rep. of	29	0.868
13	Lao PDR	119	0.463
14	Malaysia	55	0.768
15	Maldives	69	0.735
16	Mongolia	104	0.566
17	Myanmar	107	0.547
18	Nepal	120	0.461
19	Pakistan	117	0.466
20	Philippines	62	0.746
21	Singapore	26	0.871
22	Sri Lanka	70	0.732
23	Thailand	58	0.755
24	Vietnam	89	0.680

*Source:* UNDP – Human Development Report – 2001.

The gender disparity index measures discrimination towards women to the economic fruits of development. Hence, the gender disparity index is high for developed nations and low for less developed nations. Sometimes tribal communities exhibit less gender disparity than the most developed urban societies in developed countries, such as the USA and Japan. Unless and until intra-household subjugation of women can be measured and quantified, it is difficult to effectively represent the gender gap in all its dimensions. In the absence of more refined measurements, allowing for comparative analysis of countries around the world, the issue here is related only to the ethics of economic development, and the analysis is restricted to the index calculated by the Human Development Report.

#### **2.4 Ethics of International trade**

The World Trade Organization (WTO) has facilitated international trade and improved the export performance of many countries. However, domestic protectionism still needs to be brought down. Under the WTO rules, member

countries have to phase out non-tariff trade restrictions and provide a certain amount of market access to other countries. Still, as an international trade organization, WTO has not been able to provide a level playing ground to the developing countries. In the present context, we consider two important aspects in relation to the above:

Exporters from developed countries enjoy maximum subsidies, especially for farm products. This has been most unfair with respect to agriculture and primary products that constitute the bulk of the exports of developing nations. As per a WTO stipulation, developing countries can increase the aggregate measure of support to a stipulated percentage only from the level existing in 1990-91. At that time, the level of support for agriculture in developed nations varied from 30 percent in the USA to 65 percent in Japan. The support allowed for developing countries was still very low even after the full allowed quantity of support is taken. In the case of India, the actual support given turns out to be negative for some crops.<sup>26</sup>

In WTO terminology, subsidies in general are identified by “boxes,” which are given colours: green (permitted), amber (slow down – to be reduced), and blue (subsidies that are tied to programmes that limit production). In order to qualify for the “green box,” a subsidy must not distort trade, or at most cause minimal distortion. These subsidies have to be government-funded (not by charging consumers higher prices) and must not involve price supports. “Green box” subsidies are, therefore, allowed without limits, provided they comply with relevant criteria. They also include environmental protections and regional development programmes. The blue box is an exemption from the general rule that all subsidies linked to production must be reduced or kept within defined minimal levels. It covers payments directly linked to acreage or animal numbers, but also limits production by imposing production quotas or requiring farmers to set aside part of their land. With the introduction of the green box, blue box and amber box scheme, the developed countries have actually increased their support to agriculture.

Countries using these subsidies, and there are only a handful, say they distort trade less than the alternative amber box subsidy supports available to farmers in developed countries, meaning that it is next to impossible for the developing countries to compete with the developed countries. Farmers in the developed world further enjoy non-tariff supports, such as those available in the green box, which are termed as non-trade distorting, and which include payments for not producing a commodity. Export subsidies are termed as trade distorting. Strictly speaking, all are trade distorting, but they claim to be non-distorting. Another important issue is the blocking of the actual import of goods from developing countries by bringing in non-trade related issues, such as environment-friendly goods and child labour

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<sup>26</sup> Ramesh, Chandra. 2001. “Subsidies and support in agriculture: Is WTO providing level playing field,” *Economic and Political Weekly*, August 11.

free production, phyto-sanitary measures, etc. Several persons both from the developing and the developed world have criticized the unfair trade practices imposed under WTO.<sup>27</sup>

### **Ethical Dimensions of Economic Growth in near Future**

The overall economic scenario of the Asia-Pacific region for the future appears uncertain, but chances of some recovery of domestic demand, as well as export growth, has been forecast by many international financial agencies, including the Asian Development Bank.<sup>28</sup> GDP growth is modest, and the flow of FDI investment in industrial, as well as non-industrial economies, appears to be encouraging. There seems to be consistent improvement in the balance of payments position in many countries. Foreign exchange reserves, low interest rates, and low levels of inflation are conducive to investment and growth. Furthermore, trade within Asia has been reported to be increasing. Increased prosperity and growth in domestic demand would help the region. Still, there is no guarantee that poverty and inequality will decline substantially, particularly in non-industrialised low income countries unless the basic amenities and health facilities improve. (Table 2.10)

As the subsequent chapters show and attempt to reinforce, there are wide ranging aspects that affect the development process, and a conscious imparting of ethical perspectives is paramount if the goal is to be the improved well-being of the majority.

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<sup>27</sup> Stiglitz, Joseph E. 2002. "Unfair trade laws and other Mischief," chapter 6 in "Globalization and its Discontents," Norton, New York.

<sup>28</sup> *ibid.* 16.

**Table 2.10. Population and basic Health and Sanitation**

<i>Sl. No.</i>	<i>Countries</i>	<i>Total Population (Millions) 1999</i>	<i>Urban Population (as % of total) 1999</i>	<i>Population not using adequate sanitation facilities (%) 1999</i>	<i>Under-nourished people (as % of total population) 1996/98</i>	<i>Children under weight for age (% under age 5) 1995-2000<sup>a</sup></i>	<i>Children under height for age (% under age 5) 1995-2000<sup>a</sup></i>
1	Bangladesh	134.60	23.90	53.00	38.00	56.00	55.00
2	Bhutan	2.00	6.90	69.00	–	38 <sup>f</sup>	56.00
3	Brunei Darussalam	0.30	71.70	–	–	–	–
4	Cambodia	12.80	15.60	18.00	33.00	52.00	56.00
5	China Mainland	1 264.8 <sup>b</sup>	31.60	38.00	11.00	10.00	17.00
6	China, Taiwan Province of						
7	China, Hong Kong SAR	6.70	100.00	–	–	–	–
8	India	992.70	28.10	31.00	21.00	53 <sup>f</sup>	52.00
9	Indonesia	209.30	39.80	66.00	6.00	34.00	42.00
10	Japan	126.80	78.60	–	–	–	–
11	Korea, Dem. People's Rep. of						
12	Korea, Rep. of	46.40	81.10	63.00	–	–	–
13	Laos	5.20	22.90	46.00	29.00	40 <sup>f</sup>	47.00
14	Malaysia	21.00		98.00	–	18.00	–
15	Maldives	21.80	56.70	56.00	–	43.00	27.00
16	Mongolia	2.50	63.00	30.00	45.00	10.00	22.00
17	Myanmar	47.10	27.30	46.00	7.00	39.00	–
18	Nepal	22.50	11.60	27.00	28.00	47.00	54.00
19	Pakistan	137.60	36.50	61.00	20.00	26 <sup>f</sup>	23.00
20	Philippines	74.20	57.70	83.00	21.00	28.00	30.00
21	Singapore	3.90	100.00	100.00	–	–	–
22	Sri Lanka	18.70	23.30	83.00	25.00	34.00	18.00
23	Thailand	62.00	21.20	96.00	21.00	19 <sup>f</sup>	16.00
24	Vietnam	77.10	19.70	73.00	22.00	39.00	34.00

Source: UNDP – Human Development Report – 2001.

### 3. EMPLOYMENT AND ETHICS IN ASIA-PACIFIC

“Environment and Employment audit procedures should become an integral part of all development projects....We should remember that where unemployment and the resulting endemic hunger are widespread, peace and human security will become lost causes”

*M.S. Swaminathan (2003) “Public Policies for Job-led Economic Growth,” Second Ambirajan Memorial Lecture, June*

#### 3.1 Introduction

Chapter two examined the experience of economic growth in the Asia-Pacific region and discussed the growth versus development debate. This chapter focuses on employment and the need for job-led growth and development. Amartya Sen defines development as a process of expanding the real freedoms that people enjoy. According to Sen, “The success of a society is to be primarily evaluated by the substantive freedoms...members of that society enjoy.<sup>1</sup>” By analyzing development from the perspective of freedom, Sen has brought an ethical dimension to the development process. Freedom, governance, opportunities, and respect for environmental considerations, are some of the important aspects which need to be considered while defining the path of development. In societies encompassed with poverty, gender discrimination and environmental degradation, the ethical dimensions of development can be perceived from the ‘pro-poor, pro-woman and pro-nature’ oriented development policies and implementation processes which can enhance the opportunities of freedom to the marginalized segments of the society. In such a context, employment should be seen as a fundamental human right and ethical obligation of the society to provide, and not just as a mere consequence of an economic activity.

When the perspectives of ethics and development are viewed in terms of employment, the following three issues emerge as important ethical aspects: Job-led Development, Environmental Ethics and Social Ethics. ‘Job-led Development’ stresses that economic policies and interventions should aim at generating employment. The employment generation should be within the purview of environmental ethics whereby environmentally sustainable economic activities should lead to sustainable employment generation. The “Social Ethics” of employment focuses on gender, child labour and social protection policies. The pro-poor approach will be visible only if employment generation takes place among the poor and marginalized sections of society. However, as ILO argues,<sup>2</sup> employment creation should be blended with social protection policies in order to address the issues of poor people and poverty. As stated, this chapter focuses on the various dimensions of economic development vis-à-vis employment in Asia-Pacific and looks at them from the ethical perspective of being pro-poor, pro-woman and pro-nature.

### 3.2 Economic Ethics: Job-led Development

As highlighted in Chapter two, globalization and structural adjustment programmes have dominated Asia-Pacific since the 1990s, creating an impact on GDP, national incomes, balance of trade etc. The revolution in information technology, and increased trans-national business outsourcing, etc., have also had a major impact in the employment scenario. However, an ILO analysis regarding unemployment shows that unemployment rate has been steadily increasing since 1993 and growth in employment has not shown a consistent improvement in the newly industrialized Asian economies, like the Republic of Korea, Taiwan, Hong Kong and Singapore. (Table 3.1)

**Table 3.1. Unemployment in the newly Industrialized Asian Economies**

<i>Year</i>	<i>Unemployment Rate</i>	<i>Growth in Employment</i>
1993	2.4	1.5
1994	2.2	2.8
1995	2.1	2.5
1996	2.2	2.1
1997	2.4	1.7
1998	5.4	-2.7
1999	5.2	1.5
2000	3.9	1.3
2001	4.0	1.7

*Source: ILO, Yearbook of Labour Statistics, various years-quoted in Sustainable Social Development in a Period of Rapid Globalization: Challenges, Opportunities and Policy Options, UNESCAP, 2002.*

According to the Asian Development Bank,<sup>3</sup> economic trends in 2002 showed growth compared to 2001. Acceleration of exports, strong domestic demand and a general reduction in inflationary tendencies, (except in Pacific), characterized the Asian economy. However, unemployment also rose in many countries. (See Table 3.2)

Out of the 15 Asian countries which have comparative data on employment and GDP, 9 countries, which have shown improvement in GDP, have also reported an increase in their unemployment rates. Most of the Pacific Islands, for which comparative data are not available, also reported high levels of unemployment for 1998. Islands like Cook Islands (12.7%), Fiji Islands (7.9%), Micronesia (16.2%) and Papua New Guinea (11.9%) have all recorded a very high unemployment rate.

Even though India has not been referred to in the above table, India also faces a more or less similar situation to that of China in terms of unemployment. The rate of growth of employment has sharply declined between 1993-94 and 1999-2000. (See Table 3.3)

**Table 3.2. GDP and Unemployment in Asia-Pacific**

<i>Country</i>	<i>GDP 2001</i>	<i>Unemployment Rate 2001</i>	<i>GDP 2002</i>	<i>Unemployment Rate 2002</i>
China	7.3	3.6	8.0	4.0
Hong Kong, China	0.6	5.1	2.3	7.3
Rep. of Korea	3.1	3.7	6.3	3.0
Taipei, China	-2.2	5.2	3.5	5.2
Indonesia	3.3	8.1	3.7	9.1
Malaysia	0.4	2.4	4.2	3.5
Philippines	3.2	7.9	4.6	11.4
Thailand	1.9	1.5	5.2	2.4
Pakistan	2.5	6.1	3.6	9.0
Sri Lanka	-1.4	10.5	3.0	9.0
Azerbaijan	9.9	1.0	10.6	1.3
Kazakhstan	13.5	10.4	9.5	9.4
Kyrgyz Rep.	5.3	7.8	-0.5	N.A.
Tajikistan	10.2	2.3	9.1	2.7
Uzbekistan	4.5	0.5	4.2	0.4

*Source:* Asian Development Bank (2003).

**Table 3.3. Rate of Growth of Population and Employment in India**

<i>Period</i>	<i>Rate of Growth of Population (% per annum)</i>	<i>Rate of Growth of Labour Force (% per annum)</i>	<i>Rate of Growth of Employment (% per annum)</i>
1972-73 to 1977-78	2.27	2.94	2.73
1977-78 to 1983	2.19	2.04	2.17
1983 to 1988	2.14	1.74	1.54
1987-88 to 1994	2.10	2.29	2.43
1993-94 to 1999-2000	1.93	1.03	0.98

*Source:* Planning Commission, Government of India, 2002.

In terms of sector-wise employment growth rate, the primary sector shows a lower growth rate, whereas trade, construction, financial services, transportation, storage and communications have shown a faster growth rate. (See Table 3.4)

While the reports of the Planning Commission argues that the increase in the annual growth rate of employment in trade, construction and transport are due to structural changes in the product-market in the post-reform period, an intensive analysis shows that structural change does not necessarily lead to increase in employment. A comparison of employment elasticity of GDP in different sectors for 1987-93 and 1997-2002 shows a declining trend in spite of structural changes. (Table 3.5)

**Table 3.4. Annual Sector-wise Growth Rates**

<i>Industry</i>	<i>Annual Growth Rate % 1983-94</i>	<i>Annual Growth Rate % 1994-2000</i>
Agriculture	1.51	-0.34
Mining and Quarrying	4.16	-2.85
Manufacturing	2.14	2.05
Electricity	4.50	-0.88
Construction	5.32	7.09
Trade	3.57	5.04
Transport and Storage	3.24	6.04
Financial	7.18	6.20
Community, Social Services	2.90	0.55
Total Employment	2.04	0.98

*Source:* Planning Commission, Government of India (2002).

**Table 3.5. Employment Elasticity of GDP in different Sectors of India**

<i>Sectors</i>	<i>1987-93</i>	<i>1997-2002</i>
Agriculture	0.53	0.50
Mining	0.39	0.60
Manufacturing	0.42	0.25
Electricity	0.33	0.50
Construction	1.00	0.60
Trade	0.59	0.55
Transport	0.68	0.55
Financing	1.00	0.53
Social Services	0.92	0.50
All Sectors	0.43	0.38

*Source:* Planning Commission, Government of India, 2002.

Except in mining and electricity, employment, elasticity (the proportion of change in employment for every unit of change in the value of output) seems to have declined between these two periods, and a negative trend is clearly visible in all sectors. Such a process indicates job-less economic growth. *The Hindu*,<sup>4</sup> in an editorial, has opined that “the very nature of growth and development seems to be at variance with the traditional concept of employment generation.” This poses a valid question: “When traditional employment-oriented sectors, such as agriculture, plantations and few areas of manufacturing, are looking at mechanization and reduction in the dependence of labour, how can modern industries create more jobs?”

Many agricultural economies believe that the transition to industrialization will help to absorb the ‘surplus’ labour from the agricultural sector. However, the low employment elasticity of manufacturing sector has not supported such beliefs. (Table 3.6)

**Table 3.6. Employment Elasticity of Manufacturing Production in Asia**

<i>Country</i>	<i>1980-1990</i>	<i>1990-1995</i>
India	-0.59	0.004
Indonesia	-0.005	0.001
Republic of Korea	0.003	-0.0001
Taiwan (China)	-0.003	0.004
Japan	0.003	-0.005

*Source:* Calculated from ILO, Key Indicators of the Labour Market, various years – quoted in *Sustainable Social Development in a Period of Rapid Globalization: Challenges, Opportunities and Policy Options*, UNESCAP, 2002.

“The preponderance of low elasticity of employment with respect to output points to the fact that the structure of growth under globalization and liberalization has not been adequately conducive to employment expansion.”<sup>5</sup> However, characterizing modern industry, globalization and liberalization as “*not friendly to employment*” may not be correct since modern industry is about employing new skills, knowledge and technology, and any such transition requires focus on human resource development and social protection measures. While discussing the situation in Southeast Asia, particularly after 1997 crisis, the Asian Development Bank<sup>6</sup> notes that appropriate labour market policies are required for a smooth transition from the traditional system to a modern economy. It stresses the need for a “...set of policies and programmes designed to reduce poverty and vulnerability by promoting efficient labour markets, diminishing people’s exposure to risks and enhancing their capacity to protect themselves against hazards and interruptions/loss of income.” The report argues that most of the member countries of ADB have “...some form of institutionalized social protection system, but often these programmes are ineffective due to (i) limited coverage, serving only a portion of formal sector (often the wealthiest segments of society); (ii) insufficient funds, incorrectly distributed among programmes; (iii) inadequate instruments, often copies from developed countries, but not appropriate to serve specific in-country needs; and (iv) factors restricting access to statutory social protection schemes, such as legal restrictions, administrative bottlenecks, and problems with compliance.” The report further points out that, except for the Philippines, Thailand, Mongolia and Japan, none of the countries in Asia and the Pacific have active labour exchange services. Similarly, measures like unemployment insurance are not provided in most countries in East Asia, South Asia and the Pacific Islands. Countries like Cambodia, Azerbaijan and most of the Pacific Islands do not have active labour market programmes.

### **Agriculture, Employment and Development**

In one of its reports, ILO<sup>7</sup> points out that there will be 1.2 billion new entrants to the world labour market by the year 2025. It argues, “Most of the new jobs will

have to be created in cities. The share of non-agricultural employment grew by 93% in the last four decades and now accounts for 40% of all employment in developing countries.”

While the arguments of ILO cannot be doubted, two important factors have to be kept in mind while accepting the above argument:

- (i) Non-agricultural employment in developing countries grew mainly due to the push factors, and not merely due to the pull factors, of urbanized industrialized sector. As many studies have shown, high rural unemployment rates, poverty, low incomes, high population growth, unequal distribution of land, and dissatisfaction with housing are some of the determinants of rural out-migration.<sup>8</sup> The predominance of the informal sector has to be taken into account while discussing the growth of non-agricultural employment.
- (ii) Even though the non-agricultural sector accounts for 40% of the total labour market, the agricultural sector, with 60% of the labour market, is still a major sector to reckon with. Asia has 80% of the world’s economically active population in agriculture. China and India alone have 61% of the agricultural workforce of the world. (Table 3.7)

**Table 3.7. Agriculture and Growth Rate in Asia**

<i>Regions</i>	<i>% of economically active population in agriculture to the total workforce</i>			<i>Annual Growth Rate in %</i>	
	<i>1990</i>	<i>2000</i>	<i>2010</i>	<i>1990-2000</i>	<i>2000-2010</i>
East Asia	63.3	55.4	47.2	0.1	-0.5
South Asia	64.7	60.7	56.5	1.5	1.4
World	46.6	42.1	37.8	0.6	0.4

*Source:* Agriculture: Towards 2010, FAO, 1993.

The primary sector in many Asian countries is characterized by declining contribution to GDP, while a major portion of their populations depend on this sector for employment. In India, the share of agriculture in the total GDP declined from 34.7% in 1980-81 to 24.7% in 1998-99,<sup>9</sup> whereas more than 60% of the workforce continues to be in the agricultural sector. In India and in many other Asian countries, the majority of the population is into the low-productivity, low-income agricultural sector. The rural non-farm sector also contributes substantially to employment and income in rural areas. In Asia, 44% of the rural employment is generated from rural non-farm sector (See Table 3.8). Countries like China have taken strategic initiatives in promoting the rural non-farm sector by encouraging to rural industrialization process.

**Table 3.8. Share of Non-Farm Income and Employment**

<i>Region</i>	<i>% of non-farm income share to the total rural income</i>	<i>% of non-farm employment to the total rural employment</i>
Asia	32	44
East Asia	35	44
South Asia	29	43

*Source:* *The State of Food and Agriculture*, FAO, 1998.

While it is possible to perceive some Malthusian aspects to the mismatch between the workforce and output, it is also important to note that the policy and the financial support of government to the agriculture sector are steadily declining. The Indian Government's policies and institutional mechanisms still have not responded at the scale that the agricultural sector requires. In fact, there is negative response with declining public investments and unfavourable credit policies. Referring to the declining investments in agriculture and rural development, FAO warns, "This will not only constrain future growth in agricultural productivity and food supplies, but will also contribute to worsening rural poverty and degradation of natural resources. At the same time, trade liberalization and globalization is increasing competitiveness in rural areas, and many farmers in the region are increasingly penalized by poor rural infrastructure and public services. Since significant increases in public rural investment seem unlikely, governments in the region will have to give greater emphasis to using public investment resources more efficiently. This will require more efficient targeting of investment resources to achieve growth, poverty and environmental goals, and improved efficiency within the agencies that provide public goods and services."<sup>10</sup>

A look at the pattern of sectoral allocations for the Tenth Five-Year Plan in India (Table 3.9) shows the level of importance given to the agriculture sector – it has received less than 4% of the total outlay.

The downtrend in agriculture's share in total public investment in India is alarming. From 15% during 1980-81, it came down to 6% during 1992-93 and 4% during the tenth five-year plan (2002-2007). There also has been a decline in the investment in agriculture as a percent of GDP, from 1.6% during 1994-95 to 1.3% during 2000-01. While national agricultural policies talk about structural, institutional, agronomic and tax reforms, credit and finance also have become difficult. The share of priority sector advances (in which agriculture constitutes roughly 35%) in total credit of scheduled commercial banks is also steadily declining. (See Table 3.10)

**Table 3.9. Sectoral Allocation for Tenth Five-Year Plan (2002-2007) in India**

<i>Sector</i>	<i>% to the Total Outlay</i>
Agriculture and Allied Activities	3.9
Rural Development	8.0
Special Area Programme	1.3
Irrigation and Flood Control	6.8
Energy	26.5
Industry and Minerals	3.9
Transport	14.8
Communications	6.5
Science, Technology and Environment	2.0
General Economic Services	2.5
Social Services	22.7
General Services	1.1
	100.0

*Source:* Central Statistical Organization, Government of India.

**Table 3.10. Priority Sector Advances and Investment in Agriculture in India**

<i>Year</i>	<i>% of Priority Sector Advances to Total Credit</i>	<i>Investment in Agriculture as % of GDP</i>
1994-95	33.7	1.6
1995-96	32.8	1.6
1996-97	34.8	1.5
1997-98	34.6	1.4
1998-99	35.3	1.3
1999-2000	35.4	1.4
2000-01	31.0	1.3

*Source:* Reserve Bank of India, 2003 and Central Statistical Organization, Government of India.

According to the guidelines of the Reserve Bank of India, domestic commercial banks should lend 40% of the total credit to the priority sector. As the above table indicates the priority sector credit has been lower than the norms of Reserve Bank of India. Lack of institutional mechanisms, fear of Non-Performing Assets (NPA), higher rate of interest (12-14% to agricultural sector compared to 8.5% to construction sector), high transaction costs are some of the often-cited reasons for the lower credit performance in the agriculture sector.

Another important issue, which needs immediate attention, is the impact of globalization and free trade on agricultural employment. Most of the farmers in developing Asian countries have been producing for their local and regional markets. The opening of borders and inflow and outflow of agricultural commodities across borders is bound to affect demand, supply and price. The

farming community has yet to be prepared for such a change, and in this process agricultural employment may also be affected. Thus, a sector, which employs the highest number of economically active workers, has been receiving less attention in terms of investment, institutional mechanism and consistent policy support.

It is not merely a misplaced priority when a sector in which more than 60% of the country's households depend for a living receives inadequate policy and instrumental support. This is a serious ethical issue affecting the livelihoods of millions of people. Economists have been suggesting that investment should be enhanced to solve the unemployment problem. Rangarajan<sup>11</sup> argues that given an increase of labour force at 1.5% per annum, unemployment can be eliminated in the next fifteen years if India has a 7% growth rate with an employment elasticity of 0.22. For such a process, Rangarajan feels that the investment rate of the economy has to move to 28% of the GDP from the current rate of 23% of GDP, but cautions that a comprehensive agricultural policy encompassing a higher level of public investment is a very important aspect of such a process to reduce poverty, expand employment and result in broad-based growth.

Another important issue in agricultural sector is wages (Table 3.11). A study of agricultural wages in the Asia-Pacific region by ILO<sup>12</sup> shows a declining trend over a period of ten years. "In the Asia-Pacific region, Bangladesh, Indonesia and Philippines, they (real wages) show an upward trend. The increase in Philippines however is only for male wages. In Bangladesh, a decline of up to 26% is observed between 1986-89, followed by a strong increase in 1991...and a subsequent decline. Fiji, India, Myanmar and Papua New Guinea show a steady decline over different periods."

**Table 3.11. Agricultural Wages for Asia-Pacific Region**

Year	Bangladesh	Fiji	India	Indonesia	Myanmar	Papua New Guinea	Philippines
	M&F	M&F	M	M&F	M&F	M&F	M
1983	—	—	—	—	—	100.0	—
1984	—	—	—	—	—	82.8	—
1985	—	—	100.0	—	100.0	—	100.0
1986	100.0	—	94.9	—	95.2	—	105.7
1987	—	100.0	88.5	—	76.0	—	130.6
1988	85.3	77.6	77.4	—	79.9	—	—
1989	78.3	—	71.6	—	126.8	—	—
1990	74.0	—	81.4	—	106.3	—	—
1991	125.6	—	68.1	100.0	81.6	—	—
1992	120.9	—	—	115.7	66.6	—	—
1993	—	—	—	—	68.6	—	—

Source: ILO (1996b).

M: Male

M&F: Male and Female

When wages are converted into the working time for the purchase in the local market of one kilogram of the lowest priced staple, they provide a basis for comparison in which the longer the working time required, the lower the purchasing power of the wage. While, for a Swedish agricultural worker, it takes less than 5 minutes of work to buy one kilogram of the lowest priced staple, workers in Myanmar (6 hrs), Tajikistan (4 hrs), Indonesia and Bangladesh (2 hrs) have to struggle hard. In India, the Public Distribution System and food policies have enabled the worker to earn one kilogram of lowest priced staple in 30 minutes. However, most of the agricultural labour is seasonal and, hence, they get employed only for a limited period of the year. An Indian male labourer gets employment only for a period of 184 days, whereas a female labourer is employed only for 134 days in a year. Workers in Vietnam (175 days per year) and Bangladesh (185 days in a year) are more or less in a similar situation. With low wages and seasonal unemployment, the position of an agricultural wage labourer is precarious. Under-employment and Disguised Unemployment are some of the issues which pervade the agricultural economy of Asia and the Pacific.

The preceding discussions raise certain important ethical questions of development. The examples from India and other parts of Asia necessitate much stronger introspection regarding the path of development. Employment is the primary source of personal and family income, providing purchasing power and livelihood security. It is also an important determinant of social and cultural cohesion influencing the norms and values of a society. The right of individual's productive employment is mandated by the United Nations Charter. Policy interventions and social engineering processes of development need to pay more attention to the primary sector of the economy in order to address the issues of unemployment. The rural poor with low education and few resources will find it difficult to adapt to the changing scenarios in national and international economy.

### ***3.3 Environmental Ethics of Employment and Development***

The conflict between the expanding economy and the environment has received lot of attention. In most of the developing countries of Asia and the Pacific, there is a need to blend both ecological and economic development. Past protocol to address economic growth has generally resulted in discounting ecological factors. The major challenge in the future will be to minimize these conflicts and ideally strive for environmental enhancement as a natural ally of production. The degradation of natural resources in many parts of Asia and the fragile eco-system of the Pacific islands may further erode if interventions are not carefully planned. If the agriculture sector has to receive more attention for addressing food and livelihood security, the approach should focus on sustainable agricultural models, which would not only generate more employment and food, but also would sustain the natural resource base. Asia, especially, has to carefully plan its agricultural and natural resource management strategies in the face of declining freshwater resources.

Pro-active environmental policies should also take into consideration the sudden displacement of labour as happened in the controversies surrounding coastal aquaculture in India and in various other parts of Asia.

The ethical dimensions of environment management are dealt with in Chapter IV.

### ***3.4 Social Ethics of Employment and Development***

As highlighted in the discussion above, the major portion of the labour force of Asia is in agriculture. The ILO has been concerned with the situation of agricultural workers since 1919. Freedom of association, right to collective bargaining, non-discrimination, equal pay for men and women workers, the abolition of forced labour and the elimination of child labour are some of the important issues which ILO has addressed through various agricultural-specific conventions and ratifications. Freedom of association, social protection and employment promotion are the three aspects of the labour standards, which many countries in Asia-Pacific have attempted to bring in under their legal framework. Minimum Wage Acts are examples of translating the ILO charter into social protection action. However, as ILO admits, most of these initiatives have remained more as legal documents and have not been strictly enforced due to lack of adequate institutional support and organizational framework. Again, ILO argues that very few countries have adopted legislation specifically addressing agricultural workers. The report of National Commission on Rural Labour (1991) in India is still under consideration. As a consequence of this, most of the agricultural labour force in India has not been organized and, hence, they have not utilized even the minimal support system which the government offers.

Non-discrimination is the key for many labour policies. However, in terms of employment, as well as in terms of wages, women are still discriminated against in Asian countries. In most Asian countries, women occupy less than 40% of the total workforce; in India, women are less than 15% of the labour force. (See Table 3.12)

The discrimination is clearly evident from the table. Even countries like Korea and Malaysia, which have better growth rates and economic status than countries like Bangladesh, pay less to women. On the other hand, women workers in Sri Lanka and the Philippines get more than 80% of the wage that men get. Other considerations, like unpaid work of females, have not yet been fully understood at the policy level. Similarly, working conditions, particularly for women, is another serious issue.

The unemployment rate among women is much higher than for men in many Asian countries. Countries like Pakistan, Philippines and Sri Lanka have a higher unemployment rate among women.

**Table 3.12. Employment and Wages for Women in Asia**

<i>Countries</i>	<i>% of Women in the Total Work Force</i>	<i>Female Wages as percentage of Male Wages</i>
Bangladesh	38.7	71.7
Hong Kong, China	37.8	65.9
Malaysia	34.5	57.9
Philippines	34.8	84.0
Korea, Rep. of	40.5	52.3
India	14.8	50.0 to 70.0
Sri Lanka	31.6	87.8
Thailand	45.9	63.8

*Source:* ILO, Labour Statistics Division, 1998 – quoted in *Sustainable Social Development in a Period of Rapid Globalization: Challenges, Opportunities and Policy Options*, UNESCAP, 2002.

**Table 3.3. Unemployment Rate by Gender**

<i>Economy</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>
Indonesia	4.0	3.3	5.1
Hong Kong, China	2.8	3.1	2.3
Pakistan	5.4	4.1	13.7
Philippines	7.4	7.0	8.2
Singapore	3.0	2.9	3.1
Sri Lanka	11.3	8.0	17.6
Thailand	1.1	1.0	1.1

*Source:* ILO, Labour Statistics Division, 1998 – quoted in *Sustainable Social Development in a Period of Rapid Globalization: Challenges, Opportunities and Policy Options*, UNESCAP, 2002.

However in recent times, UNESCAP<sup>13</sup> has observed a new trend in the feminization of employment in the export-oriented production in some Asian countries, and it has brought out the unethical dimensions of female employment. It is appropriate to quote its findings:

*This trend towards the feminization of employment in Asian countries resulted from the needs of employers to hire a cheaper and more ‘flexible’ source of labour oriented to export promotion. It was also strongly associated with the moves towards casualization of labour, a shift to part-time work or piece-rate contracts and insistence on greater freedom for hiring and firing over the economic cycle and response to technological change. All these aspects of what is described as “labour-market flexibility” became necessary once external competitiveness became the significant goal of domestic policy makers and defined the contours within which domestic and foreign employers in these economies operated.*

*Feminization of work was also encouraged by the widespread conviction among employers in Southeast Asia that female employees are more tractable and subservient to managerial authority, less prone to organize unions, more willing to accept lower wages because of their own lower reservation, and aspiration wages, and easier to dismiss using life cycle criteria such as marriage and childbirth.*

According to the Human Development Report of South Asia,<sup>14</sup> in most of the countries in South Asia, women agricultural workers, as a percentage of total employed women, exceed that of male agricultural workers as a percentage of total number of men employed. In spite of the fact that women are more efficient than men, in terms of productivity, they are paid lower wages. In addition, there is substantial amount of invisible unpaid labour performed by women and “despite the critical involvement and contribution of women in agriculture, their presence is officially largely invisible, with few statistics reflecting their actual contribution to output and rural employment and thereby to the Gross Domestic Product.”

Another important trend, which is emerging in Asian countries, is home-based work, mostly done by women in urban areas. Home-based production accounts for half of all current employment in Sri Lanka. UNESCAP<sup>15</sup> quotes a study by UNDP, which points out that in the Republic of Korea, 33% of the working population is in home-based employment. While it offers flexibility of time and space, studies have shown “that home-based production by women, through a “putting-out” system in which such production is the base of a complex production system chain ultimately involving major multinational producers, produces the lowest level of remuneration, few or no benefits of social protection.” An analysis of the manufacturing sector by Jayati Ghosh<sup>16</sup> shows that the unorganized manufacturing sector is increasing in terms of employment, while there is a decline in organized manufacturing sector. (See Table 3.14)

**Table 3.14. Employment in Unorganized Manufacturing Sector in India**

<i>Sector</i>	<i>Employment in millions 1993-94</i>	<i>Employment in millions in 1999-2000</i>	<i>Rate of Growth (% per annum)</i>
Organized Manufacturing	6.40 (18.3%)	6.74 (16.5%)	0.87
Unorganized Manufacturing	28.60 (81.7%)	34.05 (83.48%)	2.95
Total Manufacturing	35.00	40.79	

*Source:* NSS Surveys, 50<sup>th</sup> and 55<sup>th</sup> Rounds quoted in Ghosh (2002).

Very few countries have policy perspectives for a healthy formal-informal sector relationship. This sub-contracting relationship is seen more as a tool to avoid the various social and economic protection measures propounded by ILO and the national legislations of labour laws.

UNESCAP<sup>17</sup> points out that the largest child-labour population in the world is to be found in Asia: 120 million children between the ages of 5 and 14 who are fully employed, and more than twice that many, an estimated 250 million, for whom work is a secondary activity. It also warns about the growing significance of female child labour in Asia. Even the Pacific Islands, where child-labour was not prevalent, are showing signs of increasing numbers of children leaving school early and joining the informal sector.

The occupational hazards in most of the Asian countries, particularly in agriculture, are poorly documented. Though many Asian countries have ratified the Workmen's Compensation (Agriculture) Convention 1921, most of the agricultural workers are excluded from insurance and other general protection schemes. A comparison of social security expenditures, (as percentage of GDP in 1992), and coverage of old-age pension insurance, (as a percentage of the labour force), shows that most Asian countries, except Malaysia and Japan, give low priority in operationalizing social security and old-age pension plans. Countries like India and Thailand have very low levels of social security programmes. As the ILO report<sup>18</sup> points out, limited support is more operationalized in urban areas and most rural agricultural workers are excluded from such programmes. China has introduced innovative approaches in social security. One of its 'Regulations' concerning the 'Work to Provide for Household, the Five Guarantees in Rural Areas' (1994), offers five guarantees for peasants who are without any support when they are young, old or are invalids: they are guaranteed food, clothing, room, medicare and a funeral grant. Sri Lanka's Farmers' Pension and Social Security Benefit Scheme Act of 1987, and India's Beedi and Cigar (Conditions of Employment) Act of 1966, are two examples of providing social security and better employment conditions through legislation. But, as the following table shows, these laws seem to have limited impact on the overall labour conditions of Asia.

**Table 3.15. Social Security Coverage in Asia**

<i>Country</i>	<i>Social Security Expenditure (as % of GDP)</i>	<i>Coverage of Old-Age Insurance (as % of the labour force)</i>
China	5.7	21.1
India	0.3	0.9
Japan	11.5	46.6
Korea, Rep. of	2.3	25.9
Malaysia	2.3	95.6
Philippines	1.2	52.6
Sri Lanka	2.5	N.A.
Thailand	0.1	N.A.

Source: ILO (1996b).

In industrial relations are certain serious issues which are emerging in Asian countries. Ghosh<sup>19</sup> has observed, in Indian industries, a shift in the relative bargaining power in industrial relations, away from workers, to employers. She quotes the Second Labour Commission Report, which noted that industrial relation machinery has lost its potential to consolidate labour welfare (reproduced below):

A review of industrial relations in the pre-reform decade (1981-90) reveals that as against 402.1 million man-days lost during the decade...in the pre-reform period, the number of man-days lost declined to 210 million during 1991-2000 i.e. in the post-reform period. But more man-days have been lost in lockouts than in strikes. ...A large number of people have lost their jobs as a result of VRS (Voluntary Retirement Schemes), retrenchment and closure both in the organized and the unorganized sector...

Unemployment also leads to migration, both rural-urban migration and cross-border migration. Substantial numbers of cross-border migrants are illegal migrants who are unemployed or under-employed in their native land. Such unorganized migration processes leads to social and cultural displacement and conflicts.

### **3.5 Ethics of Development**

Amartya Sen,<sup>20</sup> in one of his erudite speeches, has described the effect of women's empowerment through education and employment: *For example, there is now overwhelming evidence that women's empowerment through schooling, employment opportunities etc. have the most far reaching effects on the lives of all-men, women and children. It reduces child mortality; it cuts down health hazards of adults arising from low birth weight; it increases the range and effectiveness of public debate; and it is more influential than economic growth moderating fertility rates...*

He has also defined the linkages between equity, freedom and development. From such a perspective, employment is not merely a 'statistic,' or as Sen would like to describe it, an *inanimate object of convenience*. "Employment can be a factor in self-esteem and indeed in esteem by others."<sup>21</sup> Given such a broad social and psychological base, employment has influence on equity, freedom and development. High levels of unemployment indicate high levels of inequality, less freedom and less development.

There is a need for a fresh look towards the agricultural sector, which still is the major workforce of Asia. Characterized by low wages and low productivity, this sector receives limited policy support and investment from Governments. Our data also shows that a substantial number of sectors are not covered by social protection measures. Rights chartered by United Nations, ILO and UNICEF are yet to reach the majority of the workforce. Gender bias and exploitation of children are still widely prevalent. While it is important that labour is productive and accountable,

the ethical dimensions of development necessitate the provision of rights and protection to labour. UNESCAP<sup>22</sup> has stressed the need to focus on patterns of employment which are not prone to sudden “boom-and-bust” cycles, but are sustainable over a period of time. In the context of transitions in the Asian economy, UNESCAP has raised certain questions:

- (1) How can societies ensure the minimum provisions of basic rights and privileges to women workers and improve their working conditions without simultaneously eroding the advantages to employers and reducing the extent of female wage employment?
- (2) How can such rights and basic labour standards be ensured in the coming phase, in which heightened export competition is likely to be combined with a phase of aggregate employment contraction, as the full force of the current adjustment measures is felt in the real economies?

The above questions, when extended to the concept of employment, reflect the need for ethical dimensions in economic development. Equity and freedom cannot be achieved in a system which treats labour as mere commodity. There is a need to give more focus to human resource development, labour market policies and social protection measures in Asia-Pacific in order to facilitate smooth economic transitions.

However, many countries have started taking effective steps towards fulfilling the ethical dimensions of development. The Finance Ministers of Asia-Pacific Economic Cooperation have recommended social safety nets for a globalizing Asian and Pacific region (See Box 1). Examples, such as ‘The Maharashtra Employment Guarantee Scheme’ (See Box 2), show the viability of effective public works scheme in rural areas creating large-scale employment. The Grameen Bank model of rural credit in Bangladesh, Self-Help Group movements and Joint Forest Management programmes in various parts of Asia are able to blend employment, environment and empowerment.

In the context of ethics of economic development, there is a need to redefine the concept of full employment. From a mere economic condition when everyone who wishes to work at the prevailing-wage rate for their type of labour is employed, full employment should include rights and protections which facilitate freedom and development.

**Box 1. APEC Finance Ministers Recommendations on Social Safety Nets  
for a Globalizing Asian and Pacific Region**

The main recommendations include: (1) social safety nets should be in place before a crisis occurs since they can address the needs of the poor in good economic times, and should be adaptable to combat the effects of crisis; (2) pre-crisis planning is essential to effectively address the social effects of crises and includes the availability of reliable and timely information on the poor and frequent evaluation of safety net programmes; and (3) countries can select from a wide range of available instruments depending on their administrative capacity and target populations. In selecting the appropriate instruments, governments should ensure that the measures: (i) provide adequate protection to the poor; (ii) promote efficient targeting; (iii) avoid creating a culture of dependency among recipients by limiting size and duration of benefits; (iv) are consistent with economic incentives and overall targets of fiscal and macroeconomic policy; and (v) encourage transparency and accountability in the design and implementation of programmes and in the use of resources.

*Source:* From Social safety Nets in Response to Crisis: Lessons and Guidelines from Asia and Latin America, approved by the Asia-Pacific Economic Cooperation (APEC) Finance Ministers, May 2001.

**Box 2. The Maharashtra Employment Guarantee Scheme**

The scheme in India is perhaps the most renowned public works programme in Asia. The programme had an impressive record in terms of numbers with 875 million person-days of work created in 1991 alone. An evaluation of the programme showed that the targeting was good with more than 70 percent of the beneficiaries below the poverty line and that it effectively contributed to contain the adverse consequences of droughts. One of the key elements of the success has been attributed to the fact that the wage rate had been set at a level below the minimum wage and that this, in turn, allowed for proper self-selection. The scheme also had a visible effect on Indian infrastructure, particularly the irrigation system that has been an important factor for the consequent expansion of agricultural output. The scheme has more recently come under criticism as its records have been declining but it historically remains a major example of an effective public works scheme.

*Source:* Labour Market Policies: Theoretical background by A. Abraham and P. Verme in Social Protection in Asia and the Pacific 2001 Asian Development Bank.

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## 4. ETHICS IN RELATION TO DEVELOPMENT AND MANAGEMENT OF ENVIRONMENTAL CAPITAL STOCK

“Nature provides for everybody’s needs, but not for everybody’s greed”

– Mahatma Gandhi

### 4.1 Introduction

Ethics in environmental affairs and the management of natural resources are concerned with the impact of human actions on natural entities and nature as a whole. There is a dual nature of ethics (human to nature/human to human) in managing environmental capital stock, represented by land, water, forests, biodiversity and oceans. There exists among humans inequality with respect to those who perpetrate, those who benefit and those who suffer the most from unethical environmental activities. Humankind has begun to realize that the practice of ‘high input and high return’ in agriculture, forestry and fisheries might also create various other kinds of problems, having a negative impact on local and global scales. Science and technology based development efforts must include an ethical framework to guide human interaction with nature towards promoting and supporting humane and sustainable societies, so that future generations will not be deprived of access to an adequate and healthy natural resource base.

The interplay between the need to ensure intra- and inter-generational equity will be fascinating and exacting, and the outcome will be critical to the future of humankind.

### 4.2 Land

The Asia-Pacific region has 23% of world’s total land area and is home to about 56% of the world’s population. The distribution of land to agriculture, the primary and largest private sector industry in Asia is as follows:

**Table 4.1.**

<i>Region</i>	<i>Agricultural land (1,000 sq km)</i>	<i>Irrigated land % of crop land</i>
East Asia and Pacific	2 331	37.6
South Asia	2 128	42.0
World	15 219	19.7

*Source:* UNESCO. EOLSS, Vol. 2. 2002.

Five South Asian countries, India, Pakistan, Bangladesh, Nepal and Sri Lanka, have 21% of world’s population on only 3% of its land. The population density per hectare of arable land in South Asia is 6.0 as against 3.8 for the rest of the world.

This highlights the intense interaction of people and land in Asia, in general, and in South Asia, in particular. The major ethical considerations in land use and management are: arresting land degradation, reclaiming degraded lands, ensuring land tenure rights and public policies for promoting sustainable land use and management.

Agriculture is practiced in 5 major categories of land: irrigated lands, high quality rain-fed lands, densely populated marginal lands, urban and peri-urban agricultural lands and extensively managed marginal lands. The arid zone, semi-arid zone, coastal ecosystems and hill and mountain ecosystems are the ones where human interaction, purely from the point of view of short term economic gains in the past, are threatening the biodiversity and sustainability of the livelihood systems in these zones mainly due to improper land husbandry.

Improper land and water husbandry practices in the region has resulted in land degradation by various processes, such as water and wind erosion, water logging and salinization, lowering of water tables and soil fertility decline.

Water erosion is extensive and severe throughout the Himalayas, South Asia, Southeast Asia, and large areas of China, Australia and the South Pacific. More than half the world's irrigated land affected by water logging and salinization is located in Asia-Pacific. About 35% of the productive land in Asia is now desert.<sup>1</sup> The countries suffering most from desertification are China, Afghanistan, Mongolia, Iran, Pakistan and India.

The contribution of human activities to land degradation in the Asia-Pacific region is estimated as follows: removal of vegetation cover 37%, overgrazing 33%, unsustainable agricultural practices 25%, over exploitation through construction of infrastructure 5%.<sup>2</sup> The estimates of economic loss due to land degradation in South Asia are given below:

**Table 4.2. Provisional estimates of the cost of land degradation in South Asia**

<i>Type of degradation</i>	<i>Cost, billion US\$ per year</i>	<i>Notes</i>
Water erosion	5.4	On-site effects only
Wind erosion	1.8	Assessed relative to water erosion
Fertility decline	0.6-1.2	Tentative estimate
Water logging	0.5	
Salinization	1.5	

Source: World Soil Resources Report No. 78, 1994, FAO.

<sup>1</sup> UNEP 1997. Global Environment Outlook, <http://www.grida.no/geo1>.

<sup>2</sup> *ibid.*

Oldeman<sup>3</sup> (1998) estimated the average percentage cumulative loss of productivity at 12.8% for cropland and 3.6% for pastureland in Asia due to the impact of land degradation. The total land area affected by human induced land degradation in South and Southeast Asia is around 960 million ha as noted below. (See Table 4.3)

**Table 4.3. Impact of human induced soil degradation on changes in food productivity and areas (in million ha) affected under different management levels for South and Southeast Asia**

<i>Level of productivity change</i>	<i>Level of management</i>					
	<i>High</i>		<i>Medium</i>		<i>Low</i>	
	<i>Impact</i>	<i>Area</i>	<i>Impact</i>	<i>Area</i>	<i>Impact</i>	<i>Area</i>
Large increase	Negligible	67	–	–	–	–
Small increase	Light	171	Negligible	78	–	–
No increase	Moderate	82	Light	135	Negligible	30
Small decrease	Strong	41	Moderate	74	Light	119
Large decrease	Extreme	11	Strong	51	Moderate	69
Unproductive	Extreme	0	Extreme	–	Strong	30
Total area affected: <b>958</b>		372		338		248

*Source:* Oldeman (1998).

Out of 958 million ha, around 18% has negligible impact, 44% light impact, 23% moderate impact and 14% strong to extreme impact on food productivity. Hence, sustainable agriculture can only be ensured through sound land husbandry practices and should be central to ethics in agriculture.

Prime agricultural landscapes have been developed over thousands of years throughout Asia. UNESCO's World Heritage listing of the Ifugao Rice Terraces in the Philippines as a living cultural landscape is a fitting recognition of the achievements of indigenous people. Reinforcement of these multi-crop agro ecosystem practices strengthens the cultural identity and the people-nature linkages. Unfortunately, due to urbanization and industrialization, prime agricultural lands are being converted away from agriculture. National land use policies and town planning policies of cities must take care of arresting this trend.

**Aquaculture production** in agricultural lands, both inland and coastal, is expanding at a rapid pace. The annual growth rate in aquaculture production in Asia-Pacific was 12.8% in the decade, 1989-99, and amounted to about 90% of the world production in 1996. China is the most dominant country in aquaculture

<sup>3</sup> Oldeman, L.R. 2000. "Impact of Soil Degradation: A Global Scenario," in Proceedings of International Conference on Managing Natural Resources for Sustainable Agricultural Production in the 21<sup>st</sup> Century, New Delhi, Feb 14-18, pp 79-86.

production in the world. Large-scale development of aquaculture in the coastal areas has resulted in salinization of fields and contamination of underground water. Chakaria Sundarbans in eastern Bangladesh has been completely cleared for aquaculture.

Some of the other negative impacts of aquaculture are: loss of estuarine habitats, inadvertent introduction of competitors, predators, parasites and diseases, and genetic modification of wild stocks by inevitable escapes. Best water management and effluent treatment measures must be ensured to prevent the permanent and irretrievable damage to the land and water resources of the area.

Equity and social considerations of anthropogenic climate change due to land and forestry management practices demand, as the main 'climate agreements' repeatedly stress, equity and fair burden sharing, including the need for fair burden sharing among developed countries themselves based on the norms of responsibility or guilt, capacity and need. The United Nations Conference on Environment and Development, 1992, put forth "Agenda 21" as the framework for nations to take appropriate land husbandry plans of action for sustainable development. The commitment of all stakeholders in implementing this plan of action is vital for sustainable development.

### 4.3 Water

Asia, Europe and Africa are the continents of highest water stress in terms of water availability per person, which will accentuate during the present century leading to inequity in the availability of even drinking water. The estimated availability of fresh water as run off in Asia is given below (Table 4.4), which is the maximum potential among all the continents.

**Table 4.4. Availability of Freshwater Run-off**

<i>Area 10<sup>3</sup> Km<sup>2</sup></i>	<i>Population Million</i>	<i>Run off Km<sup>3</sup>/year</i>
43 475	3 108	14 410

*Source:* UNESCO. EOLSS. Vol. 2.

The major unethical activities in water resource development and management are: inequity in water allocation and use in the watershed, depletion of groundwater, pollution of surface and ground water, and inadequate response to mitigate the hardships encountered by people and livestock during floods and drought.

Due to unethical human activities, arising out of a mind-set not placed in favour of a pro-nature approach, the natural hydrological cycles of most river basins are becoming more and more interfered and transformed. Although the major effects of reservoir construction on the hydrological cycles are run off control and an

increase in ground water table, the ethical considerations of minimizing the loss of area and its biodiversity due to inundation of water, and humane efforts in proper rehabilitation of displaced people, must be an integral part of the planning and execution of major dams.

The conflicts that can occur between activities for hydrological cycle and water transfer links upstream in a catchment with the problems and denied opportunities for the people downstream need to be harmonized by compromise-building efforts of all the communities in the watershed. In such compromise-building, sufficient attention must be given to secure environmental sustainability through ethical considerations such as: land must remain productive, water must remain usable all the way down to the mouth, agricultural products must remain unpolluted and edible, and crucial ecosystem services must be protected.

For example, the Chao Phraya basin covers approximately one third of Thailand's land area. The basin is composed of four rivers. Transferring water from the middle to the lower part of Chao Phraya basin in the past has created opportunity cost to the upstream of the basin. Also, transferring water from the Mae Klong basin to the lower of Chao Phraya basin resulted in shifting the water resources from an area of higher economic return to one of lower. Appropriate policy for water allocation systems, within and between river basins, therefore, should be considered for both equity and efficiency factors of water use.<sup>4</sup>

The most significant distortions of the hydrological cycle are being observed in urbanized areas. Impermeable surfaces in urban areas result in a great reduction of infiltration and evaporation. This can mean that the rainfall flood volumes may increase by several times. Rainwater harvesting techniques need to be widely adopted in urban townships and cities to make an effective reuse of harvested rainwater and to increase the recharge of the aquifer.

Over-exploitation of ground water for intensification of agriculture in many Asian countries is resulting in unsustainable use of this resource, and may lead to water crisis and water famine in some areas. The classical example of this practice is being witnessed in the Indo-Gangetic plains of India. If ground water is extracted from confined aquifers below impermeable layers, the ground water table is only slightly, or not affected at all. However, in many coastal areas, as observed in quite a number of Asian countries, the over extraction of ground water leads to seawater intrusion which may lead to water insecurity for both present and future generations. Therefore, inter-generational ethical considerations demand that the utmost scientific principles and practices be adopted by the people in the

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<sup>4</sup> Sombat Sae-hae and Acharee Sattarasart 2002. "Farmers' Preferences for Agricultural Activities under Limited and Uncertain Water Condition in the Chao Phraya Basin, Thailand," in International Symposium on Sustaining Food security and managing natural resources in Southeast Asia – challenges for the 21<sup>st</sup> century, Chiang Mai, Thailand, Jan 8-11.

augmentation and equitable use and management of ground water resources, lest it will lead over time to water crisis and water famine.

One of the major sources of water in tropical Asia is the glaciers in the Himalayan mountain range. Global warming will result in the faster melting of glaciers and increasing risks of glacial lake floods. A lowering in the flow of rivers fed by snow will occur, affecting hydroelectricity generation, and water supplies to urban settlements and agriculture.

Water pollution has increasingly reached a severe magnitude in the region due to the discharge of domestic sewage, industrial effluence and run off from activities such as agriculture and mining. It has been estimated that river transport of inorganic nitrogen and phosphorous due to excessive fertilization in select areas has increased several fold over the last 150-200 years. This practice can cause toxic algal blooms, oxygen depletion and other expressions of **eutrophication**. Rivers, lakes and lagoons are natural sinks into which untreated wastes from domestic, industrial sectors and agricultural lands are dumped. It is estimated that 54% of the lakes in Southeast Asia suffer from eutrophication problems.

Ethical considerations are more important than ever before for the management of water. The emerging water crisis of today calls for awareness building and education concerning water resources, and for the adoption of regulative, economic and communicative instruments and covenants by all stakeholders, as is being promoted by the World Water Forum.

#### **4.4 Biodiversity**

Six of the twelve 'mega-diversity' countries identified by McNeely, et al,<sup>5</sup> are located in this region – namely, India, Malaysia, Philippines, Indonesia, Thailand and China.

Agro-biodiversity, that is, the varieties of crops and breeds of animals derived through centuries of natural and human selection, by design and by default, is the base on which agriculture of the world is built. Rapid industrialization and modernization have largely been responsible for the erosion of agro-biodiversity in various parts of the globe. By 2005, India is expected to produce 75% of its rice from just 10 varieties compared with the 30,000 varieties traditionally cultivated. In Indonesia, 1500 varieties of rice disappeared during the period 1975-90.

Plant and animal breeders need to access a wide range of genetic resources when developing new varieties and breeds. Such new varieties and breeds may be

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<sup>5</sup> McNeely, J.A., K.R. Miller, W.V. Reid, R.A. Mittermeier, and T.B. Werner, 1990. *Conserving the World's Biological Diversity*. WRI, World Conservation Union, World Bank, WWF-US, and Conservation International, Washington and Gland, Switzerland.

necessary as economies develop, people's needs and tastes change and diversify. More importantly, the mixing of the global gene pool will help protect past achievements in agriculture, fisheries and milk and meat production. Modern plant and animal breeding science establishments have always made use of material selected, used and maintained by farmers without the historic necessity of acknowledging the latter's contributions. While the sellers and users reap the benefits of such research and value added material, the burden of continuity and maintenance falls on the primary and secondary conservers. Primary conservers are individuals and communities who conserve biodiversity under in-situ conditions, while secondary conservers are institutions responsible for maintenance of collections made from primary conservers.

It is, hence, ethical to fix the social responsibility of giving due recognition and sharing of benefits upon the sellers and users, recognition and benefits that rightly go to a large number of women and men whose knowledge and efforts have generated the value added materials. It is precisely with such consideration that several recent legally binding international agreements, like the Convention on Biological Diversity (CBD) and the International Treaty on Plant Genetic Resources (ITPGR), have recognized the material and knowledge contribution of farmers, who are the primary conservers. The Convention on Biological Diversity (CBD), signed by more than 168 countries, is a global convention aiming at conservation, sustainable use, and fair and equitable sharing of benefits resulting from such uses. The International Treaty on Plant Genetic Resources (ITPGR) has been signed by 78 nations including India, Bangladesh, Bhutan, Democratic People's Republic of Korea, Thailand, Malaysia, and Myanmar from the Asia-Pacific region.

Over the last one century or so, secondary conservers, mostly those involved in *ex-situ* conservation efforts, like gene banks, botanical gardens, zoos and parks, have increasingly realized the growing economic cost of conservation. Among the various causes for this inflation are the rising cost of electricity, cost involved in growing out, characterization, presence of a large number of duplicate samples, non-viability of seeds, heavy maintenance and replacement costs. With the global slow down of publicly funded research, it has become increasingly difficult to continue these efforts.

The burden on primary conservers is much heavier than those faced by secondary conservers. With the industrialization of agriculture, large areas that were rich in agro-biodiversity have been replaced with crops and varieties of a narrow genetic base. This change is inextricably linked to land, lifestyles, beliefs, customs and traditional knowledge. Since a crop or a variety has to be cultivated and used year after year, the effort and cost involved is far more expensive than *ex-situ* conservation.

Rapidly shrinking agro-biodiverse areas, on the one hand, and increasing costs of *ex-situ* methods, on the other, have brought to the fore *in-situ* conservation issues.

*In-situ* conservation cannot be dealt with in isolation without addressing ethical and equity issues. While value addition to material derived through traditional knowledge and practice is crucial, it is equally important to acknowledge the contributions made by primary conservers of the past and the present.

It is crucial to distinguish the difference between conservation by modern science and conservation by traditional communities. There is little doubt that the burden of in-situ conservation has been shifted more and more to the primary conservers. Recognizing the overburden to primary conservers, ethical considerations are now being built-in through recognition, reward and benefit sharing. A new drug called Jeevani, a restorative, immuno-enhancing, anti-stress, anti-fatigue agent from arogyapaach, developed by scientists at the Tropical Botanical Garden and Research Institute (TBGRI) and based on the medicinal knowledge of the Kani tribe in Kerala, Southern India, is a good example. Three Kani tribal members divulged their traditional knowledge to Indian scientists who isolated 12 active compounds and filed two patent applications for the drug. The technology was then licensed to Arya Vaidya Pharmacy Ltd., an Indian pharmaceutical manufacturer pursuing the commercialization of Ayurvedic herbal formulations. A Trust Fund was established to share the benefits arising from the commercialization of the Traditional Knowledge based drug “Jeevani.”<sup>6</sup>

Material and knowledge conserved and used by communities are difficult to recognize and reward, unlike modern breeders who are individuals or groups of people. It is also important to recognize that there are many ways of recognition, reward and benefit sharing, because the values placed on material, honour and dignity, differ from group to group. While benefit sharing is largely addressed as a monetary mechanism, non-monetary forms of social recognition linked to honour and dignity may be as important as well. For example, recognition could be positive incentives through formal institutions in the form of subsidies, or the development of common facilities like schools, roads, transport etc., in exchange for the material and knowledge conserved.

The ethical and equity dimension should not only focus on recognizing the primary conservers. Special efforts must be made to understand the disaggregated segments of the community who made significant contributions to the cultivation of the resources and generation of associated knowledge. Given this consideration, integrating a gender perspective is essential given the major role women play as conservers, cultivators and breeders. This is so because gender is a social construct that governs the roles and responsibilities assigned to individuals within a cultural context, which leads to the generation of gendered knowledge.

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<sup>6</sup> Anuradha, R.V. 2000. Sharing the Benefits of Biodiversity: The Kani-TBGRI Deal in Kerala, India, IIED and Kalpavriksh, Pune, 43 pp.

## 4.5 Forests

It is estimated that globally about one-third of the land area occupied by forests has disappeared in the last 2000 years. The Asia-Pacific region has 655 million ha of forest area, (which is 17% of the world's forest area) which is less than one fifth of the land area. Three countries, Australia, Indonesia and China account for 52% of the forest cover in the region. The average per capita forest area for the whole region is 0.21 ha. The lowest per capita forest cover is found in South Asia at 0.08 ha. The world's highest rate of deforestation, at 1.2% per year, has been recorded in Asia. At the current rate of harvesting, the remaining timber reserves in Asia may not last for more than 40 years.

The major ethical considerations in forest management are deforestation, loss of biodiversity, forest as a resource for the community, forest fire prevention, wildlife protection and eco-tourism. The degree and manner in which society impinges on these aspects of forestry determine the extent of degradation and scope for sustainable management and use of forest wealth.

Some of the most biologically and ecologically diverse forests are under threat. About 500 species are listed by FAO as threatened and require some immediate assessment and plans for their survival prospects. About 97% of the forest cover represents natural vegetation and 3% are plantations of industrial value. A great deal of science and technology work needs to be done on selection and genetic tree improvement *in-situ* in tropical plantations.

The age-old practice of shifting cultivation (slash and burn system of forest clearing) in the hill and mountain regions of Asia has been instrumental for the decline in forest area and loss of biodiversity. This may not only influence climate through the water and energy cycles, but due to biomass burning may add to CO<sub>2</sub> emissions. Considerable changes in the scale and frequency of flooding (for example in the Ganges basin) are related to the intensity of deforestation in local mountainous regions.

Better alternatives of land management to shifting cultivation are available, and promotion through community participation and supportive public policy initiatives in the matter of community forest management, sharing of benefits such as forest food, fodder, fuel wood, medicines, gums, resins, construction material, and legal entitlements, need to be institutionalized for the conservation and sustainable use and management of forests.

Strengthening the stewardship responsibility of local communities who are granted access to forest resources under a long term tenorial agreement, and making them responsible for the reforestation efforts from part of the sale proceeds, are a couple

of the measures which will be part of the community-based Joint Forest Management strategy.<sup>7</sup>

The last decade has seen increased emphasis on achieving sustainable forest management. This approach balances environmental, socio-cultural and economic objectives of management in line with the *Forest Principles* agreed at UNCED in 1992.

The prevention and control of forest fires, extreme cases of which have been experienced in tropical Asia and Oceania in the last two decades, is a strong ethical concern, as they quickly lead to loss of precious forest biodiversity nurtured over years. International travel and global economy also will ensure the continued introduction of new pests in forests. Fire control and pest management should be an integral part of good forest management systems. Loss of wildlife (due to human action) in forest ecosystems, jeopardizes the nutritional base on which many local communities depend, can lead to the collapse of local economies and may permanently alter forest ecology.

#### 4.6 Ocean

The Law of Sea 1982 (UNCLOS) became effective in 1994, granting coastal States, a large number of which are in Asia-Pacific, the legal rights to regulate and manage aquatic resources up to 200 nautical miles from their coast. In it, the Exclusive Economic Zone (EEZ) reserves exclusive rights to exploit, develop, manage and conserve all natural resources in and under the sea within 200 miles of the shore, including fish, oil, gas, sand, gravel, minerals, etc. The inland capture fisheries production and marine capture fisheries production has been growing in the Asia-Pacific region, marking a 5.7 and 2.5% growth rate, respectively, in the decade 1989-99. Fish captures are now showing a declining trend so that effective management to preserve marine resources and a sustainable level of harvesting shall be practised. Returning captured, juvenile fish back to the sea and banning fishing in important juvenile rearing areas needs to be promoted. Reduction of unwanted by-catch is also important, as about 20-30% of the total catch is discarded every year.

Asia has the largest fishing fleet (42% of the world's total Gross Registered Tonnage). This fishing fleet has twice the capacity needed to extract what the ocean can sustainably produce. This results in a vicious circle where, as catches per vessel fall, profits decline and the fishermen over fish to maintain supplies. Further, the deep fishery resources of the Pacific island countries are being exploited by distant water fishing nations (mostly Japan, USA, Taiwan (China), China, and South Korea, which realize around 95% of the revenues from tuna fish.

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<sup>7</sup> M.S. Swaminathan Research Foundation. 2002. *The Mangrove Decade and Beyond: Activities, Lessons and Challenges in Mangrove Conservation and Management, 1990-2001*. Manual no. 5. MSSRF, Chennai. 40 pp.

Most small island States have not succeeded in converting these rights into concrete economic gains. In many cases, commercially viable, exportable fish are found outside the small island's EEZ. Even when there are stocks within the EEZ, rather than develop domestic fishing fleets and processing sectors, small islands generally opt for the easiest option: licensing long-range fleets from countries with domestic processing industries (Japan, USA, Taiwan (China), China, and South Korea to fish in their EEZ. A classic case is the tuna sector: Fifty-five percent of the world's supply of canned tuna comes from the Pacific islands, but very few are caught by locals, and a negligible share is processed by local plants.

Currently, EEZ access fees range from 2.2-10% of gross revenue for the right to fish in their EEZs. In 2000, there were 949 tuna fishing vessels in the EEZ of the Pacific islands. Small islands in the Pacific received around US\$60 million in access fees from foreign fishing activity in 1999, compared to \$15 million in 1982.<sup>8</sup> In the face of insignificant access fees, to yield greater benefits from their fisheries, the Pacific islands decided to force domestication of the tuna industry during the 1990s by duplicating the activities of long distance fishing fleets. The Pacific countries believed that the benefits of developing a fishing industry exceeded those of other economic sectors, because of the abundance of resources; the close proximity to fishing grounds (hence, lower freight costs); the low cost of labour; and the lack of alternative natural resources in the region. Unfortunately, whatever natural advantage the small islands did have with the easy access to tuna, they did not have a comparative advantage with other key factors: high risks, high costs, and high skill requirements.

Thailand, Fiji and Philippines are currently under threat from tourism-related development activities; uncontrolled growth of such development leads to over exploitation of fragile land and water systems and environmental pollution of these resources. Conversion of mangrove to shrimp mariculture and unsustainable fishing practices such as blast fishing are widespread. Thailand lost about 200,000 ha of mangrove from 1961-1993.

Sea level rise due to global warming is a contemporary phenomenon. In the 20<sup>th</sup> century, sea level rose globally by 108 mm, but regionally and locally it rose 2 to 3 times more. The impact of a more rapid rise in sea level, due to unethical ecosystem and natural resource management, may affect island States and coastal areas by intensified flooding and submergence, increased erosion of shorelines, intrusion of saline water into estuaries and coastal aquifers, drainage problems and depletion and destruction of coral reefs. The rates of loss of coral reef and mangrove habitats in the region are among the highest in the world. Occurrence of 'red tides', a special plankton bloom, causing death of aquatic organisms and

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<sup>8</sup> Gillette, R., et al. 2001. Tuna: a key economic resource in the Pacific Islands, A report prepared for the Asian Development Bank and the Forum Fisheries Agency, Manila, ADB, p. 13. <http://www.adb.org/>

paralytic shellfish poisoning, has been an environment problem of major concern in the coastal areas of the region.

#### **4.7 Epilogue**

Economic growth and development processes, both in the rural and urban areas in the region, are affecting the health of the environmental capital stock. Migration from rural to urban areas accounted for some 40% of urban population growth between 1970 and 1990 in most developing countries of the region. Urbanization and industrialization are causing environmental problems by increasing pollution levels with the concentrated discharge of gaseous, liquid and solid wastes into the environment.

There are other environmental problems in the Pacific islands such as: threats to freshwater resources, marine and coastal environmental degradation, land and forest degradation, urbanization and waste management issues, depletion of biological diversity, energy-related environmental concerns, adaptation to climate change, variability, extreme weather conditions, and sea level rise, and weak environmental management capacities and related governance issues. The impact of industrialization is increasing the problems of disposal of solid waste and wastewater. In terms of direct impact on the environment, farming activities are a major contributor to soil erosion, loss of nutrients from topsoil, expansion of agricultural areas into forest areas and marginal lands, and land salinization.

The overall Environment Impact Assessment in the region suggests a need for more legislation, regulations, guidelines and public awareness. Promoting economic growth and development, while maintaining and strengthening protection of the environment and natural resources, is one of the great policy challenges for the region. That conservation, equitable use and decontamination of natural resources need not be exclusive to economic growth and development needs to be realized and internalized in all development activities. In fact, this is the crux of ethics in an ecosystem approach to development. In all developmental pathways, Economic Impact Assessment and Environment Impact Assessment have been internalized. A third dimension that needs to be incorporated in future is an **Ethical Impact Assessment**, so that ethical obligations of society are kept in view in all developmental activities.

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## 5. ETHICAL ASPECTS OF ACCESS TO AND USE OF ENERGY

Sustainable Energy Development is “energy produced and used in ways that support human development over the long term, in all its social, economic, and environmental dimensions...”

– *World Energy Assessment – UNDP 2000*

### 5.1 Introduction

The concept of sustainable energy development has widened over a period of time to include economic, environmental, and social aspects, based on realities and constraints perceived by society. While the 1970s were dominated by economic concerns in the wake of the oil price shocks, environmental considerations began to gain prominence in the 1980s, as the threats posed by the oil crises diminished, and as environmental concerns became better understood. While local concerns received the first priority, by the late 1980s global environment concerns had become important. The Montreal Protocol of 1987 helped initiate phasing out of CFC emissions. The Intergovernmental Panel on Climate Change was set up in 1988, by the World Meteorological Organization and the United Nations Environment Programme. For the first time, the global environmental fallout of the energy sector was recognized and institutions were established to deal with the problem.

These concerns peaked in the 1990s when other stakeholders, industry and civil society, also became increasingly conscious of the impending environmental issues. The 1990s saw the social dimension of sustainability being recognized by the international community at large. There was growing recognition that energy strategies are inextricably linked to social development. It was recognized that energy services are a crucial input to primary development challenges of providing adequate food, shelter, clothing, water, sanitation, medical care, schooling, and access to information. The other related issues that received emphasis were those that linked energy to women’s issues, demographic transitions (population trends and urbanization), and lifestyles.<sup>1</sup>

Over the period 1975-97, rapid economic growth and increases in population, urbanization, and income levels, along with programmes for industrialization and poverty reduction, generated a strong demand for commercial energy in the countries of the Asian continent. The total commercial energy consumption in Asia, as a share of the world, rose from around 23% in 1975, to 26% in 1985, and further to 34% in 1997, with East Asia recording the highest share within Asia. Also,

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<sup>1</sup> Tata Energy Research Institute 2002. Sustainable Energy: Perspective for Asia, TERI, New Delhi.

China, Japan, India, and the Republic of Korea dominated commercial energy consumption in the region with a combined share of over 70% in 1997.

The various dimensions of sustainable energy development are well understood today as elaborated by the Ninth Session of the Commission on Sustainable Development (CSD)<sup>2</sup>: *Energy for sustainable development can be achieved by providing universal access to a cost-effective mix of energy resources compatible with different needs and requirements of various countries and regions. This should include giving a greater share of the energy mix to renewable energies, improving energy efficiency and greater reliance on advanced energy technologies, including fossil fuel technologies. Policies relating to energy for sustainable development intended to promote these objectives will address many of the issues of economic and social development as well as facilitate the responsible management of environmental resources.*

## **5.2 Patterns of Energy Consumption in Asia-Pacific**

In general, the energy intensity of economies rises with economic growth and increases in energy consumption (often related to a shift from non-commercial to commercial forms of energy, industrialization, and motorization), while the efficiency of energy use may be low. Beyond a certain level of per capita income, it begins to decline, indicative of the overall increase in the efficiency of energy use, the switch to more efficient fuels, and the structural changes towards less energy-intensive production. The growth in per capita commercial energy consumption reflects a clear rich-poor divide, both across nations, as well as within nations. On average, less than 20% of rural households had access to electricity in South Asia in 1970. This implied large dependence on traditional fuels. A substantial proportion of the energy use in Asia is still serviced by traditional fuels.

The emerging economies in the Asia-Pacific region, countries like India, Bangladesh, Philippines, Maldives, Pakistan, North Korea, Laos, Mongolia etc., are major consumers of fossil fuel energy. These countries face serious problems in dealing with increasing dependence on imported fossil fuels and increasing investment in utilizing the vast renewable sources of energy to meet their growing needs. Moreover, accelerated efforts all over the world to increase GDP and alleviate poverty among the millions of poor in developing countries demand a huge investment in infrastructure projects, as well as improvement in the efficient usage of energy in all sectors. High capital investment costs and unclear policy directions hamper the growth of the Renewable Energy sector as an alternative to reduce Green House Gas (GHG) emissions.

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<sup>2</sup> Commission on Sustainable Development 2001. Report of the Ninth Session (5 May 2000 and 16-27 April 2001), (Economic and Social Council, Official Records, 2001, Supplement No. 9) <<http://www.un.org/esa/sustdev/csd>> United Nations, New York.

## Fuel-mix

Around 55 and 61% of the primary energy consumption in India and China, respectively, was derived from coal in 2000, although a shift in favour of oil and gas was already under way. Likewise, in the case of West Asia, which is primarily served by oil and gas, the share of gas has increased over the last 25 years. In 2000, oil accounted for 53% of the total primary energy consumption, while the share of gas was 44%. The other major energy consumers, namely Japan and the Republic of Korea, being largely import-dependent, have diversified their fuel-mix towards a greater share of nuclear and natural gas. Some Southeast Asian economies, while increasing their share of gas, have also increased their share of coal. The reasons for these shifts range from a conscious diversification of the fuel mix to technological breakthroughs that have allowed the tapping of resources, such as gas.

Geothermal power is a major contributor to power generation in countries such as the Philippines; the country accounts for about 24% of the total installed geothermal capacity in the world. Other fast growing renewable energy sources include solar and wind. China, India, and Japan together accounted for nine percent of the world's cumulative installed wind turbine capacity in 2000. Japan, on the other hand, accounted for 45% of the solar installed capacity.

The provision of energy services directly impacts human development and the quality of life through energy's role in services ranging from cooking, provision of clean drinking water, and water and space heating to basic health care, education, and economic opportunities in agriculture, transport, and small-scale industries.

In terms of energy consumption, Asia still ranks very low compared to the American and European averages. South Asia with 20% of the world's population accounts for less than 2% of the gross world product (GWP), 5% of the global primary energy use and 3% of global energy-related net carbon emissions. The average per capita energy consumption in South Asia is the lowest in the world. In 1997/98, the average per capita energy consumption was 0.37 TOE (Tons of Oil Equivalent) compared to world's average of 1.7 TOE. Though the regional average has increased in recent years, it has remained far below the world's average. Similarly, the per capita oil consumption and per capita electricity consumption are also low compared to the world's average. However, when structural shifts in the economy take place, energy consumption, and its impact on the environment, is bound to be more.<sup>3</sup>

If one looks at the efficiency of various countries in converting energy into wealth, China and India use more energy to generate one dollar of GNP. China requires

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<sup>3</sup> Asian Development Bank 1995. The Bank's Policy Initiative for the Energy Sector, Asian Development Bank.

46,000 BTU (British Thermal Unit) per dollar of GNP whereas India spends 31,000 BTU to generate a dollar of GNP. These two countries have higher rates of consumption of BTU per dollar of GNP than the USA, UK, France, etc. Most Asian countries are more or less in similar situation (Table 5.1).

**Table 5.1. Energy Efficiency by country – 1995**

<i>Countries</i>	<i>Per Capita BTU (Millions)</i>	<i>BTU per \$ of GNP</i>
China	26.7	46 622
South Korea	115.07	11 345
Japan	141.83	3 472
Thailand	34.91	12 172
Indonesia	15.43	15 382
Kazakhstan	155.9	122 502
India	10.7	30 752
USA	327.5	12 583
United Kingdom	148.2	7 784

Source: [http://www.ecoworld.com/Articles/May23\\_BTU\\_GNP.cfm](http://www.ecoworld.com/Articles/May23_BTU_GNP.cfm)

Thus, the energy efficiency of the economy in Asia needs to be improved. Agriculture and forests are the biggest solar energy converter system in the earth. With proper planning and implementation of sustainable agriculture practices (particularly the water use efficiency), not only the energy efficiency of the economy can be improved, but employment and poverty issues can also be addressed. At present agriculture uses very little proportion of the total energy consumption in Asia. (Table 5.2)

**Table 5.2. Energy Consumption by Economic Sector in Asia<sup>4</sup>**

<i>Sector</i>	<i>% of total Consumption 1990</i>	<i>% of total Consumption 1999</i>
Industries	47.0	36.2
Transportation	16.6	16.0
Agriculture	4.0	3.1
Residential	19.0	27.3

Source: [http://earthtrends.wri.org/text/ENG/data\\_tables/data\\_table5.htm](http://earthtrends.wri.org/text/ENG/data_tables/data_table5.htm)

Fuel wood consumption is considered an unsustainable practice. Many environmentalists have called for a reduction in fuel wood consumption, particularly in the developing world. But, in terms of employment, fuel wood use generates at least 20 times more local employment in South Asia than energy from oil products (per unit of energy). Any control measures over fuel wood usage,

<sup>4</sup> Excluding Middle East.

therefore, would have to take into consideration alternative employment opportunities.

### ***5.3 Renewable Energy Options:***

The attractiveness of renewable energy technologies, such as wind, solar, and biomass, lies primarily in their abundance. Biogas plants, applications of solar energy, such as lanterns and home lighting systems, and water pumping and heating systems are some technological interventions that have become popular in the last few years. The utilization capacity of these renewable energy sources depends on the status of technology, which results from a high degree of Research and Development. Wind is becoming the world's fastest growing power source. Wind energy is creating a great challenge to fossil fuel and is becoming competitive to fossil fuels in the generation of electricity. Wind could provide 12% of earth's electricity within two decades. However, solar and wind energy are an intermittent source of energy. That is, when sky is cloudy or breeze is down, power cannot be produced. Hence, the technology has to be developed further.

The method for storage of energy that is gaining attention is to use the power generated by solar and wind energy to produce hydrogen from the electrolysis of water, which can then be stored and used on demand. PV water pumps that are used in agricultural sectors, PV panels, Solar Cookers, Solar Air/water Heaters, etc., are some of the applications of solar energy that are gaining interest among people and industries (See Box 1). Some of the technological innovations in wind energy, especially power generators, are intellectual properties of developed countries. It is essential and ethical that the intellectual rights should not hamper the technological growth in the developing countries. International norms have to be created to facilitate easy transfer of technology between the developed and developing countries.

### **Biomass fuels**

The usage of biomass as a fuel is the least controversial method for replacing the use of fossil fuels and mitigating CO<sub>2</sub> emissions. The biomass that helps to displace the use of coal in power plants is bagasse, and other crop residues. Developing countries have the maximum potential for Carbon Emission Reductions. There are around 464 sugar mills in India, which offer the most cost effective conversion of biomass to electricity.

**Box 1. Decentralized applications of renewable energy technologies:  
examples from select Asian countries**

**China: Rural Electrification with wind/photovoltaic hybrids**

In the Inner Mongolia Autonomous Region, about 150,000 small wind systems have been disseminated, powering about one-third of the un-electrified population. In the low-wind summer months, however, the system output drops to a fraction of its rated capacity and the batteries cannot be fully charged. This has led to the proliferation of micro-hybrids [addition of solar PV (photovoltaics) to wind systems]. In addition to lighting, radio, and television, the larger hybrid systems allow consumers to use refrigerators, washing machines, rice cookers, irons, and electric heaters.

**Bangladesh: The success of Grameen Shakti**

Grameen Shakti is a leading organization in the renewable energy sector affiliated to the Grameen Bank in Bangladesh. The organization aims not only at supplying renewable energy services, but also at creating employment and income-generating opportunities in rural Bangladesh. Its initiatives include supply, marketing, sales, testing, and development of renewable energy systems such as solar PV, biogas, and wind turbines. It also has installed more than 3185 solar PV systems, which have been used for a variety of applications in electronic repair shops, grocery stores, rice mills, telephone centres, and barbershops. The PV systems are also used for emergency lighting.

**India: Government Initiatives**

India ranks among the first worldwide in realizing the tremendous potential of renewable energy sources. The government has undertaken many programmes focusing on technology improvements for servicing the cooking and other requirements of the rural households. Notable among these is the biogas development programme. The biogas development programme was started in 1981/82. Of the total estimated potential of 12 million plants, 3.2 million family-type biogas plants have been installed along with community, institutional, and night soil-based biogas plants as of March 2001. With the current level of achievement, the programme is estimated to have resulted in a saving of 3.9 million tons of firewood and 0.9 million tons of urea per year as well as provided 5 million person-days of employment. The solar PV programme has found such decentralized applications as fixed and portable lighting units, water pumping, small power plants, power for telecommunication, railway signaling, offshore oil platforms, and television transmission. Solar PVs are being increasingly used for meeting the electrical energy needs in remote villages, hamlets, hospitals, and households in the hilly regions, forest areas, deserts, and islands of the country.

*Source:* Elsevier Advanced Technology (2001), MNES (undated), Urmee and Wimmer (1999) quoted in Sustainable Energy: Perspective for Asia, TERI New Delhi, 2002.

If all the Renewable Energy Technologies (RET) were to be successfully adopted in Asia-Pacific, like in India, it is estimated that the annual energy costs would decrease from 4,114 billion rupees to 4,019 billion rupees. In addition, carbon dioxide emissions would go down by 20% compared to the current business-as-usual scenario and, the emission of suspended particulate matter would be reduced by 24%.<sup>5</sup>

#### ***5.4 Trans-boundary Environmental Issues***

##### **Climate change:**

Coal fired power plants, particularly poorly maintained ones, are significant polluters, causing diverse public health and environment problems. World energy needs of about 85% are met by combustion of fossil fuels, which leads in the production of pollutants like CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub>, smog, soot and haze. Combustion of fossil fuels continuously release CO<sub>2</sub> and other gases, which cause global warming and the associated sea level rise. The latest report by the Intergovernmental Panel on Climate Change (IPCC) has warned that global warming threatens human populations and the world's ecosystems with worsening heat waves, floods, drought, extreme weather, and the spread of infectious diseases.

The consumption of oil around the world is about 20 billions barrels annually. The US has four percent of the world's population, but it emits 25% of the global warming pollution. India emits about 4% of global warming pollutants. Carbon dioxide pollution building up in the atmosphere is the single biggest contributor to global warming; it is the major greenhouse gas. Power plants emit 40% of carbon dioxide, the primary global warming pollutant. A total carbon dioxide emission from all the coal-fired power plants in India was 1.1 thousand tons per day in 1997-98, and annual emission has been computed to be 395 million metric tons. Estimate of carbon dioxide emission from power sector in India for 1990 is 213 million metric tons. Currently, there is 30% more carbon dioxide in the atmosphere than there was at the start of the Industrial Revolution, and we are well on the way to doubling carbon dioxide levels in the atmosphere during this century. Of the total 6.1 billion population of the world creating anthropogenic emissions, 2.5 billion live in the developing countries and have no access to modern energy sources.<sup>6</sup>

It is projected that by year 2050 the world population will reach 9.3 billion, and the energy demand will increase by three times. The 1990s were the hottest decade on record. Average global temperature rose one degree Celsius during the last century, and the latest projections indicate an average temperature increase of two,

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<sup>5</sup> IREDA NEWS Magazines 2002. Vol. 13, No. 3, No. 4.

<sup>6</sup> TERI Energy Data Directory & Yearbook 1999/2000. TERI, New Delhi.

to as much as ten, degrees during this century. To address the problem of global warming, steps need to be taken to combat the amount of emissions of carbon dioxide from power plants. Power generation has to switch from burning coal to the cleaner burning natural gas, combined with a large increase in energy efficiency and exploration of renewable wind and solar energy.

Though the contribution of most Asian economies to carbon dioxide emissions, in per capita terms, especially those in South Asia, is negligible as compared to the world average and the average of Organization for Economic Cooperation and Development (OECD) countries, due to the expected growth in emissions in some large Asian economies, like India and China, there is pressure on these countries to mitigate emissions. The Kyoto Protocol committed developed countries to make legally binding reductions in their greenhouse gas emissions. Under the agreement, industrialized nations must reduce their emissions of greenhouse gases by an average of 5.2 percent (from 1990 levels) by the period 2008 to 2012. Although a signatory, the US has still not ratified the treaty, in spite of being one of the major offenders in terms of high emissions, bringing to the fore the ethical question of the worst offenders being allowed to go free.<sup>7</sup>

The RAINS-Asia (Regional Air Pollution Information and Simulation Model for Asia) model, developed as an international cooperative venture involving scientists from Asia, Europe, and North America, with support from multilateral organizations, such as the World Bank and the Asian Development Bank, predicts that under the base scenario for 2020 (no major changes in economic and demographic trends or in energy and environment trends), sulphur emissions will increase from 33.6 million tons in 1990 to more than 110 million tons by 2020, an increase of 230% if no actions are taken to restrict emissions. The model predicts that large sections of southern and eastern China, northern and eastern India, the Korean peninsula, and northern and central Thailand will receive levels of acid deposition that will exceed the carrying capacity of the ecosystem. These could lead to irreversible ecosystem damage with far reaching implications for forestry, agriculture, fisheries, and tourism<sup>8</sup> – a cause for grave concern.

### **CDM and mitigation of GHG:**

A strategy aimed at reducing fossil fuel consumption for a cleaner environment is the Clean Development Mechanism (CDM). CDM is a mechanism where companies in developed countries can invest in developing countries, such as in Asia-Pacific, to achieve carbon reduction objectives at a cost lower than what it

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<sup>7</sup> The US produces more carbon dioxide than any other country, about 20 tons of airborne carbon per person per year, according to the International Energy Agency. [http://www.cbc.ca/news/indepth/background/kyoto\\_protocol.html](http://www.cbc.ca/news/indepth/background/kyoto_protocol.html)

<sup>8</sup> Downing, Ramankutty and Shah, 1997 quoted in *ibid* 1.

would have cost in the developed country. Corrective measures have to be taken in order to reduce the build up of CO<sub>2</sub> levels in the atmosphere. Global warming leads to great adverse effects on cycling of seasons, water resources, extreme change in climate events like coastal flooding, cyclones, severe drought etc. Climate changes lead to damage that is irreversible, and developing countries will be the most vulnerable to this change even though their contribution towards it is less. Hence, CDM has an important role in helping developing countries achieve sustainable development, but the crux lies in effective implementation.

Although switching to nuclear fuel is seen as a leading option for large reduction of CO<sub>2</sub> emissions by displacing fossil fuels, the related questions of cost involved for the establishment of nuclear power plants and the disposal of nuclear waste raise a number of issues. From the ecological perspective, an ethical question concerns the dumping of huge quantities of radioactive waste into the environment. Hence, switching to nuclear fuel is not seen as a preferable option until these concerns are resolved.

### ***5.5 Energy Security and Policy Issues:***

Energy is generally believed to be a limiting factor for economic growth in the developing world, while it remains a fundamental resource for continuing economic prosperity in the developed countries. While some Asian economies do not face a constraint with respect to energy availability, most are still grappling with energy shortages. Even in economies where access has been enhanced, low per capita energy consumption, particularly in rural areas, has constrained development. Given their low energy consumption levels and the structure of their economies, the linkage between energy consumption and economic growth is likely to remain strong in developing countries for sometime.

According to Agenda 21,<sup>9</sup> “Energy is essential to economic and social development and improved quality of life. Much of the world’s energy, however, is currently produced and consumed in ways that could not be sustained if technology were to remain constant and if overall quantities were to increase substantially.”

Energy efficiency and renewable energy, by reducing greenhouse gases and other air pollutant emissions, should form the main building blocks of any sustainable energy policy. Affordable access to such clean energy is seen to be one of the major elements of energy policy in most developing countries. This has been sought to be achieved mainly through ambitious electrification programmes and through large subsidies on electricity and other fuels for some consumers (poor, rural, and residential) or uses (irrigation, goods transportation, fertilizer production,

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<sup>9</sup> United Nations 1992. Agenda 21: Report of the United Nations Conference on Environment and Development (New York: United Nations Division for Sustainable Development).

etc.). Countries also have special programmes depending upon their local situation, such as the farm forestry programme in India, in view of the dominance of biomass fuels, and the promotion of localized renewable energy systems as in Bangladesh, China, and India.

But despite subsidies, poor households in Asia pay a larger fraction of their incomes for energy than middle and high-income households, and they continue to depend predominantly on traditional fuels. Private funds are not yet flowing into many developing countries primarily due to perceived risks by investors. Attracting private investment (both foreign and domestic) requires fiscal and pricing reforms in the energy sector. Though the private sector is bound to play a larger role world over, the public sector will continue its role of a long-term guarantor. And, official development assistance may need to play a greater role in sustainable energy development in the least developed countries, which are not able to attract the private sector investment.

There is a need for a greater share of renewable energy sources given the problems of pollution associated with fossil fuels and the risks associated with nuclear energy. They can help meet critical energy needs, particularly in rural areas, and enhance energy independence. (See Box 2)

Significant opportunities exist to increase the use of renewable sources of energy in the Asia-Pacific region. Photovoltaic systems are, for instance, already established as economically and environmentally efficient ways of providing electric power to areas not connected to electricity grids, especially in rural areas.<sup>10</sup>

## **5.6 Conclusion**

Expert perceptions reinforce the fact that while development in the energy sector may have been influenced, and perhaps at times driven, by international multilateral forces, the evolution of the sector and the integration of sustainability in various countries have been largely shaped by domestic imperatives.

This chapter has attempted to highlight the precarious situation on the energy front being faced by Asia-Pacific countries at the dawn of 21<sup>st</sup> century. This is mainly due to the exhaustible nature of the fossil fuel energy sources along with their associated pollution problems and GHG emissions. The percolation of Renewable Energy Technologies (RET), as an alternate for the fossil fuel energy, is still at a low level. Hence, the tapping of RET have to be increased in order to meet the power requirements of growing populations, and, at the same time, RET have to be commercialized, which will require a large trained workforce. Hence, in order to have sustainable development in the Asia-Pacific region, CDM can be used as a major potential source. Mitigation of GHG has been a great problem, as there

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<sup>10</sup> Solar Energy Journal 2002. Vol. 72, No. 1, Vol .73, No. 5.

## **Box 2. Defining an Integrated Energy Strategy for India**

### **Vision**

To meet the energy needs of all segments of India's population in the most efficient and cost-effective manner and promoting rapid economic growth while ensuring long-term sustainability.

### **Provide clean and affordable energy to all**

Promote the design and establishment of decentralized energy service providers design a basket of differentiated services available at differential prices to empower poorer customers to make a choice re-assign energy subsidy allocations towards the provision of micro-credit.

### **Ensure security of energy supply**

Map all energy resources and develop a databank of technology choices, efficiencies and costs to facilitate evaluation of trade-offs between alternative energy paths facilitate investments in energy systems and efficiency improvements with the help of the private sector encourage Commercially-driven goal-oriented private and decentralized R&D (research and development) efforts channel public R&D funds towards reducing cost of energy delivery to the poor prepare energy plans to meet unforeseen emergency situations.

### **Improve the efficiency of the energy system**

Open up energy markets to allow a larger number of players – public and private – in all market segments adequately empower independent regulatory authorities adopt uniform pricing principles, internalizing environmental costs, across all energy sub-sectors for meaningful competition and efficient resource allocation. De-link the social function of subsidy provision from energy pricing decisions institutionalize preparation of information systems, and communication and education programmes for promoting energy efficiency.

### **Reduce the adverse environmental impacts of energy use**

Accelerate the development and market adoption of environmentally friendly technologies. Strategically exploit opportunities arising out of international agreements such as climate change and the WTO (World Trade Organization) to meet energy goals establish and enforce appropriate environmental standards.

*Source:* [www.teriin.org](http://www.teriin.org)

is no well-equipped technology to accomplish it. But, the indirect and best way that can be adopted for the mitigation of GHG may be switching over from the use of fossil fuels to renewable energy forms like solar, wind energy, biomass etc. Wind, Solar, Photo Voltaic and a few other renewable energy sources development depend on the technical know-how sharing between the developed countries and rest of the world in order for RET to achieve a breakthrough. Using these technologies will also minimize irreversible damage caused to the climate.

A sustainable energy future requires strategies that address the goals of efficiency and cost competitiveness, universal access, energy security, and environmental accountability of energy systems. These strategies should include continued market reform, greater role for decentralized energy systems based on renewable energy sources, technological diffusion, and financial flows into developing countries, generally improving energy efficiency with a focus on demand-side management and the establishment of efficient structures.<sup>11</sup>

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<sup>11</sup> *ibid* 1.

## 6. ETHICS AND INEQUITY

The true gauge of success for development projects is not to be found in numerical data or statistics but “in the smiles of children.”

*Daisaku Ikeda – 2003 Peace Proposal – A Global Ethic of Coexistence: Towards a “Life-Sized” Paradigm for our Age*

### 6.1 Introduction

The UN Millennium Development Goals aim at working towards creating a more just world economic order by 2015 in terms of reducing poverty, child and maternal mortality, gender disparity, disease and improving literacy and environmental sustainability. The Asia-Pacific region houses countries that are way behind the target in terms of addressing these issues of equity with regard to children, adults and future generations, and in terms of environmental sustainability. Even within many of the countries there is substantial disparity. This chapter examines equity/inequity from three perspectives, viz. Inequity at Birth, Inequity in Adult Life and Intergenerational Equity, as well as the ethical issues associated with them.

The process of economic growth that has been adopted by most countries has been at the cost of economic development and the human factor. Although there might be an apparent reduction in percentage terms, the numbers remain large in absolute terms. For instance, an often heard critique of the process of planned development in India is that many of the plans and programmes have by-passed the people who were to be the beneficiaries.

An ethical approach to development demands that each individual is able to lead a life of dignity, wherein his/her basic minimum needs of food, clothing, and shelter are fulfilled. Inequity in terms of unequal access and exploitation on the grounds of gender, caste and class are untenable in such a framework. Birth in poverty means being born with the handicap of low health capacity in terms of being underweight. This manifests in early childhood as stunting and wasting, and inhibits the ability of a child to compete on a level playing field due to no fault of the child.

Despite advances in science and technology, numerous declarations and plans, and programmes later, the scourge of poverty continues and the benefits of economic development have not reached out to all. This is observable in disparities between nations – the developed and less developed, high income and low-income countries, and disparities within nations – apparent in pockets of hunger and malnutrition in the midst of plenty, and in discrimination on the grounds of caste, creed, gender and religion. The roots of such behaviour may perhaps be traced to a desire to dominate on the part of the powerful, to get the best for oneself at any cost and

not bother about others. Something of this can be seen in the individual and also in the larger social context of the group. In pure economic terms, a typical example would be the developed countries protecting the interests of their people under the guise of minimum support while objecting to subsidies for the poor in developing countries, thereby creating an uneven playing ground. Within a nation, the example of a large multipurpose power project constructed by displacing thousands from their land, overrunning the forest and land resources, to serve the needs of industry and urban areas without any proper rehabilitation and resettlement mechanism in place, raises to question the very essence behind such development efforts, efforts that both exacerbate present inequities and affect intergenerational equity, as well effect loss of precious natural resources.

Do the weak and poor always have to be at the receiving end? Do they not have the same right to a life of dignity? Why should future generations pay the price in the race to realize shortsighted benefits for a few? Should not sustainable development be the aim of any development effort? Examining the issue in the light of Paul Samuelson's three basic questions, namely: What to produce? For whom to produce? and How to produce?, one needs to probe further into who is going to be benefited? Does the exercise deprive some for the benefit of others? What is the long-term impact of such an endeavor going to be? In other words, just as growing awareness has in recent times led to environmental impact assessments of projects to address the issue of perpetuation of intergenerational inequity emanating from overexploitation of natural resources, we need to have an ethical impact assessment of any development effort – to draw up a matrix of who gets what and determine if the process and outcome is fair to all concerned.

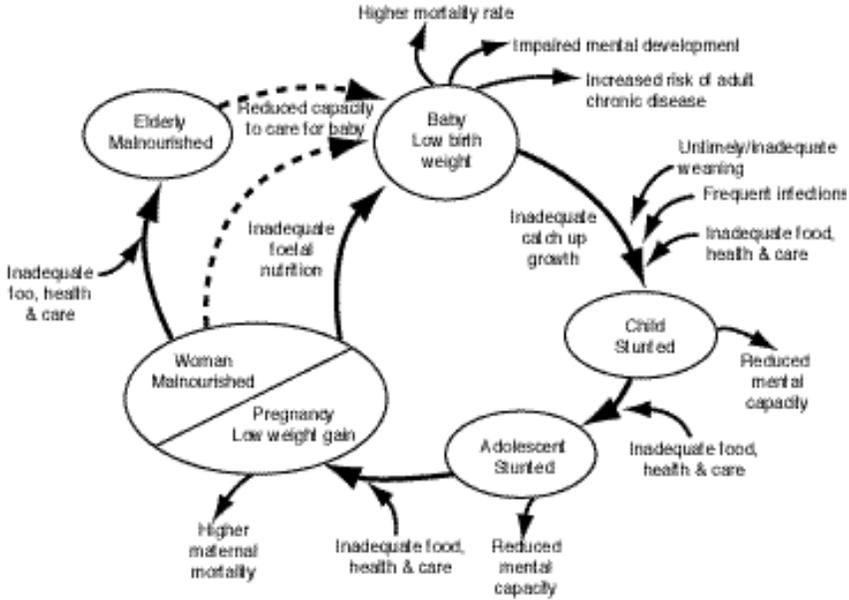
## ***6.2 Inequity at Birth***

Inequity at birth has its roots in the inability of the mother to have adequate and proper nourishment due to poverty and lack of purchasing power, thereby resulting in a low birth weight baby. Left un-addressed, it perpetuates inequity in later life, by reducing cognitive abilities and the capacity to compete.

Child malnutrition is a major cause for child mortality in the Asia-Pacific region. Almost a third of all babies in South Asia are born with low birth weight. Given that eighty percent of brain development is completed before the age of two, depressed physical and mental ability that accompanies low weight at birth has a major negative impact on a nation's economy. Such children suffer handicaps; even at birth their mental development is affected as well as their cognitive ability. Seventy percent of the world's malnourished children reside in the region. In areas of high under-nutrition, malnourished women or adolescent girls give birth to babies that are born stunted and with low birth weight (LBW). Under-nutrition is, thus, handed down from one generation to another. (See figure on Nutrition throughout the Life Cycle). Denying the child an opportunity for mental and physical development even at the foetal stage is the cruellest form of inequity. Thus,

“bridging the nutritional divide is the first requisite for a more equitable and humane world.”<sup>1</sup>

**Figure Nutrition throughout the life cycle**



Source: UN Commission on Nutrition.

According to studies, malnutrition is associated with 51 percent of child deaths in nine low-income countries – Bangladesh, Cambodia, Laos, Vietnam, India, Nepal, Pakistan, Sri Lanka and People’s Republic of China.<sup>2</sup> The majority of LBW infants in developing countries are born small as a result of intrauterine growth retardation (IUGR). Asia has a higher prevalence (12.3%) of LBW children (less than 2,500 grams at birth) than any other continent. Some consequences of LBW are greater morbidity and mortality risks, poor neuro-developmental outcomes, reduced strength and work capacity and increased risk of chronic disease in adulthood. The number of LBW children is particularly high for Bangladesh and India. While, in Southeast Asia, overall LBW rates are relatively lower, the highest prevalence of IUGR-LBW (in the range of 20-24 percent) is found in Myanmar and Cambodia.

<sup>1</sup> Swaminathan, M.S. (2002). Nutrition in the Third Millennium: Countries in Transition Plenary Lecture, 17<sup>th</sup> International Congress on Nutrition, Vienna, 27-31 August.

<sup>2</sup> Gillespie, Stuart and Haddad, Lawrence J. (2003) The Double Burden of Malnutrition in Asia: Causes, Consequences and Solutions, Sage Publications India Private Ltd., New Delhi.

The prevalence of LBW is strongly associated with the relative under-nutrition of mothers in the region; about 60 percent of women in South Asia and 40 percent in Southeast Asia are under weight (weigh less than 45 kilograms). **Maternal malnutrition** (chronic energy deficiency) varies greatly between countries. In South Asia women generally suffer from chronic energy deficit due to an insufficient daily energy intake, 500-700 kcal less than recommended. In Southeast Asia, the levels of maternal malnutrition are high in Cambodia and Vietnam.

Asia also has the highest prevalence of anemia in the world. Anemia impairs human functions at all stages of life. In South and Southeast Asia, 76 percent of pregnant women, and 63 percent of preschool children, are anemic. In Bangladesh, India, Myanmar, and Nepal, more than 70 percent of pregnant women are anemic; South Asia accounts for about 50 percent of the world's anemic women. Their babies have greater chances of being premature, underweight, dying as newborns, and remaining anemic if they survive, thus, dwarfing the nation by their very birth and compounding health and development problems.

Following low weight at birth, early childhood growth failure is manifested in growth stunting (Table 6.1). South Central Asia registered the second highest prevalence of growth stunting in the world at 44 percent in 2000. In Southeast Asia it was 33 percent.

**Table 6.1. Regional Trends and Projections for stunting among under-5 year old children, 1995-2005 (percentage prevalence)**

	1995	2000	2005
South Central Asia	48.0	43.7	39.4
Southeast Asia	37.7	32.8	27.9
All Developing Countries	36.0	32.5	29.0

*Source:* WHO (1999), in Gillespie and Haddad, 2003.  
South Central Asia includes Central Asian Republics and South Asia.

In South Asia, India and Pakistan account for the highest number of world's stunted children, and Bangladesh, Nepal, and Bhutan, all have a prevalence of over 50 percent. In 2005, it is projected that 67 percent of children in Asia will continue to be stunted. Growth stunting in childhood is a risk factor for increased mortality, poor cognitive and motor development, and other impairments in function. Children who have been severely under-nourished in early childhood are reported to suffer a later reduction in IQ. Stunting also leads to smaller size and poorer performance in adulthood. Along with LBW, it is a risk factor for adult chronic diseases. Further, half of the underweight children live in South Asia and in Southeast Asia. (Table 6.2)

**Table 6.2. Wasted, stunted, and underweight children (under five)**

Country	Wasted %	Stunted %	Underweight %
Bangladesh	15	51	56
Bhutan	4	54	40
Cambodia	13	56	52
China <sup>b</sup>	2.8	20	14.5
India	17	63	50
Indonesia	13	42 <sup>a</sup>	36
Laos	11	47	40
Myanmar	11.2	42	31.2
Maldives	17	30	38
Nepal <sup>c</sup>	8.5	50.5	49
Pakistan	9.2	50.2	38
Papua New Guinea	6 <sup>d</sup>	43 <sup>d</sup>	30 <sup>d</sup>
Sri Lanka	13	16.1	31
Philippines	6	30	28
Thailand	6	16	18
Vanuatu		19 <sup>d</sup>	20 <sup>d</sup>
Vietnam	14	44	41

Source: <sup>a</sup> UNICEF 2000; WHO 1999; FAO 1998;

<sup>c</sup> 6-36 mo age group;

<sup>b</sup> FAO 1999 (from Tontisirin. K. et al, 2002)

<sup>d</sup> refers to only part of the country

Where the prevalence of stunting is high, environmental reasons are often incriminated, as in the case of South Asia where poor hygiene and sanitation, linked with overcrowding, emerge as important determinants of stunting. Household food security is also an important factor.

The problems of low weight at birth, stunting and wasting, affect performance and productivity of the individual, placing them at a disadvantage vis-à-vis normal healthy individuals, due to no fault of their own. From an ethical perspective, the onus falls on society at large to see to it that such inequity is not allowed to exist and that the environment is favourable for the birth of healthy babies, thus, paving the way for a healthy population. Addressing the issues of alleviating hunger and malnutrition, and giving special attention to the health and nutritional needs of pregnant and nursing mothers, therefore, needs to be on the top of the agenda in the Asia-Pacific.

### 6.3 Inequity in Adult Life

Children born with low weight, and affected by malnutrition during childhood, grow into unhealthy adults who remain caught in a vicious circle of poverty, illiteracy, unemployment, and low productivity. About two-thirds of the world's hungry people are in Asia and are chronically undernourished. The hungry are also the poor.

The effect of malnutrition on adult earnings and productivity is estimated at 10 percent for stunting, 4 percent for childhood anemia and 10 percent on average per child born to a mother with goitre. These losses are conservatively 2-3 percent of GDP in low-income countries. In South Asia, the estimated losses associated with iron deficiency alone are \$5 billion per annum.<sup>3</sup> According to an IFPRI report<sup>4</sup>, chronic child malnutrition reduces gross domestic product by 0.7 percent annually in India and 0.5 percent in China.

Besides calorie and protein malnutrition, micronutrient deficiencies are severe in Asia, causing serious health and development problems. Nutritional deficiencies of iron, iodine, and vitamin A are major concerns in South and Southeast Asia, although rickets and zinc and selenium deficiencies are additional concerns in certain areas. Iodine deficiency in Southeast Asia exceeds that in all other regions of the world.

Women tend to face intra-household and societal discrimination in the region, as well as globally. Pakistan, Nepal, Bangladesh and Laos have female literacy levels of around 30 percent or less, while the levels of male literacy are at least 50 percent in all of these countries. As a segment of the population, they are more vulnerable to problems of food insecurity and unemployment. Unfavourable sex ratios, lower wages, and constraints on asset ownership are manifestations of this form of inequity. Women's literacy and empowerment has great impact on improving nutrition levels of the family.

Undernutrition involves serious economic costs that warrant making investments in improving nutrition levels a top priority. While poverty is the main cause of food insecurity, food insecurity can in turn cause or worsen poverty. Investments in reducing malnutrition generate the ultimate positive externality – children who, in adulthood, are less likely to give birth to undernourished children. Worldwide, the food supply is enough to meet the energy needs of the growing number of people if it is equitably distributed according to each person's requirements. But, food is not equitably distributed. As a result, despite increases in food supply, uneven progress is noted towards 2010, when 344 million Asians are expected to still be chronically undernourished and most will live in low-income food-deficit countries (LIFDCs), such as Bangladesh, China, India, Mongolia, Nepal, and Papua New Guinea.<sup>5</sup>

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<sup>3</sup> *ibid.* p. 2.

<sup>4</sup> IFPRI. (2002). *Reaching Sustainable Food Security for All by 2020*, IFPRI, Washington.

<sup>5</sup> Tontisirin, K., Nandi, B. and Bhattacharjee, L. (2002), "Status of Food and Nutrition Security in Asia and the Pacific Region", in *Proceedings of MSSRF-FAO Expert Consultation on Science for Sustainable Food Security, Nutritional Adequacy and Poverty Alleviation in the Asia-Pacific Region*, MSSRF, Chennai.

Public action to reduce malnutrition is both a moral imperative and an investment towards a healthy population. Economic growth per se will alone not be sufficient. Malnutrition calls for direct nutrition intervention. Nutrition fuelled growth will reduce income inequality and accelerate poverty reduction by raising productivity and reducing private and public health care expenditures. Successful examples are found in pockets, for instance, in the Tamil Nadu Integrated Nutrition Project in India, Bangladesh Integrated Nutrition Intervention Project, and the Samurdhi programme in Sri Lanka. Thailand put nutrition on its national development agenda in the seventies and made nutrition improvement one of the priority goals closely linked to poverty alleviation in the National Economic and Social Development Plans and achieved remarkable results in a short time through community-based approaches. (See Box 1)

### **Box 1. Thailand's Nutrition Security Compact**

Mobilizing “people power” in the cause of nutritional security is the most effective and sustainable strategy. The example of Thailand illustrates this.

During the past 10 years, Thailand has achieved remarkable progress in reducing maternal mortality as well as the incidence of LBW children. The strategy consisted of the following components:

- Eliminate severe, moderate and mild protein-energy malnutrition (PEM);
- Monitor growth among all pre-school children and provide food supplements where needed;
- Mainstream nutrition in health, education and agricultural policies;
- Retrain and retool existing staff and mobilize community volunteers. Choose one community volunteer for every 10 households and build their capacity;
- Encourage breast feeding and organize school lunch programmes;
- Promote home gardening, consumption of fruits and vegetables, aquaculture and food safety standards; and
- Introduce an integrated food safety net with emphasis on household food and nutrition security.

The positive impact of the above Nutrition Security Compact is evident from the decline of maternal mortality from 230 per 100,000 live births in 1992 to 17 in 1996 (Philip, *et al*, 2000). Thailand's initiative in organizing a **Community Volunteer Corps for Household Nutrition Security** is worthy of emulation by other nations.

Swaminathan M.S. (2002) “Nutrition in the Third Millennium: Countries in Transition,” Plenary Lecture, 17<sup>th</sup> International Congress on Nutrition, Vienna, 27-31 August.

Another facet of this problem emerging in Asia<sup>6</sup> is nutrition transition among population who faced severe undernutrition. Poor nutrition during fetal and infant development, combined with later periods of positive energy balance, is leading to problems of obesity and overweight in some sections of the population. In the island nations of Samoa, Nauru, Fiji and elsewhere in Melanesia, nearly half the populations exhibit at least Grade 2 obesity (BMI 30.00-39.99). Studies have reportedly shown a marked increase in the rate of consumption of sources of fat in the diets and consequent problems. (See Box 2)

**Box 2. Of turkey tails dumping and health problems and ethics!**

Disease and death from non-communicable disease are on the menu in many Pacific Island countries, thanks to the consumption of cheap, poor quality imported foodstuffs.

This menu often includes turkey tails from the US (fat-saturated bits of gristle and skin that used to go into pet food); lamb and mutton flaps from Australia and New Zealand (the loose bit from the end of a chop – previously processed into “blood and bone” fertilizer); and chicken frames (chicken carcasses after the meat has been stripped from them). Paul Zimmet, director of the International Diabetes Institute in Melbourne says: “What AIDS was in the last 20 years of the 20<sup>th</sup> century, diabetes is going to be in the first 20 years of this century. It is wiping out Nauru, the Marshall Islands, and Tonga. Name any island, and diabetes is its main health threat.”

Last year Pacific islands imported nearly 28,000 tons of New Zealand lamb, and around 3,000 tons of mutton. Lamb and mutton flaps made up about 35% of these quantities. Papua New Guinea (PNG) imports mainly Australian mutton flaps, while NZ supplies the Western Pacific. What purpose do aid programmes serve when donor governments pursue and promote trade and economic policies, which further undermine the health of Pacific peoples? The deluge of imported food and disease can only increase. Meanwhile, the range of policy options available to Pacific Island governments to address these problems is shrinking rapidly as they commit to further market reforms and trade liberalization.

A 2001 World Health Organization report, “Globalization, diet and health: an example from Tonga” states: “Although educational programmes have increased awareness about healthy diets and nutritional foods, people in the Pacific nonetheless choose to consume less-healthy foods because of cost and availability (i.e. they make economically rational, but nutritionally detrimental, decisions to consume certain foods). Thus, poor diet is not simply a health or health education issue, it is also economic.” Local, healthier, low-fat sources of protein like fish cost 15-50% more than mutton flaps and imported chicken and in many areas of Tonga are less easily purchased. Bread and rice are cheaper and more accessible than taro.

Extracts from “Killing me Softly”, by Aziz Choudry, August 03, 2002

ZNet Commentary, <http://www.zmag.org/sustainers/content/2002-08/03choudry.cfm>

<sup>6</sup> Ibid. p. 2.

### 6.4 Intergenerational Equity

The concept of intergenerational equity has to come about due to the importance we place on sustainability. There is a need to renew and maintain genetic resources so that they exist during the time of our grandchildren. Legacy does not come on its own; people have to work to leave behind a legacy. The development process has to be sustainable over the long term and it must be equitable. The World Commission on Environment and Development has defined Sustainable Development as “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” The report highlights that the continued flagrant use of natural resources, worsening level of pollution and waste, and unabated poverty will lead to a noticeable decline in the quality of life. It prescribed the adoption of a development path that would enable us to meet our needs without compromising the ability of future generations to meet theirs.

South, Southeast, and East Asia face the challenge of fighting hunger and poverty in a scenario where agriculture-led broad-based economic growth has to take place under settings where the natural bases of production resources, such as land, water, and biodiversity, have shrunk, leading to widespread environmental and agro-ecological deterioration. Signs of degradation of bread baskets, such as the fatigued rice-wheat system in the Punjab in India, and other parts of South Asia, and irresponsible fishing and aquaculturing in the region, demand urgent attention.

Water availability is a matter of serious concern. In India, it is projected that the per capita water availability will reduce from 2001 m<sup>3</sup> to the stress level of 1700 m<sup>3</sup> in the next 2 to 3 decades. In particular, water availability to the agricultural sector will reduce from the present share of 89 to about 75 percent by 2020, necessitating the production of more and more with less and less water. The needs of other sectors for water cannot be ignored. Policy reforms are needed to address these disturbing trends. These reforms may include the establishment of secure water rights to users, the decentralization and privatization of water management functions to appropriate levels, pricing reforms, greater community participation, and the introduction of appropriate water-saving technologies through an integrated water use policy. Developing countries should critically examine the extant international initiatives and evolve their country-specific systems for judicious and integrated use and management of water.<sup>7</sup>

Climate change, global warming and their impact on agriculture, and vice versa, have emerged as new threats and challenges. Expected sea-level rise, estimated to be 15-94 cm during the next century, will adversely affect the coastal ecosystem.

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<sup>7</sup> Singh, R.B. (2002) “Science for Sustainable Food Security, Nutritional Adequacy and Poverty Alleviation in the Asia-Pacific Region,” in Proceedings of MSRF-FAO Expert Consultation on Science for Sustainable Food Security, Nutritional Adequacy and Poverty Alleviation in the Asia-Pacific Region, MSSRF, Chennai.

Island states like the Maldives and Sri Lanka may face serious threats because of sea-level rise induced by global warming. It is also becoming increasingly clear that tropical and sub-tropical agriculture will be generally negatively impacted by adverse changes in temperature precipitation and the rise in sea level, thus further exacerbating the livelihood problems of developing countries in the region.

Recent global level studies have shown that about 80 years from now the average temperature will increase by 3 to 3.5 degrees Celsius and average precipitation by 2 to 4 percent. The studies have further revealed that India, with about one-sixth of the world's population, will be the biggest loser from global warming, losing tens of millions of tons of its potential cereal harvest each year because of climate change. An Indian study has shown that a 1 degree Celsius rise in temperature in North India would reduce the duration of the wheat crop by one week, thereby reducing yield by 500 to 600 kg per hectare.<sup>8</sup>

Anticipatory research, including conservation, characterization, and utilization of topical genetic resources, and use of biotechnology and other cutting-edge sciences to meet the challenges of global warming and climate change need to be initiated. The countries likely to be negatively impacted by climate change should collaborate not only in strengthening their relevant research and technology development, but also in their negotiations at various international forums.

With regard to biodiversity conservation, and due to economic and population pressures, genetic biodiversity resources are eroding fast. Moreover, their availability is getting increasingly restricted due to their propriety protection under several systems. The issues related to this aspect have been dealt with in Chapter IV.

## **6.5 Conclusion**

The pervasive, accelerating and unabated environmental degradation in the region has to be strongly addressed by shaking off the “grow now, clean up later approach.” Strong political commitment is needed to forge congruence between economic productivity and environmental improvement on the lines of the Brundtland Report recommendations.<sup>9</sup> The Report was primarily concerned with securing global equity, redistributing resources towards poorer nations whilst encouraging their economic growth. The report also suggested that equity, growth and environmental maintenance are simultaneously possible and that each country is capable of achieving its full economic potential whilst at the same time enhancing its resource base.

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<sup>8</sup> *ibid.* p. 7.

<sup>9</sup> Brundtland Commission Report, 1987.

Inequity has to be addressed using a community-based approach in collaboration with governments, and other related partners. An ethical approach to development calls for a bottom-up people-centred effort, as validated by several successful civil society initiatives in different parts of the region.

Future agricultural production programmes have to be based on a strategy that defends the gains already made, extends the gains with the use of yield enhancement technologies in rain fed, semi-arid and hill areas, and makes new gains through farming systems intensification, diversification and value addition, and institutional support by way of infrastructure and market linkages. Land and Water care, water harvesting, restoration of degraded and wasted lands, all need focused attention. Agriculture extension services should provide a viable mix of traditional and frontier technologies to farmers. On-farm and off-farm jobs/livelihoods, backed by good ecological practices, therefore, have to become the bottom line of all our economic and development policies. What we need today is an “Evergreen Revolution” through a blending of traditional and frontier technologies, and job-led economic growth rooted in the principles of environment protection, economic efficiency, social and gender equity and employment generation.<sup>10</sup>

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<sup>10</sup> Swaminathan, M.S. (2001). “Food Security and Sustainable Development,” *Current Science*, October.

## **7. IPR, ECONOMIC DEVELOPMENT AND ETHICS**

### ***7.1 Introduction***

Economic development in the contemporary world is driven by the science and technology. Advances in relevant technologies and access to them are critical determinants to economic development, leading to poverty alleviation and social security. In corollary, backwardness of nations in S&T capability and their incapability to access and absorb appropriate technologies have become the major force driving the economic divide between the rich and the poor countries. Extreme poverty, low human development and the need for huge investment in human and financial capital over a long period to establish a competent, indigenous S&T capability have trapped these poor countries into a vicious circle with no easy way out from their poverty and under-development of human and social capital. Poverty and under-development are, in addition, causing inefficient and wasteful use of natural resources, leading to rapid resource shrinkage, environment degradation, population increase, poor health and human productivity. Together, these result in stumble development, perpetuate poverty, deprive social and health security and deny an overall dignified life to the people. In this context, the increasing global shift in R&D investment from public science for common good to private science for corporate profit, together with universalization of a rigid intellectual property regime, is virtually foreclosing the chances for developing and least developed countries to access and deploy S&T to mitigate poverty, access healthy life, achieve economic development and offer a dignified life to their peoples.

### ***7.2 IP and Development***

Knowledge is the multidimensional outcome of human intellect. It is far more than intellectual property (IP). It is embodied in people, their way of life, their institutions and the materials and technologies they generate. Knowledge is the driver of human progress from all dimensions. The power of knowledge in wealth generation and development has come into sharp focus since the days of industrial revolution and more recently with advances in electronics, informatics and communication technology and biotechnology. According to the classical theory on S&T and IPRs, S&T is the engine of development, and IPRs for technologies is a major fuel ingredient energizing the engine. IPRs are considered to encourage innovation, promote investment in S&T and make the technologies work for public benefit. The history of S&T, from the time of the industrial revolution in Europe, and during twentieth century in the North America and Japan, shows that IPRs contributed to the S&T driven economic growth. However, in the case of developing countries, while indigenous technological capability is a critical determinant to economic growth and poverty reduction, no precise relationship has been established between the IPR system and economic growth.<sup>1</sup> An analysis of

this apparently contradictory paradigm shows that there is a fair and consistent relationship between the strength of IPRs, as existed prior to the implementation of the Agreement on Trade Related aspects of Intellectual Property Rights (TRIPS) and per capita income across countries. More than the IPRs, it is the strength of IPRs which determines the growth of indigenous S&T and the economy in these countries. Indications are that the economic development in developing countries does not essentially require strong IP protection, and most of these countries tend to apply a less stringent IPR regime until their per capita income is, by and large, above the US\$8000 mark.<sup>2</sup> Anthropometrical factors emphatically contribute to the competitive capability of human intellect. It is well established that manifest and hidden hunger can cause irreversible deficiency in intellectual development. In a world where intellectual development of 174 million under-five children, 90% of them from developing countries, is irreversibly affected by under-nourishment, how will universalization of strong IPRs promote equity in economic development?

The main issue, underlying the use of the IPR system for development, therefore, is to decide what level of IPR system could be effectively used for the technological and economic development of developing countries, and whether such an IPR system can co-exist with the emerging globalization of economy and trade. Responses are deeply divided with strong stakeholder mindsets. Developed countries and business corporations, who may benefit directly from IPR regime, insist on strong IPRs for all countries. Benefits of strong IPR regimes to developing countries, they point out, will include increased investment and consequent technology transfer from outside as well as increased generation of more indigenous innovations. Many developing countries, on the other hand, do not favour strong IPR regimes, particularly in those S&T areas where their indigenous capability for innovations is weak. It is also held that the claimed advantages of strong IPR, whenever realized, are not uniform across all S&T sectors.<sup>3</sup> The present IPR conflict is sharpened by the increasing presence of the private sector in S&T and its rush for establishing exclusive, rigid, legal ownership on the knowledge intensive modern technologies and services in order to leverage such ownership for exclusive trade and other strategic advantages.<sup>4</sup>

There are enough successful cases to establish that countries can cross the economic development threshold without strong IPR regimes. For example, without strong IP protection, as well as with no protection for chemical and pharmaceutical products, some of the East Asian countries, like South Korea, achieved rapid economic growth during the two decades beginning in 1960, which led to their economic transformation from developing to developed. Similarly, Switzerland, Holland and Japan benefited from their ability to technologically catch-up without patent laws for many years after the founding of the Paris Convention. Japan introduced the product patent only in 1976. A weak IP protection in pharmaceuticals provided under the Indian Patent Act, 1970 contributed to rapid and significant growth of India's pharmaceutical industry, particularly in low cost generic medicines and intermediates.<sup>1</sup> Thus, apart from the discussed relationship

between the IPR regime and economic status, there is a discernible relationship between the strength of IPR and the development of indigenous technological capability. In other words, a relaxed IPR regime was one of the chosen routes for graduation to technological capability followed by some developing countries. Some of these flexibilities provided in the IP regimes institutionalized by the Paris Convention stand abrogated with the introduction of TRIPS. TRIPS epitomizes the perverse prescription of 'one-size-fits-all' ideology of social and economic development embedded in the globalization process.

IPR regimes have costs as well as benefits, and this balance tilts differently across countries and groups within countries. The developing countries, being the 'late comers' in the world economy, are inherently disadvantaged, bearing a disproportionate share of costs with respect to the benefits received. From the perspective of developing countries, when most of the innovations originate in developed countries, IPR tends to confer privileges to producers rather than consumers. Only 3% of global patents, according to a recent UNDP survey, are owned by inventors from developing countries, and the rest are filed and held by companies based in North America, European Union or Japan. In the case of biotechnology patents, around 25,000 patents were globally granted during 1990-1995, out of which 37% originated from USA, an equal percentage from Japan, 19% from European Union and only 7% originated from rest of the world, including all developing countries. From the point of developing countries, IPRs are not to be an end in themselves, but a means to promote an indigenous S&T capability as an entry point for socio-economic development, poverty reduction, better healthcare and human development. Hence, the criteria for measuring the social benefits of IPRs are different in developed and developing countries. Therefore, a strong and uniform IPR regime prescribed under the 'one-size-fits-all' principle may essentially hinder development in developing countries. A recent World Bank analysis also suggested that the major beneficiaries of TRIPS in terms of enhanced value of patents are the developed countries, with USA expected to make an annual gain of US\$19 billion,<sup>5</sup> while developing countries face an annual loss of US\$7.5 billion on royalties and license fees.<sup>6</sup> Therefore, one of the major ethical issues arising from the 'one-size-fits-all' IPR regime is whether it will increase native economic wealth and better living standards for the poor, or lead to a transfer of wealth from poor countries to the rich to further widen the economic divide.

As many of the IP protected technologies are owned by the private sector in developed countries, they are the major beneficiaries of TRIPS mediated strong patent regime. A recent study reveals that if an average developing country were to strengthen its patent index by one unit, local annual average sales of US multinational affiliates would rise by about 2%, which in turn would raise their asset stock by about 16%.<sup>2</sup> There is, however, no clear researched information on how strengthened IPR would impact on economic growth, employment, domestic innovation processes, private sector investment in R&D, access to foreign

technology, and trans-national trade. What is evident from experience is that while strong IP regime alone would not attract outside investment, the weak IPR regime that has existed in some of the East Asian and Latin American countries did not discourage the attraction of substantial foreign direct investments (FDI).<sup>7</sup> Moreover, recent reports from international monetary institutions, such as the Report on Global Development Finance 2002 from the World Bank<sup>8</sup> and the Zedillo Report on Finance for Development<sup>9</sup> do not mention IPR as a factor determining investment. On the contrary, there is overwhelming evidence to suggest that although a strong IP regime may facilitate technology transfer under licensing, it may not promote investment and growth of indigenous S&T. It could rather choke the domestic R&D in developing countries. The deficiency in human and technical capacity to innovate competitive technology also makes strong IPR irrelevant in stimulating R&D in many developing countries. Apart from the lack of technological capability, some countries also lack economic strength to avail the social benefits of patents. The UK Commission on Intellectual Property Rights, after an extensive study of the IPR system in developed and developing countries, concluded that an IPR system suitable to the developed countries most often causes far higher costs than benefits when applied to developing countries, and IPR does not help in poverty alleviation.<sup>10</sup>

### ***7.3 IPR and Public Health***

Improvement of public health is one of the most effective means to reduce poverty in developing countries; poor public health is inextricably enmeshed with poverty. Fundamental to the improvement of public health is access to medical care and safe, affordable and effective drugs and vaccines. A strong patent regime provisioned under TRIPS, is expected to make drugs inaccessible to poor people in two ways. First, strong patents may lead to strong monopolies, which, in turn, may encourage high prices and consequent unaffordability of patented drugs by the poor. Second, by preventing local manufacture or parallel importation of cheaper generic drugs, governments are incapacitated from arranging alternate affordable supplies. These negative impacts are widely recognized for their serious implications to the public health and development needs of many poor developing and least developed countries.<sup>11</sup> It was the private sector pharmaceutical industry from the developed countries, which lobbied for the global extension of IP rights on the plea that such strong global IP rights are essential for more investment in drug research and development of new drugs.<sup>12</sup> How much such a strong patent regime would be helpful to developing countries in gaining access to existing drugs, and for developing new drugs for better healthcare, is disputable.

Apart from some health problems which are common between developed and developing countries, several major health problems, such as malaria, TB, yellow fever, sleeping sickness, etc., are exclusive to developing countries. As these diseases are not important from the point of developed countries, the pharma industry based in these countries does not give priority to drug development against

these diseases. Globally, about 95% of the investment in pharma R&D is located in developed countries. This investment is also highly skewed sectorally. The profile of R&D investment reveals that the private sector contribution in 2000 was US\$44 billion,<sup>13</sup> while the public sector investment in 1999 was US\$37 billion.<sup>14</sup> Less than 5% of these investments were deployed on R&D concerning diseases exclusive to developing countries.<sup>15</sup> Hence, the majority of the drugs are essentially developed for the health problems of developed countries and made available to developing countries for the same health problems as technological spill off. Out of the estimated 1393 drugs approved between 1975 and 1999, only 13 were specifically developed for diseases exclusive to developing countries.<sup>16</sup> However, when it comes to market share, 20% of the global drug market, US\$406 billion (estimated in 2002), is contributed by the developing countries.<sup>17</sup> According to the Global Alliance for TB Drug Development, although the size of the world market for new and improved TB drugs promises a fair financial return under IP protection, the private sector does not opt to invest in R&D for the development of these drugs, in the absence of major investment support from the public sector.<sup>18</sup> The private sector undervalues vaccine-based preventive healthcare, because it is a high risk/low return investment area, despite its significant social return in the healthcare strategy of developing countries.<sup>19</sup> This takes one to the logical conclusion that a strong global IP protection is beneficial largely to the pharmaceutical industry for increasing its market size and profit rather than stimulating it to expand its R&D to develop new drugs primarily targeted to the health problems of the larger number of people in developing countries.

Wherever medicines are available, affordability is important for access. Therefore, it becomes important to understand how a strong IPR influences the affordability of medicines. Access to medicines, in poor countries, is largely determined by their prices, although other infrastructure aspects are also important. There is a large body of evidence from developed countries that prices of patented drugs are quite high and that prices fall steeply as soon as the patent is expired and generic producers enter the market. Introduction of a strong patent regime in developing countries is predicted to raise the drug prices, to the tune from 12 to 200%, or more.<sup>20, 21</sup>

In this context, the exploitation of subtleties in the IP rules by pharma companies to 'evergreen' their patents beyond the 20-year life of original patents only aggravates the accessibility to drugs by the poor. The commonly deployed 'evergreening' methods are seeking new patents on an old drug by changing the drug delivery methods, by reducing dosage regimens, by formulating new versions or combinations of its active ingredients and on its metabolized products. All these, in effect, delay production of cheap generic substitutes of the old drug, whose initial patent has already expired. As a business strategy, it appears, evergreening has no limits. Many of the new molecules entering the market are the 'me-too-drugs' clan, so called for their similarity to existing drugs in terms of chemical structure and therapeutic effects. Driven by the increasing cost of developing and testing

entirely new compounds, there is a pressure within the industry to consolidate and stretch their profits by holding onto the rights of highly profitable drugs. Some of them, even after lapse of patent, deploy their effective trademark and market promotion skills to gain market advantage over generic producers.

The second alternative for price reduction is differential pricing under market segmentation, drug donation, allowing parallel imports and compulsory licensing at the discretion of the State. These are being strongly resisted by the pharma industry for their impact on profits. However, there are a few instances of either genuine or forced generosity by the pharma industry of granting differential pricing, donating drugs and allowing parallel importation. For example, Merck has offered to sell anti-AIDS drugs in developing countries at no-profit prices.<sup>22</sup> Similarly, Boehringer Ingelheim has offered to donate one of its drugs free of charge for five years to a developing country mother-to-child AIDS transmission prevention programme. The case of South African AIDS treatment programme illustrates the huge differences between the patented and generic triple therapy drugs and how parallel importation under such circumstances may help governments in tackling a serious healthcare crisis.<sup>23, 24</sup> The retreat made by the South African association of multinational pharmaceutical corporations from the patent infringement proceedings initiated against the parallel importation by the national government in the face of adverse publicity, is notable in this context.

Even without patents, it is difficult for many poor people to access the necessary drugs. About 80% of the people in developing countries are unable to buy pharmaceuticals at all. Even in India, where the prices of many drugs are comparatively much cheaper thanks to the absence of no product patent for pharmaceuticals and to the development of a large generic drug industry, the proportion of people who can afford to pay for drugs is only around 30%. Many people in developing countries continue to depend mainly or exclusively on traditional remedies such as herbal formulations.

The strong patent rules being enforced through TRIPS upon developing countries bring up many ethical issues. The first ethical issue involves the consequences of inaccessibility of pharmaceuticals arising from monopoly-driven high prices and the unwillingness of multinational pharmaceutical corporations to allow differential pricing, patent donation, compulsory licensing or parallel importation. The high prices may compel poor sick people either to spend more on medicines, and consequently less on other essentials of life such as food, shelter and clothing, or to forego medicines and face long suffering from illness with premature death. It is a human rights issue transcending the economic aspects of accessibility.

The second ethical issue arises from the broadened patents on process and product, evergreening patents under the legal subtleties of patent rules, and large scale patenting of DNA sequences and gene-based diagnostic technologies. Liberal patents on products and processes with broadly claimed subject matter virtually

exclude a broad area for further innovation, and facilitates augmenting the monopoly of the patent holder on the area on permanent basis, more or less. This may also exclude a large sector of pharmaceutical R&D outside the reach of a late-entering developing country's R&D. The 'gold rush' on gene patenting, following the publication of the human genome sequence, has largely succeeded in relaxing the norms of patent in many countries. The established gene patenting norms, such as isolation, cloning, and deciphering the nucleotide sequence and function, had been grossly ignored to grant patent to thousands of computer-identified genes with speculative function and uses.<sup>25</sup> Patents on gene sequences that could be used to diagnose diseases have far reaching ethical implications. For example, the patents held by the US company, Myriad Genetics, on the BRCA1 gene, which is linked to susceptibility to breast cancer, virtually stops others from developing alternative diagnostic tests.<sup>26</sup> It has been argued that patenting of gene fragments used in basic research is a "tragedy of anti-commons," suggesting that such patents place undesirable restrictions on the ability of other scientists to use such gene fragments in their own research.<sup>27</sup>

The third ethical issue is the legal hurdles being erected before developing countries on their rights to determine the grounds on which compulsory licensing is granted and the right to determine what constitutes a "national emergency or other circumstances of extreme urgency." These are important exceptions that seek to make necessary drugs affordable during times of epidemics, mass suffering and death. Although the Doha Ministerial Declaration committed "the right of each Member to grant compulsory licenses and the freedom to determine the grounds upon which such licenses are granted and to determine what constitutes a national emergency or other circumstances of extreme urgency,"<sup>11</sup> the multinational pharmaceutical lobby is on an all out effort at the ongoing negotiations in the TRIPS Council to deprive these rights to Members. [Negotiation on paragraph 6 of Doha Declaration<sup>11</sup> on the TRIPS Agreement and Public Health at TRIPS Council reached on an agreement in 2003 to allow countries without pharmaceutical manufacturing capacity to import generic versions of drugs still under patent during situations of national emergency or other circumstances of extreme urgency].

The fourth ethical issue associated with drug development and clinical evaluations is the blatant use of poor people in developing countries without proper "informed consent" or "genuine consent." Several unethical instances have come to light where drug evaluators, both public and private, have contracted poor subjects from developing countries for clinical evaluations for which subjects on informed consent are not available in developed countries, or the clinical trial on the specific test molecule is not permissible in accordance with bioethics guidelines of these countries. A more recent clinical evaluation, which stirred up the concern of medical profession and bioethical bodies, pertains to the evaluation of zidovudine, an anti-HIV drug for pregnant mothers, conducted by US researchers on African pregnant mothers.<sup>28</sup> Questioning the unacceptable ethical standards used by the researchers for this evaluation, the *New England Journal of Medicine* and *The*

*Lancet* charged them with using double standards by adopting test methods unacceptable in their home country. This revelation prompted the US National Bioethics Advisory Committee and the Nuffield Council of Bioethics to come out with a new set of guidelines and recommendations on the conduct of clinical evaluations.

#### **7.4 IP and Agriculture**

Food is essential for the survival of human beings. Hunger is a manifestation of the denial of the universal right to food. Without access to food in right quantity and quality there can be no good health and well-being of people, thus, disallowing the promotion of their human dignity and self-respect. Hence, productive and sustainable agriculture is as important as good health for economic growth and social security in developing countries. Agriculture is the backbone of the economy in these countries, providing food and livelihood to a vast majority of people in some countries. For instance, the agriculture in many small island countries in the Pacific is specialized in very few non-food plantation or commercial crops, whereas their food security and economic growth depends on international trade and its terms. Nearly three-quarters of the world's poor live and work in rural areas, where agriculture directly determines their food and livelihood security, apart from its all encompassing influence on overall economic growth. It is these poor farmers in developing countries who are ensuring their food security. Plagued with low resource capability and productivity, a mere rise in agricultural productivity may profoundly impact increased incomes, employment, trade and agro-processing, access of the poor to food and decreased poverty. For instance, it is estimated that a one percent increase in production could reduce the poverty of 6 million people in Africa by raising their income above one USD per day.<sup>29</sup>

Most commonly practiced agriculture in many poor developing countries uses land races and traditional farming methods. It is this agriculture, practiced by the poor farmers of developing countries, which had been responsible for the creation and conservation of most of the crop diversity, which is fundamental to today's global food and agriculture resources. Ninety percent of global biodiversity is concentrated in less than 10% land area around the equator; 70% of this is endemic to 12 mega-biodiversity regions.<sup>30</sup> These are the very regions that are the primary or secondary centres of genetic diversity of more than 80% of the crops used in agriculture and where the world's poorest live. This biodiversity and associated knowledge of their various characteristics, adaptive features, etc., set the entry point for the scientific improvement of crops. Way back when man started agriculture, the bio-diversity supporting agriculture was freely available across farmers, communities, researchers and countries with no restrictions and ownership rights. Cardinal to this is the total freedom that farmers have to save, sow, exchange, or sell seeds or other propagating material of all plants. These rights of farmers in regard to seeds is fundamental to the large genetic diversity created and conserved by them all over the world, particularly from the developing countries

of Asia-Pacific, Africa and Latin America, where lie much of the genetic diversity of crop plants.

Historically, IPRs were applicable only to industrial inventions and not to plants and animals and other living things, although the improvement of plant and animal stocks and discovery of new living entities economically useful to humans were essential aspects of the agricultural process. These processes and products were kept outside the purview of IP protection in all countries until 1930, when the tradition was first broken by the USA when it conferred patents to vegetatively propagated plants. Thirty years later, in 1961, with the entry of the private sector in European plant breeding, the plant breeder's right (PBR) was introduced through the International Union for the Protection of New Varieties of Plants (UPOV).<sup>31</sup> One of the earliest microbial patents was granted to Louis Pasteur in 1873 in the USA for yeast. A system of deposition of patented organisms was initiated in 1980 with the establishment of Budapest Treaty on Microorganisms.<sup>32</sup>

The floodgate of patents on genetically modified organisms, genes, nucleotide sequences and genomes was opened in USA with the controversial split judgment of US Supreme Court in 1980 in *Anand Chakrabarty vs Diamond*. Coming to the PBR, it confers exclusive rights to the breeder of a plant variety to produce, store and market its propagating material. PBR differs from patent right to the extent that it accommodates the traditional rights of farmers (UPOV terms as '*farmers privilege*') to save, re-sow, exchange and sell seeds of protected varieties, and the researcher's right (UPOV terms as '*researchers privilege*') to freely use the protected variety for research, including evolving new commercial varieties. PBR also allows adequate legal space to the State for compulsory licensing in the public interest. UPOV, over the years, with the revisions of the Convention in 1978 and 1991, has strengthened the PBR by narrowing the scope of the farmers' and researchers' privileges and minimizing the operational space of compulsory licensing.

### **7.5 IP and Ethical Issues**

There are many important ethical issues involved in the patenting of life forms, including plants and animals, microorganisms, cell lines and gene or DNA sequences. Eligibility of an invention under conventional patent protection demands novelty, involvement of an inventive step (non-obviousness) and utility of the invention. The conventional distinctions made between invention and discovery were overlooked for extending patent to biological systems, beginning in 1980 with the advent of the Budapest Treaty on Microorganisms and advances in Biotechnology. From the classical interpretation of inventions, life forms and their components are not patentable subjects. However, those supporting patenting of life forms argue that considerable ingenuity is involved in locating, isolating and describing molecular biological matter, which was until then unknown to the world, and these forms have industrial utility. Opposition to patenting of life forms

argues that all life forms, including the patented, are reproduced by essentially biological processes and the human intervention is limited to either identifying/developing a new plant variety from/by using pre-existing varieties, isolating and characterizing a microorganism from a habitat, dressing a natural DNA sequence without 'junk DNA' and finding its natural function, or expressing such genes in another genome. These, no doubt, are skilled procedures, but they are not inventions qualifying for patents. The most unethical aspect of patenting whole biotechnologically bred organism *in lieu* of changes made in one or few genes is that many thousands of unmodified native genes present in the genome of the patented organism are excluded from the reach of other researchers, although the patent holder has no innovation claim on these genes. Even in recombinant DNA technology, the genes involved are not invented, but recombined in a manner that does not happen in nature. Therefore, ethical practices in science demands that genetic resources used in agriculture must be excluded from IPR regime.

The primary basis of granting a patent to a DNA sequence or gene relies on establishing expressed sequence tagging with function and industrial applicability. In fact, the basis of establishing single function for a gene, such as coding for a particular protein or that it is associated with a particular disease, is problematic. It is simplistic to assume that each gene has independent function, that all gene expressions involve protein-making processes, and that the linear sequence of each gene is discrete without overlap. Although the DNA molecule is not well understood in all its complexities, what is hitherto revealed suggests that no gene functions in isolation, not all genes are involved in the protein making process and there are sequence overlaps in the linear arrangement of genes. Therefore, treating genes as patentable inventions on said criteria is more a reflection of ignorance than of insight, and represents greed for appropriation of a public entity. The rush for privatizing genes through patents is ever increasing following the publication of the human genome sequence in 2001. Genomics has now become a professional process, which can be mechanically performed with trained manpower, equipment and large resources enabling private and public institutions commanding such resources to analyze the genome of any species and to patent their genes. The rate of this patenting has increased during the last decade, from 6,000 sequences in 1990 to over 355,000. There is an aggressive patenting spree by biotechnology firms in developed countries largely to exclude others from as many genes as possible in an effort to create a business monopoly to control future research. Several of these patents have started stifling upstream research in many areas. Obvious consequences are the exclusion of several R&D areas for the non-patent holders, and an enormous increase in the cost and time for R&D on negotiations and payments of royalty or licensing fees. Developing countries will be the sure victims of these unethical practices, adding further cost and hurdles to their developmental efforts.

The multiple patenting in agricultural biotechnology is already causing problems for research advancement. This may be well illustrated with 'golden rice', which

was genetically engineered to synthesize beta-carotene in endosperm with a view to address the Vitamin A deficiency in the diet of millions of poor people. The technology, involving three genes, is protected by as many as 16 important patents and 72 potential product and process IP barriers owned by 32 companies and institutions.<sup>33</sup> Getting around all these patentees to negotiate and to agree to cooperate for grounding further research for the commercial development of golden rice is very complex and time consuming, apart from the high possible cost required for licensing out the rights of most of the patent holders. Also, in the absence of a clear view on the commercial feasibility and prospect of golden rice, it is not easy to negotiate any possible high license fee claims from some of the patentees. This illustrates how biotechnology innovations promoted by patents may abort further development opportunities, particularly in developing countries. It is in this context that the large multinational corporations resort to buy outs and mergers to consolidate business on the strategic patents. For example, now five biotechnology giants from North America, Europe and Japan own 70% of the 25,000 biotechnological patents granted during 1990-95. Such concentration of high-value IPR protected technologies in the hands of a small number of global conglomerates may, in fact, aggravate the disadvantages by eliminating competition.

From the point of developing countries, the choice of granting either patent or the PBR on a plant variety has profound importance. Of first importance, is how far such a choice may impact the current and future food security of country, and to what extent it may promote crop improvement research. All new plant varieties, expected to be superior to the old in yield or quality or some other respect, are created from pre-existed varieties, which are part of the genetic resources. Therefore, capability to develop a new plant variety shall be restrained by free access to appropriate crop genetic resources, including the extant varieties in commerce. When some of these genetic resources are excluded from access by IP rights, the set back to crop productivity-dependent food security could become serious in many crops. The legal provisions governing access by no means remedies the disadvantage of a poor country. The second important issue arises from the impact of PVP on the livelihood of poor farmers who eke out a meager living either exclusively or largely from agriculture. An important and immediate impact of PVP may be on seeds, with high cost and consequent inaccessibility to poor farmers, and on restrictions of the traditional right of farmers to save, use, exchange and sell seed. The impact of this will be stronger on poor farmers. A major study on the impact of PVP in developing countries shows that PVP largely benefited the seed industry, and to some extent the commercial farmers, while it neither led to increased availability of planting material to farmers nor benefited the poor farmers in raising their income.<sup>34</sup> On the contrary, the PVP severely restricted the traditional rights of farmers on seed, which had more adverse impact on poor farmers. Another example is that establishment of PVP in Kenya facilitated the introduction of many varieties of flowers and vegetables by the foreign-owned commercial exporters. These introductions, however, were neither relevant to the

poor Kenyan farmers and the crops they largely grow nor did they stimulate local research for developing better varieties of flowers and vegetables.

The third important issue is associated with the morality of granting ownership on living entities through IPRs. As discussed earlier, IPRs were evolved to promote industrial technological innovations possessing public utility. Although improvement of plant and animal stocks and identification of new, economically useful living entities were essential agricultural processes, the IP on such living systems was held antithetical to different religio-ethical value systems. It was this consensus on underlying value systems that held the biological resources as *the common heritage of mankind*. Moreover, plant genetic resources, which are essential for developing new varieties, have been conserved and improved continuously by generations of poor farmers from many developing countries. But for their past and present contributions on intelligent selection and diligent conservation, neither the large genetic resources available in each crop nor the knowledge associated thereto would have been available to modern scientific plant breeding. In recognition of this critical role being played by farmers, and to promote this role in the larger interest of future global agriculture, in 1983, the FAO International Undertaking on Plant Genetic Resources (IUPGR) developed the concept of “Farmers’ Rights,” and defined it as the “rights arising from the past, present and future contributions of farmers in conserving, improving, and making available plant genetic resources, particularly those in the centres of origin/diversity.”<sup>35</sup> Patent or PBR excluding Farmers’ Rights is ethically unacceptable and a threat to the community-based generation and conservation of genetic diversity supporting agriculture and future food security of nations. This threat unfortunately has increased with the adoption of TRIPS, wherein “protection of plant varieties by either patent, or an effective *sui generis* system or a combination thereof” is mandated.<sup>36</sup> Denial of Farmers’ Rights constitute a direct violation of Article 1 of the UN Covenant on Economic, Social and Cultural Rights, which stipulates that “in no case may a people be deprived of its own means of subsistence.” At the WTO, the African Group of countries, the ‘like-minded group’ of countries and the developing countries, in general, have shown clear opposition to the concept of IPRs over life.

Another ethical dimension introduced by the IP protection on living entities mandated by TRIPS is its inconsistency with the Convention on Biological Diversity (CBD) and the recognition of the right of local communities to biological resources (BRs) and associated traditional knowledge (TK). This inconsistency is promoting piracy of BRs and TK from many developing countries. TRIPS is unifocal in ensuring the IPR on ‘innovations’ based on BRs or associated TK, with an apparent assumption that the related prior art, as material or knowledge, is freely accessible with no legal encumbrances. Such an assumption ignores the legally binding major provisions of CBD on national sovereignty over BRs and TK *inter alia* the responsibility of State on the facilitated access to them with prior informed consent, and on the requirement of parties accessing them, establishing IPR on them

and making commercial exploitation of components of BRs and TK for the sharing of benefit with local communities.<sup>37</sup> Few of the known cases of biopiracy and intrusive patents on the BRs and TK belonging to communities of developing countries are those concerning turmeric,<sup>38</sup> neem,<sup>39</sup> ayahuasca,<sup>40</sup> hoodia,<sup>41</sup> and, smokebush.<sup>42</sup> Thanks to the Doha Ministerial Declaration this inconsistency between TRIPS and CBD is to receive attention at the ongoing negotiations in the TRIPS Council.<sup>43</sup> A proposal at TRIPS negotiations by developing countries led by India wants patent applications to declare sources of BRs or TK used as the prior art, and to produce evidence on prior informed consent and benefit sharing, wherever required.

The fourth important ethical issue arises from the often made claim that IP protection of plant varieties stimulates higher private investment in crop improvement research, which benefits all farmers, including the poor in developing countries. The benefits possible from increased R&D are on two counts: 1) from the availability of better and better varieties and consequent economic gains accessible to farmers through their cultivation, and 2) from the benefit share eligible to concerned communities with the commercialization of products or processes developed from the BRs and TK conserved by them. The first benefit pre-supposes that plant variety protection (PVP) leads to increased variety development and continuous accessibility of farmers to superior varieties. Hybrid variety breeding attracted considerable private investment, even without the PVP, because the hybrid technology by itself has a strong built-in protection. For this very reason, there is a high private sector presence in the hybrid seed sector of many developing countries, even where there is no PVP. Hence, investment on hybrid variety research by private sector cannot be attributed to the PVP. Setting the hybrid seed sector aside, a US study has shown that the introduction of PVP does not increase the total R&D activity, although the number of protected non-hybrid plant varieties significantly increased in certain crops, with increased seed sale by the private companies.<sup>44</sup> Rather than increase in R&D investment and direct benefit to the farmers through increased yield or economic return from new varieties, the PVP appears to have enlarged the seed market of private companies through market promotional and merger processes. Another study on the impact of PVP on wheat breeding and yield in the USA also shows that PVP neither contributes to increased private investment nor to increased yields, while the share of acreage sown under private varieties significantly increased.<sup>45</sup> Thus, the principal object of PVP to promote private investment in non-hybrid variety research remains largely not served even in developed countries<sup>46</sup> where PVP was introduced with stringency much earlier. With respect to the benefit sharing to eligible farming communities, there is no instance hitherto on sharing the commercial benefits accrued from PVP with the eligible community. In fact, this CBD principle is yet to gain acceptance for implementation in developed countries and by their private sectors.

Hence, a checklist of considerations for developing countries, while complying with TRIPS on PVP legislation, shall include whether the kind of PVP allowed would benefit the agricultural development through increased private investment in crop improvement, strengthen food security, promote livelihoods of people depending on agriculture through employment and other agri-business-based income generation, encourage conservation of biodiversity by local communities, or promote agricultural foreign trade. On the global agricultural R&D scenario, the public sector investment from developing countries, by a 1995 estimate, is US\$11.5 billion.<sup>47</sup> which is about one-third of the global agricultural R&D investment. Out of the remaining, the R&D contribution from the Consultative Group on International Agricultural Research (CGIAR) is around US\$0.34 billion, from the public sector of developed countries, US\$10.2 billion, and from the private sector, US\$11.5 billion.<sup>47</sup> Only 6% of this private sector R&D investment is directed to agriculture in developing countries. What is notable is that while the private sector has a relatively forceful presence in health and agricultural R&D of developed countries, its investment in these two sectors in developing countries is very low and the public sector in some of developing countries has a better foothold in their agricultural R&D. In the context of increasing entry of the private sector in the agricultural R&D of developing countries, it is important to note that the public interest of R&D is better served by promoting competitiveness and ethical mainstreaming in technology ownership and transfer.

### ***7.6 IPRs, Human rights, and Development***

IPRs are usually seen from economic and legal perspectives as the ownership rights for the exclusive use of inventions and creative works. Apart from these perspectives, there is a human rights dimension to IPRs as recognized in the Universal Declaration of Human Rights (UDHR). The principle cutting across IPRs and basic human rights became legally binding when the International Covenant on Economic, Social and Cultural Rights came into force in 1976. Article 15.1 of this Covenant affirms that the general public has a legitimate interest in intellectual productions and a right to benefit from them, and that IPRs should contribute to the scientific, cultural and economic enrichment of society. The right of society for social benefit from IPRs, and the requirements of IPRs to enrich society for its scientific, cultural and economic advancement, needs to be understood and applied in tandem with other Declarations and Covenants of the United Nations. Poverty, pestilence and under-development rampant in developing countries attract Article 25 of UDHR on the right to food, the right to adequate medical care, health and well-being and the right to development to access an adequate standard of living. The Millennium Declaration of the UN General Assembly sets poverty reduction as the major global agenda for all nations, with the target on people earning less than US\$1 per day per person (based on purchasing power parity). The persistence of extreme poverty among 1.2 billion people, the majority of them in South and Southeast Asia, is also a challenge to the rights provided under

Article 22 of UHRD on social security and economic rights, and social and cultural rights indispensable for the dignity and free development of personality. The irreversible impact of poverty on low birth weight of children, their intellectual and cognitive under-development due to pre- and post-natal malnourishment, and the lack of opportunity and access to healthcare and education, most common in developing countries, constitute the first exclusive principle against equity in a global economic order styled with a strong and universal IPR system. The UN Sub-Commission for Protection and Promotion of Human Rights captured this conflict when it declared that *“there are apparent conflicts between the IPR regime embodied in the TRIPS Agreement, on the one hand, and international human rights law, on the other, and the former violates the right of everyone to enjoy the benefits of scientific progress, its applications, the right to health and the right to food.”* Ethics, rather than economic gains, takes centre stage in the resolution of such conflicts. Such resolution has also to be an affirmation of the Declaration on Right to Development (DRTD) adopted by the UN General Assembly in 1986, which declared the right to development is *“a universal and inalienable right that every human person and all peoples are entitled to, in participating, contributing and enjoying economic, social, cultural and political development by which all human rights and fundamental freedoms can be realized.”*

The collective will of the world and the rights to human and economic development, the right of access to food, medical care, health and well-being, and the right to social security shall stand denied or limited in a global IPR regime being styled under TRIPS. It will not only pose a serious hurdle to development in all core economic sectors, like science and technology, indigenous healthcare systems, agricultural production, food security, livelihood of rural people depending on agriculture, and indigenous industries in developing countries, but also exacerbate the existing deep rich-poor divide. For many poor countries, a strong IPR regime will not help in reducing poverty, increasing accessibility to medicines, increasing employment and income, or accessing the economic, social and cultural benefits of patented technologies. Hence, it is important that while accepting the legitimate role of IPRs in each socio-economic paradigm, over exertion of IPRs in developing countries to restrict their ability to attain scientific progress, their economic, social, cultural and political development, and their rights to health and rights to food have to be forcefully rejected. These rights are entitlements of the poor and are not extended as mere charity from the rich. All countries in the world have moral and ethical responsibility to facilitate access of poor countries to these rights; such access should not be delayed or denied. The sovereign rights of the States to harmonize their national legislations and policies on IPR in accordance with international human rights obligations and principles in a manner to promote indigenous science and technology processes, achieve access to public health for all, promote the advancement of agriculture without displacing the livelihoods of dependent people, sustain traditional life styles and cultures, and advance overall economic development as exhorted by different Resolutions of the UN, have to be asserted.

In the context of the integration of globalized economic and international trade, there is an increasing divide between the UN system, on the one hand, and intergovernmental institutions outside the UN system, like the Bretton Woods institutions and WTO, on the other, in upholding ethics and equity. These institutions are clouted to effectively bypass the UN system on global regulation of economy and trade, largely on economic strength, diplomatic muscle and political maneuverability, where rights, ethics and equity are often compromised. The Bretton Woods institutions with their principal policies on liberalization, deregulation and privatization, oppose the Right to Food in their practices. Jean Ziegler, the UN Special Rapporteur on the Right to Food, states that, “we must search for other means of integrating human rights and Right to Food into the rules of international trade.” The insensitivity of these organizations in a world where an average of 10,000 people, 33% of them being children, are allowed to die every day due to lack of food is a challenge to the integration of morality and ethics in the globalization process.

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<sup>40</sup> Ayahuasca means vine of soul. The vine is *Banisteriopsis caapi*, traditionally used by indigenous people of Amazon basin for generations in religious and healing ceremonies to treat illness, meet with spirits and divine the future. This vine was taken to USA and got patented with the USPTO under Plant patent 5751 and title “Da Vine” in June, 1986 by Loren Miller, an American. Patent was opposed by the Coordinating Body of Indigenous Organizations of the Amazon Basin (COICA) and got revoked in November 1999, which however was cancelled in 2001.

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by Members pursuant to Article 71.1. In undertaking this work, the TRIPS Council shall be guided by the objectives and principles set out in Articles 7 and 8 of the TRIPS Agreement and shall take fully into account the development dimension.”

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<sup>45</sup> Alston, J. and Venner, R. 2000. The effects of the US Plant Variety Protection Act on wheat genetic improvement. EPTD Discussion Paper # 62, International Food Policy Research Institute, Washington DC. Source: <http://www.grain.org/docs/eptdp62.pdf>

<sup>46</sup> Shoemaker, R., et al. 2001. Economic issues in biotechnology. ERS Agriculture Information Bulletin No. 762, USDA, Washington DC, p. 36.

<sup>47</sup> Pardey, P., and Beintema, M. 2001. Slow Magic: Agricultural R&D a century after Mendel. International Food Policy Research Institute, Washington DC, p. 10. Source: <http://www.ifpri.cgiar.org/pubs/fps/fps36.pdf>

## 8. BRIDGING THE DIVIDES

“We are in the middle of a race between human skill as to means and human folly as to ends. Given sufficient folly as to ends, every increase in the skill required to achieve them is to the bad. The human race has survived hitherto owing to ignorance and incompetence; but given knowledge and competence combined with folly, there can be no certainty of survival. Knowledge is power, but it is power for evil as much as for good. It follows that, unless men increase in wisdom as much as in knowledge, increase of knowledge will be increase of sorrow.”

– *Bertrand Russell, Impact of Science on Society*

### ***8.1 The Role of Technologies in Propelling a Knowledge-Based Economy Towards the Creation of a Global Society***

Scientific discoveries/discussions by themselves rarely create change. It is the confluence of old and new technologies with old and emerging social needs that brings about change. While new technologies hold the promise to reach and benefit the poor, it takes far more than technology interventions to have a sustained impact on poverty/society. Appropriate technology, drawn from modern scientific advancement and indigenous knowledge systems, inclusive of traditional ecological knowledge held both by men and women, must be recognized and incorporated into micro planning of programmes. Timely local adoption often requires significant indigenous technological capacity. Success in building technology capacity has been greatest when it has been linked to an explicit national science and technology policy and carefully worked out strategies, which have the full involvement of the stakeholders and effective monitoring frameworks in place.

Knowledge-based economies, of course, are not restricted to the realm of high technologies, but Science and Technology (S&T) does tend to be central in the revolution. Above all, ethics plays a major role in shaping equitable development. This was one of the reasons that the Technology Achievement Index, a new measure which aims to capture how well a country is creating and diffusing technology and building a human skill base reflecting the capacity to participate in the technological innovations of the net change, was introduced in the Human Development Report of 2001 (HDR 2001). For the Asia-Pacific region, one finds that Japan and Korea, along with Singapore, fall in with the leaders from the developed world, while many other countries like Thailand, Philippines, China, Indonesia, Sri Lanka and India fall under the “dynamic adopters” category, and a few others like Pakistan and Nepal fall under marginalized. The Pacific islands come under the countries which are yet to make a mark, thereby, making this region very diverse in its demonstrated capacity to absorb the technologies (HDR, 2001).

Transformation of knowledge economies into a global society hinges on the proliferation of communities characterized by their strong knowledge production and reproduction capabilities, access to technologies, learning and exchange of local innovations and the intensive use of information technologies in helping them use the data generated to meet their local needs. Recognizing the immense potential of the modern technologies in addressing the challenges and concerns in the present developmental paradigm, the Millennium Declaration,<sup>1</sup> calls upon States to apply new technologies, especially ICTs, to development. It also draws attention to the need for capacity building in the nations in terms of their human resources and S&T infrastructure. Major events in the recent past leading up to the World Summit for Sustainable Development<sup>2</sup> 2002, which seeks to promote partnerships among others for knowledge and new technology and the assessment of the Millennium Development Goals,<sup>3</sup> have also called for similar actions. The following paragraphs will look at some of the issues related to the adoption of these technologies, analyze their ethical dimensions and illustrate how partnerships are important to get the excluded into the mainstream of development.

## ***8.2 Enhancing food and health security through biotechnology – the ethical issues:***

Unlike the digital divide, the genetic divide is likely to have far reaching consequences for the developing countries because of the radical nature of biotechnology and its implications for agriculture, human health and environmental management. Advances in biotechnology have the potential to alter the patterns of food production and distribution in fundamental ways.

It is clearly evident that the advances in the biosciences are having economic and social impacts.<sup>4,5</sup> These impacts are increasingly dependent on new types of relationships, teams and alliances within the research community, as well as between science, business and society and its differential absorbing capacities. Over generations, the production, transformation and distribution of food and agricultural products were generally accepted as routine aspects of daily life around the world. Therefore, such activities have rarely been addressed within the realm of ethics until the regime of intellectual propriety rights (IPR) brought about a fundamental change in this attitude. Key ethical issues being raised in relation to Genetically Modified Organisms (GMO) are 1) food safety in terms of allergens and antibiotic resistance, 2) environmental impact in terms of controlled distribution of GMOs (especially in developing countries where farm holdings are very marginal and monitoring both within the country and trans-boundary when they do not have the required technical skills, nor the budget, is very difficult, at best), 3) other issues in terms of labeling and cost benefit analyses (who decides whether the country needs this or not), 4) access to the benefits by the underprivileged (will they really benefit?) and, 5) religious questions<sup>6</sup> and considerations related to GMOs.

Grey areas continue to persist and this is relevant especially for the countries of this region, which is rich in natural resources and traditional systems. Further, the development is highly skewed in terms of access to technologies and differential capacities of human resources. While there have been measures developed to consider issues relating to access to technologies, equity, conservation of biodiversity and preservation of cultural diversity, especially in terms of recognition and reward (Articles 8j, 15, 16 and 19 of CBD,<sup>7</sup> TRIPS<sup>8</sup> and various legislations like the Farmers Rights, FAO<sup>9</sup> and novel means of documenting traditional knowledge/innovations, like peoples/community biodiversity registers, and the National Innovation Foundation<sup>10</sup> for recognition and reward), there are still a number of key issues that continue to be debated and need to be further addressed from the perspective of ethical dimensions. For instance, questions to be considered include: Who decides if genetic resources are to be priced? If they are, what is the appropriate price for genetic resources (raw materials or materials processed at different stages)? Is traditional knowledge a mere “raw material” in the grist of the modern scientific mill, or should it be accorded the same respect as the scientific knowledge of another corporate entity? How important is local traditional knowledge, and in what sort and stage of research and development can it be accepted? What systems need to be in place to validate them, so that they are accepted by international standards? Who sets these? Can independent research on this question be made to all the stakeholders involved? Who bears the cost of the tremendous capacity building exercises of these nations in terms of keeping up with the commitments and timeframes of the various conventions and treaties signed by them?

Research for poverty alleviation and productive management of natural resources requires a different set of public goods than the high-yielding varieties and breeds of grain that were produced in the past. Needed are innovative research methods and approaches that empower small scale farmers to deal with a changing environment, and innovative policies and strategies for strengthening and scaling up promising local initiatives through access to timely and appropriate information which is locale specific. In the food and agriculture sector, modern information and communication technologies (ICT) have enormous potential for wide and rapid knowledge sharing at all stages of the food chain. For example, ICT allows precision farming; farming guided by detailed environmental information so as to minimize the use of water, agrochemicals and labour. While access is highly skewed in much of the developing world, many ways of overcoming the divide are being attempted through novel approaches and partnerships between the publicly funded systems like the Consultative Group on International Agricultural Research (CGIAR), which has a significant presence in this region through the International Rice Research Institute (IRRI), International Crops Research Institute for the Semi-arid Tropics (ICRISAT), the Centre for International Forestry Research (CIFOR), WorldFish Center and the International Water Management Institute (IWMI), and initiatives at the national level. For instance, Malaysia is setting up

a biotech hub outside Kuala Lumpur that it calls Bio-valley.<sup>11</sup> Indonesia is setting up its own industrial park called Bio Island.<sup>12</sup> Even Japan and Korea have investors in this area. China, India and Indonesia are already planting acres of genetically modified cotton, and countries like Thailand and the Philippines are not far behind. Some of them like China, India and the Philippines, have regulatory systems in place, while others need to develop them.<sup>13</sup>

Public research must be strengthened, because its fruits can be passed on to small farmers at a cost, or via government channels free of charge. This cannot be done with the results of research sponsored by private enterprises. For these reasons, institutions like CGIAR, with its focus on the needs of developing countries, have to continue to play conspicuous roles in such efforts with the National Agricultural Research Systems. Regulatory processes are becoming clearer in countries, and both the public and private sectors need to show more commitment to training and support for local regulatory systems.

Biotechnology has an even greater role in the medical sector. For example, in 1989, biotech research on hepatitis B resulted in a breakthrough vaccine which also brought down the price of the vaccine, making it more affordable. Today, the more than 300 biopharmaceuticals products that are in the market, or pending regulatory approval, may hold equal promise. Since many of the raw materials for the pharmaceutical sector come from this region, along with the associate traditional knowledge, it has become imperative that the benefits reach them too. This is still a nascent and gray area and many of the legislations in place, or being developed, need to be tested. Much more needs to be done to develop vaccines and treatments for HIV/AIDS, TB, malaria, etc. Medical biotechnology raises many ethical issues, such as in areas of human cloning. A rigorous analysis of risks and benefits and a voluntary code of conduct and enforcement will be necessary to form a strong basis for drawing up areas of intervention using this technology.

One means by which the rights of future generations could be safeguarded is through the use of the precautionary principle as set forth in numerous documents, including the Rio Declaration on Environment and Development (1992), the Earth Charter (2000),<sup>14</sup> the Convention on Biological Diversity (1992) and the Cartagena Protocol on Biosafety (2000).<sup>15</sup> The precautionary principle, simply put, asserts that in areas where scientific knowledge is lacking and/or where levels of uncertainty with respect to deleterious effects are high, one should proceed with extreme caution. This applies particularly to those instances where decisions are irreversible. Other issues, like food safety, are already covered by the World Health Organization – WHO Constitution, 1946<sup>16</sup> and the Codex Alimentarius Commission 1963.<sup>17</sup>

It needs to be recognized that biotechnology may add new dimensions to existing integrated approaches, but will not replace them. Choosing the best options to address specific production problems in developing countries should be based on

economic, technical, social, ethical trade, and safety considerations. Experts, inclusive of the scientists and technologists and the media, have the ethical obligation to be proactive and to communicate in terms that can be understood by the layperson. There is also a need for donors and various government agencies to address the wider causes of food insecurity, like distribution of land and dwindling water resources, credit and adequate agricultural training, and proper infrastructure, especially unique to this region. Much more research needs to be carried out on socio-economic, environmental and biodiversity impacts of GM crops, especially in this region, which is endowed with abundant natural resources and traditional wisdom. Genetic resources for food, agriculture, and raw materials for traditional systems of medicines should be exempted from the intellectual property rights regime. Many of the countries in this region have finalized *sui generis* systems, which need to be tested for a period of time since these are bound to touch on the ethical issues being debated. Funding for public sector agricultural research should be increased and should be in support of the local needs of the region.

### **8.3 Bridging the digital divide – the role of ICT**

While there has been tremendous leapfrogging in ICT, it is clearly evident that the impact has not been distributed evenly (HDR 2001). As many as 133 developing countries have asked the UN to maintain radio stations and other traditional media as a means of disseminating information, because the use of the internet alone would exclude many people from access to information flows. It is also evident that technology transfers and diffusion are not easy. While IT strategies in the Asia-Pacific region are very strong with policy frameworks in place, like the Infocomm 21 Master plan for Singapore,<sup>18</sup> a very clear ICT policy framework and action plan worked out for Indonesia, the national IT agenda for Malaysia which hosted the GKP 2 in this region, Cyber Korea 21,<sup>19</sup> Digital 21 strategy for Hong Kong, etc., the number of users of the internet is still at a dismal 2.3% of the total population in East Asia and the Pacific, while for South Asia it is only 0.4% (HDR 2002).

While reaching the poor and realizing the potential of ICT for poverty reduction in the areas of opportunity, empowerment and security is a difficult endeavour. ICT projects implemented by grassroots organizations and individuals who have the appropriate incentives to work with marginalized groups can achieve encouraging results. Local ownership and participants from the community characterize successful ICT projects. This region has very many diverse examples of successful applications of ICT.

ICT can improve health care delivery to the poor, as in the Sanpatong Family<sup>20</sup> care project for people living with HIV/AIDS in Thailand. This successful project built capacity for self care and self reliance of people living with HIV/AIDS and their families. Not only were their attitudes changed, community care was

mobilized in the whole village to provide support and care. Telemedicines can diminish the cost and hardship of long distance travel for medical attention and diagnosis, and email can deliver, at minimal cost, recent medical findings to health workers lacking research and technological facilities. Furthermore, ICT can simplify medical data collection, record management, and paper filing. Handheld computers, or Personal Digital Assistants (PDAs), are allowing auxiliary nurse midwives, participating in the InfoDev-sponsored India Health care Delivery project,<sup>21</sup> to reduce redundant paperwork and data entry, freeing up time for healthcare delivery to the poor. Other examples include the Grameen Telecom Village<sup>22</sup> payphones as income generators. ICT can also help small farmers and artisans by connecting them to markets. The Agro-clinic Planning and Information Bank (APIB) India is a data bank which provides farmers with day-to-day information on land and water resources, the weather, seeds, fertilizers, pesticides, and usage, credit, insurance facilities, remote sensing patterns of land use, pattern changes, etc. In the Philippines, wireless technology, driven mainly by the popularity of text messaging or short message services riding on mobile phone technology, is expected to progress from being a communication tool that appeals mainly to individuals, to being a powerful business application for enterprises.<sup>23</sup> Access to such generic information helps in the overall development of the community by timely information aids. Another such example is the Knowledge Centre initiative by M.S. Swaminathan Research Foundation. (See Box 1)

While many factors contribute to the success of ICT projects in rural areas of developing countries, low-cost access to information infrastructure is the basic necessity. Still, insufficient conditions to reach the poor, inadequate or no connectivity, and unstable power supplies clearly reduce the economic viability of ICT projects. Given that it is not realistic to provide telephone lines or computers to all households in developing countries, government and regulators should be concerned with policy instruments for achieving 'universal access' and continue to look at other means of communication and transfer of information for development until then. Although the availability of content in local languages and the use of graphic and voice interfaces can make ICT applications more accessible to poor people, illiteracy, low levels of education, gender, class and caste inequalities, and development, in general, continue to be obstacles to the use of computers and other ICT tools.

#### ***8.4 Targeting the Youth***

The youth segment of the population in this region is estimated to constitute approximately 18% of the total population, over 650 million persons, or over 60% of the world youth population. By 2030, the youth segment for the region is estimated to grow to exceed over 700 million, constituting almost 15% of the total population. The sheer size of the youth population in the region underscores the magnitude of the challenge that countries face in integrating youth and developing their full potential, most critically, perhaps, in the area of employment.

**Box 1. Bridging the digital divide – Information Village at Pondicherry, India<sup>24</sup>**

The level of poverty is high in these villages. The population of one such information village is 13,097, of which 6,353 are women. The number of literates is around 4,700. Work is basically agricultural, while some people work in a fishery. Hardware and software were provided for the basic operation of PCs running Microsoft Windows 95m, equipped with dispatch receipt of Microsoft Exchange, composing documents in HTML. Voice recording on WAV format, and solar energy since the power supply was erratic. To be of use to the farm families, generic information found via the internet networks had to be rendered into locality specific knowledge that rural women and men could use. PRA surveys and other forms of data collection for needs analysis were conducted to find out what this local action specific knowledge was. Educated persons, school dropouts, and women were trained in how to design and create content both in response to a needs analysis and in the operation of information shops. Moreover, youth were trained in the maintenance of the systems and to update content. The information that they developed included: entitlement databases, information on grain prices, seed and fertilizer quality, and a directory of hospitals and health help lines. Various NGOs, government agencies, hospitals, private sector organizations and the local village communities cooperated in the project. The impact of the project was monitored to keep the government, NGOs and CSOs and the private sector informed of the practical potential of ITs. The benefits included overcoming the barriers of language, provision of an alternative to the existing poor telephone connection, improved supply of electricity, improved market prices and lower production costs due to timely dissemination of information, human resources development, gender equity in accessing the technology, women-managed knowledge centres, local enterprises created through the development of new marketing approaches and the possibility of employment creation in areas such as software development and distance education training for ITs in community development.

Such knowledge centres have now been established in more than 19 such villages, which cater to the local specific needs, and also have been spread to the other states of India.

Education of the young is one of the most important investments, and an indicator to assess developmental impact. It helps to empower youth and, thereby, the strengthen the future of the nation by being able to absorb the changes being brought about by the technological revolution. An analysis of this region indicates that, in the second half of the 1990s, the proportion of public spending on education was as high as 15-16 percent in Malaysia and the Philippines, 18% in Republic of Korea, 20% in Thailand, and 23% in Singapore. By contrast, the figures for other low-income Asian economies are lower. Pakistan spent only 7%, Sri Lanka 9%, India 12% and both Bangladesh and Nepal spent 14%.<sup>25</sup> There is a need to invest more in education, not only at the primary and secondary stage of education, but also at the tertiary level. This, combined with higher standards of health, will help

youth, both boys and girls, contribute in the development of the nation in a better manner.

There is a large number and wide range of good practice in generating youth employment in the region, ranging from labour market interventions, implemented by governments, to public-private sector partnerships and self help and self employment initiatives. New employment and entrepreneurial opportunities for young people in the region can be found in the new economy. In some countries in the region, telecentres are being set up through public and private initiatives in telephone shops, schools, libraries, community centres, police stations and clinics. Sharing the expense of equipment, skills and access amongst an ever-increasing number of users also helps to cut costs and make these services viable in remote areas. Countries in the Asia-Pacific region have been innovators in the design of antipoverty programmes like public employment schemes; and, many countries like Bangladesh, China, Nepal, Philippines, Thailand, and India have cash or food for work programmes. Micro-credit and micro-enterprise creation through technology support have been initiated among women and youth. Examples include: the Grameen Bank in Bangladesh, a NGO network that supports business activities of women in the Philippines, a bank for Agricultural cooperatives in Thailand and Badan Kredit Kecamatan (BKK) in Indonesia. Also, Science Parks and Rural Technology Parks are being set up to increase the support to help with technology transfers, training and the promotion of entrepreneurial activities.

An ecological revolution based on the adoption of eco-technologies would help a lot in creating locale specific jobs linked to natural resources. It is important that an economic development, which leads to a job-led growth, takes place. If not, conflicts will surely increase due to deprivation. Scientists of the International Peace Research Institute, Oslo, have studied the cause of armed conflicts during the last 10 years. They found that, in most cases, violent conflicts could be traced to economic, rather than ideological, differences.<sup>26</sup> Unfortunately, even now, far too high a proportion of national GDP is being spent on arms and military equipment as compared to programmes designed for poverty eradication and meeting the basic needs of the underprivileged. The so-called peace dividend still remains only in the realm of possibility.<sup>27</sup>

It might be appropriate to recall what Dwight D. Eisenhower, a great war leader who subsequently became the President of the United States, stated on the 16<sup>th</sup> August 1953 – “Every gun that is made, every warship launched, every rocket signifies in the final sense a theft from those who are hungry and are not fed, from those who are cold and are not clothed. This world in arms is not spending money alone. It is spending the sweat of its labourers, the genius of its scientists and the hopes of its children.”<sup>28</sup> Harnessing science and technology for fulfilling the basic minimum needs of every child, woman and man living on our planet will be possible only if this message becomes central to the ethos of human culture.

### ***8.5 Engendering Development***

The five-year review of progress in implementing the PFA (UN, 2001), held in June 2000, showed that the path of progress has been slow. The Millennium Declaration and the MDGs also identify gender-equality and women's empowerment as central cross-cutting goals. New approaches are needed to address these opportunities and challenges within the Platform's vision of gender equality and women's empowerment.

Literacy levels, education and employment rarely bring about dramatic changes without widespread changes to economic and cultural structures. At the current rate of literacy, UNESCO projects that in 2015 there will be an estimated 107 million illiterate young people and again more than half, about 67 million, will be young women. While some of the countries in this region seem to be progressing well, other countries, especially from the South Asian region, still have a far way to go. There, the socio-cultural construct continues to prevent women from coming into fore front and to freedom of choices.

The ethics of autonomy/freedom/empowerment of women requires that women have more say in all the decisions (freedom of speech and action) that affect their lives, including in the household, the community, the market place, the workplace, and in all levels of public assemblies and offices, from the local to the national to the international. For this to happen, women will have to have to be empowered through skills (transformation from unskilled to skilled), information (access to information and freedom of choice) and economy (access to credit and technologies). Surveys continue to show dismally little presence of women in S&T, and of the benefits of ICT reaching them. There is an urgent need to see that they benefit from the impact of globalization, and that they are recognized for the roles they perform and the knowledge they hold. While some countries do try and have quota systems to increase the presence of women it should be realized that mere number games will not help in the promotion of equity. It is important that women are able to participate meaningfully and be heard. This can happen only when there is a systematic approach of empowering them through education and improved health.

Gender equity in S&T means ensuring that scientific and technological enterprises are as open to women as they are to men, and that women can actively participate as creators and innovators at all levels – from formal high school science classes to research institutes, from technical training for school leavers to the management and shaping of technologies as end users, be at the urban or rural level. Gender equity in and through S&T is like two sides of the same coin; one cannot be done without the other. Constitutions, national laws, ministerial declarations, national bureaucratic structures and good gender development plans based on innovative partnerships can make this happen. A study conducted by the APGEST network, sponsored by UNESCO, offered very good examples of how appropriate

technologies, with support from the above mentioned components, could make a difference, especially in the areas of ICT and Green Health (traditional systems of medicines). These examples came from very diverse regions, such as Korea and the Pacific islands. There is increasing recognition of the knowledge held by women, especially in traditional medicine systems. In one of the examples documented in Fiji, it was very evident how women groups got together and helped in the revitalization of natural medicine.

Boxes 2 and 3 below describe how many governments are taking active steps to promote equality. In Vietnam, the national strategy for the advancement of women 2001-2010 sets targets to achieve greater equality and to encourage women in the areas of employment, education and health care, from its present rate of 25% to 50%. Gender responsive budgets are being introduced to ensure the objectives of gender equality, as in the Philippines and Sri Lanka.

In the growing intellectual property rights regime, it is important that women get their share of recognition and reward for better and more effective protection of women's intellectual rights. The following themes need to be explored and incorporated in any national or international legislation designed to achieve an optimum result: 1) the technological worlds of women and men differ according to social, economic, cultural and gender relationships existing between them, 2) the space in which women live affects their patterns of production and use of

**Box 2. Spearheading Gender Equity in Science and Technology (S&T) through a Ministry of Gender Equality – Republic of Korea<sup>29</sup>**

The Republic of Korea has established a Ministry of Gender Equality as the central agency that promotes the rights and interests of women and develops their capacities through mainstreaming gender policies. Significantly, it emphasizes the empowerment of women in S&T and provides training for women in information and technology. Furthermore, it promotes the advancement of female students into the fields of S&T through various measures, such as a “Girl-friendly Science Programme.” Another example is the Kyonggi Women's Development Centre for Women's IT training. The centre organizes 10-month IT training courses targeted at unemployed women, female-headed households, and handicapped women who are seeking jobs. Areas of industry shortage were identified and courses were offered. Timings were such that it suited the women and they were also supported with a commuter bus service, day care, and face to face counseling to improve the confidence level of women, which was often low either due to lack of education, age, lack of job experience, etc. The Centre helped in placements and financial tie-ups if they wanted to start a business venture after the training. The entry of women into high skilled occupations helped soften the rigid division of gender roles and job segregation in Korean society and improve women's position in the labour market. Thus, a move to promote a million housewives into ICT enabled empowerment is today becoming a reality through a supportive policy and an implementation which suited the needs of the women.

technology, as do circumstances, such as national disasters, conflicts, environmental changes and market demands, 3) the innovations that women make are based on their perceptions of the priorities in all aspects of their lives, and particularly on their understanding of the risks involved, 4) women's knowledge and skills in food production, processing and marketing play a crucial role in household livelihoods and food security, 5) technical information and skills are communicated to women, and between women, using different channels, and 6) the national policy environment affects the ways in which women use, adapt and adopt technology. There is a need to engender programmes working with Indigenous Knowledge/ Traditional Ecological Knowledge, to create a network of supporting institutions in which women will have a voice (Box 3).

**Box 3. Establishment of WANIMATE, the Women's Association  
for Natural Medicinal Therapy, Fiji <sup>29</sup>**

WANIMATE, ECOWOMEN and the Ministry of Health, the Department of Women, the Ministry of Education and the University of the South Pacific are working together to revive traditional medicine. The majority of healers are women. They live mostly in rural areas and often have little formal education. Many Fiji families have little money and rely primarily on subsistence farming and aquaculture. Although hospital outpatient's visits are free, medicines must still be purchased and bus fares needed to reach the nearest centre. Because of this situation, traditional medicines are still preferred. The WANIMATE was formed to help women comprehend the science behind the treatment and stress the importance of nutrition for good health. When the scientists, environmental activities and NGOs realized the need to protect biodiversity by documenting traditional practices, they had a regional Women's Traditional medicine Workshop in Fiji. A typical workshop includes traditional healers, village health workers and other women interested in traditional medicine. The conservation and protection of safe and effective traditional knowledge and medicinal plant resources for women and their families is promoted through training, awareness, demonstration, consultation, networking, and research that explain the issues on intellectual property rights. A traditional medicine handbook in Fijian has been published and is distributed in all workshops. Traditional gardens have been established at health centres, and women's health groups have been formed. Women healers, scientifically trained nurses, and botanical and ecological scientists have all increased their levels of awareness on traditional health and healing systems and have worked together on documentation, conservation and preservation. They all contribute to the Fiji Biodiversity Strategy Action Plan. There are management mechanisms that ensure a two-way dialogue and strong links between all stakeholders.

## Endnotes and References:

<sup>1</sup> Millennium Declaration – Resolution adopted by the UN at its 55<sup>th</sup> session of the General Assembly, 18<sup>th</sup> September 2000. <http://www.un.org/millennium/declaration/ares552e.pdf>

<sup>2</sup> The UN convened a World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa in September 2002 to mark the 10+ of the Rio meet and the Agenda 21.

<sup>3</sup> The UN Millennium Declaration had the following Development Goals: eradication of extreme poverty and hunger; universal primary education; promotion of gender equality and women's empowerment; reduce child mortality; improve maternal health; combat HIV/AIDS, malaria and other diseases; ensure environmental sustainability; develop global partnership for development: <http://www.developmentgoals.org/>

<sup>4</sup> Conserving indigenous knowledge: Integrating two systems of innovation. An independent study by the Rural Advancement Foundation International, UNDP, New York, 1994.

<sup>5</sup> [www.worldbank.org/arf/ik](http://www.worldbank.org/arf/ik)

<sup>6</sup> <http://www.biotech.iastate.edu/Bioethics/gmosethics/weedscienceart.html>

<sup>7</sup> <http://www.biodiv.org/convention/articles.asp> 'each contracting Party shall, as far as possible and as appropriate, subject to its national legislation respect and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional life styles relevant for the conservation and sustainable use of biodiversity and promote the wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of benefits arising from the utilization of such knowledge, innovations and practices.'

<sup>8</sup> [http://www.wipo.org/news/en/index.html/wipo\\_content\\_frame=news/en/conference.html](http://www.wipo.org/news/en/index.html/wipo_content_frame=news/en/conference.html) 'members shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof and provides minimum national standards for levels of protection to the creation of intellectual property and covers copyright and related rights, trademarks, industrial designs, patents, lay out designs of integrated circuits, protection of undisclosed information and control of anticompetitive practices in contractual licenses.'

<sup>9</sup> FAO <http://www.ukabc.org/TIPGRe.pgf>

<sup>10</sup> The National Innovation Foundation, which builds a national register of grassroots innovations and converting them to enterprises – a fund has been established to aid this work [www.nifindia.org](http://www.nifindia.org)

<sup>11</sup> Malaysia's High Ambitions in Bio Valley [www.corp-compass.com/biovalley\\_msia.htm](http://www.corp-compass.com/biovalley_msia.htm)

<sup>12</sup> Indonesia will it surge or slow? December 2002 [www.photonics.com/spectra/business/XQ/ASP/businessid.795/QX/read.htm](http://www.photonics.com/spectra/business/XQ/ASP/businessid.795/QX/read.htm)

<sup>13</sup> Global Review of Commercialized Transgenic Crops: 2001 Feature: Bt Cotton by Clive James, ISAAA Briefs.

<sup>14</sup> The Earth Charter. 'we must join together to bring forth a sustainable global society founded on respect for nature, universal human rights, economic justice and a culture of peace. <http://www.earthcharter.org/files/charter/charter.pdf>

<sup>15</sup> Cartagena Protocol on Biosafety – [www.biodiv.org/biosafety/](http://www.biodiv.org/biosafety/)

<sup>16</sup> History of Health for all – [www.who.int/archives/hfa/history.htm](http://www.who.int/archives/hfa/history.htm)

<sup>17</sup> The Codex Alimentarius Commission was created in 1963 by FAO and WHO to develop food standards, guidelines and related texts such as codes of practice under the Joint FAO/WHO Food Standards Programme. The main purposes of this Programme are protecting health of the consumers and ensuring fair trade practices in the food trade, and promoting coordination of all food standards work undertaken by international governmental and non-governmental organizations. [www.codexalimentarius.net/](http://www.codexalimentarius.net/)

<sup>18</sup> The Barrier in Bridging the Digital Divide and IDA's Approach to Address the Digital Divide [www.np.edu.sg/library/content/ir/irnatini.htm](http://www.np.edu.sg/library/content/ir/irnatini.htm)

<sup>19</sup> Cyber Korea [unpan1.un.org/intradoc/groups/public/documents/apcity/unpan007358.pdf](http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan007358.pdf)

<sup>20</sup> Sanpatong Family care project [www.unescap.org/esid/hds/practices/hiv/hiv3.htm](http://www.unescap.org/esid/hds/practices/hiv/hiv3.htm)

<sup>21</sup> India Health Care Project [www.iimahd.ernet.in/egov/ifip/jun2003/article4.htm](http://www.iimahd.ernet.in/egov/ifip/jun2003/article4.htm)

<sup>22</sup> Grameen Telecom Village Phone Project [www.grameen-info.org/grameen/gtelecom/](http://www.grameen-info.org/grameen/gtelecom/)

<sup>23</sup> Texting Capital of the World [www.inq7.net/inf/2003](http://www.inq7.net/inf/2003)

<sup>24</sup> Bridging the digital divide – Information Village at Pondicherry, India [www.mssrf.org](http://www.mssrf.org)

<sup>25</sup> Promoting the Millennium Development Goals in the Asia and the Pacific – ESCAP and UNDP 2003 <http://www.unescap.org/LDC&Poverty/MDG.asp>

<sup>26</sup> de Soysa, Indra and Gleditsch, Nils Petter. 1994. *To cultivate Peace – Agriculture in a World of Conflict*, International Peace Research Institute (PRIO), Oslo, Norway.

<sup>27</sup> Swaminathan, M.S. 1994. *Uncommon Opportunities: An Agenda for Peace and Equitable Development*; Report of the International Commission on Peace and Food, Zed Books, London, New Jersey.

<sup>28</sup> Eisenhower, Dwight D. 1953. Talk delivered before the American Society of Newspapers, Editors, 16 April.

<sup>29</sup> Spearheading Gender Equity in S&T through a Ministry of Gender Equality – Republic of Korea and Establishment of WANIMATE, the Women's Association for Natural Medicinal Therapy, Fiji <http://www.unesco.or.id/apgest/countryreports/>

## 9. CONCLUSION

“A world where every person has access to sufficient food to sustain a healthy and productive life, where malnutrition is absent, and where food originates from efficient, effective, and low-cost food systems that are compatible with sustainable use of natural resources. The benefits to poor and hungry are obvious – the possibility of a healthy and productive life, perhaps for the first time. Yet the gains to the well-off also bear mentioning: not only a healthier global economy, but also a world with less risk of conflict over scarce resources, less need for costly emergency relief, less poverty-driven migration, and less environmental degradation.”

– *Reaching Sustainable Food Security for all by 2020, IFPRI 2002.*

### ***Right to Development***

Poverty is the biggest human scourge on this planet. About 1.2 billion people, mainly in the 122 Third World Countries (TWCs), are in absolute poverty. About 65% of them are in South and East Asia, and another 25% in Sub-Saharan Africa. Every year, 36 million people, one-third of them children, die either directly or indirectly as a result of hunger and malnutrition. Such extreme hunger and deprivation is the ugly manifestation of man-made inequity, injustice and unethical order in sharing resources. Poverty is an attack on human dignity. It is a moral and political shame on humanity that such massive human rights violations are continuously allowed. Availability and access to food are fundamental to combating poverty. Sustainable access to food can be achieved only by national participation in the food and agricultural system and other economic activities, which confer purchasing power to the hungry.

It is the declared intent of every state to enhance the well being of its people and to safeguard their dignity and self-respect. A collective affirmation of this intent is also made in the Universal Declaration on Human Rights: “*everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security .....*” (Article 25). In the context of unabated global poverty and malnutrition, the right to food was re-stated in 1996 by the Rome Declaration on Food Security. Further, the Millennium Declaration by the UN General Assembly in 2000 urged nations to halve the proportion of people whose income is less than one dollar a day by 2015.

Science and Technology activity in the contemporary world is the engine to economic development. Advances in relevant technologies, and access to them, are powerful determinants of economic development leading to poverty alleviation

and social security. In corollary, backwardness of nations in S&T capability and their incapability to access and absorb appropriate technologies have become the major force driving the economic divide between the rich and the poor countries. Extreme poverty, consequent low human development and the need for investing huge capital over a long period for establishing a competent indigenous S&T capability have trapped these poor countries into a vicious circle; there is no easy way out from their poverty and under-development of human and social capital. Poverty and under-development are, in addition, causing inefficient and wasteful use of natural resources leading to rapid resource shrinkage, environmental degradation, pestilence and population increase, all denying a dignified life to many people.

In this context, the increasing shift in R&D investment in developed countries from public science for the common good, to private science for corporate profit, along with globalization of a rigid intellectual property regime with unprecedented coverage on processes and products from all fields of science and technology, including biological organisms and their genetic constituents, is virtually foreclosing any little chance the technologically backward countries have in accessing S&T to mitigate poverty, usher in development and ensure a dignified life to their peoples.

These countries are inherently incapacitated in establishing and promoting their own national S&T system to engine their economic growth and advancement towards the UN Millennium Development Goal. They are, in general, net importers of technology, most of which is from developed countries. The ethical issues associated with this paradigm are explicit. The decreasing role of international institutions of public good in relevant technology development to assist these countries, and the increasing role of private R&D in developed countries, is severely narrowing the TWC opportunity to access technology for development. The Declaration on Right to Development (RTD), affirmed by the UN General Assembly in 1986,<sup>1</sup> established as a universal and inalienable right that every human person and all peoples are entitled to, participate, contribute, and enjoy economic, social, cultural and political development, by which all human rights and fundamental freedoms can be realized. States have the primary responsibility for the creation of national and international conditions favourable to the realization of the RTD and to cooperate with each other in ensuring development and by eliminating obstacles to development. In the case of many TWCs which lack S&T capability, realization of RTD may not be possible without support and cooperation from international institutions of public good and liberal technology transfer from developed countries. Here, the functioning of international financial institutions in promoting Third World development, the role of developed countries in assisting

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<sup>1</sup> Declaration on the Right to Development adopted by General Assembly resolution 41/128 of 4 December 1986. <http://www.unhchr.ch/html/menu3/b/74.htm>

technology transfer, the bridging of the knowledge divide in the context of intellectual property regimes, and the impact of international trade on TWCs and their market access, all have a major bearing on the realization of the RTD.

The contemporary world order appears to have dumped the RTD somewhere in the past. While the capability of TWCs to take a development course at a pace commensurate with the UN Millennium Development Goal has not been strengthened, the climate of development, including the functioning of international financial institutions, the technology transfer regime and international trade has changed to their disadvantage. The Bretton Woods institutions championing liberalization, privatization and the compression of State domestic budgets are chartering a development model that accentuates the inequalities.

It is in this context that it has been attempted to analyze the various aspects of Ethics of Economics and Development in the preceding sections. Successful case studies/efforts have been highlighted in boxes. The basic premise from which the whole analysis has been made is that the approach to development should be pro-poor, pro-women and pro-nature. Swami Vivekananda,<sup>2</sup> an Indian visionary, has said that men and women are like the two wings of a bird: just as a bird cannot fly on one wing, no society can progress at the cost of neglecting its women. The pro-nature approach is advocated through emerging technologies, particularly in the area of precision farming, plant scale agronomy, ecotechnology and crop-livestock-fish integrated production systems that hold promise for fostering an ever-green revolution in farming, rooted in the principles of ecology, economics, gender and social equity, energy conservation and employment generation.<sup>3</sup> The approach has to be inclusive and must ensure that every child has the opportunity for a healthy and productive life. The Right to Food and the Right to Development are inalienable human rights and should be recognized as such. Examining the ethical aspect of development pathways is crucial in terms of whether an approach will cause a further rich-poor divide. Mahatma Gandhi's talisman of "Recall the face of the poorest and the weakest person you have seen, and ask yourself, if the steps you contemplate are going to be of any use to him." We have to find affordable and doable methods of integrating ethical pathways to development in practical ways for the sustained well-being and happiness of all. The example below is one such attempt.

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<sup>2</sup> Vivekananda, Swami. Complete Works of Swami Vivekananda, Advaita Ashrama, Almora.

<sup>3</sup> Swaminathan, M.S. 1996. Sustainable Agriculture: Towards an Evergreen Revolution. Konark Publishers, New Delhi and Swaminathan M.S. (2000), An Evergreen Revolution, Biologist, 47(2), 85-89.

***A proposal for Ethical Approach to Development<sup>4</sup>:  
Towards hunger-free India: Count down to 2007<sup>5</sup>***

**The Challenge:** The quantitative and qualitative dimensions of the challenge of achieving a hunger-free India are daunting. The incidence of poverty, endemic hunger, communicable diseases, infant and maternal mortality rates, low birth weight children, stunting and illiteracy is high. There are, however, many examples where progress in the elimination of poverty-induced hunger has been rapid because of a symphony approach in dealing with the multi-dimensional problem of hunger and malnutrition. Successful experiences in the elimination of hunger and poverty have shown that synergy between political will and action and strategic partnerships can help local communities to achieve seemingly impossible tasks. Such ‘messages and methods of hope’ should therefore be documented and spread widely, since they not only inspire confidence that the goal of a hunger-free India can be achieved, but will also help to build the self-confidence of all engaged in the mission of overcoming under- and malnutrition.

***Basic approach: Food with human dignity***

Food with human dignity should be the basic approach. The poor should not be subjected to a patronage approach, but should be treated as partners in achieving the aim of ensuring that every child, woman and man in their country has an opportunity for a productive and healthy life. The right to adequate food and clean drinking water should be regarded as a basic human right.

***Thrust of the Tenth Five-Year Plan (2002-2007)***

The Tenth Five-Year Plan has shifted the emphasis from food security at the household level to nutrition security at the level of each individual. Emphasis has been placed on employment, education, health and nutrition, which are all important for poverty eradication and hunger elimination. The inter-sectoral nature of chronic hunger has been recognized. By shifting the attention to individuals, the strategies adopted will be based on the principle of *social inclusion* and will help to foster a life cycle approach in nutrition interventions. For example, pregnant women will need special attention, since maternal and foetal under-nutrition leads to the birth of babies characterized by a weight of less than 2.5 kg at the time of delivery. Such low birth weight (LBW) children suffer several handicaps in later life and may not be able to express their innate genetic potential for mental and physical development.

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<sup>4</sup> Swaminathan, M.S. 2003. Commentary in Current Science, Vol. 84, No. 10, 25 May.

<sup>5</sup> These steps were discussed at a Consultation convened by MSSRF, World Food Programme (WFP) and the Food and Agriculture Organization of the United Nations (FAO) at New Delhi on 4-5 April 2003.

Such inequity at birth is inexcusable since we are now entering a knowledge-based economy. Similarly, old and infirm persons need special attention. Thanks to advances in preventive and curative medicine, we are now adding years to life. However, we should pay equal attention to adding life to years through nutrition and health care. We should recognize that we are now entering a new chapter in human longevity. There is therefore need for a proper match between nutrition requirements and nutrition support at different stages in the life of an individual. Hunger is the extreme manifestation of poverty, since the poor spend a high proportion of their earning on food. The elimination of hunger is, thus, the first requisite for eradicating poverty. Without adequate nutrition, the energy needed for higher work output will not exist in malnourished individuals.

### ***Guiding principles for converting goals into accomplishments***

*Decentralization:* The desired goal can be achieved speedily and surely only if a decentralized approach to implementation is adopted. 'Think, plan and act locally,' with support at the state and national levels, should be the motto. Elected local bodies, together with the concerned Departments of Government (health, education, women and child welfare, rural and tribal development, etc.) should prepare micro-level action plans. They should form a local level 'Alliance for a healthy and productive life for all'. The one million elected women members of local bodies can be empowered to spearhead the freedom from hunger movement, since they are more aware of the problems of nutrition and drinking water. Decentralization will enhance accountability, reduce transaction costs and remove corruption in delivery systems.

*Life-cycle approach:* For ensuring nutrition security at the level of each individual, a life-cycle approach is necessary so that the nutritional needs of the individual can be met from birth to death. Special programmes for adolescent girls, pregnant women, nursing mothers, infants (0-2 years) and old infirm persons should continue. What is needed is the horizontal integration of numerous vertically structured programmes. Such a functional integration will help to create a symphony at the level of each village/town/city to ensure that all links in the food availability-access-absorption chain function at a high level of efficiency and effectiveness. Management tools and not additional monetary support will be needed to bring about at the field level such convergence and synergy among ongoing programmes.

*Food for Work as the vehicle:* In keeping with the basic approach of food provision with human dignity, it was agreed by all participants that Food for Work (FFW) was the best existing vehicle of delivery. Effectiveness of the FFW programme could be ensured through two approaches. One is that of fine-tuning, i.e. ensuring that FFW is made available during the peak hunger season, which varies across agro-climatic regions. The other major change required is to broaden the scope of the programme to ensure wider coverage, suitability to pregnant and lactating

women, the old and weak, and to help embark on achieving the stated nutrition targets in a mission mode. It is suggested that FFW be broadened in scope to include community work related to cooking and serving of midday meals, door-to-door delivery of nutritional supplements, polio-drops, vitamin A and iron tablets, etc. maintenance of anganwadi centres, school buildings, food banks, village drinking water systems, cleanliness of the village, school kitchen gardens, fuel plantations, village forests and other community assets. This would ensure that even those handicapped by age, pregnancy or poor health could participate in the programme and earn their food with dignity, and with no adverse physical impacts. Priority could be given to the employment of women in the most food-insecure districts. Identification of projects could be left to the gram panchayats. Monitoring of community work could be carried out by school teachers or anganwadi workers. A brief 'on the job' training/awareness module would prepare this hunger-elimination task force for their new semi-skilled assignments. This would also ensure the availability of a semiskilled work force within the village, which could be involved in the implementation of existing and new schemes coming from the central and state governments.

*Information, education and communication:* There is need for launching a *nutritional literacy movement* to spread awareness of the adverse consequences of malnutrition-induced intellectual and physical dwarfism among children. The *nutritional literacy movement* should include issues relating to food safety, *codex alimentarius* standards, sanitary and phytosanitary measures, etc. Mass media, particularly those in the public sector, like Doordarshan and All India Radio, can play a very important role in making the hunger-free India movement a success. Community radio stations, giving location-specific information, should be encouraged to assist other mass media in spreading messages of hope. It will be useful to set up Media Resource Centres for a Hunger-free India. Such centres can provide credible and timely information to the print, audio, video and new (i.e. internet) media.

*Household entitlement card:* It will be useful to provide every family with an entitlement card, giving information on the various government projects which they can access. The information may be disaggregated by gender, age, religion, caste and class, and precise addresses of contact persons and offices may be given. Such information will enable everyone to make the best use of their entitlements. A single step of this kind will help enormously to ensure the effective utilization of all the schemes of central and state governments and bilateral and multilateral donors.

*Capacity building:* Since a decentralized approach involving the empowerment of over three million women and men members of local bodies holds the key to the success of this national movement for food and clean drinking water for all, it is essential that a national consortium of Agricultural, Rural and Women's Universities, as well as government and non-governmental training and research

institutions, is formed for undertaking capacity building in areas such as management, communication and organizational skills with reference to the implementation of the hunger-free area programme. The capacity-building programmes can be organized on a 'Trainers' Training model,' in order to achieve a multiplier effect.

*Asset building and community development:* The poor are poor because they have no assets like land, livestock or fish ponds. They often are illiterate and lack proper dwellings. They survive on wage employment, which, particularly in the case of women, does not reach the level of even the prescribed minimum wage. A massive effort is needed to help them to shift from unskilled to skilled work through training in market-driven skills. The on-going micro-finance led self-help revolution will be the speediest way to help them to rise above the poverty level. This will call for establishing effective forward and backward linkages, particularly with technology sources and markets. Insurance and Venture Capital support should also be available to micro-enterprises. We have now an opportunity to leapfrog in achieving our goal of enabling everyone to earn his/her daily bread.

### ***Initiation of a National Food for Social Capital Programme***

The social capital of a country is the product of interaction between the human capital and the cultural, political, economic, nutritional and natural environments. Human and social capital constitutes the most precious wealth of a nation. Mahatma Gandhi and Vinobha Bhave advocated the principles of *antyodaya* and *sarvodaya* for achieving high social synergy and capital. A society committed to building its social capital will try to promote programmes which represent a 'win-win' situation for all, thereby avoiding winners and losers and the consequent social conflict and disruption. During the last few years, the Government of India, as well as some state governments, has initiated many programmes like Sampoorna Gramin Rozgar Yojana, Annapoorna, Antyodaya Anna Yojana, and Universal Noon-meal Programme for School Children, etc. It is now clear that our farmers will produce more if we can enhance consumption and, thereby, opportunities for assured and remunerative marketing. Therefore, the initiation of a National Food Guarantee Scheme will help to ensure that all who are hungry today due to lack of livelihood opportunities or other constraints are able to have food for a productive life. Such a National Food Guarantee Scheme can serve as an umbrella for all ongoing projects like those mentioned earlier. In addition, it can provide food grains for initiating a Nagarpalika Rozgar Yojana, as well as for a wide variety of social support initiatives like Food for Health (TB, HIV/AIDS, Malaria, etc.), food for those employed in ICDS, Nutritious Noon Meal and other similar projects.

In other words, food can become a powerful currency for achieving the goal of a hunger-free India. Using food as a currency has twin advantages, namely, there could be greater off-take of food grains from farmers, thereby providing them with an incentive to produce more, and secondly, for meeting the immediate needs of

the poor, destitute, migrant labour and all others who are undernourished today. *The Urban Food Insecurity Atlas* released by the President in October 2002 clearly brings out the urgent need for attending to the hunger problems of the bottom 10% of the poor (ultra-poor) in towns and cities. Therefore, the setting up of an umbrella programme combining the principles of the Employment Guarantee Scheme of Maharashtra and of various Food for Work Programmes under a National Food for Social Capital Programme will be timely. This could serve as a hub of a series of activities. It can start with a total allocation of 15-20 million tons of food grains during 2003-04. Such a block grant of food grains can be managed by a Malnutrition-free India Trust, headed by the Deputy Chairman of the Union Planning Commission; The Trust can sanction small projects to meet specific local requirements as well as to fill gaps in the ongoing programmes. At least 5 million tons of grain should be available to support local level Community Food Banks in 'hunger and hydrologic hot spot' areas and specific programmes designed to improve maternal and foetal nutrition as well as to provide nutrition support to those affected by TB, leprosy and other diseases. Such a Food Guarantee Initiative will be psychologically an important index of the capability of Indian farmers, on the one hand, and a political commitment to achieve the Prime Minister's goal of a hunger-free India by 15 August 2007, on the other. Such a programme could be announced by the Prime Minister in his address to the nation on 15 August 2003.

### ***Monitoring and evaluation***

This could be done at various levels starting with Gram Sabha and Citizens Groups (like the Right to Food Group) and government agencies and research institutions. An effective and transparent monitoring system will also help to ensure the implementation of the directives of the Supreme Court of India.

### ***Consultative Group for Freedom from Hunger***

Both at the national and state levels multi-stakeholder consultative groups for 'Agenda 2007: Hunger-free India' could be organized, comprising representatives of the concerned Government of India ministries and departments, professional experts, National Commission for Women, civil society organizations, business and industry, mass media and bilateral and multilateral donors, with the Union Planning Commission serving as the nodal agency for such a consultative group. Such a group would help to foster strategic partnerships as well as synergy among political leaders, professionals and peoples' organizations.

### ***Standing Committee of the National Development Council***

A Standing Committee of NDC could be set up for monitoring progress and ensuring the success of Agenda 2007. The NDC Committee chaired by the Prime Minister could include Chief Ministers of states where there is widespread under- and malnutrition as well as of food secure states, so that there could be lateral

sharing of experiences among states. Such a Standing Committee could provide the political guidance and support needed for implementing this important programme.

### ***Immediate action during 2003-04***

Besides the announcement of the 20 million tons Food for Social Capital programme and the setting up of a Malnutrition-free India Trust by the Prime Minister on 15 August 2003, immediate action needs to be taken to end poverty-induced chronic hunger and the transient hunger caused by drought and natural calamities through a series of Community Food, Fodder and Feed Banks. Such banks may be established in all the 'hunger hot spots' of the country. CFBs managed by local Self-help Groups, preferably of women, would save considerable transaction and transport costs. They will also help to widen the food security basket through the inclusion of local grains like millets, pulses, oilseeds and tubers. It will also be advisable to reclassify coarse cereals as 'nutritious grains' in order to underline their desirable nutritive properties.

### ***No time to relax on the food production front***

While the alleviation of hunger by improving access to income, balanced diets and safe drinking water should receive high priority, there is no time to relax on the food production front. We need to bring about productivity, quality (including food safety), profitability and sustainability revolutions in farming based on a Farming Systems Approach. There is an urgent need for enhancement of investment in agriculture and rural infrastructure development. There is also need for conferring on small producers the power of scale through cooperatives, self-help groups and other socially viable methods of group endeavour both at the production and post-harvest phases of farming. Our spectacular progress in the dairy sector is largely through such management innovations. There is need for a movement for trade and quality literacy including an understanding of sanitary and phytosanitary measures and *codex alimentarius* standards. There is also need for launching a Jal Swaraj and Water Literacy Movement. Above all, there is need for a paradigm shift from jobless to job-led growth in order to ensure that every poor person is enabled to earn his or her daily bread. In a predominantly rural and agricultural country like India, agricultural progress (i.e. crop and animal husbandry, fisheries, forestry and agro-forestry and agro-processing) will be the most effective social safety net against hunger and poverty. Hence, the ongoing fatigue of the green revolution in wheat, rice and other major crops should be converted into an evergreen revolution designed to promote productivity improvement in perpetuity without associated ecological harm. Agricultural and rural development, if given adequate and appropriate attention, will help the country to take to the path of job-led economic growth. Our substantial grain and foreign exchange reserves and the three million elected women and men members of local bodies have provided

us with an uncommon opportunity for launching a frontal attack on hunger and poverty. It will be a tragedy if we do not act, when we are in a position to act.

To conclude, the 'Agenda 2007: Hunger-Free Area Programme' should keep in mind the following advice of Gandhiji given before his death: 'Forget the past. Remember every day dawns for us from the moment we wake up. Let us all, every one, wake up now.'

## **ETHICS OF INFORMATION COMMUNICATION TECHNOLOGY (ICT)**

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Regional Unit for Social & Human Sciences in Asia and the Pacific  
(RUSHSAP)

## **ETHICS OF INFORMATION COMMUNICATION TECHNOLOGY (ICT)**

### **1. INTRODUCTION**

Globalization and digital convergence in the emerging knowledge society has raised complex ethical, legal and societal issues. We are faced with complex and difficult questions regarding the freedom of expression, access to information, the right to privacy, intellectual property rights, and cultural diversity. ICT is an instrumental need of all humans for the gathering of information and knowledge, and as such, should be guaranteed as a basic right to all human beings. All over the world, rights that are already legally recognised are daily being violated, whether in the name of economic advancement, political stability, religious causes, the campaign against terrorism, or for personal greed and interests. Violations of these rights have created new problems in human social systems, such as the digital divide, cybercrime, digital security and privacy concerns, all of which have affected people's lives either directly or indirectly.

It is important that the countries of the Asia-Pacific region come up with an assessment of the situation, followed by guidelines for action to combat the incidence of malicious attacks on the confidentiality, integrity and availability of electronic data and systems, computer-related crimes, such as forgery and fraud, content related offenses, such as those related to child pornography, and violations of intellectual property rights (IPRs). Further, threats to critical infrastructure and national interests arising from the use of the internet for criminal and terrorist activities are of growing concern after the September 11 incident. The harm incurred to businesses, governments and individuals in those countries in which the internet is used widely, is gaining in scope and importance, while in other countries, cybercrime threatens the application of information and communication technology for government services, health care, trade, and banking. As users start losing confidence in transactions and business, the opportunity costs may become substantial.

The challenges to the region, reportedly, lie mainly in the general lack of awareness of information security issues, the rapidly evolving complexity of systems, the increasing capacity and reach of information and communication technology, the anonymity afforded by these technologies, and the transnational nature of communication networks. Few countries in the region have appropriate legal and regulatory frameworks to meet these challenges. Even where awareness is growing and where legislation may be adequate, capacity to use information security technologies and related procedures, as well as to protect against, detect and

respond effectively, to cybercrime, is low. As a result, reports of cybercrime may represent only a small fraction of their incidence, creating a need for more accurate estimates of the prevalence of cybercrime. (Duggal, <http://www.cyberlaws.net/cyberindia/articles.htm>).

There are a few countries of the region which, as a result of governmental investment, policy development and human resources development programmes, have built significant capacity, experience and know-how which can be shared with other countries. Cybercrime is a global problem that threatens all countries and economies. As a crime that is committed across national borders, it requires cooperative, pro-active approaches in support of the less developed countries of the region.

The objective of this paper is to compile:

- i. Information concerning ethical issues in the Asia-Pacific regarding:
  - i. Digital Divide
  - ii. Poverty
  - iii. Piracy
  - iv. Cybercrime
  - v. Human Rights
  - vi. Gender Equality
- ii. Information on the initiatives and programmes undertaken at the local, national, regional, and international levels concerning the above matters; and
- iii. Recommendations to overcome the challenges and issues raised.

Based on the findings, recommendations for action will be highlighted as programmes towards combating the negative aspects of the use of ICT, and towards achieving the positive results of embracing ICT culture in everyday life.

### ***1.1 Overview***

Information technology is impacting all walks of life all over the world. ICT developments have made possible a transition in information storage, processing, and dissemination, from paper to virtual and from atoms to bits, which are now setting new standards of speed, efficiency, and accuracy in human activities. Computerized databases are extensively used to store all sorts of confidential data of political, social, economic or personal nature to support human activities and bringing various benefits to the society.

However, the rapid development of ICT globally also has led to the growth of new forms of national and transnational crimes. These crimes have virtually no boundaries and may affect any country across the globe. Thus, there is a need for awareness, policy formation, and enactment of necessary legislation in all countries for the prevention of computer related crime. Globally, internet and

computer-based commerce and communications cut across territorial boundaries, thereby creating a new realm of human activities, and undermining the feasibility and legitimacy of applying laws based on geographic boundaries. The new boundaries, which are manifested in the monitor screens, firewalls, passwords, intruder detection, and virus busters, have created new personalities, groups, organizations, and other new forms of social, economic, and political groupings in the cyber world of bits. Traditional border-based law making and law enforcing authorities find this new environment of cyber boundaries very challenging.

Cyber systems across the globe have many different rules governing the behaviour of users. Users are completely free to join or leave any system whose rules they find comfortable or uncomfortable. This flexibility may at times lead to improper user conduct. Also, in the absence of any suitable legal framework, it may be difficult for System Administrators to check on frauds, vandalism or other abuses, which may cause the lives of many online users to be miserable. This situation is alarming because any element of distrust for the internet may lead to people avoiding doing transactions online, thereby directly affecting the growth of e-commerce. The use or misuse of the internet as a medium of communication may in some situations lead to direct damage to real physical society. Non-imposition of taxes on online transactions may have its destructive effect on physical businesses, and also government revenues. Terrorists may also make use of the web to create conspiracies and violence. Wide and free sharing of ideologies, beliefs, convictions, and opinions between different cultures might cause physical and emotional stress and confusion that might lead to physical violence.

## ***1.2 What is Ethics***

In the last decade, dozens of ethics centres and programmes devoted to business ethics, legal ethics, bioethics, medical ethics, engineering ethics, and computer ethics have sprung up. These centres are designed to examine the implications of moral principles and practices in all spheres of human activity on our lives.

Ethics can be viewed from two angles, normative and prescriptive. First, ethics refers to well-based standards of right and wrong that prescribe what humans ought to do, usually in terms of rights, obligations, benefits to society, fairness, and specific virtues. Ethics, for example, refers to those standards that impose the reasonable obligations to refrain from rape, stealing, murder, assault, slander, and fraud. Ethical standards also include those that enjoin virtues of honesty, compassion, and loyalty. And, ethical standards include standards relating to rights, such as the right to life, the right to freedom from injury, the right to choose, the right to privacy, and right to freedom of speech and expression. Such standards are adequate standards of ethics because they are supported by consistent and well-founded reasons.

Secondly, ethics refers to the study and development of personal ethical standards, as well as community ethics, in terms of behaviour, feelings, laws, and social habits and norms which can deviate from more universal ethical standards. So it is necessary to constantly examine one's standards to ensure that they are reasonable and well-founded. Ethics also means, then, the continuous effort of studying of our own moral beliefs and conduct, and striving to ensure that we, and our community and the institutions we help to shape, live up to standards that are reasonable and solidly-based for the progress of human beings.

## **Definition**

*“Ethics are moral standards that help guide behaviour, actions, and choices. Ethics are grounded in the notion of responsibility (as free moral agents, individuals, organizations, and societies are responsible for the actions that they take) and accountability (individuals, organizations, and society should be held accountable to others for the consequences of their actions). In most societies, a system of laws codifies the most significant ethical standards and provides a mechanism for holding people, organizations, and even governments accountable.”* (Laudon, et al, 1996)

### **1.3 ICT Ethics**

ICT ethics are not exceptional from the above-mentioned view of ethics. In a world where information and communication technology has come to define how people live and work, and has critically affected culture and values, it is important for us to review ethical issues, as well as social responsibility, in the Asia-Pacific region. This is a difficult task because of the diversity in creed, class, caste, dialect, language, culture and race throughout the region. Moreover, the issue of ICT ethics takes on added significance as the region struggles with the dynamics of globalization and the current political environment after the September 11 incident.

### **ICT Ethical Issues**

Analysing and evaluating the impact of a new technology, such as ICT, can be very difficult. ICT does not only involve technological aspects, but also epistemology since the main component of ICT is information which represents data, information, and knowledge. ICT assists and extends the ability of mankind to capture, store, process, understand, use, create, and disseminate information at a speed and scale which had never been thought possible before. Some of the impact and changes of ICT are obvious, but many are subtle. Benefits and costs need to be studied closely for a nation to progress and improve the quality of life for its citizens. Issues that have arisen from the adoption of ICT, such as the application of automated teller machines (ATM), can be summarized as follows (Baase, 1997):

- Unemployment

The automation of work has caused creative destruction by eliminating some vocations and creating new ones. How does this affect the employment or unemployment of the work force of a nation?

- Crime

Stolen and counterfeit ATM cards are used to steal millions of dollars each year throughout the region. The anonymity of the machines makes some crimes easier and creates many new types of crimes.

- Loss of privacy

Transactions are transmitted and recorded in databases at banks, hospitals, shopping complexes, and various organizations, in the public or private sector. The contents of electronic communications and databases can provide important and private information to unauthorised individuals and organizations if they are not securely guarded.

- Errors

Information input into the databases is prone to human and device error. Computer programmes that process the information may contain thousands of errors. These errors can create wrong and misleading information about individuals and organizations. Information and programme errors might result in financial loss, or even the loss of lives.

- Intellectual property

Millions of dollars of software is illegally copied each year all over the world. This phenomenon has a great impact on the software industry in the region. Local and foreign software industries need consumers support all over the world to maintain the progress of technology. Most importantly, for the sake of growth in indigenous ICT innovation and invention, local software industries in Asia-Pacific need local support in protecting their intellectual property rights and investment.

- Freedom of speech and press

How do the constitutional rights of individuals in terms of the freedoms of speech and press apply to electronic media? How seriously do the problems of pornography, harassment, libel, and censorship on the net affect individuals and society? What government initiatives have been used in handling this crisis?

- Digital Divide

How does ICT affect local community life? The increasing use of computers has increased the separation of rich and poor, creating a digital divide between the information “haves” and “have-nots.” What subsidies and programmes have been provided by governments of the region to address the issue?

- Professional Ethics

How well trained and ethical are our ICT professionals in dispensing their duties? Faulty and useless systems that cause disasters and hardships to users might be built by incompetent ICT professionals. In dispensing their duties ICT professionals must demonstrate their best practices and standards as set by professional bodies for quality assurance.

#### ***1.4 UNESCO's Info-Ethics Programme***

The development of digital technologies and their application in worldwide information networks are opening vast new opportunities for efficient access to and use of information by all societies. All nations can fully benefit from these opportunities on the condition that they meet the challenges posed by these information and communication technologies. Thus, UNESCO's Info-Ethics Programme was established for the principal objective of reaffirming the importance of universal access to information in the public domain, and to define ways that this can be achieved and maintained in the Global Information Infrastructure. It seeks to address the areas of ethical, legal and societal challenges of cyberspace, as well as privacy and security concerns in cyberspace. It aims to encourage international cooperation in the following aspects: ([http://www.unesco.org/webworld/public\\_domain/legal.html](http://www.unesco.org/webworld/public_domain/legal.html))

- Promotion of the principles of equality, justice and mutual respect in the emerging Information Society;
- Identification of major ethical issues in the production, access, dissemination, preservation and use of information in the electronic environment; and
- Provision of assistance to Member States in the formulation of strategies and policies on these issues.

## 2. REGIONAL ISSUES

### 2.1 *Cybercrime*

There are no scientifically conducted detailed studies exclusively on the issue of cybercrime and information security in the Asia-Pacific region. However, some broad figures are available in the public domain, which can serve as indicators of the broad situation in the region today. Surveys conducted by Computer Security Institute (CSI, 2003) confirm that the threat from computer crime and information security breaches continues unabated and that its financial toll is mounting. However, the financial losses reported have plummeted. Fifty-six percent of respondents reported unauthorized use, compared to 60 percent last year (and compared to an average of 59 percent over the previous seven years of the survey). The total annual losses reported in the 2003 survey were \$201,797,340, a figure that is down 56 percent from the high-water mark of \$455 million reported last year. The overall number of significant incidents remained roughly the same as last year, despite the drop in financial losses. Followings are some of main findings reported in the survey:

- As in prior years, theft of proprietary information caused the greatest financial loss (\$70,195,900 was lost, with the average reported loss being approximately \$2.7 million).
- In a shift from previous years, the second most expensive computer crime among survey respondents was denial of service, with a cost of \$65,643,300.
- Losses reported for financial fraud were drastically lower, at \$10,186,400. This compares to nearly \$116 million reported last year.
- As in previous years, virus incidents (82 percent) and insider abuse of network access (80 percent) were the most cited forms of attack or abuse.
- Respondents again weighed in strongly opposed to the idea of hiring reformed hackers (68 percent were against).
- The percentage of those who reported suffering incidents in the prior year who said they reported those incidents to law enforcement remained low (30 percent).

The statistics gathered on few countries in the region, as listed below, gives us some indication as to the seriousness of cybercrime in the region.

#### 2.1.1 **Cybercrime in Malaysia**

Cases related to ICT are often reported in local vernacular papers concerning various issues ranging from cybercrime to equal access to the internet. The following are some examples of common news items concerning cybercrime that appeared in Malaysian newspapers:

- Hackers have struck at government websites again, this time targeting the Social Security Organization (Socso) by posting an image of a covered skull on its site at: <http://www.perkeso.gov.my> (26<sup>th</sup> June 2001).
- Sixty government websites have been hacked between February 1, 1999 and April 3 this year, with a total of 89 actual hacking incidents taking place.
- Dec 29, 2001: A hacker intrusion on the Malaysian Parliament's website has reportedly generated criticism from some officials who claim the government has taken a slapdash approach to internet security.
- 22<sup>nd</sup> August 2000: A hacker is believed to have tried to dupe internet users into giving away their private financial information by posing as an online executive at Maybank Bhd.

In the first six months of 2003, Malaysian NISER recorded 394 incidences of cybercrime as shown in Table 2.1 below. 48.47 percent of the reported incidences were hack threats followed by virus attacks at 28.68 percent.

**Table 2.1. Incident Statistics in Malaysia JAN-JUN 2003**

	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>Jun</i>	<i>Total</i>	<i>%</i>
Hack Threat	20	4	42	40	41	44	191	48.47
Virus	16	6	3	24	51	13	113	28.68
Spam	3	5	6	7	6	8	35	8.88
Intrusion	4	2	0	5	11	3	25	6.34
Harassment	5	2	1	3	1	3	15	3.80
Forgery	1	1	1	2	2	3	10	2.53
Denial of Service	0	0	0	1	1	1	3	0.76
Mail bomb	0	0	0	0	1	0	1	0.25
Destruction	0	0	0	0	0	0	0	0
<b>TOTALS</b>	49	20	53	83	114	75	394	100

Source: NISER (<http://www.niser.org.my>).

### 2.1.2 Cybercrime in Japan

The following are some examples of cases reported in Japan:

- Crime related to internet dating services in Japan more than doubled in the first six months of 2002.
- 800 sex crimes have been reported for the first half of 2002 as compared to 888 for the whole of 2001.
- The total number of crimes involving the internet was almost 60 percent higher in the first half of 2001 than in the first half of 2000.
- A worker for NEC Toshiba Space System Co. illegally accessed Mitsubishi Electric Corporation's antenna designs for a high-speed internet satellite in December 2001 (*Ananova*, <http://www.ananova.com/news/story/>).

- The National Police Agency said that there were about 51,000 attempts by hackers to break into police computer systems throughout the country during the three-month period from July to September 2002 (The Japan Times, <http://www.japantimes.co.jp/cgi-bin/getarticle.pl5?nn20021108a3.htm>).

Crimes reported in 2000-2001 (Tatsuzaki, 2002):

- The combined figure for the purchase of sex from underage children and child pornography has doubled.
- Internet fraud has increased by 94 percent.
- Crime involving internet auctions has increased by 140 percent.

### 2.1.3 Cybercrime in South Korea

The following are a couple examples of cases reported in South Korea (Computer Crime Research Centre, <http://www.crimeresearch.org/eng/news/2002/10/Mess1602.htm>):

- In South Korea, cyber offences, including slandering and financial fraud online, shot up 126 percent (33,289 cases) in 2001 from a year before.
- The number of cases jumped 43 percent in 2000, with computer-savvy teenagers topping the list of offenders.

### 2.1.4 Cybercrime in Hong Kong

The table below is of cybercrimes reported in Hong Kong from 1995-2000 (Broadhurst, 2002) showing an increase from a total number of 14 in 1995 to 368 in 2000, an increase in 26 times in 5 years.

**Table 2.2. Cybercrime in Hong Kong 1995-2000**

<i>Cases</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>
Hacking/Cracking*	4	4	7	13	238	275
Damage Online	2	4	3	3	4	15
Deception	0	0	2	1	18	29
E-Theft & Other	8	13	8	17	57	49
<b>TOTALS</b>	<b>14</b>	<b>21</b>	<b>20</b>	<b>34</b>	<b>317</b>	<b>368</b>

*Source:* TCD HKP September 2002.

## 2.2 Pornography

Pornography, which is a moral crime in most societies, has started to attract millions of internet surfers from all over the world, including from the Asia-Pacific region. Table 2.3 below shows some statistics to highlight the seriousness of this problem.

**Table 2.3. Increasing Pornography in Asia-Pacific**

<i>Country</i>	<i>Number of Internet Users Flocking to Pornographic Sites During March 2002</i>	<i>Increase In % Over March 2001</i>
South Korea	10.7 million	72%
Taiwan, China	2.5 million	30-40%
Hong Kong, China	715,700	–
Singapore	373,100	–

*Source:* [http://www.unescap.org/escap\\_work/ict/cybercrime](http://www.unescap.org/escap_work/ict/cybercrime).

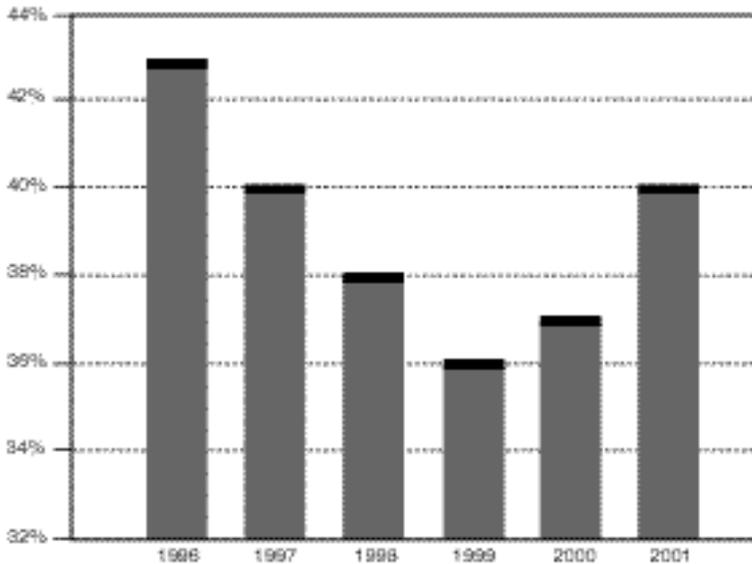
Internet brings great benefits, but also great risks to children. Among the worst forms of cybercrime is the global trade in child pornography. International criminal investigations have revealed several global networks exchanging child pornography. Several operations had been carried out to investigate the seriousness of the matter, among them are (Bryneson, 2002):

- Operation Wonderland, 1998: identified 100 suspects in 12 countries, more than 1 million images of child pornography discovered;
- Operation Avalanche, 2001: identified 250,000 subscribers, grossed more than \$5 million, and 100 arrests in the US alone.
- Operation Landmark, 2001: identified 11,000 users, 400 distributors, 130 search and arrest warrants issued in 19 countries.

### **2.3 Piracy**

In early 2002, International Planning and Research Corporation (IPR) completed an analysis of software piracy for the year 2001 as part of an ongoing study for the Business Software Alliance (BSA) and its member companies. The purpose of the study is to review the available data and utilize a systematic methodology to determine worldwide business software piracy rates and the associated dollar losses. Software piracy is measured in this study as the amount of business application software installed in 2001 without a license (BSA Global Software, 2001).

The results from the annual BSA Global Piracy Study for 2001 indicate that software piracy continued to pose challenges for the software industry. For the first time in the study's history, the world piracy rate increased in two consecutive years, 2000 and 2001. The 2001 piracy rate of 40 percent is a marked increase from 37 percent in 2000. Both years were up from the low set in 1999 at 36 percent.



Source: BSA Global Piracy Study for 2001.

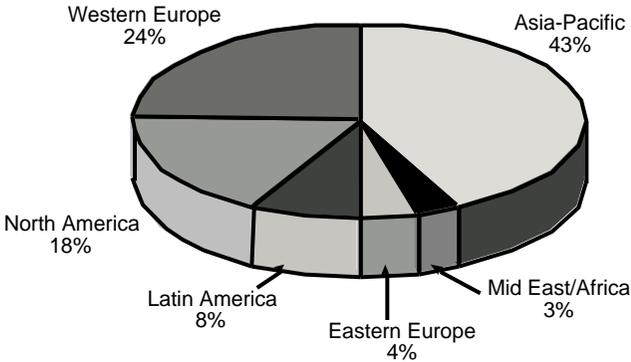
**Figure 2.1. World Piracy Rate**

Since the study began in 1994, there had been a steady decrease in the rate of software piracy. Unfortunately, this downward trend in piracy rates has not been evident in the past two years. In 2000, the level of piracy for developed countries increased, rather than continue the downward trend as expected. In 2001, the effects of a worldwide economic slowdown that hit technology spending particularly hard probably caused the increase in the piracy rate. The results of the study indicate that software piracy rose in response to the pressure of the curtailed spending of the economic downturn. This was the first period of a general global economic slowdown since the study began in 1994. The results suggested that the progress made against piracy in the 1990s was conditional. Compliance with software licensing is at risk of being considered an economic luxury that can be abandoned in difficult times.

### 2.3.1 Piracy in Asia-Pacific Region

Several large countries in Asia experienced increases in their piracy rates. Malaysia and India experienced rate increases of 70 percent for both countries in the above BSA Global Piracy Study for 2001. The Philippines' rate increased to 63 percent. Most other countries showed small changes in their piracy rates. Indonesia had an 88 percent piracy rate, down from 89 in 2000. Japan held steady with a 37 percent piracy rate. Australia had a 27 percent piracy rate, down from 33 in 2000. New Zealand, with a 26 percent piracy rate, continued as the country with the lowest piracy rate in the Asia-Pacific region. Vietnam, with a piracy rate at

94 percent, continued as the country with the highest piracy rate in the region. China, at 92 percent, followed as the country with the second highest piracy rate. As the chart in Figure 2.1 shows, the regions with the highest dollar losses in 2001 were Asia-Pacific, Western Europe, and North America.



**Figure 2.2. Dollar Losses by Region to Piracy in 2001**

### 2.3.2 Piracy in other regions (2001)

#### *Middle East*

The three largest economies in the Middle East, Turkey, Israel, and Saudi Arabia, each saw a decrease in the piracy rate, with Turkey dropping the most, from 63 percent in 2000 to 58 percent in 2001. Israel, with a 40 percent piracy rate, was the country with the lowest piracy rate in the region. Lebanon, Qatar, and Bahrain had the three highest piracy rates in the region, at 79, 78, and 77 percent respectively.

#### *Africa*

Africa saw a small increase in the piracy rate, from 52 percent in 2000 to 53 percent in 2001. South Africa, the largest economy in the region, had the lowest piracy rate, at 38 percent. Kenya with 77 percent and Nigeria with 71 percent were the two countries in the region with the highest piracy rate.

As Figure 2.1 shows, the regions with the highest dollar losses in 2001 were Asia-Pacific, Western Europe, and North America. These regions have the largest economies and correspondingly, the largest PC and software markets. In Western Europe and North America, the relatively low piracy rates still translate into large dollar losses. The Asia-Pacific region, where the piracy rate is substantially higher than North America or Western Europe, made up 43 percent of the world losses due to piracy. In the US, the piracy rate declined to 25 percent in 2001, down

from 31 percent in 1994. This is the lowest rate of any country, but still represents a dollar loss of \$1.8 billion. Japan's 37 percent piracy rate resulted in the second largest dollar losses in 2001 at \$1.7 billion. China, which historically has had some of the highest piracy rates in the world and is still among the highest with 92 percent, has the third largest losses with just under \$1.7 billion. In Western Europe, Germany and France had the highest dollar losses with \$681 million and \$527 million, respectively. Italy was third with \$468 million in dollar losses.

#### 2.4 Other Cases

Examples of regional cases that have been reported in the last few years in countries in the Asia-Pacific region are summarised in Table 2.3 below.

**Table 2.3. Examples of regional cases reported**

<i>Country</i>	<i>Cases</i>	<i>Year</i>
Singapore	Commercial Affairs Department (CAD) of the Singapore Police Force has received 32 complaints from consumers that their credit cards had been used to make fraudulent online purchases from local and foreign websites. Online transactions only make up 5 percent of total credit card transactions, but make up 50 percent of all credit card fraud, according to an Asian Wall Street Journal report.	2001
Japan	Police arrested five teenage girls, members of a virtual motorcycle gang formed via the internet, on suspicion of assaulting a member in June who tried to leave the group. The group called "Mad Wing Angels" was established in January by 30 girls across Japan who got acquainted with each other through the "i-mode" mobile phone internet access service of NTT DoCoMo Inc. Members include girls who do not have a motorcycle and the group has never held a gathering of all its members. However, some gang members plan to burn up the road in the future wearing the same gear. The members also set internal rules – such as "an eye for an eye" – and pledged to fight all-out battles with opponents. According to investigations, the girls were angered by the 16-year-old member's request to leave the group in order to study abroad and called her to a park in Tokyo's Minato Ward on the night of June 1. They allegedly beat her in the face and abdomen and pressed lit cigarettes onto both of her arms, inflicting injuries requiring three weeks of treatment.	August 2001

**Table 2.3.** (continued)

Country	Cases	Year
<b>Thailand</b>	A Ukrainian man, Maksym Vysochansky was arrested by Crime Suppression Division (CSD) police and US Secret Service agents. He was on the US Secret Service's most-wanted list as he is said to have pirated software and then sold copies on several channels on the World Wide Web. Head of the US Secret Service in Thailand said his operations had caused over \$1 billion in damage to the US software industry. A US court charged Vysochansky with criminal copyright infringement, trafficking in counterfeit goods, money laundering, conspiring to launder money, and possession of unauthorized access devices.	2003
	A man has been found guilty of posting defamatory messages on the internet in Thailand's first ruling on cyber-defamation. Thanet Songkran was given a two-year suspended sentence for posting a note on a web bulletin board, which listed the phone number of a young woman and a message alleging she was a student prostitute, <i>The Nation</i> newspaper said.	2002
	Thai university students arrested for hacking have been ordered to pay for their crime by serving at the very website they defaced. The hackers planted a bogus news flash on a government ministry's site, detailing plans to set up a new club to promote prostitution and pornography. The message was removed after a few hours and the intrusion traced to a local university. As punishment, these undergraduates were ordered to work on the ministry's website for a certain period.	2002
Korea	Korea's <i>Chosun Ilbo</i> newspaper reported that a 15-year-old student was the country's "Hacker Queen" after winning a contest organized by an internet security provider. Analysts noted that Choi Hae-ran's hacking skills were good enough to break into almost any company's homepage easily. Choi says that she learned about hacking by simply browsing various websites. She is now listed in an online Hall of Fame for Korean hackers, and her dream is to become "a hacker that catches hackers."	2001
Taiwan	The CIH virus (aka Chernobyl) infected 600,000 PCs worldwide in 1999, and on its trigger date of April 26 it wiped out entire hard drives on many machines. The damage was estimated at over \$100 million. It was concentrated in a few countries, especially South Korea, where about 250,000 computers were hit. The virus was written by an engineering student in Taiwan, Chen Ing Hau, supposedly as a challenge to anti-virus makers. Tracked down while serving in the army, Chen apologised and claimed that he never meant to cause any damage. In the end, no charges were filed because no Taiwanese citizen filed a complaint. Surprisingly, several software firms recruited Chen when he left the army, and he took a job with one called Wahoo. He appears to have escaped	1999

**Table 2.3.** *(continued)*

<i>Country</i>	<i>Cases</i>	<i>Year</i>
	punishment for his actions, although he should probably avoid visiting Korea.	
China	Prosecutors in China announced the country's first criminal case against a hacker in May 2001, signalling a tougher line on internet crime. Lu Chun, a 21-year-old sophomore in Beijing, allegedly used downloaded hacker Trojans to steal a company's internet account and password. He then gave out the information to schoolmates and friends, and sold it through the internet, resulting in over 1,000 people using the company's internet account fraudulently.	2001
Filipina	23-year-old Onel de Guzman was a student at AMA Computer College in Manila before he admitted to possibly releasing (but not to writing) the "Love Letter" virus in September 2000. "Love Letter" brought down hundreds of corporate networks and infected millions of PCs, becoming the most costly virus in history, with damages estimated at US\$8.7 billion. Guzman apparently dropped out of school after professors rejected his thesis proposal on methods for stealing computer passwords. Investigators concluded that he belonged to a hacker society, and other members also contributed to the "Love Letter" virus. However, prosecutors decided he didn't commit any crime under Philippine law. The Philippine Congress later enacted a law specifically covering computer crimes such as virus writing.	2000

### **3. EXISTING STRUCTURES AT REGIONAL/SUB-REGIONAL OR NATIONAL LEVEL**

#### ***3.1 Introduction***

Asia-Pacific is characterized by numerous diverse trends socially and politically. There are a number of poor countries in Asia-Pacific, as well as developing countries which aspire to join the rank of a few like Japan, Taiwan, and Singapore. Penetration of the internet is varied among the countries. The future holds tremendous promise for the Asia-Pacific region, but countries will have to respond quickly in order to combat the cybercrime that poses a serious threat to the region. A survey conducted by Computer Security Institute confirmed that threats from computer crime and information security breaches continue unabated in the region and that financial toll is mounting. The region needs coordinated and strict measures in the form of cyberlaws to combat these increasing crimes.

Cyberlaws in Asia-Pacific are beginning to take shape in response to incidents that have affected the region. Many countries have enacted cyberlaws: Australia, India, Japan, Malaysia, Philippines, Korea, Taiwan, Philippines, Singapore, and Pakistan. Numerous international and regional endeavours have been made which have laid the foundation for further evaluation of regulatory mechanisms for cybercrime.

Cyberlaw is a new phenomenon having emerged long after the invention of internet. Initially, the internet grew in a completely unplanned and unregulated manner. As such, it was open to all sorts of new criminal activity. Even the inventors of the internet could not foresee the scope and consequences of cyberspace. The growth rate of cyberspace has been enormous, roughly doubling every 100 days. Cyberspace is becoming the new preferred environment of the world, especially among the younger generation. With the phenomenal growth of cyberspace, new issues relating to various legal aspects began to emerge. In response, cyberlaws were created. There is no one definition of the term “cyberlaw.” Anything concerned with, related to, or emanating from, any legal aspects or issues concerning any activity of netizens and others, in cyberspace, comes within the ambit of Cyberlaw (Duggal, 2002).

Addressing cybercrime starts with prevention, i.e. enhancement of information security and ensuring that the private sector and other users take a pro-active approach to information security. Thus, some frameworks based on combating cybercrime are discussed below.

### **3.2 Regional and International Cooperation Frameworks for Combating Cybercrime**

There exist several cooperation frameworks for combating cybercrime at the regional and international levels. Among these cooperation frameworks are:

#### **a) G8 24-Hour Network for High-Tech Crime**

Justice and Interior Ministers from the G8 nations, Canada, France, Germany, Italy, Japan, Russia, UK and USA, met in Washington, DC, on 10 December 1997 under the chairmanship of the United States (Broadhurst, 2002) (G8, 2002). A common decision was reached to combat high-tech crime, recognizing the unprecedented ways the new computer and communications technologies were vulnerable. A 24-hours surveillance principle and a ten-point action plan to combat high-tech crime was put forward as follows:

##### Principles to Combat High-Tech Crime

- i. There must be no safe havens for those who abuse information technologies.
- ii. Investigation and prosecution of international high-tech crimes must be coordinated among all concerned States, regardless of where harm has occurred.
- iii. Law enforcement personnel must be trained and equipped to address high-tech crimes.
- iv. Legal systems must protect the confidentiality, integrity, and availability of data and systems from unauthorized impairment and ensure that serious abuse is penalized.
- v. Legal systems should permit the preservation of and quick access to electronic data, which are often critical to the successful investigation of crime.
- vi. Mutual assistance regimes must ensure the timely gathering and exchange of evidence in cases involving international high-tech crime.
- vii. Trans-border electronic access by law enforcement to publicly available (open source) information does not require authorization from the State where the data resides.
- viii. Forensic standards for retrieving and authenticating electronic data for use in criminal investigations and prosecutions must be developed and employed.
- ix. Information and telecommunications systems should be designed to help prevent and detect network abuse, and should also facilitate the tracing of criminals and the collection of evidence.
- x. Work in this area should be coordinated with the work of other relevant international forums to ensure against duplication of efforts.

### Ten-Point Action Plan to combat High-Tech Crime

- i. Use our established networks of knowledgeable personnel to ensure a timely, effective response to trans-national high-tech cases and designate a point-of-contact who is available on a 24-hour basis.
- ii. Take appropriate steps to ensure that a sufficient number of trained and equipped law enforcement personnel are allocated to the task of combating high-tech crime and assisting law enforcement agencies of other states.
- iii. Review our legal systems to ensure they appropriately criminalize abuses of telecommunications and computer systems and promote the investigation of high-tech crimes.
- iv. Consider issues raised by high-tech crimes, where relevant, when negotiating mutual assistance agreements or arrangements.
- v. Continue to examine and develop workable solutions regarding: the preservation of evidence prior to the execution of a request for mutual assistance; trans-border searches; and computer searches of data where the location of that data is unknown.
- vi. Develop expedited procedures for obtaining traffic data from all communications carriers in the chain of a communication and to study ways to expedite the passing of this data internationally.
- vii. Work jointly with industry to ensure that new technologies facilitate our effort to combat high-tech crime by preserving and collecting critical evidence.
- viii. Ensure that we can, in urgent and appropriate cases, accept and respond to mutual assistance requests relating to high-tech crime by expedited but reliable means of communications, including voice, fax or e-mail, with written confirmation to follow where required.
- ix. Encourage internationally recognized standards-making bodies in the fields of telecommunications and information technologies to continue providing the public and private sectors with standards for reliable and secure telecommunications and data processing technologies.
- x. Develop and employ compatible forensic standards for retrieving and authenticating electronic data for use in criminal investigations and prosecutions. (<http://www.g8summit.gov.uk/brief0398/prebham.shtml>)

### **b) The Forum of Incident Response and Security Teams (FIRST)**

FIRST was formed to address the continuous stream of security related incidents affecting millions of computer systems and networks throughout the world. FIRST was founded in 1990 in California, USA, to bring together a variety of computer security incident response teams from government, the commercial sector, and academic organizations to discuss how to improve the implementation or

institutionalization of ICT ethics. Thus, FIRST aims to foster cooperation and coordination in incident prevention, to promote prompt rapid reaction to incidents, and to promote information sharing among members and the community at large (FIRST, <http://www.first.org/about/first-description.html>).

The goals of FIRST are:

- To foster cooperation among information technology constituents in the effective prevention, detection, and recovery from computer security incidents;
- To provide a means for the communication of alert and advisory information on potential threats and emerging incident situations;
- To facilitate the actions and activities of the FIRST members including research, and operational activities; and
- To facilitate the sharing of security-related information, tools, and techniques.

FIRST provides a forum for facilitating trusted interactions among incident response and security teams. Assistance for interactions is available on either a team-to-team basis (through introduction to teams) or by using FIRST infrastructure to share information among all members in a secure way. The increased ability to communicate with peer entity teams allows for faster resolution of computer security incidents, regardless of their source, destination, or transit path. FIRST also hosts an annual Computer Security Incident Handling conference. This conference focuses on the issues of incident response and security teams, and brings together incident response and security professionals from around the world who share their experiences and expertise. The presentations are international in scope and include the latest in incident response and prevention, vulnerability analysis, and computer security.

### **c) Asia-Pacific Networking Group**

The Asia-Pacific Networking Group (APNG) is the oldest Asia-Pacific Internet organization dedicated to the advancement of networking infrastructure in the region, and to the research and development of all associated enabling technologies. Its mission is to promote the internet and the coordination of network interconnectivity in the Asia-Pacific region. From APNG emerged the Asia-Pacific Policy and Legal Forum (APPLe), in 1996, focusing on internet governance, legal and policy issues. In 1998, APNG helped form the Asia-Pacific Security and Incident Response Coordination Working Group (APSIRC), which focuses on the design of network security. APNG set up APSIRC in order to catalyze the formation of national Computer Emergency and Response Teams (or commonly known as CERTs) and increase awareness among internet practitioners and network managers of its ethical procedures to combat cybercrime.

#### **d) Computer Emergency Response Team and Coordination Centre (CERTCC-KR)**

The Korea Computer Emergency Response Team and Coordination Centre (CERTCC-KR) is the first incident response organization in Asia, except for Australia. CERTCC was originally established in the United States to solve problems regarding computer incidents such as internet hacking.

As the Korea Information Security Agency's (KISA) incident response team, CERTCC-KR supports counter-measuring activities involving networks in Korea. It also plays a key role in the creation of unified cooperative systems among network operating institutions. CERTCC-KR joined the Forum of Incident Response and Security Teams (FIRST, the international institution comprising of national representative CERTs in North America, Europe and Asia-Pacific) in 1998 as an official member in order to actively countermove against global incidents requiring international cooperation. And CERTCC-KR also participated in the Asia and Pacific Networking Group (APNG) to create an aggressive security-work group named the Asia-Pacific Security Incident Response Coordination (APSIRC).

Moreover, CERTCC-KR acts as the secretariat of CONSortium of CERTs (CONCERT) established in 1996 to jointly counteract domestic incidents in order to boost information security technologies of domestic institutions, respond to incidents, and share information for the prevention of incidents.

The main objective of CERTCC-KR is to protect the information on the domestic network infrastructure in an ethical manner. Its goals are as follows:

- Prevent incidents in information networks;
- Cooperate to receive incident reports and correspond to incidents;
- Analyse the damaged system and support technologies;
- Restore damages, and analyse and trace the attackers;
- Hold public education seminars related to incident prevention;
- Publish and distribute various types of technological documents to prevent hackings and viruses; and
- Develop technologies to prevent incidents.

#### **e) Asia-Pacific Computer Emergency Response Task Force (APCERTF)**

Asia-Pacific Computer Emergency Response Task Force (APCERTF) was proposed by AusCERT and formed with the following memberships (Yamaguchi, 2002):

- Australian Computer Emergency Response Team (AusCERT)
- Bach Khoa Internetwork Security Centre (BKIS)
- CERNET Computer Emergency Response Team (CCERT)

- Computer Emergency Response Team Coordination Centre-Korea (CERTCC-KR)
- China Computer Emergency Response Team Coordination Centre (CNCERT)
- Hong Kong Computer Emergency Response Team Coordination Centre (HKCERT/CC)
- Indonesia Computer Emergency Response Team (IDCERT)
- Information Security Centre – Korea Advanced Institute of Science and Technology (ISC/KAIST/KCERT)
- Information-technology Promotion Agency/IT Security Centre (IPA/ISEC)
- Japan Computer Emergency Response Team/Coordination Centre (JPCERT/CC)
- Malaysian Computer Emergency Response Team (MYCERT)
- Singapore Computer Emergency Response Team (SingCERT)
- Taiwan Computer Emergency Response Team/Coordination Centre (TWCERT)
- Taiwan Computer Incident Response Coordination Centre (TW-CIRC)
- Thai Computer Emergency Response Team (ThaiCERT).

The mission of APCERTF is to maintain a trusted contact network of computer security experts in the Asia-Pacific region in order to:

- Enhance regional and international cooperation on information security;
- Develop measures to deal with large-scale or regional network security incidents;
- Facilitate information sharing and technology exchange;
- Promote collaborative research and development; and
- Address legal issues related to information security and emergency response across regional boundaries.

#### **f) The Yokohama Global Commitment 2001**

The “Yokohama Global Commitment 2001,” was held in Yokohama, Japan on 17-20 December 2001. Representatives from governments, intergovernmental organizations, non-governmental organizations, the private sector, and members of civil society from around the world, focused on strengthening the commitment to protect children against commercial sexual exploitation and sexual abuse, in the physical realm or cyberspace. This was a follow up of the First World Congress against Commercial Sexual Exploitation of Children held in Stockholm, Sweden in 1996. The Yokohama Global Commitment reaffirmed the protection and promotion of the interests and rights of the child to be protected from all forms of sexual exploitation. It calls for more effective implementation of the Convention on the Rights of the Child by States party to the convention in order to create an

environment where children are able to enjoy their rights. It also calls for the development of international and regional standards to protect children from sexual exploitation through new instruments, including the following: Supplementing the United Nations Convention against Trans-national Organized Crime, and the Convention on Cybercrime (<http://www.unicef.org/events/yokohama/outcome.html>).

**g) Asia-Pacific Cyberlaw Forum (APCF)**

The Asia-Pacific Cyberlaw Forum (APCF) is committed to the cause of developing strong, logical and vibrant cyberlaws in the different countries of Asia-Pacific. It is of the opinion that Asia-Pacific as a region seems to be far behind in the field of enacting cyberlaws for regulating activities of netizens in cyber space. Barring a handful of countries in Asia-Pacific, most of the countries in this region have low Internet penetration and consequently, have not felt the need to legislate cyberlaws. However, given the way internet is rapidly growing, it will only be a matter of time before all the countries in Asia-Pacific need to enact and adopt cyberlaws. The Asia-Pacific Cyberlaw Forum (APCF) aims to become the focal point for giving appropriate input to all governments of Asia-Pacific in the field of drafting, enacting and adopting cyberlaws.

APCF is committed to the fact that Asia-Pacific nations should not reinvent the wheel. Asia-Pacific nations should learn from the previous wisdom and practical experiences of other nations in the world who have enacted and implemented cyberlaws. APCF aims to become a rallying point for research, brainstorming, information and all kinds of matters concerning cyberlaw in Asia and the Pacific. APCF will coordinate cyberlaw Asia, being Asia’s premier membership-based cyberlaw body, in raising awareness about different facets of cyberlaw. (<http://www.cyberlaws.net/asiapac.htm>).

Other initiatives for combating cybercrime are summarised in Table 3.1 below.

**Table 3.1. Example of Initiatives in Combating Cybercrime**

<p>APEC LOS CABOS DECLARATION, 26-27 OCT 2002</p>	<ul style="list-style-type: none"> <li>• Identify national cybercrime units and international high-technology assistance points of contact and create such capabilities by October 2003.</li> <li>• Establish institutions that exchange threat and vulnerability assessment (such as Computer Emergency Response Terms) by October 2003.</li> <li>• Calls for closer cooperation between law enforcement officials and businesses in the field of information security and fighting computer crime.</li> </ul>
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**Table 3.1.** (continued)

APEC e-SECURITY TASK GROUP	<ul style="list-style-type: none"> <li>• CERT Capacity Building</li> <li>• UNGA 55/63 Report to Ministers/Shanghai Declaration</li> <li>• IT security training material</li> <li>• Compendium of IT Security Standards</li> <li>• IT security skills recognition</li> <li>• Encryption policies</li> <li>• Electronic authentication</li> </ul>
APEC Cybersecurity strategy	<p>Action Items</p> <p>Legal developments</p> <ul style="list-style-type: none"> <li>• Adopt comprehensive substantive, procedural and mutual assistance laws and policies</li> <li>• APEC to facilitate development of laws and policies</li> <li>• Report status to TEL Ministers</li> </ul> <p>Information sharing and cooperation</p> <ul style="list-style-type: none"> <li>• Assist in development of information sharing institutions</li> <li>• Assist in development of 24/7 units</li> </ul> <p>Security and technical guidelines</p> <ul style="list-style-type: none"> <li>• Identify standards and best practice</li> <li>• Encryption and authentication legal and policy issues</li> <li>• Security business case for corporations</li> </ul> <p>Public awareness</p> <ul style="list-style-type: none"> <li>• Material development, such as OECD Guidelines</li> <li>• Website to provide cyber ethics and cyber-responsibility material</li> </ul> <p>Training and education</p> <ul style="list-style-type: none"> <li>• Identify and organize training opportunities</li> <li>• Promote training of technology security professionals and distribution of materials</li> <li>• Website of training opportunities wireless security</li> <li>• Examine issues (Steve Orłowski, 2002).</li> </ul>
ASEAN COMMUNIQUE: Joint Communique of the Third Asean Municipal Meeting on Transnational Crime, October 2001	<ul style="list-style-type: none"> <li>• Recognize the growing need for the region to deal with many more forms of transnational crime, including cybercrime.</li> <li>• Expressed concern with the newly emerging trends of transnational crime, such as cybercrime.</li> </ul>
E-ASEAN CYBER SECURITY PLEDGE	<ul style="list-style-type: none"> <li>• The E-Asean Task Force Group of Nations signed the E-Asean cyber Security Pledge in September 2002 as a reiteration of the commitment of its members against the terrorism.</li> <li>• This pledge was adopted and signed in the aftermath of the scenario that emerged after the 11<sup>th</sup> September attacks.</li> </ul>

### **3.4 ICT Policies of Selected Countries in the Asia-Pacific**

Findings from a few countries in the region are presented below, based on the availability of information concerning ICT policies and frameworks that have been initiated, in order to provide insight on the efforts committed so far. Most of the information is taken from Asia-Pacific Conference on Cybercrime and Information Security held in Seoul, Republic of Korea, 11-13 November 2002, organized by United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). The papers presented at the conference give us some insight to the efforts and initiatives undertaken by individual countries.

#### **3.4.1 Singapore**

Singapore was an early and fervent adopter of ICT. Now, with one of the highest penetration rates of ICT usage among nations, Singapore finds itself having a large stake in the well-being and safety of cyberspace. Legislation has been enacted to protect the users of cyberspace. A combination of legislation by the Government, self-regulation by the industry and continuous education of consumers is Singapore's approach to the challenges posed by this new age (Chan, 2002).

Many initiatives taken in tackling cyber security issues aimed at improving confidence in the local electronic commerce scene and hence promoting the use of e-commerce. Other initiatives are aimed at enlarging the pool of quality ICT security expertise in Singapore that is able to feed corporate demands and sustain local research and development efforts. Consortia are formed by industry and supported by the Government to provide the focus for self-regulation and platforms for reflective discussions between industry players and the Government. Along with the institutions set up to acquaint citizens with the benefits of cyberspace, campaigns are conducted to inculcate safe habits online.

#### *Public Awareness and Professional Competency*

The Infocomm Development Authority (IDA) of Singapore envisages an infocomm-savvy Singaporean society and has initiated several initiatives in this direction. In particular, IDA implemented the e-Lifestyle & Marketing Programme (ELM), a 3-year programme to demystify infocomm technology and enable Singaporeans to use infocomm technology to enhance their quality of life and standard of living in the information society in more ethical manner.

On the infocomm security front, IDA initiated, in November 2001, a yearlong public awareness campaign aiming at the public and private sectors as well as the general public to inculcate safe computing practices. The Singapore Computer Emergency Response Team (SingCERT) regularly conducts workshops, seminars and courses on more technical topics of ethics.

The National Infocomm Competency Centre (NICC) is an industry-led, government-supported, organization that aims to provide assistance to individuals and organizations to enable them to maintain a high level of infocomm technology competency.

### *ICT Security Developers in Singapore*

The Government supports local companies offering infocomm security consultancy, services and products. Some samplings of the security framework developers in Singapore that encourages ethical manner of ICT:

- CE-InfoSys ([www.ce-infosys.com](http://www.ce-infosys.com))
- D'Crypt ([www.d-crypt.com](http://www.d-crypt.com))
- DigiSAFE ([www.digisafe.com.sg](http://www.digisafe.com.sg))
- PrivyLink ([www.privilink.com.sg](http://www.privilink.com.sg))
- Transparency ([www.transparency.com.sg](http://www.transparency.com.sg))

### *Cyber-crime Investigation Capabilities*

The Criminal Investigation Department (CID) is the premier investigation agency in Singapore vested with the staff authority for all criminal investigation matters within the Singapore Police Force (SPF). Apart from investigating all major and specialized crime cases, CID houses a Technology Crime Division (TCD). As the authority on technology crimes, TCD is the investigation specialists, forensic specialists as well as builders of technology crime capability for the entire police force. Its scope of operation goes beyond computer crime and includes traditional crimes committed with the use of technology such as encrypted mobile devices, Internet and even the wireless platform. In order to ensure that the nation is ready for such crimes of the future, the approach adopted by TCD was also to build capabilities through research, alliance building and education.

### *Institutions*

The local universities are tapped to provide the research capabilities, allowing researchers to gain more field exposure in the process. For example, the Singapore Police Force and the Nanyang Technological University are collaborating to tackle the increasingly prominent role of technology in crimes, particularly in the area of forensics.

### *Public Incident Response Capabilities*

SingCERT is established to facilitate the detection, resolution and prevention of security-related incidents on the Internet. SingCERT also issues advisories and alerts when incidents or events occur. SingCERT maintains a website and a hotline to facilitate the reporting and dissemination of advisories.

SingCERT is also a founding member of the Asia-Pacific Security Incident Response Coordination Working Group (APSIRC-WG). The APSIRC-WG is staffed by volunteers from the national Incident Response Teams (IRTs) from Japan, Korea and Singapore and aims to promote collaborations with other international IRTs and security groupings such as the Forum of Incident Response and Security Teams (FIRST). Furthermore, APSIRC-WG provides assistance when regional countries would like to establish their own IRTs.

SingCERT is working with the Japan Computer Emergency Response Team (JPCERT/CC) and the Australian Computer Emergency Response Team (AusCERT) on future activities for the APSIRC-WG.

### *Cyberlaw*

#### Electronic Transactions Act

In Singapore, the Electronic Transactions Act (ETA) establishes the supporting legal infrastructure for the PKI. It was enacted in 1998 to provide a legal infrastructure for electronic signatures and electronic records, and to give predictability and certainty to electronic contracts. It is modelled after the Illinois Electronic Commerce Security Act and the UNCITRAL Model Law on Electronic Commerce, which sets the framework for electronic commerce laws in many countries.

The ETA addresses the following issues:

- Commercial code for electronic commerce transactions: This creates a predictable legal environment for electronic commerce and deals with the legal aspects of electronic contracts, use of electronic signatures and electronic records and authentication and non-repudiation concerns. It is noteworthy that electronic signatures have the same legal binding effect as that of written signatures.
- Use of electronic applications and licences for the public sector: This allows government departments to accept electronic applications and to issue electronic licences and permits without amending their respective Acts.
- Liability of service providers: This exempts network service providers from criminal or civil liability for content that they merely provide access to.
- Provision for a PKI: This provides for the appointment of a Controller of Certification Authorities (CCA) to enable regulations to be made for the licensing of Certification Authorities (CA). The Infocomm Development Authority (IDA) is currently appointed the CCA of Singapore. The Act provides for certain minimum standards for all certification authorities, whether or not they are licensed, as well as higher standards for licensed authorities.

## Electronic Transactions (Certification Authority) Regulations

In 1999, the Electronic Transactions (CA) Regulations were made to establish a voluntary licensing scheme for CAs. Public CAs are strongly encouraged to obtain licenses.

## Computer Misuse Act

The Computer Misuse Act (CMA) was first enacted in 1993 and amended in 1998. It is aimed at protecting computers, computer programmes and information stored in computers from unauthorized access, modification, use or interception. The CMA also applies to any person, irrespective of his physical location, who hacks into computers located in Singapore. It also applies to any person in Singapore who hacks into computers outside Singapore.

The 1998 amendments ensure that newer forms of cybercrime (such as Trojan horses, password trafficking or denial of service attacks) are addressed. It also provides enhanced penalties for computer crime proportionate to the potential and actual harm caused. The amendment also gives the police powers to gain lawful access to computer material including the decryption of materials that are encrypted.

## Evidence Act

The Evidence Act was amended in 1996 to permit the use of electronic records as evidence in courts. The provisions are modern and adapted to the network and Internet environment. The Act also allows the use of litigation support systems and the use of video-conferencing in Singapore courts.

### 3.4.2 China

China has made national initiatives in devising policy and framework to manage the onslaught of ICT activities at the national, provincial, and regional levels. Among the initiatives taken by the government are (PRC, 2002):

- i. Institutional framework of public information network security supervisory
  - Public Information Network Security Supervisory Bureau of Ministry of Public Security;
  - Provincial Public Information Network Security Supervisory Department;
  - Regional Public Information Network Security Supervisory Department.
- ii. Fundamental policy
  - Ensuring Preventive Measures:
    - Protect important computer systems

Strengthen education and propaganda for the prevention of computer crime

Deter computer crime before it occurs

- Attack cybercrime as a means of prevention
- iii. Cooperation with other organizations
- Educational institutes
  - Computer technology companies
  - Internet Services Providers (ISP)
  - Other countries in the region
- iv. Modernize network police group
- Periodical education:
    - To refresh knowledge;
    - To keep up with the current situation;
    - To master new technology.
  - Temporary education:
    - To cope with emergence of incidents, such as an outburst of a virus.
- v. Legislation
- Regulation of Security and Protection of Computer Information systems of the People's Republic of China (1994)
  - Management Regulation of Security and Protection of Computer Information Networks Connected with INTERNET (1997)
  - Criminal Law of the People's Republic of China (1994)

### 3.4.3 Korea

As most social activities heavily rely on the information and communication infrastructure, Korean societies are very exposed to cybercrimes such as cracking, virus incidents, obscenity, violent images, infringement of copyright and violations of human rights (Cha, Y. 2002).

Cyber threats include hacking, viruses, spam mail, logic bombs, manipulation of insiders, leaks of personal information, etc., as indicated in the table below:

**Table 3.2. Cyber Threats**

<i>Crime</i>	<i>Incidents</i>	<i>Rate (%)</i>
Leaks of personal information and invasion of privacy	870	43.5
Spam mail	659	33.0
Virus and cracking	219	11.0
Obscene and violent images	181	9.1
Alienation and digital divide	50	2.5
Infringement of copyright and illegal copy of S/W	15	0.8
Others	6	0.3
Totals	2 000	100.0

*Source:* KISA (Korea Information Security Agency), 2001.

Korea has adopted initiatives in the formation of the Information Security Policy and Strategies which encompass the following matters:

- Information Infrastructure Protection
- Anti-Hacking and Virus activities
- Promotion of a Culture of Security
- Distribution of Electronic Signatures
- Privacy Protection and Ethical cyberspace
- Technology and Industry

A summary of initiatives that have been carried out in Korea is given under the headings as follows:

- Information Security System at the national level
  - ◆ Governmental system for information security to establish the information security system at the national level.
    - Government established Committee on Protection of Information Infrastructure (with the Prime Minister as the Chairman) including Ministers of Finance and Economy, Justice, National Defence, Information and Communication according to Regulation on Protection of Information and Communication Infrastructure enacted in January 2001.
    - Government established (April, 1996) KISA (Korea Information Security Agency), to provide for the safe use of information and communication technology at the private level. The agency establishes policy, systems and techniques of information security.
    - Government established ICEC (Information Communication Ethics Committee) to control the circulation of harmful information and to keep cyber environments safe and sound.

- ◆ Cooperation with private sectors
  - Government closely cooperates with private CERT and ISAC in various fields, such as the communications and financial fields, and information security companies to cope with cybercrime.
  - Government is supporting self-regulation of civic and business organizations that can complement governmental regulations coping with the rapid spread of illegal and harmful information.
- Advancement of security through a campaign to enhance a “culture of security consciousness”
  - ◆ Private sectors formed the Information Security Implementation Council to enhance information security (July, 2002).
  - ◆ Government is acting to impress individuals, businesses and government agencies with the importance of information security, through a campaign to enhance the culture of security.
  - ◆ Information ethics programmes including support of lecturers and programmes, been run targeting adolescences, adult and teachers to improve information utilizing capability and cultivate information ethics.
- Policies for Information Security Technologies
  - ◆ Technology and Manpower Development
    - Considerable investment shall be made in the technology of information security. For example, 279 billion Korean Won (Including 84.5 billion Korean Won from private sectors) needs to be invested over the next 5 years from 2003 to 2007.
    - Collaborative study shall be promoted among three sectors: academic, business and research institutes, to contribute to the development of the information security industry.
    - Support for international standardization of international organizations.
    - Encourage colleges and universities (including graduate schools) to open more new courses relating to information security, and support the nurturing of human resources for information security by offering more specialized education and training.
    - Certificate for information security experts and internet security experts shall be established and upgraded to be a national examination to promote manpower supply in the information security field.
- Consolidation of reliability in e-Commerce through wide use of electronic signatures
  - ◆ Digital Signature Act was enacted in February 1999 to provide a legal basis for safe use of electronic signature and authentication services.

- ◆ As of October 2002, 6 certification authorities are providing certification service.
  - ◆ The use of electronic signature in various transaction fields, such as internet banking, e-procurement and cyber stock market, is increasing. The number of electronic signature users increased to 4.24 million in September 2002, up from 50 thousand in the fourth quarter of 2000.
  - ◆ To secure the reliability in e-commerce between nations, offices concerned are proactively participating in the Asia PKI forum addressing international interoperability, and have been proceeding with an Electronic Signature Interoperability Pilot Project together with Japan and Singapore since June 2001.
- Nationwide forecasting/warning system of electronic infringement
    - ◆ Ministry of Information and Communication, major vaccine companies and KISA has deployed a real-time forecasting/warning system for cracking and virus incidents.
    - ◆ CERT is organized to operate the system for coping with electronic infringements in each field, while ISAC is teamed up for that in public sectors, such as finances and communications.
  - Monitoring and Reporting of Personal Data Infringements and Harmful Information
    - ◆ Reports and consultations regarding personal data infringements and illegal spam mails
      - Personal Data Protection Centre has been established to receive reports of personal data infringements and to provide consulting services for victims.
      - Spam Mail Complaint Centre ([www.spamcop.or.kr](http://www.spamcop.or.kr), opened in July, 2002) has been operating as an organization exclusively charged with spam mail reports and counseling services. This organization helps victims of spam mail and teaches how to block unsolicited spam mails.

### **3.4.4 Mongolia**

The Mongolian Government has established the followings approaches to combat cybercrime and provide for information security at the national level in the following areas (Mongolia, 2002):

#### *Prevention of cybercrime*

The Mongolian Government has declared that one of its priorities is the development of information and communication technology. But, combating

cybercrime and enhancing information security has not been mentioned. So, there is no master plan/policy or strategy on how to combat cybercrime. Of course, user awareness is very poor in the country because no systematic information is given on these issues. Local companies, such as DataCom, InfoCon, BodiCom, InterActive, are developing quite good security systems on their financial programmes, and also on their local area networks. However, there is no active, special information security agency operating on these issues in broadband. Regarding human resources, there are no employees being prepared on information security issues. Unfortunately, there is no special agency that can utilize engineers effectively to fight against cybercrime.

*Monitoring, detection and investigation*

Currently, there is no record of what Mongolia has done regarding cooperation with other states on law enforcement for cybercrime. Also, cooperation between internet service providers and law-enforcement officials has been very weak in the country. Law enforcement has granted the internet service providers a license for their operation; this is the only preventive measure. There are no national law-enforcement focal points for cybercrime.

Legal systems that permit the preservation of and quick access to electronic data pertaining to particular criminal investigations is well established in the Mongolian code of criminal procedures. Although many things regarding information security are covered by Mongolian criminal procedures, there are no skilled specialists who can monitor, detect and investigate information security and cybercrime issues.

*Effective prosecution*

In order to stop or reduce the misuse of information technology, it has been suggested that Mongolia establish a work group to make a master plan on Information Security. The first step for this measure is to encourage the Information Security law work group to continue its work on that issue. The following have been included in the plan:

- a) To develop a project to train information security/cybercrime specialists, and establish a separate police department to fight cybercrime;
- b) To publish guide books on these issues in Mongolian language;
- c) To establish a mechanism for effective exchange of information on security issues between countries in the future;
- d) To establish a permanent agency inside Mongolian government structure;

- e) To attract foreign partners and support on this issue;
- f) To develop a plan to support private sector and NGO activities on information security issues; and
- g) To learn and introduce methodologies of cybercrime fighting in Mongolia from the experiences of other countries, such as Korea.

### 3.4.5 Philippines

During the incidence of the “Love Bug Virus,” the Philippines had no law specifically governing computer crimes; the applicable laws used in that instance were RA 8484 (Access Device Regulation Act) and the Article 327 of the Revised penal Code (Malicious Mischief). The Access Device Act law was designed to penalized credit card fraud. The “Love Bug” incident put pressure on the Philippines Congress to pass a Bill regulating the use of computers and penalizing hacking, launching of viruses and other cybercrimes (Borje, 2002).

#### *E-Commerce Regulation*

The Electronic Commerce Act of 2000 (RA 8792) was imposed to penalize the following:

- a) Hacking or cracking, referring to unauthorized access into or interference in a computer system/server or information system, or any access in order to corrupt, alter, steal or destroy, introduce computer virus and/or loss of electronic data documents; and
- b) Piracy, or the unauthorized copying, reproduction, dissemination, removal, distribution, importation, use, substitution, modification, storage, uploading, downloading, communication, making available to the public, or broadcasting, of protected materials, electronic signatures or copyrighted works, including legally protected sound recordings, phonograms and information material on protected works, in a manner that infringes on intellectual property rights.

The penalty regarding the above acts is a fine of a minimum of P100,000 fine and a maximum as commensurate to the damage incurred, and from 6 months to 3 years imprisonment.

As a framework for combating cybercrime, the Philippines government has established a council known as Information Technology and E-Commerce Council (ITEC). To achieve their aims, the following goals were marked as points of concern:

- Information Infrastructure Development
- Human Resource Development
- Business Development
- E-Government Implementation
- Create enabling Legal and Regulatory environment.

The government agencies that are involved in the framework and their responsibilities are listed below:

- National Bureau of Investigation (Anti-Fraud and Computer Crimes Division): Investigation of all computer-related crimes and other offences which make use of advances in technology;
- Intellectual Property Office: Handles intellectual property rights violations;
- National Telecommunications Commission: Supervizes and regulates the telecom and broadcast industry; and
- Department of Trade and Industry: Implements E-Commerce Act and Handles consumer complaints.

### **3.4.6 Thailand**

In December 1998, the Thai Cabinet approved the Information Technology Laws Development Project, as proposed by the Ministry of Science Technology and Environment. The project has a mandate to research and develop six IT laws that will serve as an infrastructure for electronic commerce, and to enhance confidence among the members of the electronic transactions playground by providing rules and regulations (Kaewjumngong, 2002).

The above-mentioned ICT laws are as follows:

- a) Electronic Transactions Law: To recognize the legal effect of data messages by treating them as the functional equivalent of written messages, or evidence in writing, with a view to promote electronic transaction reliability.
- b) Electronic Signatures Law: To enable reliability of the use of electronic signatures.
- c) Electronic Fund Transfers Law: To facilitate the electronic transfer of funds.
- d) Computer Crime Law: To criminalize the new type of offences made possible by the borderless virtual world.
- e) Data Protection Law: To protect right of privacy in the information society.
- f) National Information Infrastructure Law (NII): To provide equitable and thorough information infrastructure and enable universal access by promoting more equitable and affordable rights and opportunities to access information and communication services. The purpose of NII Law focuses on reducing Thailand's digital divide.

#### *Computer Crime Law*

Thailand's computer crime law was drafted according to the framework of the Cybercrime Convention Council of Europe since a common purpose of the convention is to harmonize national laws. Apart from the Criminal Procedural Code which provides for the power and duty of administrative of police officers to collect

or obtain evidence in a criminal case, the Computer Crime Law also stipulates some powers, as following:

#### *Search and seizure without warrant*

Permitted where there is a reasonable grounds to believe that an offence prescribed under the Bill has been committed, and if left delayed until a search warrant is issued, the article whether being tangible or not or the evidence related to such offence may be removed, hidden, destroyed or altered from its original state, the competent authority shall have the power to enter at any time into a dwelling place or a place where there is a reasonable grounds to suspect that property, or the evidence connected with commission of an offence, is hidden or kept therein, for the purpose of accessing and investigating a computer system or any other article with reasonable grounds to believe that it is involved in the commission of an offence. Seizing, attaching, making a copy of or performing any other act on the said computer system or computer data, to use as evidence in connection with the commission of such offence, is also allowed.

#### *Powers to demand traffic data and others*

For the purpose of seeking facts and the collection of evidence, the competent authority shall have the power to demand computer traffic data from a service provider involving communications on a computer system, or other involved persons. In case the computer data has been encrypted, the authorities can order a person concerned with such computer data to decrypt it.

In April 2001, Thai Computer Emergency Response Team (ThaiCERT) was established as an electronic discussion forum on cyber security to encourage people to be aware of the security problem. Its members include government agencies, as well as companies in the private sector that are more conscious about cyber security.

### **3.4.7 Vietnam**

With respect to laws concerning internet activities, it was reported that up to 2002 Vietnam had no laws concerning computer crimes and ICT intellectual properties rights. As far as cryptography is concerned, it is used only by organizations of the Communist Party and the Government.

Information security and cybercrime are under the jurisdiction of state bodies. The Ministry of Public Security is in charge of information security and cybercrime, the Ministry of Culture and Information regulates and censors content of information before they are placed on the internet, and the Ministry of Post and

Telecommunications is in charge of licensing and regulating internet services. Vietnam plans to establish cyberlaws like other countries in the region.

### 3.4.8 Malaysia

Malaysia government has come up with lots of security measures to inculcate the ethical culture to all ICT users with the concerted cooperation of the private sectors. Below are some underline laws and policies Malaysia has adopted to prevent malicious act.

#### *Cyberlaws*

The development of IT and multimedia, without parallel development of laws, can result in abuses and, in turn, discourage the use of such technologies. Being aware of these issues, the Malaysian Government has already approved and passed its own set of cyberlaws:

- Digital Signature Act 1997
- Computer Crimes Act 1997
- Telemedicine Act 1997
- Communications and Multimedia Act 1998

#### *Communications and Multimedia Act 1998 (CMA)*

To ensure information security and network reliability and integrity, under the CMA, the Commission is entrusted to ensure information security and the reliability and integrity of the network. Legal issues relating to network security are addressed in the Communications and Multimedia Act and the Computer Crimes Act 1998. Thus, the CMA provides for a restructuring of the converged ICT industry. It creates a new system of licenses and defines the roles and responsibilities of those providing communication and multimedia services. Though intended to allow the converged ICT industry to be self-regulating, the Act also provides for the existence of the Communication and Multimedia Commission (the roles and powers of which are more clearly defined by the Communications and Multimedia Commission Act 1998) as a new regulatory authority to oversee the converged ICT industry. The Communications and Multimedia Act was brought into force on 1<sup>st</sup> April 1999. ([http://www.cmc.gov.my/akta588/eng/legis\\_cma1998\\_pg3.htm](http://www.cmc.gov.my/akta588/eng/legis_cma1998_pg3.htm)).

#### *Malaysian Communications and Multimedia Commission (MCMC)*

MCMC is a statutory body established under the Malaysian Communications and Multimedia Commission Act 1998 to regulate and nurture the communications and multimedia industry in Malaysia in accordance with the national policy objectives set out in the Communications and Multimedia Act 1998 (CMA). Apart from regulating and nurturing the communication and Multimedia industry in accordance

with the CMA, the MCMC is also the “Controller” for the Certification Authorities under the Digital Signature Act 1998.

The MCMC is also charged with overseeing the new regulatory framework for the converging industries of telecommunications, broadcast and online activities. The 10<sup>th</sup> National Policy Objective, as stated in the CMA, requires the Commission to ensure information security and the integrity and reliability of the network for the country.

### *Police*

The police have “sweeping” enforcement powers. They have jurisdiction over the CMA and also the CCA. All complaints relating to network security matters will be passed to either the MCMC and/or to the police.

### *Computer Crimes Act 1997 (CCA)*

As computers become more central to people’s lives and work, they become both targets and tools of crime. This Act serves to ensure that misuse of computers is an offence. Under the Computer Crimes Act 1997, acts such as unauthorized access to computer material with intent to commit or facilitate the commission of a further offence, unauthorized modification of contents of any computer and/or wrongful communications, abetment and presumption are addressed. Thus, legal issues identified, such as fraudulent use of a network, improper use of network facilities/services and interception of communications, are described in the CMA. The Computer Crimes Act was brought into force on 1 June 2000 (<http://www.mycert.mimos.my/crime.html>).

### *Digital Signature Act 1997*

Transactions conducted via the internet are increasing. As identities in cyberspace can be falsified and messages tampered with, there is a need for transacting parties to ascertain each other’s identity and the integrity of the messages, thereby removing doubt and the possibility of fraud/unethical manners when conducting transactions online.

The Act mainly provides for the licensing and regulation of Certification Authorities (CA). CAs issue Digital Signatures and will certify the identity (within certain limits) of a signor by issuing a certificate. The Act also makes a digital signature as legally valid and enforceable as a traditional signature. The Digital Signature Act was brought into force on 1 October 1998 (<http://www.cca.gov.my/legislat.htm>).

### *The Copy Right Act 1997*

Copyright serves to protect the expression of thoughts and ideas from unauthorized copying and/or alteration. With the convergence of Information and Communication

Technologies (ICT), creative expression is now being captured and communicated in new forms (example: multimedia products, broadcast of movies over the Internet and cable TV). These new forms need protection. The Copyright (Amendment) Act amends the Copyright Act 1987 to extend copyright law to the new and converged multimedia environment. The transmission of copyright works over the internet now clearly amounts to infringement. Technological methods of ensuring works and authorship info are not altered or removed is also protected to ensure an ethical manner. The Copyright (Amendment) Act 1997 was brought into force on 1 April 1999 (<http://www.mycert.mimos.my/copyright.html>).

#### *The Telemedicine Act 1997*

Healthcare systems and providers around the world are becoming interconnected. People and local healthcare providers can gain access to quality healthcare advice and consultation from specialists from around the world, independent of geographical location. The Act serves to regulate the practice of tele-consultations in the medical profession. The Act provides that any registered doctor may practise “telemedicine,” but other healthcare providers (such as a medical assistant, nurse or midwife) must first obtain a license to do so. Patient’s consent and regulations must be handled in an ethical manner (<http://www.mycert.mimos.my/telemeng.html>).

#### *Malaysian Administrative Modernization and Management Planning Unit (MAMPU)*

Security issues in the public sector is administered by MAMPU (Malaysian Administrative Modernization and Management Planning Unit). Within MAMPU is the ICT Security Division. They operate a CERT for the Government. They recently launched The Malaysian Public sector Management of Information and Communications Technology Security Handbook (myMIS). The handbook is a set of guidelines concerning compliance and adherence to best practices and measures leading to information and network security. (<http://www.mampu.gov.my/ICT/MyMIS/MyMIS.htm>)

#### *The National IT Council (NITC) and National ICT Security and Emergency Response Centre (NISER)*

The National Information Technology Council of Malaysia (NITC Malaysia) functions as the primary advisor and consultant to the Government on matters pertaining to IT in Malaysia’s national development. Its main objectives are to:

- Promote the sustainable growth of IT development and application via R&D planning and technology acquisition strategies;
- Ensure the smooth integration of new technologies into social and economic development;

- Determine the likely impact of IT on the economy and society; and
- Explain and promote the potential of IT in transforming societies in its entire dimension ([http://www.nitc.org.my/nitc\\_objectives.shtml](http://www.nitc.org.my/nitc_objectives.shtml)).

NITC gave birth to the National ICT Security and Emergency Response Centre (NISER) to address e-security issues of the nation and as to act as Malaysia's CERT (MyCERT). They offer their services in research in vulnerability detection, intrusion detection and forensic technology. Presently, they offer their services to both public and private sectors (Abas, 2001).

### **3.4.9 Afghanistan**

The goal for Afghanistan is to build a high-quality, low-cost ICT network, in order to give all Afghans access to the employment, educational, business, health care and entertainment opportunities of the digital age. The government, in consultation with all stakeholders, developed a national ICT strategy that will ensure an appropriate balance between commercial and public interests, including the needs of large and small business, public institutions and individual Afghans (UNESCAP, 2002).

The report further seeks to propose a strategy for the development and implementation of a national ICT policy for Afghanistan. The Afghanistan ICT strategy must be flexible to help address and adapt to a complex and rapidly changing environment. Informed participation of all strategy stakeholders and coordinated investment of the collective resources of Afghanistan will be essential if the benefits of ICT are to be realized. Government leadership is required to develop and implement a national strategy. The national ICT policy should be made in Afghanistan, by Afghans, for Afghans. It should be consistent with Afghanistan's history, economic realities, the international context, and the country's unique cultural and social requirements. Recognizing the economic, cultural and social implications of a national ICT policy, three basic objectives will be pursued by the strategy:

- (i) Network Access – ICT networks must be accessible and affordable to all Afghans.
- (ii) Information and Knowledge Access – ICT policies for universal access to information and knowledge are crucial if Afghans are to take their rightful place in the global economy.
- (iii) Government Use of ICT – Government must use ICT to improve its operations and services.

### 3.4.10 Hong Kong

#### *National ICT Policies*

The Hong Kong Government has adopted a multi-prong approach in its ICT policy to promote further deregulation of the IT sector, construction of telecommunications-related infrastructure, the growth of e-business and e-government, investment in IT education, investment in cyber cities and technology parks, reform in legal framework concerning intellectual property rights and e-business, as well as international IT cooperation. The blueprint of Hong Kong's ICT policy is known as Digital 21' IT Strategy (<http://www.american.edu/initeb/cc9979a/PAGE3.HTM>).

#### *Digital 21' IT Strategy*

In May 2001, the Hong Kong Government released its updated 'Digital 21' IT Strategy to outline future IT development in Hong Kong. The objective is to position Hong Kong as a leading global e-business community and digital city by targeting e-business, e-government, IT manpower, building a digital society, and by exploitation of enabling technologies.

#### *ICT Legal Environment*

Hong Kong actively promotes the protection of software copyrights, privacy and security in its ICT Policy framework. Still, Hong Kong has an enviable track record of maintaining a censorship-free society. A well-developed and properly functioning legal system enables the city to actively contribute to the latest international development on IT issues. Hong Kong has enacted the following laws related to ICT legal framework:

- Freedom of Information Act
- Privacy Act
- Privacy Protection Act
- Computer fraud and Abuse Act
- Electronic communications privacy Act
- Computer Matching and Privacy Protection Act
- Protection of Intellectual property

#### *Software Copyright*

A survey in 2000 revealed that 56 percent of the software sold in Hong Kong was pirated or illegal, lower than some countries in the region. The Hong Kong Government has criminalized copyright piracy on a commercial scale, including the deliberate use of software in a business environment, and employees who

knowingly use pirated software will be subjected to legal liabilities. The Intellectual Property Ordinance 2000 extends criminal penalties for unlicensed software from sellers to corporate users.

A recent high-profile local court case illustrates Hong Kong's commitment in protecting software copyright. On October 11, 2002, a high court judge ordered the authorized Microsoft computer retailer Able System Development to pay Microsoft USD 4.5 million in damages for copyright infringement. Able had illegally pre-loaded unlicensed copies of the Office and Windows programmes onto computers it sold between 1996 and 1998 without permission from Microsoft.

### *Privacy*

Hong Kong has enacted ICT legislation, such as the Personal Data (Privacy) Ordinance, which covers Code on Access to Information, based on the European Union (EU) Directive. In the meantime, the Office of Privacy Commissioner for Personal Data focuses on privacy aspects of identity cards and health databases.

### *Censorship*

The freedom from internet censorship has been seen as one of Hong Kong's economic competitive strengths. Freedom of speech is a constitutional guarantee under the Basic Law of Hong Kong.

## **3.4.11 India**

India's efforts in promoting the adaptation of ICT and in combating cybercrime can be summarised by the following legal enactments and initiatives:

- The Information Technology Act 2000
- Rules under the Information Technology Act
- The Semiconductor Integrated Circuits Layout-Design Act
- The Semiconductor Integrated Circuits Layout-Design Rules
- The Communication Convergence Bill
- Computers and the Indian Law
- Hacking and the Indian Law
- Network Service Providers and the Indian Law
- Cybercrime Police Station established in Bangalore, India: a first in Asia-Pacific
- Cybercrime Cells established in different states in India for investigating cybercrime.

National Task Force on Information Technology and Software Development has implemented an appropriate legal framework for the creation of an IT-based society,

with due focus on intellectual property rights (IPR), secrecy, security and safety of information.

India also established the Asian School of Cyber Laws (ASCL) in 1999 to facilitate awareness, study and advanced research in cyberlaw and information security. It provides education and training programmes in cyberlaw, information security and cybercrime investigation. In these fields, they have been working closely with several educational institutions, corporate houses, law enforcement agencies and Government departments, both within India and abroad.

### **3.4.12 Bangladesh**

The Bangladesh government, in response to a broad range of benefits of Information Communication Technology (ICT) in all sectors of economy and human development, developed a national policy framework for the development of the ICT sector with all its ethical norms (BCC, <http://www.bccbd.org/html/itpolicy.htm>).

This Policy aims at building an ICT-driven, knowledge-based society by the year 2006. It calls for a country-wide ICT-infrastructure to be developed to ensure access to information by every citizen.

#### *Legal Issues Addressed*

Software copyright provisions embodied in the Bangladesh Copyright Act 2000 were implemented by establishing appropriate enforcement bodies, as mentioned in the Act, to protect against computer crimes, such as computer fraud, hacking, damaging programmes and data, and introducing/spreading computer viruses.

To enhance the capacity of the judiciary, Computer-based Management Information System (CMIS), with suitable Wide Area Network (WAN) and Local Area Network (LAN) was planned to be established for the Supreme Court and for the District Courts and Tribunals. It consists of three inter-related modules, namely, (i) a case management module, (ii) a legal framework module, essentially covering two basic sources of updates, namely the Bangladesh legislative code and the Bangladesh case law database and (iii) a court administration module, whose areas of application may include court inspections, planning and budgeting, transactions, financial accounts, staff-related information and reporting, statistical applications and records management.

Furthermore, in order to utilize ICT fully, exploiting its immense potential in the economic, social, commercial, and scientific fields, a National ICT Task Force has been formed whose objectives include the following:

- Promote and facilitate the use of ICT in all sectors of the economy for transparency, good governance and efficiency improvement.

- Develop a large pool of world-class ICT professionals to meet the needs of local and global markets.
- Promote the use of ICT by providing special allocations for ICT project implementation in the public sector. Train the decision makers in ICT use and promote an ICT culture.
- Provide effective incentives for development of an ICT sector to both local and foreign entrepreneurs.
- Develop an efficient ICT infrastructure that provides open access to international and national networks.
- Establish a legislative and regulatory framework for ICT issues like IPR, data security and protection, digital signatures, e-Commerce, ICT education, etc., as well as to ensure quality ICT education provided by different private organizations.
- Set up national databases that are reliable and easily accessible by all the people of the country.
- Set up an ICT organization at the highest level to continuously promote and foster ICT Industry.
- Enact Laws and Regulations for uninterrupted growth of ICT, in conformity with World Trade Organization (WTO) stipulations.

### **3.4.13 Cambodia**

A national ICT policy for Cambodia was recently proposed within the framework of the eASEAN Agreement. The four main areas of the proposed policy are: 1) enhancing information infrastructure, 2) developing human resources, 3) developing local content, and 4) creating the necessary legal and regulatory environment. As evidence that Cambodia is fully aware of the importance of ICT, the National Information Communications Technology Development Authority (NiDA), chaired by Prime Minister, was established on 23 August 2000. The responsibilities of this authority are to formulate IT promotion and development policy for the short, medium and long term, to implement IT policy to ensure maximum economic growth, and to monitor and audit all IT-related projects in Cambodia. The ICT policy related goals include creating mass awareness among selected groups by sensitizing decision makers and government workers to ICT, and introducing the use of computers in the schools (NiDA, <http://www.nida.gov.kh>).

On the 10<sup>th</sup> of July, 2003, the Cambodian government made a decision on the Establishment of Technical Working Groups on Policy and Strategy for Developing Information Communications Technology Sector, which comprises the followings:

- Appointment of officials of the NiDA Secretariat and related ministries to be members of Technical Working Groups for policy and strategy.
- Responsibilities and duties of the groups to develop ICT policy and strategy.

### 3.4.14 Australia

#### *The Telecommunications Act 1997*

The Telecommunication Act 1997, and associated legislation, is the third complete overhaul of Australian telecommunications regulatory shifts in the provision of communications services to Australians. The transition to competition has brought with it a heightened concern for consumer protection and the provision of services to people out of metropolitan centres in all its ethical forms. Among the important consumer protection measures are the safeguards set out in the Consumer Protection and Service Standards Act 1999. The main objective of this Act, is to provide a regulatory framework that promotes the following:

- Provision of appropriate community safeguards in relation to telecommunications activities, and adequate regulation of participants in sections of the Australian telecommunications industry;
- The development of an Australian telecommunications industry that is efficient, competitive and responsive to the needs of the Australian community; and
- The equitable distribution of benefits from improvements in the efficiency and effectiveness of the provision of telecommunications networks and facilities; and the supply of carriage services.

#### *Radio Communications Act 1992*

The objective of this Act is to provide for management of the radio frequency spectrum in order to:

- (a) Maximize, by ensuring the efficient allocation and use of the spectrum, the overall public benefit derived from using the radio frequency spectrum;
- (b) make adequate provision of the spectrum for use by public or community services;
- (c) provide a responsive and flexible approach to meeting the needs of users of the spectrum;
- (d) encourage the use of efficient radio communication technologies so that a wide range of services of an adequate quality can be provided;
- (e) provide an efficient, equitable and transparent system of charging for the use of spectrum, taking account of the value of both commercial and non-commercial use of spectrum;
- (f) support the communications policy objectives of the Commonwealth Government;
- (g) provide a regulatory environment that maximises opportunities for the Australian communications industry in domestic and international markets; and

- (h) promote Australia's interests concerning international agreements, treaties and conventions relating to radio communications or the radiofrequency spectrum.

### *Institutions/framework relating to ICT Ethics*

#### Australian Institute of Computer Ethics (AICE)

AICE is a multi-disciplinary resource and research centre composed of a diverse group of people who care about the social effects of information and communications technology and seek to identify associated ethical problems and guidelines. AICE is based at Swinburne University of Technology in Hawthorn, Melbourne, Victoria and Charles Sturt University in Wagga Wagga, New South Wales.

#### Australia's National Computer Emergency Response Team (AusCERT)

AusCERT, as Australia's national Computer Emergency Response Team (CERT), is an independent, not-for-profit organization, based at the University of Queensland. AusCERT covers its operating costs through member subscriptions and the provision of affordable computer security training and education, and consultancy services. The Commonwealth government currently provides funding for certain parts of AusCERT's operations. AusCERT monitors and evaluates global computer network threats and vulnerabilities from numerous sources throughout the year, including after hours when Coordination Centre staff remain on-call to respond to new information in a time critical manner. As a result, AusCERT publishes security bulletins, drawing on material from a variety of sources, with recommended prevention and mitigation strategies. AusCERT has access to accurate, timely and reliable information about emerging computer network threats and vulnerabilities on a global basis. Additionally, AusCERT maintains a large network of CERT contacts in North America, the United Kingdom, Europe and throughout Asia (<http://www.auscert.org.au/render.html?cid=2>).

#### *Business Ethics Research Unit*

The Business Ethics Research Unit (BERU), based at Victoria University, runs frequent seminars, concentrating on ethics in the business context. BERU has existed for several years and has member-level links with AICE.

#### *Ethical Enterprise Network*

The Ethical Enterprise Network (EEN) aims to help members adopt ethical practices within their own enterprises and build awareness in the community about ethical, sustainable and just business practices. EEN also aims to build networks between ethical enterprises through membership, a regular newsletter, meetings and sharing of information about ethical activities, internal and external. (EEN, 2000)

### 3.4.15 Japan

The main cyberlaws of Japan are:

- ***Unauthorized Computer Access Law of 1999***

The Law prohibits acts of unauthorized computer access and stipulates penal provisions for such acts. It calls for assistance measures to be taken by the Metropolitan or Prefectural Public Safety Commissions to prevent a recurrence of such acts, as well as computer-related crimes committed through telecommunication lines. They are also to maintain the telecommunications-related order that is realized by access control functions, and, thereby, contribute to the sound development of the advanced information and telecommunications society.

- ***Copyright Law of 2002***

The purpose is to provide for the rights of authors and the rights neighbouring thereon with respect to works, as well as performances, phonograms, broadcasts and wire diffusions, to secure the protection of the rights of authors, etc., having regard to a just and fair exploitation of these cultural products, and thereby to contribute to the development of culture.

- ***Basic Law on the Formation of an Advanced Information and Telecommunications Network Society (IT Basic Law)***

The purpose of this Law shall be to promote measures for the formulation of an advanced information and telecommunications network society expeditiously and intensively by stipulating the basic ideas and the basic policy for formulating measures, clarifying the responsibilities of the State and local governments, and providing stipulations on the development of a priority policy programme for the formation of an advanced information and telecommunications network society.

Japan also has a Special Action Plan on Countermeasures to Cyber-terrorism of Critical Infrastructure which view that cyber terrorism has the potential to have a large impact on people's lives and on the economic activities of business using telecommunications networks and information systems. The goal is to protect the critical infrastructure from such attacks. ([http://www.kantei.go.jp/foreign/it/security/2001/cyber\\_terror\\_sum.html](http://www.kantei.go.jp/foreign/it/security/2001/cyber_terror_sum.html)).

#### *Framework relating to ICT Ethics*

Foundations of Information Ethics, Japan (FINE)

This project is five-year joint effort, funded by the Japan Society for the Promotion of Science, and by researchers from Kyoto, Hiroshima and Chiba Universities for the construction of philosophically tenable thinking of ethical issues in the ever

increasing variety of uses of computers and information technology and their impacts on society.

### **3.4.16 New Zealand**

New Zealand represents the Asia-Pacific region well in terms of their IT legal environment. They have memberships with several worldwide organizations dedicated to internet and DNS regulations, information sharing, privacy protection, and combating piracy. These organizations include the World Intellectual Property Organization, International Corporation for Assigned Names and Numbers, and Privacy International.

The following are examples of laws in New Zealand that are related to cyberlaw, either directly or indirectly:

#### *Model Freedom of Information Law (2001)*

New Zealand is one of the countries that subscribe to the Model Freedom of Information Law which provides for an enforceable legal right to access information held by public bodies upon submission of a request. Everyone may claim this right, and both information and public bodies are defined broadly. The Law also provides for a more limited right to access information held by private bodies, where this is necessary for the exercise or protection of any right. In this respect, it follows South African legislation in recognizing that private bodies hold much important information, and that to exclude them from the ambit of the law would significantly undermine the right to information. The right to information is guaranteed in international law, included as part of the guarantee of freedom of expression in Article 19 of the International Covenant on Civil and Political Rights. (<http://www.american.edu/initeb/sf9412a/legal.htm>).

#### *Electronic Transactions Act 2002*

The ETA does three things in order to facilitate the use of electronic technology:

- It confirms that electronic methods of communication are legally effective;
- It sets default rules for the time and place of dispatch and receipt of electronic communications (whether or not the communications are used to meet statutory requirements); and
- It provides that certain paper-based legal requirements may be met by using electronic technology that is functionally equivalent to those legal requirements.

*Copyright Act 1994*

This Act allows copyright owners to control certain activities relating to the use and dissemination of copyright works. Under the Act, the owner of copyright in a work has the “exclusive right” to do certain “restricted acts” in relation to the work.

*Personal Properties Securities Act 2002*

The Act affects all security interests in personal property, such as cars, computers and boats (under 24 metres in length), but does not apply to land. A security interest over these items secures the payment of money, or the performance of an obligation.

*Frameworks at Regional Level*

Centre for Asia-Pacific Technology Law and Policy @ Nanyang Business School (CAPTEL). <http://captel.ntu.edu.sg>

CAPTEL is a centre for research and consultancy in technology law and policy to promote ICT ethics development in Asia-Pacific. The core objective of the centre is to conduct developmental research on technology law and policy. To achieve their objective, the centre has multi-track themes to reflect the diverse expertise from the School and associate fellows. Among the areas of focus of the Centre are:

- a) Protection Regimes for Intellectual Property Rights – The laws relating to the protection of intellectual property of new technologies and to the new property developed by the use of new technologies.
- b) Legal Infrastructure for E-Business – Research on the development of International Treatises, Codes and Model Laws and their impact on E-Commerce.
- c) Regulation of the Internet – Researching the development of Standards for Internet Regulation to manage Internet conduct in Asia-Pacific; Content regulation.
- d) ICT Laws – Cybercrime, Technology Security, Privacy and other ICT laws.
- e) Telecommunications Law – Access Issues.
- f) Biotechnology Law & Ethics – Research in related laws and policy and regulatory infrastructure.
- g) ICT Competition Law.
- h) Development of a repository database of relevant laws and cases in the region for further research – Collecting and sharing with the Public information on the region’s reported cases and developments affecting technology.

### **3.5 Women and ICT**

#### **3.5.1 Asian Pacific Women's Information Network Centre (APWINC)**

The Asian Pacific Women's Information Network Centre or APWINC promotes the use of multimedia applications and information technologies among women. APWINC is a young organization; it is an offshoot of the desire of many individual women and women's organizations to work together towards developing ways to promote positive portrayal of women in the mass media.

#### **3.5.2 Asian Women's Resource Exchange (AWORC)**

The Asian Women's Resource Exchange (AWORC) is an internet-based women's information service and network in Asia. It is an initiative geared towards developing cooperative approaches and partnerships for increasing access to, and exploring applications of, the new information and communication technologies for women's empowerment. AWORC aims to help expand existing regional networks in the women's movement, promote electronic resource sharing and build a regional information service that will support various women's advocacies specifically those that are very critical for the women in our region. AWORC aspires to contribute to global efforts to address gender disparity on the Internet. It is geared towards building sustainable, as well as promoting Net literacy and enhancing social activism among individual women and women's organizations. The members of the growing AWORC community include women's information, resource and documentation centres, women's information providers and users; as well as communications organizations working closely with women's networks.

#### **3.5.3 Women's Electronic Network Training (WENT)**

Since 1999, AWORC has been holding an annual training workshop on electronic networking open to women and their organizations in Asia and the Pacific. The Women's Electronic Networking Training (WENT) is open to all women whose organizations play, or will play, a significant role in promoting the use of information and communication technology to enhance women's role and capacity in ethics, social and policy advocacy, as well as to strengthen women's organizations and networks in Asia and the Pacific.

From the first workshop in 1999 which trained 23 women from 11 countries to use email and Web-based services to promote and enhance their participation in the review process for the Beijing Platform for Action (popularly known as the Beijing Plus Five review), WENT has diversified its training courses to respond to various information and communication needs of women in Asia and the Pacific. Since 2000, WENT has parallel instructional tracks on Web-based Information Management, Using ICT for Advocacy, and Managing information using Database.

### **3.5.4 Asian Pacific Women’s Information Network Centre (APWINC) South Korea**

The Asian Pacific Women’s Information Network Centre or APWINC promotes the use of multimedia applications and information technologies among women. It sees its participation in AWORC as one important step towards enabling women in the Asia-Pacific region to use information and communication technologies to advance their status and rights in society.

### ***3.6 Asian-Pacific Development Information Programme***

The Asia-Pacific Development Information Programme (APDIP) is an initiative of the United Nations Development Programme (UNDP) that aims to promote the development and application of new ICT for poverty alleviation and sustainable human development in the Asia-Pacific region. It does so through three core programme areas, namely: Policy development and Dialogue; Access; Content Development and Management (<http://www.apdip.net/documents/>).

APDIP delivers its objectives through activities that involve awareness raising and advocacy, building capacities, promoting ICT policies and dialogue, promoting equitable access to tools and technologies, knowledge sharing, and networking. Strategic public-private sector partnerships and opportunities for technical cooperation among developing countries (TCDC) are the key building blocks in implementing each programme activity. APDIP has also lunched programmes like International Open Source Network (IOSN), in the developing countries in the Asia-Pacific Region to achieve rapid and sustained economic and social development by using affordable yet effective Open Source ICT solutions for bridging the digital divide Wong.

In line with APDIP’s goals of improving access to developing countries, the overall objective of this project is to create a Centre of Excellence on Open Source technologies and applications. It also aids countries in sharing information on Open Source (OS), assist with the development of needed toolkits and resource materials, support “localization” efforts and, generally, help facilitate and coordinate OS programmes and initiatives through networking.

**Table 3.3. Top 15 Countries in Internet Penetration Rate at Year-End 1999**

<i>Rank</i>	<i>Country</i>	<i>Users/1 000 Population</i>
1	Canada	428.20
2	Sweden	414.15
3	Finland	408.04
4	US	406.49
5	Iceland	403.46
6	Denmark	395.97
7	Norway	379.59
8	Australia	343.27
9	Singapore	310.77
10	New Zealand	264.90
11	Netherlands	255.55
12	Switzerland	245.81
13	United Kingdom	236.41
14	Taiwan, China	216.82
15	Hong Kong, SAR China	212.91
	Average of Top 15 Countries	328.16
	Worldwide Average	46.75

*Source:* Computer Internet Industry Almanac, October 2000:  
<http://www.c-i-a.com/200010iu.htm>.

**Table 3.4. Top 15 Countries in Internet Use at Year-End 1999**

<i>Rank</i>	<i>Country</i>	<i>Users (Millions)</i>
1	USA	110.8
2	Japan	18.2
3	UK	14.0
4	Canada	13.3
5	Germany	12.3
6	Australia	6.8
7	Brazil	6.8
8	China	6.3
9	France	5.7
10	South Korea	5.7
11	Taiwan, China	4.8
12	Italy	4.7
13	Sweden	4.0
14	Netherlands	2.9
15	Spain	2.9

*Source:* Computer Industry Almanac, <http://www.c-i-a.com/199911iu.htm>.

**Table 3.5. Length of Time to Reach 30% Penetration in USA**

<i>Technology</i>	<i>No. of Years to Reach 30% Penetration</i>
Internet	7
Television	17
Telephone	38
Electricity	46

*Source:* US Internet Council, April 1999.

## 4. CHALLENGES AND ISSUES

There are many challenges and issues that need to be addressed by governments, NGOs, communities, professional organizations, and individuals at large in the process of embracing ICT as a tool for the development and progress of humanity in general. The main challenges and issues that we going to be engaged with include the digital divide, poverty, privacy, cybercrime, human rights, and gender inequality.

### 4.1 Digital Divide

The ethical implications of ICT pose considerable issues and challenges in the Asia-Pacific region. ICT represents an unprecedented opportunity to provide new knowledge, services, and opportunities in rural and underserved areas. Both urban and rural consumers may benefit from ICTs by receiving: (i) enhanced access to information and communication across large distances, (ii) improved access to governmental and quasi-governmental resources and services, (iii) new credit and financial services available through palmtops and information kiosks, (iv) new opportunities to design, manufacture and market their products through ICT-technological systems, (v) more and better education through computers, and (vi) superior medical advice, diagnosis or knowledge in their own region. In the long term, the region ICT projects could prove to be the most effective means of driving change in the urban/rural areas of the region: *socially*, by ensuring equal access for underprivileged groups, *economically*: by creating new kinds of work and financial transactions, and *politically*: by improving the quality, speed, and sensitivity of the state apparatus to the needs of region citizen-consumers.

Table 4.1, provided by the Computer Internet Industry Almanac, shows the internet penetration rate at the end of 1999. They show a world average of 46.75 as compared to 428.20 per 1,000 population in Canada. These figures confirm the existence of a digital divide between developed and underdeveloped nations. Actions to bridge this gap need to be implemented expeditiously. Table 4.2 shows that the length of time to reach 30% internet penetration rate in USA is less than 7 years as compared to 48 years in the case of electricity supply. This calls for more aggressive actions from the governments of underprivileged nations to intensify their promotion of the use of ICT. Table 4.3 notes ICT indicators of penetration of a few selected countries.

The countries of the Asia-Pacific region have wide diversity in geography, economics, politics, culture, language and many other aspects. The region has about 61 percent of the world population, and 5 of the 9 highest population developing countries are in the region, namely, Bangladesh, China, India, Indonesia, and Pakistan.

**Table 4.1. Top 15 Countries in Internet Penetration Rate at Year-End 1999**

<i>Rank</i>	<i>Country</i>	<i>Users/1 000 Population</i>
1	Canada	428.20
2	Sweden	414.15
3	Finland	408.04
4	US	406.49
5	Iceland	403.46
6	Denmark	395.97
7	Norway	379.59
8	Australia	343.27
9	<i>Singapore</i>	<i>310.77</i>
10	<i>New Zealand</i>	<i>264.90</i>
11	Netherlands	255.55
12	Switzerland	245.81
13	United Kingdom	236.41
14	<i>Taiwan, China</i>	<i>216.82</i>
15	<i>Hong Kong, SAR China</i>	<i>212.91</i>
	Average of Top 15 Countries	328.16
	Worldwide Average	46.75

*Source:* Computer Internet Industry Almanac, October 2000:  
<http://www.c-i-a.com/200010iu.htm>.

**Table 4.2. Length of Time to Reach 30% Penetration in US**

<i>Technology</i>	<i>No. of Years to Reach 30% Penetration</i>
Internet	7
Television	17
Telephone	38
Electricity	46

*Source:* US Internet Council, April 1999.

The Information Society is so called because of the pivotal role played by ICT in dissemination of information-intensive services (business and property services, communications, finance and insurance) and the public sector services (education, public administration, and health care). The digital divide comes into existence due to the gap between those who have access to, and use of ICT, and those who do not. Digital divides exist both between countries in Asia-Pacific, and between countries in the world. Furthermore, the concept of the digital divide is extended to encompass the issue of disparity between how different nations are using information and communication technologies as a tool for human development, intellectually, socially and economically.

**Table 4.3. ICT Indicators of Selected Countries**

<i>Country</i>	<i>Telephone Mainlines Per 1 000 People 1999</i>	<i>Mobile Telephones Per 1 000 People 1999</i>	<i>Personal Computers Per 1 000 People 1999</i>	<i>Internet Host Per 1 000 People 1999</i>
Indonesia	29.1	9.83	13.4	0.18
Philippines	37.9	36.97	19.5	0.23
Thailand	84.5	39.57	40.4	0.49
Brazil	152.2	84.70	52.9	1.93
Malaysia	219.3	145.05	94.5	2.80
Argentina	213.8	109.72	59.9	3.08
South Africa	126.9	101.06	54.1	4.21
Korea	449.7	499.04	181.3	6.03
Ireland	472.4	360.59	352.6	15.95
Singapore	484.1	381.45	390.9	22.19
Hong Kong, SAR	559.6	551.02	360.2	66.40
Finland	557.2	678.10	507.8	117.25

*Source:* World Development Report, 1999/2000.  
World Competitiveness Yearbook, 2000.

The digital divide is a new gap created by ICT between insiders and outsiders of the info-sphere. The info-sphere is not a geographical, political, social, or linguistic space. It is the space of mental life, from education to science, from cultural expressions to communication, and from trade to recreation. The borders of the info-sphere cut across North and South, East and West, industrialized and developing countries, political systems and religious traditions, younger and older generations, even members of the same family.

It seems more accurate to say that the digital divide occurs between individuals rather than between countries or whole societies, between the computer literate and the computer illiterate, between the information rich and the information poor, whatever their nationality or neighbourhood. Currently, only 5 percent of the world's populations have access to information and communication technologies (ICTs). The remaining 95 percent are "disadvantaged" or "underprivileged." They live under the shadow of the new digital reality, which allows them no interaction or access, but which profoundly influences their lives.

The digital divide is the source of most of the ethical problems emerging from the evolution of the Information Society. The digital divide disembowels, discriminates, and generates dependency to the underprivileged. It can create new forms of colonialism and apartheid that must be prevented, opposed and ultimately destroyed. This is the main challenge of the Asia-Pacific region in the era of the Information Society.

## 4.2 Poverty

ICTs are increasingly central in the effort to escape poverty. Few would argue that lack of access to information and communications technologies is an element of poverty in the way that insufficient nutrition or inadequate shelter is. ICTs have repeatedly demonstrated their potential for alleviating poverty in the Asia-Pacific region, and in developing countries around the world. For example, poor people have experienced benefits in the form of: increased income; better health care; improved education and training; access to job development opportunities; engagement with government services; contacts with family and friends; enterprise development opportunities; increased agricultural productivity, and so on. However, in probably all cases, these experiences have arisen from highly focused and locally intensive pilot projects that were experimental in nature. Whilst doubts and uncertainties continue to exist with regard to the applicability of ICTs to the problems of the poor, such projects contribute immeasurably to the growing body of knowledge and experience that is required in order to understand the conditions under which ICTs can be usefully applied towards the alleviation of poverty.

The tables in Appendix B show the correlation between per capital income, the technology index and ICT diffusion in a few selected countries in the region. These two tables indicate some correlation between per capital income and ICT diffusion. The question is: “Can the use of ICTs alleviate poverty and overcome the digital divide?”

The global problem of poverty alleviation is enduring and massive. Achieving the millennium development goal of halving global poverty by 2015 will require an enormous undertaking many orders of magnitude greater in resource mobilization and complexity. In terms of their global impact on the world’s poor populations, and the Asia-Pacific region, in particular, the effect of the existing initiatives is undetectable. But, in many cases, their contribution is to indicate areas of activity that have emerged as critical factors for improving the lives of the poor through the application of ICT. Take, as an example, the application of ICT in teaching and learning, referred to as Smart Schools or e-learning. We are now beginning to understand the critical role of community participation, in addition to institutional transformation, culture specificity, policy-making telecommunications reform, openness in government, the need for a suitable legal framework and the development of human resources that are also necessary.

A lack of national policies promoting ICT as a tool for development may be deduced from the poor ICT infrastructure, such as inefficient telephone services or absence of electricity, in many rural and remote areas in Asia-Pacific. The natural geographical features, such as vast expanses of land, scattered islands, and difficult terrain have contributed to denying the benefits of the new technology to a vast majority of lower income communities in countries like India, Nepal, Indonesia and the Philippines. The costs of computer hardware and software,

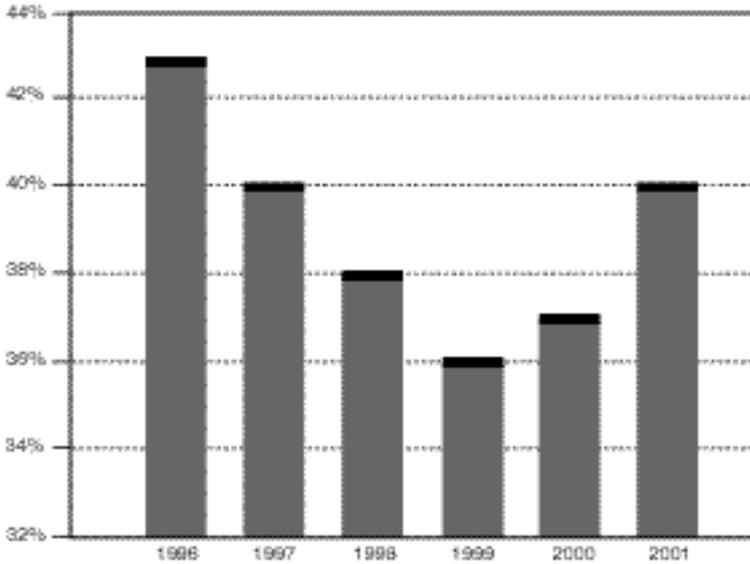
especially licensed software, and costs of maintenance and connectivity is beyond the affordability for these communities. The average monthly charge for an internet account in the Pacific countries studied is US\$50. On an annual basis, this amounts to one quarter to one half of the annual per capita GDP of many countries in the Pacific and is clearly unaffordable by the majority of people (Cabrere-Balleza, 2002). To offer a comparison, a typical US user will pay 1.2 percent of the per capita GDP in the US every month to access the internet while a user in Madagascar will pay 614 percent of per capita GDP (S. Nanthikesan, Trends in Digital Divide, Harvard Centre for Population and Development Studies).

The underprivileged need to be made aware the importance of ICT. They need to be given access to the infrastructure and services available, and provided with the skills for using ICT, in order to establish their presence in the world, and, ultimately, be able gain the benefits provided by ICT for wealth creation through e-commerce and services industries. This might help in achieving the millennium development goal of halving global poverty by 2015. But, the challenge is how to do it?

### **4.3 Piracy**

The results from the annual BSA Global Piracy Study for 2001 indicate that for the first time in the study's history, the world piracy rate increased in two consecutive years, i.e. in the year 2000 and 2001 (see Figure 4.1, same as Figure 2.1). The 2001 piracy rate of 40 percent is a marked increase from 37 percent in 2000. And, both years were up from the low set in 1999 at 36 percent. Since the study began in 1994, a steady decrease in the rate of software piracy was observed. In 2001, the effect of a worldwide economic slowdown has hit technology spending particularly hard. The results of this year 2001 study indicate that software piracy rose in response to the pressure of the curtailed spending of the economic downturn. This is the first period of a general global economic slowdown since the study began in 1994. The results presented here suggest that the progress against piracy that was made in the 1990s is conditional. Compliance with software licensing is at risk of being considered an economic luxury that can be abandoned in difficult times.

Factors like economic downturns and low standards of living crudely indicate that poverty is the main reason for the high rate of piracy in underdeveloped countries, and especially in the Asia-Pacific region where per capital incomes are much lower than in developed nations. In fiscal year 2001, Malaysia and India experienced piracy rate increases, 70 percent for both countries (see Table 4.4). The Philippines' rate increased to 63 percent. Indonesia had an 88 percent piracy rate, down from 89 percent in 2000. Vietnam, with a piracy rate at 94 percent, continued as the country with the highest piracy rate in the region. China, with 92 percent, followed as the country with the second highest piracy rate. In order not to be left outside the info-sphere during difficult times has forced individuals and corporations to resort to piracy because ICT is considered as luxury during those difficult periods.



Source: BSA Global Piracy Study for 2001.

**Figure 4.1. World Piracy Race**

The prices of software listed in the Asia-Pacific region do not encourage individuals to buy originals because their incomes do not permit them to do so. Piracy seems to be unavoidable in order to be in the info-sphere, regardless of the religious belief or ethical values one holds. If piracy persists in a country, it will affect the local software industry and wealth creation through ICT investments. Local companies and venture capitalists will not want to invest in ICT there because they will lose to piracy. Thus, the country remains poor and the society promotes piracy, which then kills any indigenous ICT industry. This vicious circle then continues. The challenge is how to stop the vicious circle?

#### **4.4 Cybercrime**

Regional and international trends in cybercrime take various forms, including theft, fraud, extortion, crimes against persons, sales of drugs and contraband, intellectual property piracy, theft of information, spread of malicious codes, denial of service attacks and cyber-terrorism. There have been no detailed studies conducted exclusively on the issue of Cybercrime and Information Security in Asia-Pacific as a whole. The 2002, a Computer Crime Survey conducted by the Computer Security Institute confirmed that the threat from computer crime and information security breaches continued unabated, and that the financial toll was mounting. The systems that are particularly vulnerable to cybercrime are national critical infrastructures, computer networks, electronic governance systems, online justice and medical emergency systems. There are numerous international and regional

**Table 4.4. Piracy Rate in Asia-Pacific**

Asia-Pacific	Piracy Rates						Retail Software Revenue Lost to Piracy (1 000)					
	1996 %	1997 %	1998 %	1999 %	2000 %	2001 %	1996 \$	1997 \$	1998 \$	1999 \$	2000 \$	2001 \$
Australia	32	32	33	32	33	27	128 267	129 414	192 237	150 390	132 533	91 011
China	96	96	95	91	94	92	703 839	1 449 454	1 193 386	645 480	1 124 395	1 662 404
Hong Kong, SAR	64	67	59	56	57	53	129 109	122 169	88 627	110 190	86 195	164 040
India	79	69	65	61	63	70	255 344	184 664	197 333	214 557	239 629	365 318
Indonesia	97	93	92	85	89	88	197 313	193 275	58 756	42 106	69 991	79 463
Japan	41	32	31	31	37	37	1 190 323	752 598	596 910	975 396	1 666 331	1 721 050
Korea	70	67	64	50	56	48	515 547	582 320	197 516	197 269	302 938	186 574
Malaysia	80	70	73	71	66	70	121 488	82 552	79 268	84 154	95 567	94 544
New Zealand	35	34	32	31	28	26	29 271	20 284	21 758	19 656	12 373	11 445
Pakistan	92	88	86	83	83	83	23 144	20 395	22 667	18 913	31 379	11 429
Philippines	92	83	77	70	61	63	70 735	49 151	31 138	33 163	27 091	24 655
Singapore	59	56	52	51	50	51	56 553	56 599	58 262	61 758	44 299	41 802
Taiwan, China	66	63	59	54	53	53	116 980	136 850	141 274	122 946	154 754	136 735
Thailand	80	84	82	81	79	77	137 063	94 404	48 613	82 183	53 082	41 123
Vietnam	99	98	97	98	97	94	15 216	10 132	10 328	13 106	34 938	32 246
Other Asia-Pacific	86	83	74	71	75	70	49 113	31 974	16 739	20 262	7 566	62 616
<b>Totals</b>	<b>55</b>	<b>52</b>	<b>49</b>	<b>47</b>	<b>51</b>	<b>54</b>	<b>3 739 304</b>	<b>3 916 236</b>	<b>2 954 812</b>	<b>2 791 531</b>	<b>4 083 061</b>	<b>4 726 454</b>

Source: BSA Global Piracy Study for 2001.

initiatives which have laid the foundation for the further development of mechanisms for enhancing information security and preventing cybercrime. Factors which have hampered efforts to promote information security in the region include: lack of awareness, capacity, technology and insufficient regulatory protection. Still, few countries in the region have enacted cyberlaws (United Nations Economic and Social Commission for Asia and the Pacific [UNESCAP] Asia-Pacific Conference on Cybercrime and Information Security 11-13 November 2002, Seoul, Republic of Korea.)

The lack of legal instruments notwithstanding, the incidence of malicious attacks on the confidentiality, integrity and availability of computer data and systems, computer-related offences such as forgery and fraud, content-related offences such as those related to child pornography and intellectual property rights (IPRs) violations, are considered to be significant. Threats to critical infrastructure and national interests arising from the use of the internet for criminal activity are of growing concern. The statistics of cybercrime reported by Thailand and Korea, Table 4.5, are enough to explain the increasing concern about cybercrime in the region.

**Table 4.5. Cybercrime Report of Thailand  
(April 2002 to November 2002)**

<i>Incidents</i>	<i>Cases</i>	<i>%</i>
Pornography Website (Thai Language)	1 419	38.98
Pornography Website (Foreign Language)	832	22.86
Child Pornography	63	1.73
Pornography Products Website (Thai Language)	443	12.17
Pornography Products Website (Foreign Language)	36	0.99
Intellectual Piracy Website	187	5.14
Other Illegal Material	175	4.81
Prostitution	89	2.45
Gambling (Thai Language)	96	2.64
Gambling (Foreign Language)	30	0.82
National Security	270	7.42
Total	3 640	

Source: Royal Thai Police Agency <<http://www.police.go.th/crimewebpost/report/sum.php>>

**Table 4.6. Cybercrime Report of Korea**

<i>Crime</i>	<i>Incidents</i>	<i>Rate (%)</i>
Leak of personal information and invasion of privacy	870	43.5
Spam mail	659	33.0
Virus and cracking	219	11.0
Obscene and violent image	181	9.1
Alienation and digital Divide	50	2.5
Infringement of copyright and illegal copy of S/W	15	0.8
Others	6	0.3
Total	2 000	100.0

Source: KISA (Korea Information Security Agency), 2001.

**Table 4.7. Report on cracking and virus incidence in Korea**

<i>Crime</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>
Cracking (Case)	64	158	572	1 943	5 333	5 252
Virus (Case)	–	–	–	–	65 033	27 561

Source: Korea Information Security Agency.

Countries of the Asia-Pacific region have started to have appropriate legal and regulatory frameworks to meet these challenges, (see Table 4.8). Awareness is growing, but even where legislation may be adequate, the capability to use information security technologies and related procedures to protect against human right abuses, and to assist other countries, is still considered low. As a result, reported cybercrime may represent only a small fraction of the total incidence. There is a need for more accurate estimates of the prevalence of such malicious attacks on human development.

**Table 4.8. Cyberlaw Initiatives in Asia-Pacific Countries**

<i>Country</i>	<i>Law</i>	<i>Year</i>	<i>Purpose</i>
Australia	Copyright Act 1968	1968	Protect intellectual property rights
	Copyright Amendment (Digital Agenda) Act 2000 (which amended the Copyright Act 1968)	2000	Balanced copyright regime that encourages creativity, investment and innovation in the development of new content as well as promoting reasonable online access to research, cultural and educational materials
	Copyright Amendment (Moral Rights) Act 2000	2000	“Moral rights” to the original creators of copyright material, whether or not they are also still the owners of copyright of the material.
New Zealand	Digital Technology and the Copyright Act 1994	1994	
	Copyright Act 1994	1994	
Hong Kong, SAR	The Intellectual Property Ordinance 2000 (Fulfil World Trade Organization (WTO) Article 61 of the Agreement on Trade-Related Aspects of Intellectual Property Rights)	2000	Extends criminal penalties for unlicensed software from sellers to corporate users
	Personal Data (Privacy) Ordinance		Covers privacy in public and public sectors
	Code on Access to Information (European Union (EU) Directive)		
	Control of Obscene and Indecent Articles Ordinance		Deals with sexually explicit materials
	Digital Signature (Electronic Transactions Ordinance 2000)	2000	Whether the transformation was generated using the private key that corresponds to the signer’s public key  Whether the initial electronic record has been altered since the transformation was generated

**Table 4.8.** (continued)

<i>Country</i>	<i>Law</i>	<i>Year</i>	<i>Purpose</i>
Indonesia	Patents	August 1, 1991	Compulsory licensing provisions, a relatively short term of protection (14 years), and a provision, which allows importation of 50 pharmaceutical products by non-patent holders
	Trademarks	April 1993	The law provides protection for well known marks. Marks must actually be used in commerce, and cancellation actions must be lodged within five years of the trademark registration date
	Copyrights <ul style="list-style-type: none"> <li>• Act No. 6 of 1982 regarding Copyrights</li> <li>• Act No. 7 of 1987 regarding the Amendment of Act No. 6 of 1982</li> <li>• Act No. 12 of 1997 regarding the Amendment of Act No. 6 of 1982 as Amended by Act No. 7 of 1987</li> <li>• Government Regulation No. 14 of 1986 regarding Copyright Council; as Amended by Government Regulation No. 7 of 1989</li> <li>• Circular Letter of Minister of Justice No. M.01-PW.07.03 of 1987 regarding the Authority to Investigate Copyright Criminal Infringement</li> </ul>	1987	Provides conformity with international standards for copyright protection. A bilateral copyright agreement between the United States and Indonesia went into effect in August 1989 extending national treatment to each other’s copyrighted works. The government has demonstrated that it wants to stop copyright piracy and that it is willing to work with copyright holders to this end.
Korea	Patent & Utility Model Protection		
	Copyright Protection		
	1 Copyright Protection in Multimedia		

**Table 4.8.** (continued)

<i>Country</i>	<i>Law</i>	<i>Year</i>	<i>Purpose</i>
	Trademark Law	1997	A trademark under the Trademark Act is “a sign, character, figure, three-dimensional shape or any combination thereof or those with colour which are used on goods or service by a person who produces, manufactures, processes, sells or certifies such goods or services in order to distinguish his goods or services from those of others.”
	Design Law		
	Unfair Prevention and Trade Secret Protection Law	February 2001	Broader protection of well-known trademarks.
	New Plant Varieties	1995	A special law to provide protection for new plant varieties.
	Database In Copyright Act	1993 and 1995	For the Databases and certain neighbouring rights of copyrighted works have been afforded protection by amendments to the Copyright Act in.
	Semiconductor Chip Layout Designs	1992	The Government passed the Semiconductor Chip Layout Design Act in 1992, which became effective in September 1993 to protect of semiconductor chip layout designs.
	Trade Secrets	1991	In 1991, a statutory basis was provided for the protection of trade secrets, by an amendment to the Unfair Competition Prevention Act. Various Korean law and regulations requires foreign business to submit detailed information on business plan or product to government for mandatory approval.

**Table 4.8.** (continued)

<i>Country</i>	<i>Law</i>	<i>Year</i>	<i>Purpose</i>
Philippines	The Intellectual Property Rights Code <ul style="list-style-type: none"> <li>• Copyright and Related Rights;</li> <li>• Trademarks and Service Marks;</li> <li>• Geographic Indications;</li> <li>• Industrial Designs;</li> <li>• Patents;</li> <li>• Layout-Designs [Topographies] of Integrated Circuits; and</li> <li>• Protection of Undisclosed Information</li> </ul>	January 1, 1998	Imposes higher penalties and fines for the manufacture, distribution and use of unlicensed software.
	House Resolution 890		Pushes for the interconnection of local Internet Service Providers into one Internet exchange.
	Wiretapping Laws		Wiretapping is not allowed unless ordered by the court. The Anti-Wiretapping Law requires a court order to obtain a telephone tap.
	Cryptography and Liberty 1999 An International Survey of Encryption Policy		The use of cryptographic hardware and software is not currently controlled in the Philippines and so the domestic use of encryption by citizens is not restricted. This is a forward step for the Philippines as the government has noted the importance of security of electronic information for electronic commerce, the threats of economic espionage, and the need to protect privacy online.
Singapore	Copyright Act (Cap 63) of 1987 Layout-designs of	1987 was amended in 1994, 1998 and 1999	

**Table 4.8.** (continued)

<i>Country</i>	<i>Law</i>	<i>Year</i>	<i>Purpose</i>
	Integrated Circuits Act 1998	1988	Protection for original layout-designs that are created after the issuance of the Act (i.e. 15 February 1999).
Thailand	Copyright law 1994	1994	Extends a criminal penalty for unlicensed software from sellers to corporate users.
	Official Information Act	1997	
	The Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS)	1995	
	Most enforcement activities remain under the jurisdiction of the Economic Crimes Investigation Division (ECID) of the Royal Thai Police.		
	Electronic Transaction Act	2002	
Japan	Copy right law 1899	Amendment 1969 updated 1998, 1999, 2000	Provides criminal penalties for unlicensed software from sellers to corporate users.
	Science & Tech. basic Laws Law No. 130	1995	
	Patent Law		Facilitates the spread of online business by enhancing the protection of intellectual rights by internet firms
	Law on the Formation of Advances Information & Telecommunications Network Society.	Jan 2001	
	Electronic media – IT comprehensive law	April 2001	
	Unauthorized Computer Access Law		Prohibits acts of unauthorized computer access in order control computer crime
	Law of data protection	2000	
	Law Concerning Electronic Signatures & Certification Services	2001	
	Spam Blocking Law	Proposed soon 2003	

There are a few countries in the region that have governmental policies on development and human resources development programmes, and that have built significant capacity, experience and know-how, which can be shared with less developed countries. Cybercrime does not respect national borders; therefore, it requires cooperative, pro-active approaches in support of the less developed countries of the region. New ethical policies for this information age are urgently required to fill the rapidly multiplying “policy vacuums” (Moor, 1985). But filling such vacuums is a complex social process that requires the active participation of individuals, organizations, and governments, and ultimately the Asia-Pacific communities, at large, in a concerted organized effort (Bynum, 1995).

#### ***4.5 Human Rights***

Human Rights, in terms of freedom of expression and the protection of confidentiality of personal data, should be the fundamental principle of any democratic society in the ICT world. However, the exercise of this principle should not undermine respect for others and human dignity, and it should be in line with the law. The meaning of freedom of expression, personal freedom, right to use personal data and its secrecy, are not at all firmly established among the different nations in Asia-Pacific and, thus, ICT users in different countries have different ideas regarding these issues.

The notion of freedom of expression is a principle widely recognized as one of the foundations of a democratic functioning of society, taking into account the Universal Declaration of Human Rights, the Protection of Human Rights and Fundamental Freedoms, and the First Amendment of the Constitution of the United States of America. It is linked with the values of each society, and, thus, it presents many difficulties in establishing a regional standard.

Penalty for the abuse of the freedom of expression is clearly an issue of parallel importance. Such penalties are, at present, foreseen for infringements of personal freedoms, through defamation, insult, infringements of private life, racial hatred, political abuses, business rivalry, as well as a threat towards law and order, e.g., terrorism, trafficking, and gambling. The limits of freedom of expression for employees, through the employer’s power to control the means of communication, as in the case of infringement of employees’ private electronic correspondence, is another matter of concern. It appears clear that penalization is sometimes difficult to put into practice. Such is the case with regard to technical obstacles. For instance, the identification of electronic culprits is difficult, or even impossible, with the present technology of information filtering and safeguarding of personal identity. Furthermore, an obvious question remains open concerning how to legally act when the authors of such malpractice live abroad, or when their actions (e.g., posting specific materials on a website) are totally legal in their own countries, but illegal in those from where access is possible. The fundamental issue is, thus, to overcome the paradoxical situation in which each national authority wishes to

limit access according to its own rules, while at the same time maintaining the freedom of expression and the right to personal privacy for each individual. A real example is the paradox between the Malaysia Multimedia Super Corridor's Bill of Guarantee (of no censorship on the content of the internet) and the distribution of pornographic materials to the public.

The use of multipurpose smart cards in many areas of human economic, social, political, and personal activities marks the beginning of a wide range of uses of personal information on a single card. These cards can contain data of the most sensitive kind about an individual. They may not only contain an individual's medical history and financial status, but also behavioural patterns and possibly even sex life. At the same time, they are used in a wide range of contexts and purposes other than clinical care and business transactions. The Human Right of respect for privacy requires that confidentiality of personal data should be guaranteed at all times. All users of personal data must be able to show a legitimate purpose in collecting and processing such data on individuals. The challenge is how to guarantee the legitimate collection and use of personal information about individuals and still honor the Human Rights philosophy?

Respect for security and privacy requires the use of encryption technology where appropriate, the use of closed networks for the transfer of personal data and organizational measures to support security. As personal data security is necessary, an Asia-Pacific region security standard should be observed wherever an electronic transfer of personal, identifiable, data occurs. Such transfers must be transparent and subject to evaluation by independent bodies.

The right of each individual to participate in the development and use of any system of private personal record-keeping is a key part of the concept of the citizen as stakeholder in democratic governance. The citizen must also been given access to any of his/her records that are kept electronically in databases. How many countries in Asia-Pacific recognize this right for their citizens?

#### ***4.6 Gender Equality***

It is universally acknowledged that the ICT sector is the fastest growing area in the global economy, but the use of such technologies by women's organizations became noticeable only after 1995. As in most regions of the world, the spread and growth of ICT usage has been uneven across Asia and the Pacific. Women and men in different countries have not benefited equally. Women have to contend with ideological, systemic, and institutional barriers to access ICT (Cabrere-Balleza, 2002).

Getting reliable statistics on women's internet use in the Asia-Pacific region is very difficult. The standard indicators are not disaggregated by sex, and the available data is not very reliable or comparable. However, it is clear that the numbers are

small and the distribution limited. Most women ICT users in almost every developing country in the Asia-Pacific region are not representative of women in the country as a whole, but rather are part of a small, urban educated elite. The table below shows the percentage of women online, with South Korean women at 42 percent, in the 12 October 2000 survey by the Korean Information Centre.

**Table 4.9. Women Online as a Percentage of the Total Internet Population**

<i>Country</i>	<i>% of Women Online</i>	<i>Source</i>
Ethiopia	14	CABECA survey reported in World Bank (2000)
France	33.4	Media Metrix & Jupiter Communications; As of August 2000
Germany	31.7	Media Metrix & Jupiter Communications; As of August 2000
Latin America	38	Wall Street Journal
Senegal	17	CABECA survey reported in World Bank (2000)
<i>South Korea</i>	42	<i>Korean Network Information Centre, Reported in Nua Internet Surveys; Oct 12, 2000. <a href="http://www.nua.ie/surveys/?f=VS&amp;art_id=905356101&amp;rel=true">http://www.nua.ie/surveys/?f=VS&amp;art_id=905356101&amp;rel=true</a></i>
Sweden	44.2	Media Metrix & Jupiter Communications; As of August 2000
United Kingdom	35.9	Media Metrix & Jupiter Communications; As of August 2000
United States	50.1	Media Metrix & Jupiter Communications; As of August 2000
Zambia	36	CABECA survey reported in World Bank (2000)

*Source:* S. Nanthikesan, Trends in Digital Divide, Harvard Centre for Population and Development Studies.

**Table 4.10. Internet usage by working status (% of Internet users), year 2000, OEDC**

<i>Working status</i>	<i>Information retrieval</i>	<i>email</i>	<i>e-commerce</i>	<i>Web pages</i>
Public workers	25.1	23.5	21.9	30.2
Private workers	28.7	32.9	34.4	32.1
Self-employed workers	17.9	17.1	15.5	22.6
<i>Housewives</i>	1.0	2.9	6.1	–
Students	18.5	18.2	15.8	11.3
Retired people	5.6	3.5	6.3	3.7

*Source:* Censis-Unicab.

*Divide index*      *Divide index*      *Divide index*      *Divide index*  
71.5                      77.3                      74.9                      79.6

**Table 4.11. Persons aged 10 and over who had used personal computer in the past 12 months by age and sex (Year 2000)**

Age group	Male			Female			Overall		
	No. of persons ('000)	%	Rate*	No. of persons ('000)	%	Rate*	No. of persons ('000)	%	Rate*
10-14	155.8	11.6	73.0	147.8	11.4	72.6	303.6	11.5	72.8
15-24	339.2	25.2	76.1	374.8	29.0	81.7	713.9	27.0	78.9
25-34	348.2	25.8	63.6	407.1	31.5	66.2	755.3	28.6	65.0
35-44	347.1	25.8	48.6	286.0	22.1	40.4	633.0	24.0	44.5
45-54	127.5	9.5	25.2	66.8	5.2	14.6	194.4	7.4	20.2
55-64	25.9	1.9	9.1	9.1	0.7	3.7	35.0	1.3	6.6
>= 65	3.6	0.3	1.0	0.8	0.1	0.2	4.4	0.2	0.6
Overall	1 347.3	100.0	44.1	1 292.4	100.0	42.0	2 639.7	100.0	43.1

Source: Census and Statistics Department, Hong Kong.

Most women in Asia-Pacific region, especially in developing countries, use ICT only at work. Except in upper-income brackets, home access to an ICT is not a common phenomenon. Users at work generally divide up between those who use it as a tool of production (routine office work, data entry, manufacturing, computer industry jobs, programming, and related work) and those who use it as a tool of communication (creating and exchanging information).

But, time constraints, as well as bandwidth limitations, make Web use difficult for women. Few women are producers of ICT, whether as internet content providers, programmers, designers, inventors, or fixers of computers. In addition, women are also conspicuously absent from decision-making structures in ICT in the Asia-Pacific region, especially in the developing countries. Email is the major ICT application that women's organizations and individual women in developing countries use in the region. A series of factors, including literacy and education, language, time, cost, geographical location of facilities, social and cultural norms, and women's computer and information search, dissemination skills, as well as bandwidth limitations, constrain women's access to information and communication technology.

## 5. RECOMMENDATIONS

### 5.1 *Requirements for Holistic Integrated Policy and Framework*

Holistic, integrated, and cohesive policies need to be established at international, regional, and national levels to ensure effective and beneficial application of ICTs within the Asia-Pacific region, especially in the poorer and inadequately serviced areas. Given that different countries of the region have expertise in different parts of this new technology, collaboration efforts between countries in the region will bring greater benefits in the application of ICTs for development of the region. The most basic problems and challenges that public policymakers face trying to enhance ICT diffusion and development are the lack of both financial and trained human resources. The need for continuous collaboration in the development of ICT is vital. Recommendations in the following four areas are offered for collaborative work to ensure that the countries of Asia-Pacific are not left behind in embracing ICT for achieving competitive advantages:

1. Adoption of sound education programmes at all levels to 1) foster literacy, in general, and ICT literacy, in particular, 2) establish cybercrime free technology, and 3) provide for a secure information society within the region and info-sphere;
2. Promotion of human resource development programmes and collaborative Research & Development in priority areas of ICTs within each country and in the region as a whole;
3. Establishment of up-to-date, common, and mutually supporting cyber-laws for combating crime and protecting intellectual property rights towards the creation of cybercrime free information society, and to encourage further inventions and innovations to generate wealth; and
4. Adoption of ICT standards, regulations, and quality assurance to foster high quality and secure services and products that maintain competitiveness for the benefit of all communities within each country, in the region, and in the world.

### 5.2 *Addressing the Challenges*

#### 5.2.1 **The Digital Divide**

Guarantee access by the greatest number of people to ICT facilities and services through the provision of:

- i. Basic infrastructure of electricity and communications to all rural and remote areas with special focus on rural areas utilizing the developing technology of wireless capabilities;

- ii. Community centres with basic hardware, software, access lines, and maintenance staff for free use by all underprivileged citizens regardless of age, gender, education, and social status;
- iii. Basic hardware, software, and access lines for all at affordable cost commensurate with local per capital incomes;
- iv. ICT facilities to guarantee computer literacy for every single pupil attending school;
- v. Special computer literacy programmes for underprivileged women and senior citizens;
- vi. Free access to the Internet in schools and public libraries;
- vii. Recognition in educational systems that computer literacy is a basic and necessary skill;
- viii. Multilingual content and interface to accommodate multilingual citizens of the world accessing common knowledge; and
- ix. Ensuring that ICT is not used to discriminate against, or disadvantage, those who would not or cannot participate (e.g. replacing humans with ATM's).

### **5.2.2 Human Rights**

Adoption of common policies and principles for the information society in terms of:

- i. Freedom of expression and freedom of the press, with due respect to laws, order, and the common interest of every person;
- ii. Free, compulsory and universal primary education with special emphasis on ICT literacy;
- iii. Promotion of public domain information portals, services, and networks accessible to all;
- iv. Encouragement of public involvement in the development process of public ICT systems and services; and
- v. Opportunities for all to distance education and life-long learning opportunities offered by ICT.

### **5.2.3 Cybercrime**

Provision of cyber-laws and enforcement through the attainment of the following goals (see Appendix A):

- i. High levels of awareness of information security and cybercrime issues amongst users at home, in government and educational institutions, in the private sector, and amongst legal officers;

- ii. Increased exchange of information on information security and cybercrime at the regional and national levels;
- iii. Policies and legal and regulatory frameworks at the national level that are consistent with existing or developing international legal instruments;
- iv. Effective regional mechanisms for preventing cybercrime and improving protection against, detection of, and responses to, cybercrime;
- v. Secure information systems, networks and transactions in the public and private sectors;
- vi. Safe and secure environments for users, especially children and young persons;
- vii. Effective mechanisms for detection of, and responses to, cybercrime at the national and regional levels, including the creation of environments that are conducive to the reporting of cybercrime;
- viii. Widespread adoption of, and compliance with, relevant codes of conduct and best practices at the national level; and
- ix. Increased capacity to conduct domestic electronic investigations and to assist with trans-national investigations.

#### **5.2.4 Poverty**

Global poverty can be reduced through the promotion of ICT programmes to the underprivileged as follows:

- i. Awareness programmes emphasizing the importance of ICT in the knowledge economy;
- ii. Providing access to ICT infrastructure, content, and services available;
- iii. Providing training of knowledge and skills in using ICT; and
- iv. Promoting utilization of facilities provided by ICT in wealth creation through e-commerce and services industries.

#### **5.2.5 Piracy**

Promotion of anti-piracy programmes through the following actions:

- i. Promotion of fundamental understanding of the destructive nature of piracy in terms of hindering the following: the progress in the ICT industry, wealth creation, employment opportunities, knowledge creation, and national status and reputation;
- ii. Regulation and control of software prices commensurate with national per capital incomes;
- iii. Enforcement of penalties for crimes committed against copyright and intellectual property protection laws; and

- iv. Encouragement of indigenous ICT to maintain availability of software products at local affordable price.

### **5.2.6 Gender Equality**

Promotion of fair and equal access to ICT infrastructure, content, and services for human development, regardless of gender, through:

- i. Provision of awareness programmes on the importance of ICT in the knowledge society for disadvantaged, handicapped, and gender groups within each country, especially in underserved areas;
- ii. Provision of basic facilities to train basic skills and provide access to gender group;
- iii. Empowerment of gender group to be independent and able to take advantage of the benefits obtained from mastering skills in the application of ICT.

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## Appendix A

### Recommended Supporting Actions (Adopted at the Asia-Pacific Conference on Cybercrime and Information Security, held from 11 to 13 November 2002, in Seoul, Republic of Korea)

<i>Goal</i>	<i>Actions to Achieve Goal</i>	<i>Relevant initiatives and organizations that may cooperate</i>
<i>I. Increased stakeholder awareness and transfer of knowledge.</i>		
<p>1. High levels of awareness of information security and cybercrime issues amongst users at home, in government and educational institutions, in the private sector, and amongst legal officers.</p>	<p>1.1 Conduct national user awareness campaigns for the general user, including children and young people, educational institutions, consumers, government officials and the private sector, using different media.</p> <p>1.2 Target the media. Educate media professionals, and then encourage them to increase public awareness.</p> <p>1.3 Engage large private sector corporations and industry associations in the sponsorship of awareness programmes.</p> <p>1.4 Promote the concept of “Ethics for the Information Society.”</p> <p>1.5 Conduct seminars for high-level authorities (prime ministers, ministers and other senior government officials and legislators). Programmes should be tailored to requirements in each country.</p> <p>1.6 Support/initiate/expand capacity building programmes, including, in particular, national and regional professional workshops for the judiciary and other legal officers including those in NGOs, as well as specialist training in the field of information security. Use existing materials (e.g. material developed by APEC) adapted for local requirements and languages.</p> <p>1.7 Advise less developed countries on effective systems for protection against, detection of and responses to, cybercrime.</p> <p>1.8 Strengthen national crime prevention strategies and programmes by supporting the inclusion of broad, multi-targeted measures to prevent cybercrime.</p>	

<i>Goal</i>	<i>Actions to Achieve Goal</i>	<i>Relevant initiatives and organizations that may cooperate</i>
2. Increased exchange of information on information security and cybercrime at the regional and national levels.	2.1 Establish appropriate regional mechanisms to increase exchange of information on cybercrime and information security issues and activities between APEC and other regional cooperation secretariats. 2.2 Establish national cybercrime and information security councils that include the participation of all stakeholders – the private sector, government authorities, telecommunications service providers, law enforcement officials, the judiciary, NGOs and others. 2.3 Where appropriate, establish 24-hour points of contact between government and industry at the national level.	APEC ASEAN
<i>II. Improved policy, legal and regulatory frameworks for promoting information security and addressing cybercrime.</i>		
3. Policy, legal and regulatory frameworks at the national level that are consistent with existing or developing international legal instruments and that provide for proportionate and dissuasive sanctions, including deprivation of liberty.	3.1 Make “best practice” legislation and guidelines available, consistent with existing or developing international legal instruments such as the Council of Europe Convention on Cybercrime, the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty. 3.2 Provide technical assistance to governments to enable them to review and assess existing policies, laws and practices relating to cybercrime and information security. 3.3 Maintain a detailed compendium of new and existing legislation in the Asia-Pacific region that impacts on information security. 3.4 Encourage proactive, self-help approaches by the private sector, and enhance its willingness to assist in law enforcement investigations.	WIPO

<i>Goal</i>	<i>Actions to Achieve Goal</i>	<i>Relevant initiatives and organizations that may cooperate</i>
<i>III. Establishment of regional mechanisms to improve cybersecurity.</i>		
4. Effective regional mechanisms for preventing cybercrime and improving protection against, detection of, and responses to, cybercrime.	<p>4.1 Establish a regional standing group/ committee/network of experts to provide advice and give appropriate inputs, as well as act as a focal point or help desk for requests for assistance from developing countries, and establish a website in support of this activity.</p> <p>4.2 Establish a Regional Information Security Centre.</p> <p>4.3 Establish sub-regional CERTs covering several countries where necessary.</p> <p>4.4 Establish a regional CERT Network.</p> <p>4.5 Establish a regional mechanism for the exchange of information and experience.</p> <p>4.6 In general, involve academia and establish private sector partnerships (in line with the UN Global Compact). Coordinate and consolidate initiatives to avoid duplication.</p>	
<i>IV. Increased protection against cybercrime.</i>		
5. Secure information systems, networks and transactions in the public and private sectors.	<p>5.1 Make information regarding IT security standards and international best practices relating to information security available to governments and the private sector.</p> <p>5.2 Facilitate greater sharing of information and capacity-building relating to the APEC secretariat's work on IT security standards, in particular its work in best practices.</p> <p>5.3 Share information on IT security professional certification and provide support for the development of the IT security professional workforce in less developed countries.</p> <p>5.4 Identify and promote measures for encouraging and assisting companies and other legal entities to adopt minimum levels of systems and transaction security, including codes of conduct and other measures that assist the private sector to be more accountable for harm to governments, businesses and individuals.</p>	<p>APEC – e-security Task Group and the HRD steering group project</p> <p>ASEAN</p>

<i>Goal</i>	<i>Actions to Achieve Goal</i>	<i>Relevant initiatives and organizations that may cooperate</i>
	5.5 Support governments in the establishment of national information security policies, procedures and practices that facilitate international assistance in combating cybercrime.	
6. Safe and secure environments for users, especially children and young persons.	6.1 Promote and support the use of filtering, rating, parental control and related software, as well as measures for the establishment of safe environments for the use of the Internet by children, such as walled gardens.	ECPAT International
<i>V. Improved detection of, and responses to, cybercrime</i>		
7. Effective mechanisms for detection of, and responses to, cybercrime at the national and regional levels, including the creation of environments that are conducive to the reporting of cybercrime.	7.1 Establish or strengthen Computer Emergency Response Teams (CERTs) where they do not exist, or where they require upgrading. 7.2 Establish national hotlines for reporting cybercrime, in cooperation with the private sector and NGOs. 7.3 Develop, disseminate and promote guidelines for consumer protection in the context of electronic commerce.	OECD (Council Consumer Guidelines – December 1999)
8. Widespread adoption of, and compliance with, relevant codes of conduct and best practices at the national level.	8.1 Develop, disseminate and promote relevant codes of conduct and best practices for users and suppliers of ICT, in support of the concept of “Ethics for the Information Society.” 8.2 Promote self-regulation in the private sector. 8.3 Ensure that codes of conduct and best practices are reflected in the criminal procedure laws of the country, where appropriate.	ECPAT International INTERPOL

<i>Goal</i>	<i>Actions to Achieve Goal</i>	<i>Relevant initiatives and organizations that may cooperate</i>
<p>9. Increased capacity to conduct domestic electronic investigations and to assist with transnational investigations.</p>	<p>9.1 Increase focus on cybercrime issues in existing and proposed mutual assistance regimes, along the lines of the Council of Europe Convention on Cybercrime.</p> <p>9.2 Support the development of operational mechanisms and procedures for mutual assistance, for example, through the expansion of participation of less developed countries in existing cooperation frameworks such as the G-8 24/7 network.</p> <p>9.3 Provide technical assistance for the establishment of specialized units within government for addressing cybercrime and information security.</p> <p>9.4 Establish/strengthen/promote mechanisms for the exchange of information on cyber forensic tools, techniques and methodologies.</p>	<p>G-8 Network for 24/7 assistance</p> <p>International Organization on Computer Evidence</p>
	<p>9.5 Produce guidelines on cybercrime issues.</p> <p>9.6 Develop a webpage of cybercrime links (regional and national).</p> <p>9.7 Encourage acceptance of, and compliance with, international legal instruments such as the Convention on Transnational Organized Crime, the Optional Protocol to the Convention on the Rights of the Child on the sale of children, child prostitution and child pornography, the WIPO treaties relating to the protection of intellectual property rights and the Council of Europe Convention on Cybercrime.</p> <p>9.8 Encourage the development of low-cost systems for protection against, detection of, and responses to cybercrime, based on open-source solutions, including the development of technology that facilitates the surveillance of unlawful or harmful misuse of computers.</p>	<p>APEC (Electronic Authentication issues paper)</p>

**Appendix B**  
**Benchmarking: ICT Indicators**

<i>Country</i>	<i>Daily Newspapers Per 1 000 People 1996</i>	<i>Radios Per 1 000 People 1996</i>	<i>Television Per 1 000 People 1997</i>	<i>Telephone Mainlines Per 1 000 People 1999</i>	<i>Mobile Telephones Per 1 000 People 1999</i>	<i>Personal Computers Per 1 000 People 1999</i>	<i>Internet Host Per 1 000 People 1999</i>
Argentina	123	677	289	213.8	109.72	59.9	3.08
Brazil	40	435	316	152.2	84.70	52.9	1.93
Hong Kong, SAR	800	695	412	559.6	551.02	360.2	66.40
Finland	455	1 385	534	557.2	678.10	507.8	117.25
Indonesia	23	155	134	29.1	9.83	13.4	0.18
Ireland	153	703	455	472.4	360.59	352.6	15.95
Korea	394	1 037	341	449.7	499.04	181.3	6.03
Malaysia	163	432	166	219.3	145.05	94.5	2.80
Philippines	82	159	109	37.9	36.97	19.5	0.23
Singapore	324	739	354	484.1	381.45	390.9	22.19
South Africa	30	316	125	126.9	101.06	54.1	4.21
Thailand	65	204	234	84.5	39.57	40.4	0.49

*Source:* World Development Report, 1999/2000.  
World Competitiveness Yearbook, 2000.

**Appendix C**  
**Ranking Among Selected Nations**

High	1	Finland	2	1	1	2	1	1	1	9
	2	Hong Kong	1	5	3	1	2	3	2	17
	3	Singapore	4	3	4	3	4	2	3	23
	4	Korea	3	2	5	5	3	5	5	28
	5	Ireland	6	4	2	5	5	4	4	30
Medium	6	Argentina	7	6	7	7	6	7	7	47
	7	Malaysia	5	8	9	6	8	6	8	50
	8	Brazil	10	7	6	8	9	8	9	57
	9	South Africa	11	9	11	9	7	9	6	60
Low	10	Thailand	9	10	8	10	10	10	10	67
	11	Philippines	8	11	12	11	11	11	11	75
	12	Indonesia	12	12	10	12	12	12	12	82

*Source:* NITC Estimates, 2000.

**Appendix D**  
**ICT Diffusion**

**ICT diffusion in selected Asian economies**  
**(per thousand people)**

<i>Economies</i>	<i>Telephone mainlines (1999)</i>	<i>Cellular phones (1999)</i>	<i>Personal computers (1999)</i>	<i>Internet users (2000)</i>
<b>Developing Asia</b>				
Bangladesh	3.4	1.2	1.0	0.2
China	85.8	34.2	120.0	13.4
India	26.6	1.9	3.3	4.5
Indonesia	29.1	10.6	9.1	1.8
Kazakhstan	108.2	3.0	n.a. <sup>a</sup>	4.2
Kyrgyzstan	76.2	0.6	n.a. <sup>a</sup>	2.1
Malaysia	203.0	137.0	68.7	68.8
Nepal	10.6	n.a. <sup>a</sup>	2.6	1.4
Pakistan	22.2	2.1	4.3	8.5
Philippines	39.5	36.6	16.9	6.2
Sri Lanka	36.4	12.2	5.6	3.4
Thailand	85.7	38.4	22.7	16.5
Vietnam	26.8	4.2	8.9	1.3
<b>Industrial and newly industrializing economies</b>				
Japan	494.0	449.4	289.6	213.8
Hong Kong, SAR	577.5	636.1	290.5	260.0
Singapore	482.0	418.8	527.2	419.1
Rep. of Korea	441.4	504.4	189.2	323.1
Taipei, China	545.2	522.4	180.7	288.4
United States <sup>b</sup>	681.8	311.5	510.5	537.2

*Data sources:* International Telecommunication Union (2000) and Nua Internet Surveys (2000).

<sup>a</sup> n.a.: data not available.

<sup>b</sup> Estimates for the United States were included in the table for purposes of comparison.

### Human Development in the ASEAN Countries

<i>Country</i>	<i>Human development rank (2001)</i>	<i>Human development index (2001)</i>	<i>Life expectancy at birth (1999)</i>	<i>Adult literacy rate (1999)</i>	<i>GDP per capita USD (1999)</i>	<i>Technology achievement index (1999)</i>
Singapore	26	0.876	77.4	92.1	20 767	0.585
Malaysia	56	0.774	72.2	87.0	8 209	0.396
Thailand	66	0.757	69.9	95.3	6 132	0.337
Philippines	70	0.749	69.0	95.1	3 805	0.300
Vietnam	101	0.682	67.8	93.1	1 860	–
Indonesia	102	0.677	65.8	86.3	2 857	0.211
Myanmar	118	0.551	56.0	84.4	1 027	–
Cambodia	121	0.541	56.4	68.2	1 361	–
Lao PDR	131	0.476	53.1	47.3	1 471	–

**ETHICAL ISSUES OF NANOTECHNOLOGY  
DEVELOPMENT IN THE ASIA-PACIFIC REGION**

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for the Regional Meeting on  
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## I. INTRODUCTION

It is amazing what science brings to human life with time. In 1946, when the first computer Eniac was invented, its size was enormous, but its speed was only one-eighty thousandth that of a current personal computer. The story goes that when it was switched on, the entire Philadelphia city went out of electricity. With the development of semiconductors, bringing computers down to palm-size, scientists, at first, skeptical of the possibility of making them any smaller due to limited technology.

Nanotechnology, often referred as the manipulation of matter at the atomic molecular level, has been able to change many scientists' skeptical view on the coming scientific development. The word "nano" derives from the Greek *nanos*, which means dwarf. A nanometer is one billionth of a meter, or roughly 75,000 times smaller than the width of a human hair. Approximately 3 to 6 atoms can fit inside of a nanometer (nm), depending on the atom. Therefore, nanotechnology refers to the use of devices that have a size of only a few nanometers.

The essence of nanotechnology is the ability to work at the molecular level and to create large structures with fundamentally new molecular organization. The novel and differentiating properties and functions are developed at a critical length scale of matter typically under 100 nm. When matter is modified at the nanoscale, it can have extraordinary and useful properties, which we have never been able to create and observe before (AllChemE, 2001).

Scientists studying molecular nanotechnology are interested in ways to manipulate individual atoms and molecules to build things with almost unimaginable precision. Building things with atomic precision is an amazing contrast to the manufacturing techniques of today, which are very crude when examined at the molecular level. Agelucci (1999) gives an interesting analogy, which helps to better comprehend the nanotechnology. Much in the same way Michelangelo created statues from blocks of marble, manufacturers today frequently create objects by first creating larger objects and then removing excess material by grinding, chiseling or sanding. Components that seem to fit together precisely are billions of atoms out of alignment. Poorly fitting components wear out faster, require costly lubrication and may eventually lead to mechanical breakdown. From a molecular perspective, even the most precise of today's mechanical components fit poorly. These factors plague modern manufacturing techniques causing enormous waste, pollution and imprecision.

Nanotechnology has been utilized and adopted in many areas and fields. For example, with the application of nanotechnology, it is possible to restore and retrieve information for each atom and electron using a current semiconductor where thousands of electrons move around. With such sizing down, the energy

efficacy can be maximized and this enables the manufacture of palm-size supercomputers. The early 21<sup>st</sup> century may come to be seen as the start of the nanotechnology revolution. Nanotechnology can be applied to various domains and areas including telecommunication, medicine, biotechnology, environmental energy, and universe security.

Today, major industrial countries are incorporating nanotechnology in their innovation systems as they see it as an engine for wealth creation in the near future. Over 30 national governments have already launched nanoscience initiatives, and have begun to invest heavily in research and development (Roco, 2002). Especially, the Asia-Pacific region has emerged as a leading centre for nanotechnology. Government, industry and the business sector have displayed strong ambition and effort in pushing their countries into the nano-future. At the most basic social level, nanoscale engineering is going to be responsible for massive changes in the way we live, the way we interact with one another and our environment, and the things we are capable of doing.

There is no question that with nanotechnology, many facets of human living will be enriched. Advanced nanotechnology may build machines that are thousands of times more powerful, and hundreds of times cheaper than today's devices. However, with its staggering implications, including the ability to atomically modify matter, both living and non-living, nanotechnology also brings ethical quandaries which need to be contemplated seriously, not only by the scientists, but also by all people as social agents. It is imperative that we reinforce productive use for beneficial purposes, while limiting malicious use of the technology.

In terms of controlling the malicious use of the technology, it has not been long since educators and scientists introduced the issue of ethics in science and technology. Still, many countries are not participating in the study of ethics applied to different areas, for instance, social, environmental, and educational issues. Plus, even for those countries that are participating, these issues are perceived with different weight based on a country's cultural background, belief system, traditions, developmental growth, etc.

Ethics is defined as "the study of the general nature of morals and of the specific moral choices to be made by a person (American Heritage Dictionary)." In other words, ethics comes from the moral philosophy of a person. Therefore, one's personal philosophy is a significant part of any discussion of ethics. Ethical perspectives can be influenced by one's family values, educational background, social learning, professional activities, religious beliefs, and individual needs.

As the importance of ethics education in science and technology has been identified, many scientists, educators, researchers have taken steps towards the establishment of ethics education. They have attempted to identify the side-effects of what science and technology may bring to human lives and educate people to prevent the harmful use of the technology. In the beginning of 1990's, Ethical, Legal, and Social

Implication (ELSI) has been identified as a growing research interest for people who are involved in the ethical aspects of science and technology in many countries, including Japan, Taiwan, Korea, and Singapore. Most of the ELSI projects have involved ethical issues in biotechnology and genetics.

This paper intends to first examine what nanotechnology is, and what are its related areas of development. Second, the paper will examine the current status of nanotechnology in those nations which have started investing in its development. Since nanotechnology is technology that is related to other types of technology, including biotechnology and information technology, it is hard to draw clear boundaries between nanotechnology and others in terms of identifying its development. Technology convergence has been identified as a universal trend; and, these technologies are very interactive among themselves. The result is that ethical issues related to nanotechnology are also related to biotechnology, information/communication technology, environmental technology, etc. Third, this paper will examine ethical issues on potential negative outcomes from development in nano-related areas. Lastly, the paper will explore efficient strategies and recommendations to educate people about the risks and benefits of technology use.

## II. NANO REVOLUTION

### *1. Nanotechnology: The possible, the achievable, and the desirable?*

The idea of atom-by-atom construction was first put forth by Nobel Prize winning physicist, Richard Feynman. Feynman suggested that devices and materials could someday be fabricated to atomic specifications, but for this to happen, a new class of miniaturized instrumentation would be needed to manipulate and measure the properties of these small-“nano-structures.” In 1981, the scanning tunneling microscope (STM) was proved to be the enabling technology by which we can visualize and manipulate at the atomic level. The STM uses electrical vibrations to move a needle-tipped device and position it with near atomic precision. At first, the STM images were only of conducting surfaces, but this limitation was overcome with the development of the atomic force microscope (AFM) in 1986, which images non-conducting surfaces with similar resolution. STM and AFM are two techniques that have become major workhorses for the characterization of nanoscale materials (IWGN, 1999b).

In the mid-1980s, Dr. Eric Drexler, a researcher concerned with emerging technologies and their consequences for the future, introduced the term ‘nanotechnology’ to describe atomically precise molecular manufacturing systems and their products. The possible developments he has identified include molecular manufacturing systems able to construct computers smaller than living cells, devices able to repair cells, diamond-based structural materials, and additional molecular manufacturing systems. The specific outcomes of the development he noted were expected to yield following consequences.

- Nearly free consumer products
- PC’s billions of times faster than today
- Safe and affordable space travel
- Virtual end to illness, aging, death
- Pollution reduction and automatic cleanup of existing pollution
- End of famine and starvation
- Superior education for every child on Earth
- Reintroduction of many extinct plants and animals
- Transforming Earth and the Solar System

In 1990, the first international conference on nanotechnology was held in Palo Alto, California, sponsored by the Foresight Institute, which was founded by Drexler and the Global Business Network. The conference was hosted by the Department of Computer Science at Stanford University. The volume that resulted from the conference presents a variety of technologies that contribute to nanotechnology,

as well as, several perspectives on the consequences of success. The discussion included atomic probe microscopes, self-assembly in molecular crystals, protein engineering, and micromachining. Although the public had not yet heard much about nanotechnology, the fever was spreading amongst scientists. By 1992, the Institute for Scientific Information noted that the prefix “nano-” was one of the most popular among new journals, including *Nanobiology* and *Nanostructured Materials*.

A National Science Foundation’s announcement noted that nanofabrication is a critical enabling technology for a wide variety of disciplines and that its development would help the nation remain at the forefront of many growing research areas. Further, the utilization of self-assembly and self-organization would further enhance the revolutionary constitution of the nanoscale devices. Many countries, companies and scientists believe that nanotechnology will be the leading technology of the 21<sup>st</sup> century, and many are investing heavily into its research. There have also been several economic indicators regarding the acceptance of the inevitability of nanomachines. Since the late 90’s there have been a number of nanotechnology start-up companies which have drawn the interest of stock market investors.

On the other hand, Drexler (1986) warned everyone to remember the three aspects of development: what is possible, what is achievable, and what is desirable in science and technology development. Achieving the expected outcomes is still in the process. Now what needs to be identified is “what is desirable?” This may depend on safety, ethical perspectives, human rights and dignity, religion, etc. The side effects from the outcomes of these potential changes need to be identified in advance as much as possible. In the following section, we will examine specific applications and their outcomes in each of the related fields of nanotechnology.

## **2. Nanotechnology and its related fields**

Nanotechnology will have a profound impact on existing and emerging technologies in almost all industry sectors. Cingolani (2002) has identified areas related to the development of nanotechnology (Figure 1). These areas include nanoelectronics, material, environment and energy, medicine and health, basic research, and aerospace.

The move from research and development to commercialization is still to come, however, the predicted outcomes of its development based on the timeframe are shown in Figure 2 below:

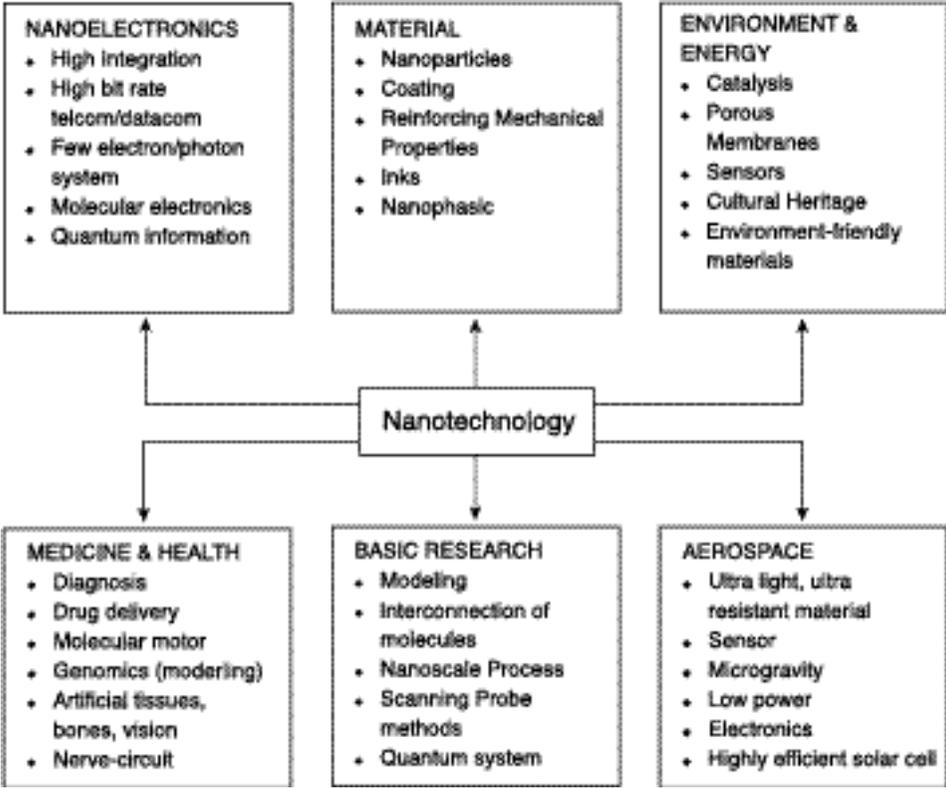


Figure 1. Trend of Nanotechnology (Cingolani, 2002)

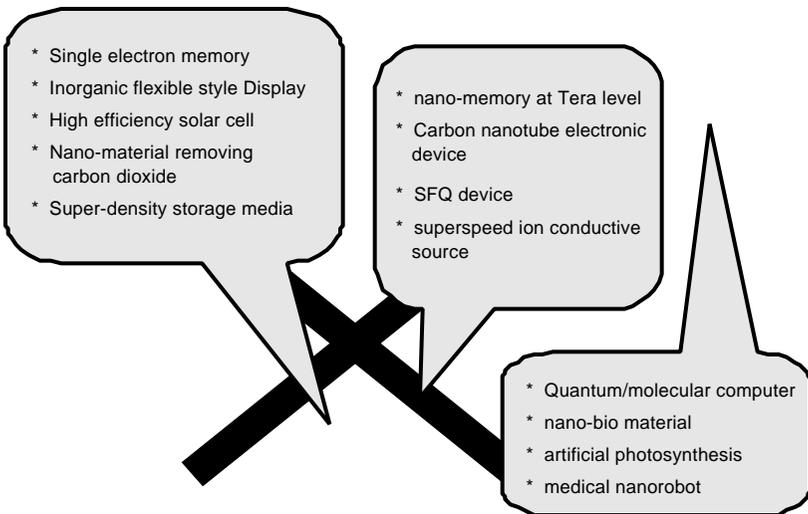


Figure 2. Expected Milestone of Nanotechnology (Park, 2002)

## **A. Material and Manufacturing**

Manufactured products consist of atoms. The properties of those products depend on how those atoms are arranged. Viewed from the molecular level today's macroscopic manufacturing methods are crude and imprecise. Casting, milling, welding and all the other traditional manufacturing methods spray atoms about in great statistical blotches.

Compared to conventional technologies, nanotechnology controls its structure at the molecular level. It's ability to synthesize nanoscale building blocks, with precisely controlled size and composition, and then to assemble them into larger structures with unique properties and functions, will revolutionize segments of the materials manufacturing industry. Nanostructuring is expected to bring about lighter, stronger, and programmable materials; reductions in life-cycle costs through lower failure rates; innovative devices based on new principles and architectures; and use of molecular manufacturing (IWGN, 1992b). It will also bring about bottom-up construction by molecular machines assembling molecular building blocks to form products, including new molecular machines. Biology shows that molecular machine systems and their products can be made cheaply, in vast quantities and at low cost (Mnyusiwalla, Daar, & Singer, 2003).

## **B. Nanoelectronics and Computer Technology**

Nanotechnology has contributed to bringing hardware advances for exponentially smaller, faster, and cheaper semiconductors that have fueled computer technology. The capacity of conventional silicon chips is still increasing. According to Moore's law, the computing power of the current chips will double every 12-18 months; however, chips can not follow Moore's law forever for both technical and economical reasons (AllchemE, 2001).

Nanotechnology is the solution for overcoming this obstacle, by utilizing nanostructured microprocessor devices for declining energy use and cost per gate, thereby potentially improving the efficiency of computers by a factor of millions. This allows for the creation of integrated nanosensor systems capable of collecting, processing, and communicating massive amounts of data with minimal size, weight, and power consumption; as well as mass storage devices that can store more than a hundred billion bytes in a volume the size of a sugar cube.

## **C. Medicine and Health**

Disease and ill health are caused largely by damage at the molecular and cellular level. Today's surgical tools are, at this scale, large and crude. It is said that from the viewpoint of a cell, even a fine scalpel is a blunt instrument more suited to tear and injure than heal and cure. Modern surgery works only because cells have a remarkable ability to regroup, bury their dead and heal over the injury.

Nanobiology is a rapidly advancing frontier. It has already catalyzed an explosion of entirely new industries in health care, medicine, food and nutrition, environmental management, chemical synthesis and agriculture. It has been predicted that nanobiotechnology will bring tremendous advances in the early detection of diseases and their treatments, and in our fundamental understanding of pathogenic pathways.

In the future, it is expected that nanotechnology will yield fleets of computer controlled molecular tools much smaller than a human cell and built with the accuracy and precision of drug molecules. Such tools will allow medicine to intervene in a sophisticated and controlled way at the cellular level (Merkle, 1996). If we have surgical tools that were molecular both in their size and precision, we can develop a medical technology that, for the first time, will let us directly heal the injuries at the cellular level that are the root causes of disease. With the precision of drugs combined with the intelligent guidance of the surgeon's scalpel, we can expect a quantum leap in our medical capabilities. This, however, is just hype, it has not been achieved as of now.

Along with these goals, advances in nanoanalytical tools and engineered nanoscale systems are converging with the rapid progress made in genomics, combinatorial chemistry, high throughput screening and sequencing, drug discoveries, micro-fluidics and bioinformatics. It is believed that the development of nanodevices that will change the face of medical diagnosis and treatment are just around the corner. For example, the development of tiny sensors is anticipated that could be placed in the human body through implantation or injection into the bloodstream (Merz, 2001). These sensors could measure the chemistry and biochemistry of the host, collecting unprecedented quantities of data, and might even be able to broadcast this information to remote receivers using wireless technique (Merz, 2001). Also, these sensors could store medical information about a person so that emergency personnel could obtain medical history even if the person is not able to convey it. It could also be a source of security and identification just as fingerprints. At this stage, it has been reported that the initial experiment on the developed tools have been completed. However, it will take some more time to become popularized. For example, the implementation of a microchip into a human has been accomplished. Called "cyborg," which is a word derived from combining "cybernetic" and "organism," such implementation allows for the wireless reporting of all medical information about the patient to physicians.

Health care and correctional professionals laud this technology, noting that people can be monitored more easily and less expensively than by institutionalizing them. Arguments are compelling when it comes to helping people with medical risk to get help quickly. Moreover, implanted chips could dispense customized amounts of drugs, (i.e., chemotherapy, insulin, dialysis), to treat patients more efficiently and less invasively, during sleep for example.

Considerable progress in this field is currently underway. The shortage of organ transplants is already a major problem that is only likely to worsen as the population rapidly ages. Efforts are thus underway to develop synthetic organs. Advances in nanoengineered materials combined with a molecular scale understanding of wound healing and tissue repair processes will be key to integrating engineered biomaterials into biological tissue and to engineering tissue and organs that will take over at least some vital functions of failing organs (Vogel, 2001). To cite a few examples of the immense effort that is unfolding in this area, 1) biocompatible sensors are being developed with the potential for use *in vivo*, 2) hybrid nano-electro-mechanical (NEMS) devices powered by biomolecular motors are being developed for application to biosensors and self-assembling, 3) sub-cellular NEMS devices are being investigated to drive a totally implantable artificial heart, and 4) highly luminescent semiconductor quantum dots have been coupled to biomolecules for use in ultra-sensitive biological detection. Further, major progress has already been made in recording from single neurons and their stimulation, and culturing nerve cells on microelectronic devices. It seems likely that technology will be able to control at least a few simple brain functions by the use of brain implants (Vogel, 2001).

It is hoped that nanotechnology will give us new instruments to examine tissue in unprecedented detail. Sensors smaller than a cell would give us an inside and exquisitely precise look at ongoing function. Tissue that was either chemically fixed or flash frozen could be analyzed literally down to the molecular level, giving a completely detailed “snapshot” of cellular, subcellular and molecular activities. Integrated nanoscale sensors could monitor the condition of a living organism, the environment, or components of the nutrient supply, sampling a range of conditions with a high degree of sensitivity. With arrays of ultra-miniaturized sensors that sample a range of chemicals or conditions, the confidence level and specificity of detection will be much greater than is now possible with separate macroscopic sensors. Sophisticated, small, and inexpensive sensors employing nanotechnology will be available to contribute in maintaining good health (Roco, Williams, & Alivasetos, 1999).

However, when it comes to health with technology, there are many ethical issues and concerns to explore, and identifying the ideal line between what is technologically possible and what is ethically appropriate is a controversial issue. Ethic concerns related to biotechnology have been dealt with throughout its development.

#### **D. Aeronautics and Space Exploration**

Another area which could benefit from nanotechnology development is space systems. Present manufacturing capability limits the performance, reliability, and affordability of space systems, but nanotechnology has the potential to produce space hardware with tremendous improvement in performance and reliability, and at substantially lower cost.

The strength-to-weight ratio and the cost of components are absolutely critical to the performance and economy of space ships: with nanotechnology, both of these parameters will be improved. Besides providing remarkably light and strong materials for space ships at low cost, nanotechnology will also provide extremely powerful computers with which to guide both those ships and a wide range of other activities in space.

Likely, the desire to send spacecraft away from the sun with diminishing solar power for extended missions, compel continued reduction in size, weight, and power consumption of payloads. The use of nanostructured materials and devices may contribute to the solutions for these challenges.

### **E. Information Technology**

Nanotechnology is stimulating significant advances in surveillance and monitoring technology. Personal video recorders can collect household viewing information. Constant monitoring of individuals is now possible, from credit ratings, financial transactions, health records, police files, cameras in public spaces, to marketing surveys for gauging consumer preferences. More importantly, increasingly sophisticated new data processing technology enables the effective sorting of large amounts of information, and provides the ability to track individuals as they navigate their way through networks like the internet (Lyon, 2001).

### **F. National Security**

Nanotechnology is important in the field of national security. Rapid and inexpensive manufacture of great quantities of stronger and more precise weapons is guided by increased computational power. Many potential defense applications are available including information dominance through advanced nanoelectronics, virtual reality systems based on nanostructure electronics that enable more affordable, effective training; enhanced automation and robotics to offset reductions in military manpower, reduce risks to troops, and improve vehicle performance; higher performance military platforms that provide diminished failure rates and lower life-cycle costs; improvements in chemical/biological/nuclear sensing and casualty care; nuclear nonproliferation monitoring and management systems; and lastly, combined nanomechanical and micromechanical devices for control of nuclear defense systems (Petersen & Egan, 2002).

In more unconventional forecasts, bionanobots might be designed that when ingested from the air by humans, they could assay DNA codes and self-destruct in an appropriate place, probably the brain, in those persons whose codes had been programmed. Nanobots could be designed to attack certain kinds of metals, lubricants, or rubber, destroying conventional weaponry by literally consuming it. From a defense perspective, new realms of clothing would be possible, such as smooth, strong fabrics; sensory enhanced garments of fibers mixed with nanochip,

and able to absorb or reject chemical agents or toxins. These are potential applications; they will take some time to be brought to fruition.

## **G. Environment and Energy**

Nanotechnology has the potential to significantly impact the generation and remediation of environmental problems through understanding and control of emissions from a wide range of sources, development of new green technologies that minimize the production of undesirable by-products, and remediation of existing waste sites and polluted water sources. Removal of the finest contaminants from water supplies (less than 300 nm) and air (under 20 nm), and continuous measurement and mitigation in large areas of the environment, are envisaged (Flagan, 1999). In addition, the development in nanotechnology might offer fundamentally new ways to manufacture new chemicals and pharmaceutical products; measure, control, and remediate contaminants in various media; and contribute to dematerialization resulting in less environmental impact from the extraction, transport, manufacture, use and disposal of materials.

Conventional processing creates many by-products, which can have an enormous impact on the environment and add to the costs of purification and pollution control. However, highly specific catalysts that would generate only the desired product, in emulation of biological enzymes, require nanostructuring. Nanotechnology application in energy and environment may involve challenges in three areas: pollution sensing and detection, pollution prevention, and energy conversion.

### *a. Pollution sensing and detection*

It is well understood that long-term exposure to fine particulate matter is a significant risk factor for cardiopulmonary and lung cancer mortality in humans. In urban air, fine particulates typically exhibit a maximum in both number and mass in the 100 to 300 nm diameter range (Johnston, 2002).

Rapid and precise sensors capable of detecting pollutants at the molecular level could greatly enhance our ability to protect human health and the environment. Major improvements in process control, compliance, ecosystem monitoring, and environmental decision-making would be possible if more sensitive and less costly techniques for contaminant detection were available. Of particular interest are continuous monitoring devices capable of yielding real-time information, and also those that can detect pollutants (Masciangioli, 2003).

The threat of heavy metal pollution is a serious environmental concern because the toxicity of such metals on living organisms, including humans, and because the consequence of heavy metals is not biodegradable. Due to the difficulty in the remediation of sites contaminated with heavy metals, there is an urgent demand for an onsite sensor capable of detecting heavy metal ions before the concentration reaches a dangerous level.

A nanocontact sensor has been developed which has the potential for detecting even a few metal ions without preconcentration and is particularly suitable for onsite detection of heavy metal ions, including radioactive elements (Tao, 2002). Nanocontact sensors can be extremely sensitive with the potential capability of detecting a few metal ions, and the sensor can be miniaturized and automated, making it conducive to onsite field applications. Because the sensor is fabricated with conventional microelectronic fabrication facilities and relatively simple electrochemical techniques, it should be cost effective. Although it has not taken place yet, it is anticipated that the sensor will lead to the early warning and prevention of heavy metal ion pollution (Tao, 2002).

#### *b. Pollution prevention*

Pollution prevention refers to source reduction and other practices that efficiently use raw materials, energy, water, or other resources to reduce or eliminate creation of waste. This strategy also includes using less toxic and renewable agents and processing materials, where possible, and the production of more environmentally benign manufactured products (Masciangioli, 2003). Nanotechnology could play a key role in pollution prevention technologies. For example, nanotechnology-based home lighting could reduce energy consumption by an estimated 10%. Nanostructured catalysts can make chemical manufacturing more efficient by providing higher selectivity for desired reaction products (Masciangioli, 2003).

Nanotechnology applications could also help create benign substances that replace currently used toxic materials. For example, nontoxic, energy-efficient computer monitors are replacing those made of cathode ray tubes (CRT), which contain many toxic materials (Socolof, Overly, Kincaid, & Geibig, 2001). Newer liquid crystalline displays are smaller, do not contain lead, and consume less power than CRT computer monitors. Using carbon nanotubes in computer displays may further diminish environmental impacts by eliminating toxic heavy metals and drastically reducing material and energy use requirements, while providing enhanced performance for consumer needs. Field emission displays (FEDs) that use carbon nanotubes are the latest development in display technology.

The ability to incorporate nanoscale inclusions in composites has the potential to produce materials with improved properties and tailored to specific applications such as improved filter systems. This could produce systems with increased environmental robustness, resulting in longer service life, reduced overall system costs and replacement needs, and reduced environmental impact. It is apparent that nanotechnology has the potential to produce lighter, smaller structures, resulting in systems with reduced energy consumption and substantially enhanced environmental quality through pollution prevention, treatment, and remediation.

### *c. Energy conversion*

The use of energy, such as electricity and fuel for transportation, is responsible for an enormous and adverse impact on the environment. Nanoscale systems offer the potential for renewable energy conversion systems with much less waste production; when this potential is coupled with improved batteries or fuel cells having nanoscale or mesoscale electrodes for energy storage in transportation, the positive impact on the environment could be tremendous (Flagan, 1999). Another example would be removal of greenhouse gases from the atmosphere cheaply and efficiently.

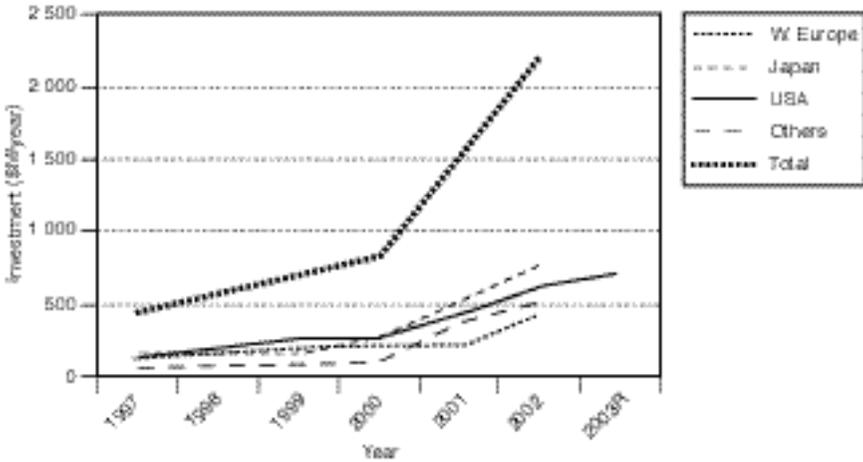
### ***Conclusion***

As examined in this section, there are many possibilities in terms of what nanotechnology can bring to quality of life. Many facets of human lives, directly or indirectly related, could change with the development of nanotechnology. So far, we have explored what is expected to be “possible” in terms of what nanotechnology can bring to us. Still, many or most of these outcomes have a long way to go for achievement.

Secondly, it is a global trend that technologies do not only advance within their sole field, but also work in interaction with other types of technology. For example, as information technology is incredibly diffused to all industries, the boundaries between technologies are collapsing and the most advanced countries focus on fusing different technologies, especially information technology, biotechnology and nanotechnology. This “Technology Convergence” is seen as a key to develop the industry and extend its influence to others. In the next section, we will examine major nations in Asia in terms of government funding, research and development of nanotechnology.

### III. NANOTECHNOLOGY IN ASIA-PACIFIC NATIONS

Nanotechnology is a prime example of the global spread of research and development. The worldwide nanotechnology research and development investment reported by government organizations has increased approximately five times in the last five years from 1997 to 2002 (see Figure 3). The United States, Japan and Europe all are world leaders in this area (IWGN, 1999a). Other countries also have been making vast investments in this field from the national level.



**Figure 3. Government Funding for Nanotechnology (Roco, 2002)**

At least 30 countries have initiated national activities in this field. A series of interdisciplinary centres with nanotechnology activities has been established at many universities, creating a growing public research and education infrastructure for the field. The worldwide annual industrial production in the nanotechnology sectors is estimated to exceed \$1 trillion in 10-15 years from now, which would require about 2 million nanotechnology workers (Roco, 2002).

There is no question that the spending for research and development of nanotechnology in different countries indicates its considered importance in the current technological revolution that is underway. As the 21<sup>st</sup> century unfolds, nanotechnology’s impact on the health, wealth, and security of the world’s people is expected to be at least as significant as the combined influences in this century of antibiotics, integrated circuits, and other advanced materials.

Development of nanotechnology will enable us to enhance people’s quality of life in terms of general safety issues. For example, one of the biggest health problems in developing countries is trauma, especially from road traffic accidents, combined

with an shortage of rehabilitation facilities. Better nanomaterials for making safer tires, or nanotechnology-based scaffolds to grow new bone, may be extremely helpful in application to this problem, especially if the promise of mass production at very low cost materializes.

The Asian region has emerged as a leading centre for nanotechnology. Government, industries and the business sector have shown a strong ambition towards pushing their countries into the nano-future. Total spending across the region in nanotechnology significantly exceeded USD \$1 billion in 2002, with more than half that total coming from Japan. In particular, Japan, China, Taiwan, Australia, and Korea have significantly expanded efforts and augmented budgets compared with 2001 (ATIP, 2003). Spending in China is much smaller, but China appears to be leading the world in sheer numbers of new nanotechnology companies; more than 300 firms are currently working in nanotechnology. Taiwan, Australia, and Korea all support vibrant nanotechnology programmes and feature a rich technology infrastructure. Singapore and India have launched national nanotechnology programmes, and Thailand, Malaysia, and New Zealand have also announced significant new efforts in nanotechnology.

The 1<sup>st</sup> International Conference on Nano-Micro-Interface (NAMIX) was successfully held in Berlin on May 26-28<sup>th</sup> 2003. Dr. Liu presented a comparison of nanotechnology funding for 2003-2007 among seven Asia countries. China, Republic of Korea, India, Malaysia, Singapore, Taiwan and Thailand are all making strong and long-term commitments to nanotechnology research and development. The following table is the summary of Asian Nanotech Government Funding Comparison for 2003-2007.

<i>Country</i>	<i>Population</i>	<i>Funding (5Y)</i>	<i>Priority</i>	<i>Policy Characteristics</i>
China	1.2 bil	300 M+	M, ME	Natl & region Centres
India	1.0 bil	20 M	M, MEMS	Not yet coordinated
Rep. of Korea	48.3 mil	1 B	M, E	Natl & region Centres
Malaysia	21.8 mil	23 M	M	Natl Centres
Singapore	4.2 mil	60 M	M, E	bottom up still
Taiwan	21.5 mil	500 M	M, E, Bio	stress on education
Thailand	62 mil	25 M	M, MEMS	Nat'l centre

M-Materials, ME-Molecular Electronics, E-Electronics

**Figure 4. Asian Nanotech Government Funding Comparison for 2003-2007**

The following are country reports of five leading nations in Asia-Pacific in terms of research and development in nanotechnology.

## **Japan**

Current Japanese national policy on science and technology is based on the Science and Technology Basic Law (STBL, law no. 130), which establishes basic policy requirements for the promotion of science and technology, and emphasizes promoting policies for their progress. The objective of this law is (a) to achieve a higher standard of science and technology to contribute to the development of the economy and society in Japan and to the improvement of the welfare of the nation, as well as (b) to contribute to the progress of science and technology in the world for the sustainable development of all human society.

Japan's STBL identifies nanotechnology as a major field for concentration, along with the life sciences, information and communication technologies, and the environment. Japan has been investing in nanoscience and technology science since the mid-1980s with various national programmes, each covering a five to ten-year plan. Its government funding for nanotechnology per capita has been the highest in the Asia-Pacific region and the world. Its funding for 2002 has been increased about 20-30% from 2001 (Liu, 2003).

Japan already occupies a considerable market share in nanotechnology. It has become the worldwide supplier of the carbon nanotube (CNT), which was discovered in 1991 by Japanese scientist, S. Iijima. Carbon nanotubes are arrangements of carbon atoms that are formed into tiny tubes about a millionth of a millimeter in diameter. They possess interesting properties, including tremendous strength and the ability to act as either a conductor or a semiconductor, and therefore, are related to the various field of nanotechnology. To expand the avenues of potential applications of carbon nanotubes, various research projects have been launched to investigate the properties of the new material by various groups of laboratories in both the public and private sectors. As a result, a great many research products have been gained, for example, the discovery of a new type of one-dimensional (1D) carbon structure through a carbon nanotube in 2003. Carbon nanowires have possible uses as nose tips for space shuttles, materials for ultrastrong fibers, friction-free rotational nanobearings, probes, emitters, and even highly coherent point sources of monochromatic electron beams.

Along with development of carbon nanowires, a scanning tunneling microscope (STM) has been much researched for analyzing and manufacturing nanoscale, nanoelectronic devices such as single electron device, and nano-material, etc. (Park, 2002). In 2002, by arranging nanoscale particles of resin in an orderly fashion, scientists in Japan created a procedure that could potentially lead to a simple way to fabricate tiny functional devices, including switches and sensors. Arrays of such functional resin nanoscale particles could be interconnected to create miniature

sensors and electronic devices in various shapes. Also, a method for the manufacture of diamond structures that allows for sharpening to a fine tip measuring just 2 nm in a diameter – five times sharper than diamond needles made using conventional techniques – has been developed. Diamond has excellent properties for use in electronic devices, and the thinner the diamond the better the performance. The new manufacturing method is thus considered a promising way to fabricate diamond needles for use as electron emitters in field-emission devices for flat-panel televisions, as well as for high-frequency components in cellular telephones and other wireless devices.

Another area in which Japan has significantly shown improvement is research in nanofabrication technology. It started with the Japanese Technical Literature Act of 1986, wherein the Secretary of Commerce required annual reports regarding important Japanese scientific discoveries and technical innovations in such areas as computers, semiconductors, biotechnology, robotics, and manufacturing. The public-sector funding mechanism in Japan, especially through the Ministry of International Technology and the industry's network of academic, government, and corporate research advisors and its project-oriented research and development strategy, is in a unique position to recognize and contribute to the fundamental knowledge base of this emerging discipline.

## **China**

Nanoscience and nanotechnology have received increased attention in China since the mid-1980s (IWGN, 1999a). China has been advancing rapidly in nanoscience and technology development in the last few years with increased government allocation of funds and coordinated programmes. China is budgeted to spend USD 250-300 million during 2001-2005. More aggressive initiatives are about to launch as the National Nanotech Research and Development Centre is currently being built near Beijing University, Tsing Hua University, and The Chinese Academia of Science (CAS). They are expected to be completed in 2 years and their main areas of strength are development of nanoelectronic devices and nanomaterial (Liu, 2003).

Asian research activities, especially in China, are principally focused on carbon nanotubes (CNTs). Other activities include the formation of carbon structures with nanoscale porosity of channels and the use of nanoscale carbon materials as catalysts in synthesis and processing of other nanoscale materials. In 2000, China produced single-walled carbon nanotubes that can store and release hydrogen in significant quantities at room temperature. These nanotubes are also reusable, which is an exciting step towards making hydrogen energy available for daily use in future. Also in 2000, China synthesized carbon nanotubes with a diameter of 0.5 nm, the thinnest academically recognized particle at that time, using an anode filled with carbon nanotubes and the arc discharge technique.

In 2002, the thread-making method was discovered. After developing a method of growing closely packed, vertically aligned arrays of carbon nanotubes on silicon surfaces, they attempted to pluck a clump of nanotubes from an array. But instead of cleanly capturing a clump, they found they were pulling continuous threads of nanotubes.

In 2003, local doctors treated 18 patients with bone disease by implanting a new type of artificial bone developed by Chinese scientists with nanotechnology. What makes the new technology different from traditional therapies is that the artificial structure planted in the human body disintegrates gradually over a period of time.

There is an increasing number of registered nanotechnology firms in China. Currently, there are over three hundred nanotechnology companies, most of which were established in 2000-2002. The majority of these companies are small and were created with modest investment. However, most of them have revenue streams to support their research and development efforts. Sales to date have been largely domestic, but several firms are now taking advantage of modern communication technologies in an effort to reach global markets (ATIP, 2003).

## **India**

Unlike other countries in the Asia and Pacific region, in India, private companies have largely sighed away from investing in research. Universities and national research centres have usually worked in isolation. This lack of synergy and cooperation between the two sectors has hindered the growth of inventive technology. Private companies have, at most, worked with university labs in consulting mode, where a short-term interaction has been sought for solving a well-defined problem, mostly of a trouble-shooting nature. This sort of interaction has never blossomed into a relationship with a long-term vision for research driven product or technology development.

Recently, the Indian government has started the Nanoscience and Technology Initiatives. Various funding agencies such as Department of Science and Technology (DST) and the University Grants Commission (UGC) have launched large nanoscience research programmes. The main nanoscience research has been conducted at institutions such as the Indian Institute of Science (Bangalore), Indian Institute of Technology (Madras, Chennai, Kharagpur, Bombay, Mumbai, New Delhi), Central Electronics Engineering Research Institute (Pilani), University of Pune, Solid State Physics Laboratory (Delhi), Tata Institute of Fundamental Research (Mumbai). Recently a number of institutions such as, Raman Research Institute (Bangalore), National Chemical Laboratory (Pune), Central Glass and Ceramic Research Institute (Jadavpur), University of Delhi, University of Hyderabad, have also begun more coordinated nanoscience and technology research.

In 2000, government launched a USD 15 million fund for a five-year national programme on Smart Materials coordinated by 5 government agencies involving 10 research centres across India with a key focus on Micro-Electro-Mechanical Systems (MEMS) technology, which is the integration of mechanical elements, sensors, actuators, and electronics on a common silicon substrate through microfabrication technology. The Nanomaterials topics include nanostructure synthesis and characterizations, DNA chips, nanoelectronics, and nanomaterials. In 2002, the Department of Science and Technology launched the National Nanotech Programme with total funding of USD 10 million committed over the next 3 years. The Indian Institute of Science (IISc), known as Knowledge Hub of India, was awarded USD 1.0 million for its Nanoscience Research Centre.

Unlike China, widespread use of English language in India makes India much more accessible to the Western world, drawing investment and global cooperation opportunities. For example, the IndiaNano, a platform recently established by the US and Indian US Community in the Silicon Valley together with Indian R&D community, is trying to coordinate the Indian academic, corporate, government, and private labs, entrepreneurs, early-stage companies, investors, IP, joint ventures, service providers, start-up ventures, and strategic alliances. However, it is still reported that despite the fact that the Indian science, technology and business network is spread worldwide, international cooperation is not as smooth as in other countries because a problem persists in obtaining necessary visas.

### **Taiwan (China)**

Taiwan's major nanotechnology research effort is in the area of miniaturization of electronic circuits. The Taiwanese government has launched its ambitious National Initiative on Nanoscience & Technology in 2002. This is a 5-year plan with a total budget of USD600 million from 2002 to 2007 (Liu, 2003).

In 2001, Taiwan made progress ironing out the basic design rules for 0.10-micron process technology. In 2002, single-electron transistors and memory cells from gold colloidal islands linked with C<sub>60</sub> derivatives were created. Researchers combined top-down electron-beam lithography and bottom-up nanophased material synthesis techniques to create these devices.

In 2003, scientists in Taiwan developed polycrystalline alloys with new compositions and structural states, the first of their kind in the world. Researchers successfully produced "nanostructured high-entropy alloys" – metalware products forged at high temperatures, with enhanced hardness, durability, wear-resistance, along with opto-electric and magnetic properties.

### **Republic of Korea**

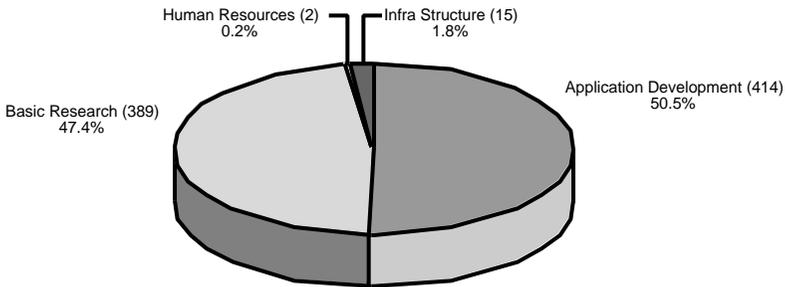
In March 2002, the Korean government published a comprehensive report on the Korean nanotechnology programme, entitled "2002 Nanotechnology Development

Plan to Be a World Leader in Nanotechnology.” The report was prepared by eight funding agencies and covers a ten-year programme that began officially in 2001. According to this report, the decade-long programme will be allocated from governmental agencies a total of USD \$820 million, and from private industry a total of \$418 million. South Korea has committed 2.391 trillion won (USD 2 billion) over a ten-year period from 2001 to 2010. The increase in government spending in nanotechnology for 2002 compared with 2000 is about 400 percent (Liu, 2003). South Korea has focused on fields with promising potential markets. For example, they allocated about \$10 million per year for the next ten years in nanoelectronics memory chips (Roco, 2002).

In 2001, South Korea made nanotube field-effect transistors in bulk by growing them in vertical bunches, they then used electron beam lithography and ion etching to make the source, gate and drain electrodes that control the flow of electrons. These high-density arrays of transistors can be controlled with very little energy.

In 2002, a promising new method for the synthesis of highly crystalline, uniformly sized maghemite (Fe<sub>2</sub>O<sub>3</sub>) nanoparticles was devised. Such magnetic nanoparticles are of interest for a host of applications, including medical imaging and drug delivery. South Korean scientists are also hailing another advance in tailoring carbon nanotubes; the long thin structures that many are looking at as the building block for the next generation of nanoscale devices.

Korea’s Nanotechnology Plan is divided into three segments: 1) basic research, application and development, 2) construction of facilities (infra structure), and 3) development of human resources. The bulk of the funding will directly support research and development activities, which will continue to take place at universities, governmental laboratories and private industries.



**Figure 5. Investment Categories in Nanotechnology (KISTEP, 2002)**

## **Singapore**

Singapore, with full support of its government, started to accelerate the promotion of nanotechnology business. In January 2002, the Nanoscience & Nanotechnology Initiative (NUSNNI) was established in the National University of Singapore. Area of strength is the development of nanomaterial (Park, 2002).

In 2003, Singapore employed nanotechnology in the development of methods for diagnosis and subsequent possible therapies. Materials Research and Engineering (IMRE) and the National University of Singapore researchers have worked towards creating a nanotechnological platform, or lab-on-a-bead, for multiplexed analysis of biomolecules. The multidisciplinary team has managed to “bar-code” DNA and proteins, using tiny light-emitting crystals known as quantum dots. By embedding quantum dots into microbeads, bearing short strands of DNA, the researchers created labels that can recognize particular DNA molecules of interest and tag them with a unique identification code. These crystals can be tailored to give off light when certain disease-causing genes or proteins are detected.

## **Australia**

The National Research Council (NRC) of Australia has sponsored various aspects of research and development in nanotechnology since 1993 and Australia is becoming more aggressive in pursuing nanotechnology, focusing on fields with potential markets (IWGN, 1999a). Australia’s capabilities in nanotechnology reside mainly within its public-sector research institutions; its universities, the Commonwealth Scientific and Industrial Research Organization (CSIRO), and the Cooperative Research Centres (CRCs). Several recent ventures are helping to form a strong nanotechnology network in Australia. The government-funded Australian Research Council (ARC) has devoted one-third of its funds in 2003 to four priority areas of research, one of which is nanotechnology.

Australia is competitive in advanced materials, such as bio-health and mimetics, with strengths in biology and environmental science, however, Australia’s nanotechnology efforts are approximately the size of those of Taiwan or Korea. In most areas of nanotechnology, the Australian private sector is lagging behind those of leading Asian countries.

Australia is well placed to offer services at reasonable cost. In a previous evaluation, costs in Australia were found to be between 40-70% of US costs (Fowler, 2003). The bottom line is that Australia is highly cost-competitive after India and Indonesia. Many researchers and scientists are exploring various ideas to bring development in nanotechnology and to further provide solutions for the international alliances that nanotechnology demands (Fowler, 2003).

### *Summary and Conclusion*

In summary, Asian-Pacific countries can be divided into two groups depending on the timing of their involvement in the nanotechnology research and their development activities. The first is composed on Japan, China, Taiwan, Korea, Australia, Singapore, and India, and the latter is composed of Thailand, Malaysia, and New Zealand.

Overall, two interesting trends have been reported (ATIP, 2003). Firstly, national support and financial budgets have been increasing gradually and competition among the nations is becoming more dynamic. Total spending within the region on nanotechnology research and development exceeded USD 1 billion in 2002, particularly in Japan, China, Taiwan, Australia, and Korea have significantly expanded efforts and augmented budgets compared with 2001.

Secondly, the spread of information internationally has become a priority. Nanotechnology conferences, workshops, symposia, and exhibits are proliferating in an almost uncontrolled manner. In addition to the obvious benefits of ready access to current technical information, these various meetings and events have done much to inform the nanotechnology community of initiatives and government programmes within each of the participating countries. Such activities contribute to strengthen the international activities where researcher and technologists share ideas, approaches and results. These activities facilitate the development of technology and also encourage the bringing of efficient ideas for relevant issues into life.

Lastly, among the developed countries in Asia, Japan and Korea are engaged in the development of technology convergence. Japan and Korea are now keeping pace with the countries with advanced status of technology convergence, that is, the USA and European countries, including England.

#### IV. ETHICAL ISSUES OF NANOTECHNOLOGY IN THE ASIA-PACIFIC REGION

In the 1980s, nanotechnology was considered a revolutionary scientific and engineering venture that would invariably impact the existing infrastructure of consumer goods, manufacturing methods, and materials usage. Not surprisingly, those potential benefits have dominated scientific and mass media coverage of nanotechnology. However, any technology can be a double-edged sword, and environmental and safety concerns pertaining to the consequences of the development of nanotechnology only recently have been discussed in the mainstream media.

The invisible nature of nanoscale materials has fed fears that nanotechnology will lead to a significant invasion of privacy. Prospects of micromobility, autonomous operation, and self-replication have fueled additional concerns that such a technology could spin out of control with dire consequences for society. For example, Bill Joy, in *Spectator*, stated that “grey-goo would surely be a depressing ending to our human adventure on Earth, far worse than mere fire or ice, and one that could stem from a simple laboratory accident.” Highfield (2003) also commented on this saying that “the idea that humans have the ability to shuffle nature’s building blocks more than nature herself already has is entirely potty.”

The initial ethical issues associated with nanotechnology have to be identified along with discovery and development as it changes human lives and the way the world is. One needs to keep in mind three things before we discuss ethics vis-à-vis nanotechnology. Firstly, as with any technology, there is nothing intrinsically good or bad about nanotechnology, it all depends on how it is used. Thousands of years ago, ancestors found that fire was good for staying warm, for sterilizing food and making it tastier, only to find out later that, it could also burn people, torch their houses and ruin their crops. The initial purpose of most new technologies is always sound. However, often they are later found to have negative aspects as well. Therefore, when one explores ethical aspects of a new technology, it is wise to focus on the potential ill uses and negative side effects of the technology, in hope of identifying preventative measures.

Secondly, when it comes to discussing ethical issues in nanotechnology, they overlap with those of other technologies, including information and biotechnology technologies. As mentioned before, nanotechnology is diffused into all industries, the boundaries between technologies are collapsing, and the most advanced countries are focusing on fusing different technologies, especially information technology, biotechnology and nanotechnology. Nevertheless, a study of nanotechnology’s ethical, environmental, economic, legal, and social implications is lagging far behind the science.

Third, when one talks about ethics, it has different definitions for all individuals, and, in a broad sense, all nations. People perceive ethics with different weight based on cultural background, people's belief systems, traditions, developmental growth, etc. Ethics has a lot to do with one's and the nation's moral philosophy. Hence, ethical perspectives on the development of science and technology can be influenced by family values, educational background, social learning, professional activities, religious beliefs, and individual needs.

Therefore, ethical perspective is not something that is grasped at once, but grows with education, exposure and indirect/direct experiences. It takes time to gain ethical insights and grow one's own ethical views on the various issues derived from the development of science and technology. This is achieved through constant self-inquiry, and exploration of potential outcomes and their justifications. Until now, priority has been for development firstly, and ethical issues have been largely ignored. However, with time, many scientists, educators, researchers are identifying the need to look into the pertinent ethical issues of development.

### *1. Attitude towards ethics in Asia-Pacific*

Asia is composed of countries with rediscovered national potentialities, renewed energy and a proper work ethics. It is an area dominated by the economic giant Japan, with newly industrializing countries developing at a very rapid rate. Japan's recovery after World War II was sparked by a national determination to excel again in the world through means other than military might. The Republic of Korea was a very poor country when liberated from colonial status in 1945, soon divided into two parts by the superpowers, and devastated by the Korean War. Nevertheless, Koreans' traditionally high educational zeal, combined with their indomitable will for modernization and prosperity, have made their country a good model of economic development. Taiwan is another example of a newly industrialized society. Since 1949, Taiwan reformed and reorganized its society and made it a showplace of economic development.

All the economically viable countries in this area, including Singapore, Hong Kong, Malaysia and Thailand, have some common traditional characteristics in Confucian ethics and close-knit family systems. These are the foundations of the spirit of industry, harmony and order that contribute to high economic incentive, organic relationship of men, and the peace of society.

It is the cultural characteristics that oriental countries stress, the spiritual realm of man and society, which make pursuing technology development for national growth a priority. The factors that have contributed towards many countries in Asia becoming developed are strong work ethics and putting the needs of society before individual needs and rights; this has been the trend for many years. Although new generations are still practicing their rationale in terms of what is appropriate or not, the society is heading for the development of technologies.

In all facets of technology development, Asian countries had a later start than Western countries. Human rights, equity, privacy, security – all ethical issues are related to economical status and survival needs. When it comes to educating about the ethics of technology, one may have to establish a philosophy of ethics first. In situations where people are eager to participate for a free lunch, regardless of the research outcomes, ethical issues of research subjects is not the primary consideration. Therefore, ethics education should be targeted at the scientists, researchers and nano-developers in terms of the consequences and potentially ill-effects of technological development.

## ***2. Research Ethics and Nanobiotechnology***

Nanotechnology can be beneficial for prevention, diagnosis, and treatment in health. It is good news that development of nanotechnology aids early diagnosis and enables better treatment, with transplants and cellular repair systems. Some avenues of research in nanotechnology include the incorporation of artificial materials or machines into human systems, as is beginning to happen with implanted computer chips. Still, many people have skeptical views on modification of living systems, and, especially the prospect of implanting artificial materials or machines in humans.

While this technology promises tremendous improvement in the quality of life for some patients, it will be the task of the government to regulate experimentation. In the case of the fabrication and usage of brain implants, implications may go beyond considerations of safety and ethics. For instance, current law considers whether crimes are conducted under the influence of drugs. In the future, one may have to ask whether a person's state of mind has been impacted by the influence of externally addressable brain implants and, if so, who is responsible for their actions (Vogel, 2001).

For technology to be refined there has to be a room for constant research and development. There may be two ethical aspects in the development of nanotechnology when it comes to research: who participates in the experiment and how it is done. In the case of Asia, the people with low socio-economic status are often the research subjects. Usually, researchers provide incentives to people who are willing to participate, and these subjects willingly accept payment for their participation. In case of India, for example, many dead bodies are sold to medical institutes for clinical training and study. This is not quite ethically desirable, but the pattern between demand and supply seems to be set.

When it comes to nanobiotechnology, the characteristics of research are large in the sense that it needs a large quantity of samples. Moreover, those who participate are often those medically desperate enough to take the implied risks. Even the clinically proven medical or surgical interventions have uncontrollable side effects following treatment – research interventions are often more risky. Researchers must

be aware of potential side effects, especially when the results are not supporting the hypothesis.

### ***3. Global Power***

National security, both economic and military, is a vital part of governmental concerns that will be impacted by the anticipated discoveries and developments in this field. Competition for economic security also represents an important aspect of nanotechnology, augmenting military security and defense capabilities. One should remember that unbalanced development in nanotechnology among different countries may yield to a breakage of harmony in the international security, further threatening misuse of the technology. Nanotechnology development will enhance automation and robotics offsetting reductions in military manpower, and the performance of military platforms. In positive ways, nanotechnology developments may contribute to improvements in chemical/biological/nuclear sensing capabilities. However, this can be used only by powerful nations to monitor others from gaining any such power, further yielding an even more uneven power relationship for undeveloped nations. Unlike the past when East Asia was far behind the West in the 70's and 80's, there is now a gap between nations within Asian-Pacific. Therefore, there is the possibility that nations possessing military power may use it against those who do not have it.

### ***4. Equity in technology***

Nanotechnology development may yield the uneven utilization of technology on both national and international levels. Who will benefit from advances in nanotechnology? Will it be just another way for rich nations to get richer, or should we be taking steps now to ensure the developing and underdeveloped countries can participate?

In Asia, there is already a great gap between the undeveloped and developed countries. Japan, Taiwan, Singapore are countries which have fairly well established welfare systems, where as Nepal, India, Pakistan, Sri Lanka are still suffering from uneven welfare provision. Therefore, it can be an ethical concern to prevent the global "nano-divide" from further contributing to uneven power and wealth distribution.

It is of concern that there could be conflict and competition between the developed and the developing world. Those who participate in the nano revolution stand to become not only wealthy but also powerful. Some developing nations may well grow into major economic and, potentially, military powers. Most of the developing world is going to be faced with exploding populations, hunger, abuse of the environment, and political instability. Nanotechnology could act as a catalyst for national development and there could be unequal progress between the developed and non-developed countries causing the gap in living conditions and the provision of social welfare to widen.

Due to unbalanced development in technology, medical benefits in Asia have been limited. This has led to the comparatively larger gap between the rich and the poor within nations, and in broad sense, between nations as well. At this point, medical benefits that result from nanotechnology development will be very good news for those who can afford it. In a long run, such equipment and devices may be available for many people, but as of now, it is only for those who can financially afford it. It is natural that development of high-tech equipment will not be cost-reasonable since so much investment is made in nanotechnology. That means, in the countries like India and China, where people have difficulty with basic daily needs, advanced high-tech medical diagnosis and treatment technologies with nano-devices will be a long time in coming into popular use.

### **5. *Privacy vs. Family Values***

With the development of nanotechnology, information management has been improved. Privacy is generally defined as the right to be let alone and the right to control the flow of certain kinds of personal data. As a precondition of trust, privacy is an essential ingredient in a society where 'social capital' is required for stimulating innovation. A society with strong social capital is one where social trust facilitates co-operation and networking for mutual benefit (Coleman, 1998).

Nanotechnology can bring tremendous benefits to individuals. It can also have devastating effects on maintaining social capital. Now, a chip, called cyborg, is available to be inserted in the human body to track all the medical information about the person. Someday, people might be able to carry around a DNA chip in their wallet, of course, accompanied by the risk of having it misused by another person. This may be very convenient, but it also creates the risk of the wrong use of the information. When medical information is misused by medical professionals and staffs, questions may arise on ethical, social and legal issues (Mnyusiwalla, Daar & Singer, 2003). For example, information can be released to insurance companies unintentionally. This raises questions concerning privacy issues: about how we will be able to protect ourselves from those who already have access to all our personal information.

The question may be: Who has access to the information? The opportunity and the challenge that we face, as we begin our research and development of nanoscience in information technology, is to ask these questions at an early stage of our work so that serious moral dilemmas can be averted. The time is short, as progress in this field is expected to be extremely fast (Merz, 2001).

Former US House of Representatives speaker Newt Gingrich, urging federal government support, says that "a nano-virus could kill more people than a global thermonuclear war." Privacy and civil rights groups worry about misuse of the technology. The potential power of some people over others is crippling scary. Will we have a new generation of slavery, where those deemed of superior

augmented intelligence make those with more brawn than brain do the physical work of the world more efficiently and effectively? Or will all parents voluntarily microchip their babies at birth, in order to ensure the best possibilities for their progeny, and to provide governments with data about our needs?

Astrophysics Professor Gregory Benford says that to guard us from intrusions developed by half of the world's programmers, the other half will be working on devices to protect our privacy. This is such an irony. The privacy and ethics debate will continue to rage on about all aspects of new technology as long as they continue to be produced. Much more societal resources need to be allocated for examining these impacts before things get out of hand. There is no stopping the future. There is no denying its wonderful and yet scary possibilities. However, we need ethical guidelines to protect our individual rights and freedoms, and legal processes need to be set in order. As of now, no law deals adequately with the potential impact of this new technology.

Ethical issues on privacy have well considered for other perspectives of Information Communication Technology, like confidentiality. Likely, the ethics issues concerning nanotechnology will also merit such consideration. Many medical professionals and related personnel were glad to hear the news about potential availability of information tracking nano-device within the human body. Now, the question is who will have access to it and how will they be controlled?

Unlike Western countries, Asian culture emphasizes family values and belongingness. Confusion may arise between privacy and family values, as it has always been an ethical conflict when it comes to medical matters. There long has been controversy on the family's right to know of a loved one's medical condition, as opposed to the individual's right to privacy. It is often the case that patients do not know of their own illness, because the family, for the sake of keeping the patient "emotionally healthy," withholds critical medical information.

Even when the patient is over 18 years old, guardians and close relatives are involved in consultations with the physician. In other words, with so much information available using high-tech diagnostic and sensing devices, all the possible information on one's body might be available to be shared. Since it is the Asian value that families are invited into decision-making processes, and that confidentiality is not such a strict concept, there is a good possibility that all of one's medical information could be released to those who claim to have the right to know. Further, with developing information technology, there is greater accessibility and storage capacity for individual information, therefore appropriate solutions have to be developed to keep this information from being exposed inappropriately.

## 6. *Environment*

Nanotechnology offers great promise for delivering new and improved environmental technologies. Developed nanodevices are used in manufacturing rapid and precise sensors that are capable of detecting pollutants at the molecular level, further protecting human health and environment. The nanodevices are also used to manufacture household and ecosystem-related technologies, helping to reduce or eliminate of creation of waste, and to create benign substances to replace the toxic materials that are used currently.

It is yet unknown how nanostructured materials and other related nanotechnologies might affect human health and interact with the environment. The eventual proliferation and use of nanotechnology could cause unintended consequences, such as the creation of new classes of toxins or related environmental hazards (Zhang and Masciangioli, 2002). The range of possible damage is vast, from personal low-flying supersonic aircraft injuring large numbers of animals, to the collection of solar energy on a sufficiently large scale to modify the planet's albedo and directly affect the environment. There is already considerable concern that technical developments could cause adverse effects that are unforeseen. We are already witnessing some precursors of nanotechnology-associated pollution. Potentially harmful effects of nanotechnology might arise as a result of the nature of nanomaterials themselves, the characteristics of the products made from them, or the aspects of the manufacturing process involved (Masciangioli, 2003). On the other hand, increased knowledge of the dynamics of processes specific to nanoscale structures in natural systems will improve understanding of transport and bioavailability, and further lead to preventing or mitigating environmental harm (Flagan, 1999).

With such active investment in nanotechnology, there are certainly newly developed nanomaterials, entering the environment. Except for India, China and Australia, many Asian countries are facing space limitation and shortage due to their limited land area. Apartments grow higher due to habitat increase, and decreasing real estate availability. The environment has to contain all the people of the nation and also their waste products. Due to limited space, there is high degree of air pollution from the excessive number of cars. On top of this, there is the question of how effectively nano-waste can be managed in such space-limited countries.

In Asia, education about environmental issues started much later than in the West. In many countries, NGOs coordinate their efforts with government ministries and international agencies, like UNEP. Since 2002, China, Japan and Republic of Korea have been working together on environmental issues, facilitated by the Japan Environment Education Forum (JEEF).

## **V. RECOMMENDATIONS FOR REINFORCING ETHICAL ATTITUDES**

It is always better to go through the exercise of formulating solutions to potential ethical issues before the technology is adopted by society. Thorough exploration of ethical aspects is only limited by what is predictable, rather than dealing with what has happened. An examination of ethical issues can prevent some negative consequences of nanotechnology that may arise, therefore, the ethical aspects discussed in this paper and potential solutions are based on the exploration, rather than actual implementation, of any particular strategy. This task gives a starting point for an examination of the ethics of developing nanotechnology, and attempts to come up with appropriate policies that will aid in its development, so as to eliminate, or at least minimize, damaging effects on society.

### ***1. Developing Ethical Reasoning as a Grounding Task***

In most disciplines, education has progressed by establishing a foundation and then building pyramids of knowledge step by step. This has promoted enhanced departmentalization in academia, thus allowing each field imprinting its own way of thinking on its scholars (Vogel, 2001).

As mentioned in the previous chapter, the attitude towards ethics may be different depending on cultural background and one's personal belief system. It is important to establish one's own philosophy on ethical thoughts as a grounding task, and gradually learn to engage the social effects of the technology that surrounds in daily lives. The daunting challenge of exposing students and prospective scientists to relative ethical issues is not an easy one. However, educators must be aware of what is required to prevent detrimental effects of technology, including the fostering of critical perspectives and logical reasoning of consequences, problem solving skills, and the ability to draw an ideal boundary between what is desirable and what is achievable in the technology. Developing a sense of ethics and individual perspectives should start as early as possible. What is presented to students has to reflect a balance between gain and loss based on their own philosophical stance. In order for this to happen, secondary school teachers, counselors, and administrators also must be educated to formulate effective teaching strategies on ethics education. They have to be able to effectively present clear and thorough pictures of what science and technology can bring to human lives in both positive and negative lights. Early exposure of ethical concepts and their relevance to life should help to develop insights on deciding what is appropriate or not, when it comes to humans vs. technology.

## **2. Ethical Dialogue**

### **A. National level**

In most of the countries in Asia-Pacific, ethical issues are dealt with much less than other issues related to science and technology development. As mentioned before, this may be due to the work ethic in Asian countries, which has played an important role for industrialization. Nonetheless, this leads to lack of dialogue on ethical quandaries and sound solutions. Therefore, dialogue between research institutes, granting bodies, and the public on ethical issues may be helpful. All aspects of development and its results need to be explored from different professional viewpoints. Initiating ethical dialogue is important in order to stimulate people's perspectives, and increase knowledge of potential dangers.

One cannot separate the scientific, economic, education and industrial interactions. However, the intent should be to work in a collaborative effort to meet the common goals of all concerned. Involvement of this kind will enable ethicists to consider whether there is a different belief system between those who have caught the vision of a world shaped by nanotechnology and those who have not.

The need exists for an innovative mechanism to encourage professionals and industries to be aware of ethical consequences. For example, in order to provide medical care in an ethical and humane way, physicians need to be better educated about specific aspects of ethical medical practice. Routine bioethics education for medical students and resident physicians, and continuing medical education for practicing doctors should exist to accomplish this. In the case of Australia, the Department of Industry, Science and Resources, has held a workshop on nanotechnology in Australian industry. In this workshop, they not only discussed identifying opportunities for the practical transfer of nanotechnologies based on collaboration and communication, but also the ethical considerations of the potential outcomes. Although there was no solution presented to the discussed issues, this suggests that the researchers identified the need to deal with ethics related issues from the national perspective.

In the end, all the technology applied to human lives is based on an interdisciplinary approach. It is important to communicate with other professionals to gain knowledge of other fields in order to maximize the benefits and minimize the misuse. In addition, journalists need to be involved in the early stages of nanotechnology since they have an important influence on public perceptions related to the benefits of such technology. Summarily, appropriate educational strategies and approaches, both for the public and scientists to understand the ethical issues, are required.

## **B. International level**

The involvement of developing countries is imperative to establishing a foundation for the ethical use of nanotechnology throughout the world. It is only recently that research on ethical, legal, and social issues (ELSI) of genomics and biotechnology in developing countries has become active, although not all countries have ongoing active research on ELSI. In South Korea, the Ministry of Science conducted a research project on ELSI in 2001, even though ELSI has just started there. Such activities should be encouraged. In 2002, China, Japan and South Korea formulated an international environment project called “Tripartite Environmental Education Network (TEEN),” in which each nation communicates efficient strategies to educate the public about environmental issues. This could become an international commission similar to the one proposed for genomics, or other forms of global issues networking. There is also a need for a global opinion-leaders network for the ethical and social implications of nanotechnology, conducted through Internet-based tools for collaborative networking (Mnyusiwalla et al, 2003).

### **3. *Research in ELSI and Reinforcement***

Education on research into ethical, legal and social issues needs to start as early as possible. As mentioned above, this can be implemented at the university level. However, it can also be reinforced via research at all levels – from undergraduate summer students to graduate students, postdoctoral fellows, junior faculty and senior investigators. This can be done by presenting career awards, training grants and emphasizing the development of highly qualified personnel in large-scale grant applications. Capacity strengthening should also include different sectors and developing countries. Along with national growth, increases come in the variety of research grants and government funds available for research. ELSI research should be eligible for such grants, so that research findings can be implemented as potential strategies.

Secondly, it is suggested that regulatory agencies for research and experimentation in nanotechnology need to be established in all concerned countries; it is unlikely that existing agencies can adequately deal with the tremendous changes caused by developments in nanotechnology. Researchers need to assign a certain portion of their budgets for solving consequential ethical issues. The US seems to be heading down this path, but has yet to make a larger percentage commitment. For example, the Human Genome Project benefited from the decision to dedicate 3 to 5% of its budget for research funding into ethical, legal and social issues (ELSI). In many Asian countries, as mentioned in an earlier chapter, the amount of government funding has increased year after year for nanotechnology development. However, they do not seem to have allocated portions of their nanotechnology budgets for ELSI, and should make steps towards serious considerations regarding this issue.

#### **4. Public Engagement:**

##### **A. NGO's Role and Responsibilities**

Specific guidelines and regulations to prevent misuse of nanotechnology should be formulated with participation of non-governmental organizations (NGOs). NGOs need to monitor the rapid development of science and technology and to make improvements in environmental and human-friendly science by taking part in policy-making, execution, and evaluation in science and technology – fields dominated by government, businesses, and the science and technology elite. NGOs need to develop models to activate civil participation in science and technology policy-making. They should enable the public to access reliable and understandable information on technological innovations, and be able to participate in public and private decision-making concerning technological developments and their implementation.

There needs to be a specific NGO assigned to work with ethical concerns of technology development. Rapidly growing investment in the field calls for emphasizing the role of civil watchdogs for nanotechnology-related policy and research for government and business. At the moment, NGO's in Asian countries deal with reported issues other than ethical ones. As of now, not many ethical issues have emerged. There is a need to activate civil participation in social arguments on the enactment of laws to reduce the risks inherent in modern science and technology, particularly, in nanotechnology.

In case of Asia, not all countries have NGOs. In China, for example, there are no independent NGO's that play the role of watchdog from a neutral position between the government, industry and the public. Most of the policies and specific guidelines are set by government bodies. In Japan and Korea, some NGO's are acknowledging the seriousness of ethical issues and are attempting to develop them into a major agenda either independently or with government assistance.

##### **B. Science Facilities: Museums and Centres**

In order to expose children and the public at large at the beginning stage of technology development, other educational facilities need to be provided as a means of information dissemination. The role of science museums are now changing from simply being displays to being active and experiential educational environments. Science museums should consider including exhibits on the ethical and social implications of nanotechnology. They should also engage students and citizens with balanced perspectives between pros and cons of the discussion of issues. Often what happens is that exhibitions are often sponsored by industries and commercial institutions, therefore, slanting the content and message of the exhibit to fit the agenda of the sponsor. In other words, it is inevitable that exhibitions may have some commercial purposes for the consumers or technologists for its sponsors.

It is the role of science museum to introduce science to the public most efficiently and comprehensively. The advancement and rapid proliferation of science and technology in almost every aspect of human activity has given rise to a host of associated ethical and moral issues. Ethical problems have become an urgent matter-of-fact problem of modern society. People need an understanding of science in order to relate to the many complex science-related issues that confront our modern world.

### ***Conclusion***

There are many strategies to formulate effective solutions for ethical concerns in nanotechnology. First of all, understanding the overall importance of ethics is the grounding job. One's ethical perspective is based on one's philosophy and personal belief system. Therefore, developing a sound belief system is an important task for education beginning at a very early stage. School education can include ethics classes to stimulate students to develop insights on what ethics is all about and how it relates to human lives.

Another way of reinforcing ethical thought and education would be ethical dialogue between different parties and countries both at the national and international level. At the national level, scientists, researchers and the public should communicate in terms of how the outcome of technology development influences humans living. Internationally, voices of advanced countries and beginners in nanotechnology should exchange views. Expert advice should be shared about how to prevent predicted negative outcomes and where to draw the line in terms of how far to go with the technology. At the national level, non-government organizations can play an active role, facilitating ELSI research either as part of entire research itself, or operate a separate research agency to initiate research on ELSI. At the public level, science museums and centres can play an effective role in educating students and citizens in terms of how best to introduce various sides of science technology related to humans.

Internationally, Roco and Tomellini (2002) suggest that priority goals may be envisioned for global collaboration in nanoscale research and education, such as, gaining better comprehension of nature, increasing productivity, promoting sustainable development, and developing humanity and civilization. This may help minimize the "nanodivide" among the nations in Asia, and further contribute to human development enhancement. Opportunities for collaboration will continue to amplify once those national programmes are in place. A number of companies at their pre-competitive phase, ready to participate globally in working for what is best all people, will increase.

## VI. SUMMARY AND SUGGESTIONS

Nanotechnology is a process of building working devices, systems and materials, molecule-by-molecule, by controlling matter measured in billionths of a meter. The new science has been made possible by major advances in microscopy, material science, molecular-level manipulation, and knowledge at the interface between classical and quantum physics. Scientists have already created single-molecule transistors – an enzyme-powered bio-molecular motor with nickel propellers and a tiny carrier able to move about from the blood into the brain – which can efficiently and directly deliver tumor-fighting chemicals.

Expenditure on research and development in nanotechnology has increased dramatically over the past few years with little regard for its ethical, environmental, legal and social implications, creating a potential collision course of the type witnessed over genetically modified crops. Scientists envision medical nanorobots traveling within the body, destroying viruses and cancer cells, removing wastes accumulated in the brain and repairing other damage to restore the patient's youth and vitality. Nanotechnology holds the promise of dramatically improving performance of materials and devices with cheaper, better production processes.

While most industrialized countries are investing heavily in nanotechnology research and development (increasing from \$678 million worldwide in 1997 to more than \$2.2 billion in 2002), its ethical, environmental, economic, legal and social implications have not yet been taken a close look at seriously and pursued on a large enough scale. Asian companies are funding US research, striking deals for patents from US universities, thus, facilitating the nanotechnology training of their workforce. By 2010, 90% of all physical scientists will be Asian, 50% of them practicing in Asia (Lux, 2003).

It is expected that technology promising such massive change in our lives will receive ambiguous treatment, being viewed with excitement, suspicion, and fear. We believe that nanotechnology offers enormous potential for positive change, especially in the areas of healthcare and medicine, but there is a need for open public discussion regarding the benefits and risks of this new technology to ensure public acceptance of its development. Nanotechnology raises unique equity, privacy, security, environmental and metaphysical questions that require detailed discussion now and, perhaps, specific regulations in the future.

When it comes to ethical issues and concerns in Asia, defining what ethics is, and developing ethical perspectives, are grounding tasks. The meaning of ethics and morality may alter depending on cultural characteristics. When discerning the line between right and wrong, appropriate and inappropriate, delimitations and boundaries may vary. Ethical awareness refers to a philosophical perspective of one's view upon the relationship between technology and humans. The writer's

speculation about the reason for the late start in shaping attitudes towards this subject is that it is not only due to the development delay in technology, but also because of the differences in perception of looking at what comes first, ethics or work.

Secondly, because of economic status leading to inequality among Asian nations, nanotechnology development may raise a question of equity, the creation of a gap between those who benefit from the technology and those who do not. Although vast investment has been made in nanobiotechnology for developing nanodevices and healthcare equipment, there is still a long way to go for its popularization. This means that those who can afford costly quality treatment will take advantage, while the others will not be able to do so.

At the moment, some Asian nations are experiencing off-sequence science civilization. For example, in China, there are still houses without telephones. However, with rapid economic growth, the distributional rate of cellular phones is much higher than that of regular telephones. This will contribute to widening a gap between the people who experience the advantages of the technology and those who do not, and to the nano-divide in general.

Third, with the development of nano-structured devices in information and communications, individual information, both medical and personal, may be revealed to others without the person being aware of it. Plus, medical concerns are often shared with immediate family members, which may provoke a conflict with right of privacy and confidentiality. With the advance of information tracking and storage device improvements, such information may be disclosed to relatives and become available for viewing. Depending on cultural and philosophical perspectives of those who have access to the information and decision-making process, in Asian societies, there may come a major controversy between private and social.

Lastly, ethical parameters pertaining to gender issues may be distorted because most of the scientists in the field – nanodevelopers – are males and may not be familiar with female-related issues. Simply put, there are more male than female scientists, and this may be the case in Western countries as well. This may cause overlooking ethical issues related to women, such as environmental or medical (ex: nurturing, pregnancy, etc.). There is a need of further research in order to identify those issues.

Nanotechnology per se does not affect human dignity and integrity. However, just like when dealing with any technology, some of its applications present some risks. More attentive monitoring and control has to be enforced in the fields where technology meets the human body: in biomedical application or human living environment, just as with communication and information system. As mentioned earlier, nanotechnology is the kind of technology that can be applied in other fields, including biotechnology, and information and communication technology, which makes the separation of ethical issues between them difficult. At present, many

developed countries are working on convergence of technologies, and nanostructured devices and materials are used in biotechnology, information and communication technology.

Several avenues for nanotechnology have been identified in efforts to address the social and ethical implications of genomics and biotechnology (Mnyusiwalla, Daar, & Singer, 2003). They include, firstly, appropriate funding for research regarding ethical, legal and social issues (ELSI); secondly, focusing on strengthening capacity in ELSI research at all levels, both educationally and professionally: from undergraduate summer students to graduate students, postdoctoral fellows, junior faculty and senior investigators; and, thirdly, initiate ethical dialogue between scientists, NGOs/activist groups/pressure groups, government and industry. ELSI research on the role of genomics and biotechnology in developing countries has been started already. And finally, it is important to induce public engagement – students and citizens – with the involvement of media organizations and science museums for exhibits on ethical and social implications of nanotechnology.

While awareness of biotechnology is relatively high today, only a few would recognize the concept of nanotechnology. Therefore, the goal is not only to elevate citizens' awareness of the latter through public involvement, but also to bring to light related social, including ethical, issues.

Ethical issues derived from the technology advancement bear on relations for people from different socio-economical groups, ethnic, educational, religious, and cultural backgrounds and such issues as equity, privacy, security, risk/benefits, quality of life, choices, gender issues, etc. Therefore, these issues should be dealt with comprehensively from all aspects of technology development related to everyday living and quality of life.

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## VIII. GLOSSARY\*

**Assembler:** A chemical device that given certain atomic or molecular inputs (starting materials) can output a specific molecular structure or aggregation.

**Atomic Force Microscope (AFM):** An instrument able to image surfaces to molecular accuracy by mechanically probing their surface contours. A kind of proximal probe.

**Biomolecular Nanotechnology:** Nanotechnology existing in living systems and resulting from our ability to use biomolecules as components for molecular nanotechnology.

**Bottom-Up:** Building (or designing) larger, more complex objects by integration of smaller building blocks or components.

**Bucky Ball:** Round (convex) fullerenes ranging in size from 20 to over 500 carbon atoms.

**Carbon Nanotube:** A one dimensional fullerene (a convex cage of atoms with only hexagonal and/or pentagonal faces) with a cylindrical shape. Carbon nanotubes discovered in 1991 by Sumio Iijima resemble rolled up graphite, although they can not really be made that way. Depending on the direction that the tubes appear to have been rolled (quantified by the 'chiral vector'), they are known to act as conductors or semiconductors. Nanotubes are proving to be useful as molecular components for nanotechnology.

**Catalysis:** The action of a catalyst, especially an increase in the rate of a chemical reaction.

**Conductor:** A substance, material or object that allows electricity to flow through it with low resistance.

**Cyborg:** A human who has certain physiological processes aided or controlled by mechanical or electronic devices.

**Dip Pen Nanolithography:** A method for nanoscale patterning of surfaces by the transfer of a material from the tip of a scanning probe microscope onto the surface.

**Fractal:** A mathematical construct that has a fractional dimension.

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\* Information obtained from following websites:

<http://www.nanoword.net/library/def/index.htm>

<http://nanotech-now.com/nanotechnology-glossary-S-U.htm>

<http://www.genomicglossaries.com/content/Microscopy.asp>

[http://www.genomicglossaries.com/content/miniaturization\\_glossary.asp#semiconductor](http://www.genomicglossaries.com/content/miniaturization_glossary.asp#semiconductor)

**Fullerene:** A class of cage-like carbon compounds composed of fused, pentagonal and/or hexagonal  $sp^2$  carbon rings.

**Genome:** The total DNA contained in each cell of an organism. Mammalian genomic DNA (including that of humans) contains  $6 \times 10^9$  base pairs of DNA per diploid cell. There are somewhere in the order of a hundred thousand genes, including coding regions, 5' and 3' untranslated regions, introns, 5' and 3' flanking DNA. Also present in the genome are structural segments such as telomeric and centromeric DNAs and replication origins, and intergenic DNA.

**Genomics:** The study of the full complement of genes that make up an organism.

**Grey Goo:** A scary concept dreamed up by Erik K Drexler whereby tiny assemblers, or molecular machines, that are capable of making copies of themselves, are let loose and proceed to replicate uncontrollably, consuming everything in their path and turning it into a grey goo.

**Insulator:** A substance, object or material that does not conduct electricity.

**Lithography:** A process for creating chemical patterns on a surface.

**Mesoscale:** A device or structure larger than the nanoscale ( $10^{-9}$  m) and smaller than the megascale; the exact size depends heavily on the context and usually ranges between very large nanodevices ( $10^{-7}$  m) and the human scale.

**Micro-Electro-Mechanical Systems (MEMS):** A generic term to describe nano-scale electrical/mechanical devices.

**Micro Force Microscopy:** A method for observing local magnetic fields near a surface by scanning the surface with a magnetic probe.

**Micro Electromechanical Systems:** “The fabrication or micro-machining of materials to make stationary and moving structures, devices and systems of a nominal size, scale from a few centimeters to a few micrometers.” \*

**Microgravity:** A condition in which the effects of gravity are greatly reduced. An environment in which there is very little net gravitational force, as of a free-falling object, an orbit, or interstellar space.

**Molecular Nanotechnology:** A term coined by Drexler referring to technology resulting from the ability to thoroughly and inexpensively control matter on the molecular level.

**Moore’s Law:** An empirical trend in the microelectronics industry for the number of circuits per chip to double roughly every 18 months.

**Nano:** From the Greek *nanos* – meaning “dwarf” this prefix is used in the metric system to mean  $10^{-9}$  or one billionth ( $1/1,000,000,000$ ).

**Nano-Electro Mechanical Systems (NEMS):** Systems consisting of integrated electromechanical actuators of nanometer-scale dimensions.

**Nanotechnology:** The application of nanoscience in order to control processes on the nanometer scale, i.e. between 0.1 nm and 100 nm.

**Nanotube:** A one dimensional fullerene with a cylindrical shape.

**Nerve-circuit:** Also know as reflex arc that regulates a reflex, or automatic response.

**Nuclear Magnetic Resonance (NMR):** An analytical method that can detect subatomic and structural information of molecules by measuring the absorption of radio-frequency electromagnetic radiation by nuclei under the influence of a magnetic field.

**Scanning Electro Microscopy:** A method of producing images of a surface by scanning an electron beam over the sample and measuring the electronic interactions with the interface.

**Scanning Probe Methods:** A method for imaging nanoscale features of surfaces by scanning a sensor (probe) over a surface. Near-field effects such as tunneling, van der Waals forces, local fields and more are serially detected at localized points on the surface and used to create an SPM image.

**Scanning Tunneling Microscope (STM):** An instrument able to image conducting surfaces to atomic accuracy; has been used to pin molecules to a surface.

**Semiconductor:** A substance or object with conductive properties between those of a conductor and an insulator.

**Synergy:** The interaction of two or more agents or forces so that their combined effect is greater than the sum of their individual effects.

**Top-Down:** Molding, carving and fabricating small materials and components by using larger objects such as our hands, tools and lasers.

**Zeolites:** Any one of a family of hydrous aluminum silicate minerals, whose molecules enclose cations of sodium, potassium, calcium, strontium, or barium, or a corresponding synthetic compound, used chiefly as molecular filters and ion-exchange agents.

It has become appallingly obvious that  
our technology has exceeded our humanity.  
Albert Einstein

The cloning of humans is on most of the lists of  
things to worry about from Science, along with  
behaviour control, genetic engineering,  
transplanted heads, computer poetry  
and the unrestrained growth of plastic flowers.  
Lewis Thomas

To see what is right, and not to do it,  
is want of courage or of principle.  
Confucius

