Chapter Twenty-Two

Introduction

Long before the end of the last Century, declining environmental quality and increasing public concern over the environment, both locally and globally, had begun to create a demand for the strengthening of environmental protection within Asia and the Pacific. Policy-makers therefore began the decade of the 1990s with a mandate to improve the state of the environment in region. Whether or not they have succeeded is perhaps a subjective judgement, biased to some extent by an individual’s social and economic welfare-improvements in some dimensions of environmental quality have been, and are continuing to be achieved, especially among the more developed economies of the Northeast Asian (and parts of South Pacific) subregion. However, what is beyond doubt is that the 1990s have seen progress in the establishment of the institutions and policy tools needed to address the region’s urgent environmental concerns from hereon.

Two core findings have shaped the approach taken by policy makers to the environment in Asia and the Pacific during the last decade. Firstly, a growing body of information became available documenting the generally poor state of the environment. The UN ESCAP State of the Environment Reports, of which this is the third, were instrumental in assembling data that confirmed the everyday experience of many citizens of the region: from air to water pollution, from land degradation to desertification, the rapidly industrializing and urbanizing countries of the region experienced poor and, in many cases, declining environmental quality (United Nations 1990 and 1995). A number of topical reports by the ADB (1997), the World Bank (1994 and 1997) and other organizations also predicted that continuation of these trends would lead to a further decline in many dimensions of environmental quality during the 1990s in many parts of the region (Brandon and Ramankutty 1993; Hettige et al 1997; O’Connor 1994). Secondly, in general, the poor state of the environment has, in general, been attributed to the policy failures and institutional weakness in environmental management. Where environmental protection systems have been strengthened, this has generally led to progress in reducing pollution, land degradation and other environmentally damaging processes, and, in turn, measurable improvements in environmental quality. Moreover, contrary to the fears of some policy-makers, there is little evidence that stronger environmental regulation has undermined the competitiveness of the Asian and Pacific Region economies in world markets (ADB 1997). Progress in policy reform and institutional capacity building, however, has been highly uneven; faster and more effective in some places than in others.

This Chapter concludes the report, and summarizes the discussion therein concerning the prevailing conditions and trends in the physical environment across the region, their impacts on the health and well-being of the region’s population, and the management and policy responses which have been adopted to address them. It then goes on to look at projected trends and future scenarios for the region’s environment, and concludes with a discussion of future prospects.

Prevaling Conditions and Trends

A snapshot of prevailing and likely trends for environmental and socio-economic conditions in Asia and the Pacific is provided in Figure 22.1, which shows an improvement in economic and some quality of life indicators, but portrays a picture of the overall degradation of the environment. These trends are discussed further below.

A. Socio-Economic Trends

Asia and the Pacific is the most populous region in the world, with a population that has more than doubled in the latter half of the last Century, from 1.7 billion in 1960 to 3.7 billion in 2000, and is still rising. The rate of growth of population, however, fell slightly in the last decade, from 1.6 per cent in the period 1990-95, to 1.4 per cent in the period 1995-2000. Much of this population increase has taken place in urban areas; the urban population of the region has doubled in the last 20 years alone. The number of megacities (with populations greater than one million) has also increased significantly, from 3 in 1980 to 12 in 2000, which alone presently accommodate about 12 per cent of the region’s urban population.

1. Economic Growth

Economic growth, measured in terms of gross domestic product (GDP), has contributed to improving social conditions across much of the region. Between 1965 and 1990, GDP in Asia and the Pacific as a whole grew by an annual average of 3.8 per cent per capita (ADB 1997). Over the 1990-1997 period, GDP soared at an annual rate of 7.9 per cent in Northeast Asia and Southeast Asia, and 5.7 per cent in South Asia (World Bank 2000). Despite the financial crisis that hit many countries of the region in 1997-98, economic growth managed to revive in 1999; the GDP of countries in developing part of the region posted a robust growth rate of 6.2 per cent in 1999, much higher than the 2.6 per...
### Figure 22.1 Environment and Development Trends in Asia and the Pacific 1995-2005

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| Pollution              | Freshwater pollution | †         |
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|                       | Greenhouse gases      | †         |
|                       | Solid waste generation| †         |
|                       | Agro-chemical use     | †         |
|                       | Pollution by energy generation |         |
|                       | Vehicular pollution   | †         |
|                       | Industrial pollution   | †         |

| Environmental policies/actions | Public authorities action | †         |
|                               | Business sector’s response | †         |
|                               | Env. monitoring & research | †         |
|                               | Env. education & awareness | †         |
|                               | Activities of major groups | †         |
|                               | Int’l Conventions (participation) | †         |
|                               | Subregional cooperation   | †         |

**Note:** † Increase, ‡ Slight increase, ‡ Decrease, ◊ Slight decrease, ‖ No change

Red color shows deteriorating trend
Green color shows improving trend
GDP and urban growth have not been indicated by red or green color because their impact could be good or bad.
cent rate recorded in 1998. This rate is expected to remain virtually unchanged through 2000 (ADB 2000).

2. Income and Quality of Life Trends

In 1975, over half of the population of Asia and the Pacific was classed as poor, based on the World Bank “dollar a day” threshold for poverty. Moreover, using a more generous poverty threshold of 2 dollars a day, almost 2 billion people, or the majority of the region’s population could be classed as poor. Today, using the “dollar a day” criteria, around a quarter of the population is classed as poor. However, due to the rapid population growth, the absolute number of poor has remained extremely high, at 900 million in 1998 (which is about twice as many people as in the rest of the developing world combined). For example, in South Asia, where the overwhelming majority of the poor are found to live (some 522 million), numbers have increased by more than 30 million since 1980, although the ratio of poor to total population has declined considerably over this period (World Bank 1999). Likewise, People’s Republic of China in 1998 still had 213 million poor (World Bank 1998), some 17 per cent of its population, and it has also been estimated that 10 million people may have been added to the ranks of the poor between 1996 and 1998 due to the financial and economic crisis that hit the countries in Northeast and Southeast Asia.

Standards of health and nutrition have improved substantially over the past few decades. Average life expectancy across the region rose from 58 years in 1975, to 67 years at end of the Century. In particular, these rates of increase were exceeded in the subregions of Northeast, Southeast and South Asia. The biggest influence on raising life expectancy has been reduction in infant mortality. The lowest infant mortality rate, at around 6 per thousand live births in Central Asia, while the highest is in South Asia, at 77 per thousand live births; these are compared to a worldwide developing country average of 58 per thousand live births (ADB 2000). These variations to a large extent reflect differences in factors such as nutritional intake, access to health-care, safe water and sanitation. The incidence of child malnutrition in Northeast and Southeast Asia is almost the lowest in the developing world (only Latin America is lower). By contrast, incidence is the highest in South Asia, where in 1990, six out of ten children had stunted growth from malnutrition, compared with four out of ten in Sub-Saharan Africa. In addition, one in three babies in South Asia was born underweight in the same year, compared to 1 in 6 in Sub-Saharan Africa (ADB 1997).

B. Resource Trends

1. Land, Forest and Biodiversity

The assessment of the condition of natural resources in Asia and the Pacific shows an overall deteriorating trend (Figure 22.1). Land scarcity, along with its degradation, is putting serious stress on food production and security in the region. The arable land per capita of agricultural population has already declined by about 20 per cent since 1970. Currently, per capita arable land availability is 0.18 hectare, which is much below the world average of 0.24 ha (UNEP 1999). Land degradation is also contributing to a rising number of landless, who are moving to environmentally fragile areas such as steep slopes and forests, further contributing to land degradation. Of the world’s 1 900 million hectares of land affected by soil degradation since 1945, the largest portion of this area (over 850 million hectares) was in Asia and the Pacific. Arid and semi-arid areas of the region are particularly vulnerable; it is estimated that 1.3 billion (over a third of the region’s population) live in areas prone to drought and desertification.

Agricultural intensification, including the expansion of irrigation and the increased application of agrochemicals, has allowed a substantial expansion in crop yields, and also permitted the cultivation of vast expanses of arid lands. Irrigated areas alone increased by about 6 per cent between 1995 and 1998. However, the chances of a their further expansion at such a rate are low, due to increasing pressures on finite (and in some cases dwindling) water resources. Fertilizer and pesticide consumption in developing countries of the region has also grown steadily over the years (Figure 22.2). The region’s share in world’s total fertilizer consumption swelled from 32 per cent in 1988, to 50 per cent in 1998. Pesticide use increased from an annual average rate of 3 per cent in 1983/93, to 4.4 per cent in 1993/98. However, the growth in production attributable to these factors is unlikely to be sustainable, since poor irrigation practices and over-application of agro-chemicals have taken their toll on both land and water resources, including an increase in pollution, Stalinization and desertification.

Forests and biodiversity are also under extreme pressure. The region has the highest rate of deforestation, at 1.2 per cent per annum (FAO 1998), the highest rate of commercial logging and biggest volume of fuelwood removal in the world. Already, over half of the region’s forest base has disappeared and another three quarters of a million hectares of forests are being lost annually. Habitat modification, fragmentation and loss, along with over-exploitation of resources and introduction of exotic species, have placed the rich biodiversity of the region under serious threat. About two thirds of the region’s
wildlife habitats have already been destroyed, thousands of plant and animal species are threatened and genetic diversity is declining at a pace (Tuxill 1999). However, a positive trend is the growing rate of forest plantation, which is one of the highest in the world.

2. Aquatic Resources

Massive withdrawals from rivers, lakes and underground reservoirs have contributed to a growing scarcity of freshwater in parts of the region. Taking the standard benchmarks of 1 600 cubic metres per capita per year as water stress, 1 000 cubic metres per capita as water scarce, the Republic of Korea (at around 1 500 cubic metres), Singapore (at around 1 700 cubic metres), and Maldives (at around 1 000 cubic metres) are already water stressed or scarce. In addition, several other areas in the region including the Aral Sea in Central Asia, and the North China plains are also experiencing acute shortages of water. Sectoral competition and conflicts in water-use (particularly between agriculture and industry) have also become critical.

The marine and coastal environment is also under pressure from species over-exploitation and habitat degradation, and is under the looming threat of potential climate change and sea level rise. Several of the region’s most important fishing areas and almost two thirds of the major fish species are either fully or over-exploited. About 80 per cent of the coral reefs in Southeast Asia, 54 per cent in the Indian Ocean, and 41 per cent in the Pacific Ocean, are at medium to high risk.

3. Food Security

There has been a decline in the growth rate of crop production over the past few years. Growth in cereal production, for example, declined from 3.2 per cent in 1969-71 to 1.9 per cent in 1994-96, and decreased by a further per cent or so 1996/97 (FAO SOFA). The region has been a net food importer of late, with cereal imports growing at an average annual rate of 9.5 per cent in the period 1986/96. With regards to food security, the average daily food availability in calories falls below nutritional requirements in Bangladesh, Cambodia and Mongolia, and close to them in Nepal, Sri Lanka, Lao People’s Democratic Republic, Papua New Guinea and the Solomon Islands. Aquaculture is becoming increasingly important to augment food production, as the productivity of land declines and many marine fish stocks are over-exploited. The region now contributes almost 90 per cent to the total world production of marine aquaculture.

4. Energy Consumption

Energy consumption has escalated with the growth in industrialization and urbanization in the region. Between 1975 and 1995, commercial energy use in South Asia had an average annual growth rate of 6.6 per cent; and in Northeast Asia and the South Pacific, 5.3 per cent, between 1975 and 1995 (World Bank 1998). Per capita commercial energy use more than doubled during the same period (UNEP 1999). Overall, the region accounted for 26.8 per cent of the world’s commercial energy consumption in 1995.

C. Pollution Trends

The urban areas are by far the worst affected by air pollution. Of the major cities in the world with the highest levels of total suspended partculates (TSP) in the air, 9 are located in Asia. The levels of TSP in many cities are two to three times those recommended by WHO. Six of the major cities with high levels of sulphur dioxide are also located in the region (UNEP 1999). The impacts of haze, acid rain and transboundary air pollution have also increased substantially.

Inland and coastal water pollution has also increased in severity as a result of factors such as unplanned and unmanaged urbanization, industrialization and agrochemical use. Four rivers in the region – the Yellow River in People’s Republic of China, the Ganges River in India, and the Amu Darya and Syr Darya in Central Asia – top the list of the worlds most polluted rivers, according to a report of the World Commission on Water. In terms of levels of suspended solids, the region’s rivers typically contain some four times the world average and 20 times OECD country average levels (ADB 1997). Biological oxygen demand (BOD) in the Asian and Pacific Region’s rivers is also 1.4 times the world average, and they contain almost three times as much bacteria from sewage. The reported median fecal
coliform count in the region’s rivers is reportedly 50 times higher than the WHO guidelines (UNEP 1999). Pollution of coastal and marine environment has also intensified and is evident in the increased frequency of algal blooms in the region’s seas, with major outbreaks in recent years in Australia, People’s Republic of China, Republic of Korea, Japan and New Zealand.

The burden of waste has also increased markedly, with rapid population growth, urbanization and increasing affluence. Conservative estimates of waste arisings in the region give that 1.5 million tonnes of municipal solid wastes are produced per day, and 5.2 million tonnes of industrial solid wastes; figures which are expected to more than double in the next 25 years (World Bank 1999). The generation of hazardous wastes from manufacturing, hospital and health-care facilities and nuclear power and fuel processing plants has also increased tremendously. People’s Republic of China alone produces more than 50 million tonnes of hazardous wastes per annum.

D. Cost of Environmental Degradation

Overall, it is estimated that the economic cost to the region from environmental degradation ranges from 1 to 9 per cent of a country’s annual GNP (ADB 1997), or an average of about 5 per cent of GDP; in People’s Republic of China, this may be as high as 10 per cent (World Bank 1999). Non-economic costs, that affect welfare but not GDP, are even larger, but are often difficult to quantify (ADB 1997). The economic cost of air pollution health damages is estimated at US$1 billion a year in cities such as Bangkok and Jakarta (World Bank 1999).

E. Trends in Policy Environment

While most environmental trends are negative, several positive changes can be discerned in the state of policy responses across the region. Among these are the improvement in governance by public authorities through strengthening of institutions; enhancements in the formulation and implementation of policies; growing environmental awareness and public participation (Box 22.1); increasing

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Box 22.1 Community Action for the Environment: Bhaonta-Kolyala Village in Rajasthan

It’s an unusual ritual the villages of Bhaonta-Kolyala follow. Every year, they pour water into a johad – a crescent-shaped earthen check-dam. This started in 1986, when villagers of Bhaonta-Kolyala noticed a remarkable development in Gopalpura, a nearby village. Gopalpura had water in its wells round the year. The reason – villagers had revived johads with the help of Tarun Bharat Sangh, an NGO.

Led by two local farmers, the beleaguered villagers approached the TBS. They were offered help, but on one condition – that the villagers should be ready to take upon themselves the task of regeneration.

After organizing themselves and the neighbouring villages, on March 6, 1987, the villagers started protecting forests and repairing old johads. They mapped the natural drainage system and chose tentative sites to construct new johads. The aim was to catch each and every drop of rainwater that fell on the village, say the villagers.

During the course of their search, they discovered an old johad, buried in silt, on the slope of the barren hills. In 1988, repair work on the johad started. When the monsoons arrived, the johad was filled with water. Overwhelmed by the results from a single johad, the villagers started building more such structures. Today, the village has a total of 15 water harvesting structures, including a 244 metres long, 7 metres tall concrete dam in the upper catchment of the Aravalli, the construction for which was started in 1990.

The dam was a turning point. Even those who had migrated were called back. By 1995, a year after the completion of the dam, water level in the wells downstream rose by two to three feet. “The percolation of water from this dam is three feet an hour. Its impact is felt in villages 20 km downstream. All the wells are now filled with water,” says a villager. Today, all the agricultural land is under cultivation. Milk production has risen up to 10 times. Every rupee invested in a johad has increased the village’s annual income by 2.5-3 times.

The most important lesson from Bhaonta-Kolyala is that when villages work with each other to regenerate the environment, there are unexpected blessings. Sometimes, they are as big as a river. In the case of Bhaonta Kolyala, it was Arvari River. In 1990, when the villagers started constructing the big dam, no one knew that the site was the origin of the river. And by catching and percolating water, they were injecting life into the river. Moreover, building water-harvesting structures was not enough for the villagers. To control soil erosion, they then went on to demarcate 12 square kilometres of the adjoining forest area for regeneration, and in 1995 they declared it as a public wildlife sanctuary, the “Bhaironath Public Wildlife Sanctuary”, claimed to be the first of its kind in the country, and now home to three tigers, many bluebulls and deer.

Source: Down to Earth, April 30, 2000
environmental consciousness in business and industry (Box 22.2); and enhanced interest and participation of NGOs and civil society in environmental management. Various efforts have been also made to explore innovative environmental regulatory policies that are sensitive to country and local context, and socio-economic situations (Aden et al 1999; Afsah and Vincent 1997; World Bank 1999), traditional command and control regulation is in many cases being supplemented by a variety of second and third generation policy tools.

However, in terms of government allocations, some countries of the region, particularly in Southeast Asia, have reduced the budget for the environment, although there are clear differences in the precise nature of these cuts. In Thailand, for instance, budgets have been reduced by about 20 per cent, especially for pollution and energy conservation; the Philippines suffered a 25 per cent mandatory reserve on many types of expenditures. In Northeast Asia, the Republic of Korea’s environmental budget shrunk from 2.8 per cent in 1997 to only 0.3 per cent in 1998 (ADB 1998). Moreover, highly visible instances of policy failure, such as the forest fires and haze that have plagued Southeast Asia, only serve to highlight the opportunity for policy reform and more effective policy implementation, all on the basis of stronger systems of governance within the region.

**Box 22.2 Private Sector Initiatives for Environmental Rehabilitation – the Use of Indigenous Techniques**

Rehabilitation of arid lands subjected to mineral exploration has been accelerated and improved by the private sector in Australia, by the application of Aboriginal fire management techniques. Such techniques assist seed release in regenerating spinifex grasses, which in turn accelerates the rehabilitation of smaller disturbed areas, such as drill pads, hard standing areas and borrow pits. It also avoids the dominance by annual species previously experienced using other methods.

The initiative by an Australian company was first started by discussing the idea with local Aboriginal people. It was noted that a striking decline in the number of native mammals had taken place in the desert, and fewer species of flora were appearing. Studies indicated that this decline had occurred recently, in the last 30 to 50 years, i.e. since Aboriginal groups had abandoned their traditional life in the Western Desert and settled in missions and other European communities. The last Aborigines moved out in the early 1960s.

The source of this decline was soon revealed: when Aborigines moved out, with them went the practice of frequent burning. The great skills with which these fires were set by Aborigines to take advantage of wind conditions, humidity and topography, emerged in their conversations with scientists. Their pattern of burning meant that there were always many areas adjacent to each other at different stages of growth and decline, and there was rarely enough fuel over a big area to feed the vast bush fires which now occur.

When the bushes re-burnt, the seeds stored in the sandy soil were heated. This made them receptive to the next rain, soon after which 20 or 30 species of plants, most of them herbs, blossomed and provided food and medicine for local people and food and shelter for native fauna. Even after the heat of a fire had split the seed coat, the seeds had to wait several years for water, in a region that had a sparse 150 mm to 250 mm rainfall a year.

Having realized the value of the technique, the company employed local Aboriginal communities to burn the desert spinifex in a traditional way, which allowed the revival of scores of plant species and encouraged the return of many animals. The project also provided guidelines for using fire to rehabilitate areas throughout the remote arid interior of Western Australia, and the company is now conducting further trials to develop fire behaviour models that will help in planning safe burning programmes to enhance and protect the remarkable desert ecosystem.

Source: Government of Australia 1999

**PROJECTED TRENDS AND FUTURE SCENARIOS**

A. **Socio-economic**

Over the next two decades, population growth rates in the region are expected to decline significantly. In Northeast Asia, for example, population growth is expected fall from 0.9 per cent per year, to 0.4 per cent, in the next 20 years. In absolute terms, however, the total population will increase substantially with the addition of 700 million people in the next 15 years in Asia alone (UNDP 1999). This increase in population could be one of the most important factors for environmental stress, including scarcity of resources such as land, forest, water and biodiversity, and may contribute further to water and air pollution (Kainuma et al 1998). The burgeoning population will be accompanied by increasing number of urban dwellers. In 20 years’ time, over half of the region’s population will live in cities. Migration and urban reclassification will continue to contribute between 55 to 60 per cent of
urban increase, and the number of cities with a population of more than 10 million is expected to rise from 11 at present, to 18 by 2015, and will continued to increase in future (Kainuma et al 1998).

1. Economic Growth

Asia and the Pacific is projected to continue with its high rates of output growth. Such growth is critical in creating employment, alleviating poverty and making available resources for infrastructure and human resource development, and for increasing access to basic amenities. The projections show a tendency towards convergence of growth rates between different subregions, as well as between countries within a subregion. Long-term projections indicate that People’s Republic of China will consolidate its position as the second largest economy, while the region will emerge as the largest economic zone in the world (Noland 1995).

Economic growth implies a shift to higher productivity, thus the agricultural sector’s share in output and employment is expected to decline, as there is a shift towards a predominance of industrial productivity. This, in turn, implies an increasing use of energy, especially coal – a major source of pollution. Moreover, growth of the industrial sector invariably occurs in clusters in and around major cities, thereby invoking the migration of the labour force into urban areas, and pressurizing urban environments.

2. Income and Quality of Life

Based on the analysis of future growth in Asia and the Pacific, it has been projected that three out of five of the region’s absolute poor could be lifted from poverty by 2025. South Asian countries are likely to see a substantial reduction in poverty, where it has been predicted to fall below 20 per cent by about 2025. However, despite these potential improvements, the region’s core poverty will still be concentrated in South Asia. In People’s Republic of China, if the relationship between growth and poverty continues to hold, “a dollar a day” poverty in People’s Republic of China could fall to less than 10 per cent over the same period.

With the continuation of positive economic trends, the region’s health and nutrition profile will also continue to improve. Child malnutrition in People’s Republic of China and Southeast Asia may well decline to 15 per cent in 2020. However, South Asia will still have a large share of the undernourished children in the world; even under the optimistic scenarios, 1 in 3 South Asian children under 5 will remain undernourished. The life expectancy at birth will improve all over the region, and is expected to reach an average of 70 years in the region by 2030.

B. Natural Resources

1. Land, Forest and Biodiversity

Without major interventions, the rate of land degradation is likely to continue (UNEP 1999). Maintaining, let alone improving, the situation for per capita land availability will be difficult, as populations continue to increase and agricultural land is lost to urban, industrial and transport infrastructure. The challenge is to optimize land use for competing needs. Given the limited scope for expanding croplands, future food production will rely heavily on the intensification of agriculture and use of fertilizer and pesticides. As past trends in freshwater supply indicates, it may not be possible to expand irrigated lands any further, and they may even contract due to depletion of aquifers and enhanced competition with other users. Moreover, high rates of fertilization and pesticide-use may not translate to a corresponding increase in yield due to erratic and sometimes non-optimal applications, and concomitant negative environmental impacts of agrochemical applications.

The region’s dominance of world trade in tropical hardwoods is likely to decline in future because of the depletion of timber reserves and increased domestic wood consumption (UNEP 1998). Tropical forest destruction has gone too far to prevent some irreversible damage, and it would take many generations to replace the lost forests with plantations. If current rates of harvesting continue, the Asian and Pacific Region’s timber supplies may vanish in less than 40 years. If continued, deforestation will also further aggravate the widespread incidence of desertification, soil erosion, siltation, flooding and biodiversity loss, and will be one of the major contributors to drought and potential threats of climate change. Forest plantation efforts are likely to intensify. The sustainable forest and agricultural management policies that were introduced in the 1990s will continue to be implemented and may show more promising results. Shifting cultivation may continue to pose a threat to watersheds, for instance throughout the Mekong subregion. In Northeast Asia, particularly in Japan, Republic of Korea and Democratic People’s Republic of Korea, the trade-off between forest protection and development will become a critical issue where there is limited flat land for urban and industrial expansion.

Increasing population pressure and land use changes will continue to threaten the region’s biodiversity. Some scientists project that a mass extinction of species may take place in the tropics within the next 20-25 years, based on the fact that only about 10 to 30 per cent of natural habitats are now left in many countries of the region (UNEP 1998).
Genetic erosion may also intensify as the reliance on high yielding varieties increase. In India, for example, 75 per cent of rice production may come only from 10 varieties by 2005 compared with the over 30 000 varieties traditionally cultivated.

Among resources, the most dramatic rise in demand is for freshwater, for example, demand for safe drinking water is anticipated to increase five-fold in the next 40 years (Kainuma, M. et al 1998; Figure 22.3). Based on an acceptable threshold of 1 600 cubic metres per capita per year, arid areas such as Afghanistan and Iran (Islamic Republic of) will become water stressed by 2025 if the population growth under the United Nations low and medium projections continues. Parts of India (e.g. Rajasthan) and People’s Republic of China will narrowly avoid this situation. Increasing freshwater demand among different sectors will also intensify current sectoral conflicts. Although agriculture will continue to be the largest consumer of water, the fastest increase in water demand will occur in urban and industrial sectors, where demands are projected to climb 135 per cent over the next 40 years (UNEP 1998). Water scarcity may also be exacerbated by potential climate change.

2. Aquatic Resources

As most fishing areas reach their maximum potential and the production from capture fisheries dwindles, aquaculture production will become an increasingly important industry in the region. Predictions show that there may no longer be an increase in average capture fisheries output. The rate of mangrove forest depletion and coastal and marine resource degradation may not halt, but will slow down in many countries of the region due to introduction of protective measures.

3. Food Security

The region is projected to remain a net food importer in the near future (Alexandratos 1995). The trend in food availability in terms of calorie per capita is expected to improve by 2010, with projected calorie per capita of 2 450 for South Asia, 3 040 for Northeast Asia and 2 730 for all developing countries (Leisinger 1996). Nevertheless, a United States Department of Agriculture study indicates that the situation may deteriorate in future in some countries of the region, which may face a decline in per capita consumption of food during the next decade. The limiting factors in meeting the challenge of producing more food will be availability of productive land and supplies of fresh water, especially in populous and arid areas. The region is thus expected to continue to rely heavily on imported foods. It has been predicted that the region’s share of world cereal imports may rise to about 42 per cent from its current level of 33 per cent by 2010 (ADB 1997). Even People’s Republic of China, which is currently self-sufficient in grain production may begin to import around 175 billion tonnes by 2025, an amount almost equal to total current world exports (Brown et al 1999).

4. Energy Consumption

Demand for energy in Asia and the Pacific is expected to double every twelve years, compared to the world estimate of every 28 years (UNEP 1999). The total primary energy supply in the region (excluding Islamic Republic of Iran, Central Asia and some South Pacific countries) is projected to rise from 2 791 million tonnes of oil equivalent in 1997, to 4 392 million tonnes of oil equivalent in 2010 (IEA 1998; Figure 22.4). The region’s primary energy supply is expected to soar by 78 per cent, including People’s Republic of China by 59 per cent and Japan, Australia and New Zealand combined by 19 per cent. Coal will remain the major fuel choice in future, especially in India and People’s Republic of China, and demand is projected to increase by 6.5 per cent a year (World Bank 1997). Despite shrinkage in their uses, traditional sources of fuel such as firewood, charcoal, and crop and animal residues will continue to be
important sources of energy for rural populations in developing countries in coming decades. The use of nuclear and hydropower is expected to grow, particularly in those countries without substantial fossil fuel resources (United Nations 1995). If current trends in economic development continue, the current rate of energy consumption growth will more than triple within the next 30 years.

C. Pollution

As material inputs expand, the pollution load in terms of discharges in all of the natural spheres will inevitably increase, with a corresponding high cost to human health. With unchanged policies and technologies, emissions from electricity generation and transportation in developing countries will grow exponentially. Projections indicate that by 2030, they will be between five and ten times higher than during the 1990s. Improved policies, however, could cut the rate of emissions by about 20 per cent from their projected 2030 levels. Policy reforms in general, together with investments in low-polluting technologies, can more or less stabilize emissions at their 1990 levels.

The continuous growth in energy consumption and reliance on energy sources with relatively high carbon content, such as coal and oil, will enhance the production of greenhouse gases such as CO₂ in the region. Under the high economic growth scenario, emissions will peak by 2050 at a level 2.7 times that of 1990 and then start to fall two times the current level by 2100 at around 13 Giga tonnes of Carbon (GtC) (Kainuma et al 1998). Since transport and power generation, the fastest growing sectors, are likely to remain as the prime consumers of energy, improvement of energy efficiency and implementation of initiatives for the development of mass transport system will help reduce the growing emission trends. The movement toward accelerated decarbonization made in Kyoto, Japan in 1997 will also enable a reduction in overall greenhouse gas emissions by at least 5 per cent below the 1990 levels in between 2008 and 2012. It is estimated that suspended particulate matter (SPM) concentration in People’s Republic of China’s atmosphere will increase 1.4 times in 2020 and 3.5 times in 2050 larger than that in 1990 under business as usual scenario. Figure 22.5 shows regional distribution of particulate matter with diameter less than 10 µm in 1990 (PM₁₀) (Kainuma et al 1998).

Estimates show a worsening situation in terms of national and transboundary air pollution, from SO₂ and acid precipitation, unless effective abatement measures are taken. In Northeast Asia, for example, emissions of SO₂ are expected to increase from about 15 to 41 tonnes in 2020, which could exacerbate the problem of cross-border acid rain. The areas with lowest critical loads (i.e. up to 320 milligrams per sq m) and which are most sensitive to acidic deposition are located in South China and in Southeast Thailand, Cambodia and South Viet Nam.

Water pollution may also worsen in many countries of the region. The Republic of Korea has initiated a set of ambitious water quality targets for 2001 and 2005, but considering the serious eutrophication problems, especially in lakes, it will be difficult to meet these standards; more so under a
scenario of increasing fertilizer use.

Coastal and marine pollution in the region is likely to increase in future. Untreated urban and industrial wastes that find their way into the sea will continue to constitute a major threat to the coastal and marine environment. In addition, the mercury associated with long term nuclear wastes dumping and oil spills caused by tanker accidents will continue to pose major threats to the overall quality of coastal waters and damage to marine ecosystem and fishery resources.

Another important problem will be caused by the increase in wastes. Figure 22.6 shows the increase in wastes in the high and low economic growth scenarios. Municipal solid wastes would increase more than seven times in Asia and the Pacific in the high growth scenario and three times in the low growth scenario in 2030 (Kainuma et al 1998). In the short term, according to the World Bank, municipal solid wastes may more than double in the next 15 years (World Bank 1999). Furthermore, hazardous wastes generated by manufacturing, hospital and health-care facilities, and nuclear power and fuel processing plants are also estimated to more than double within the next 10 to 15 years.

D. Policy Environment

There is a growing trend in the continued advancement of policy and programmes which aim to integrate environmental consideration into the region’s development framework. However, the resources and access to environmental technology will continue to present constraints in the implementation of policies for sustainable development. A lot will hinge upon the inputs and assistance of the developed countries towards provision of new and additional financial resources and the transfer of technology on concessional terms. The role of major public interest groups, particularly the private sector and NGOs, will continue to enhance.

Figure 22.5 Suspended Particulate Matters in Asia and the Pacific

(a) SPM in 1990 (b) SPM in 2050 (under business as usual)


Disclaimers:
1. Any boundaries and designations used on this map do not imply official endorsement or acceptance by the United Nations.
2. The dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.
Whilst population and unsustainable economic growth, poverty, consumption and globalization have all been identified as key elements of change in the conditions of environment and natural resources, the failure to avoid environmental degradation in the region can to a large extent be traced to the weakness of institutions, adoption of inappropriate policy tools and the lack of effective policy enforcement. The principal environmental challenge in the 21st Century is therefore policy reform and its effective implementation in both individual and cross-sectoral areas. Meeting the sustainability challenge requires new policy approaches that integrate environmental concerns into the very core of investment, planning and technology decision-making in the region’s economies.

A. Policy Challenges

The implementation of appropriate policies and programmes, enactment of laws, rules and standards for enforcement of policies, and creation of delivery mechanisms for the implementation of plans and enforcement by institutions all provide stability for the environment. Challenges, in this respect, lie in how governments can provide clear signals and incentives to the agents tasked to carry out the underlying goals and objectives of development. Effective implementation of environmental legislation remains one of the biggest challenges in many countries of the region. It needs to be resolved by bridging the gaps between intent and action.

At the national level, the most daunting challenge is not only to guide the overall development process on a sustainable path, but also to promote vertical coordination between various tiers of government, at national, provincial and local levels, as well as horizontal coordination between the key sectors of the economy. The process of plan formulation should involve intensive deliberations on those aspects of sustainable development most relevant to national priorities and extensive participation of the public in giving their views and suggestions on adoption of appropriate means to accomplish sustainability.

An essential aspect of such plans, and one often omitted in practice, is the examination of such cross-sectoral issues as budgetary priorities, trade and investment policies, specific technology needs, research and development, and roles of trans-national corporations and international capital flows. Comprehensive analytical procedures for prior and simultaneous assessment of the impacts of decisions on social and environmental aspects of sustainability need to be applied, not only at the project and sectoral levels (Box 22.3), but also in the analysis of programmes and policies including macro-economic policies.

The 1992 Earth Summit moved the concept of sustainable development to the forefront of public discourse in Asia and the Pacific and around the world. If sustainable development remains somewhat elusive as an organizing principle for the world economy as a whole, the events of the 1990s helped to bring the concept into sharper focus in a regional context. From the Asian economic crisis, to forest burning, haze and continued destruction of coastal ecosystems, as well as many other environmental and development challenges, two key dimensions of sustainable development in the region emerge. The first is the urgent imperative to dramatically reduce severe poverty and improve socio-economic welfare for much of the population. The second, is that sustainable development in Asia and the Pacific must
resolve the escalating demands for energy, materials, water and other resource inputs to production and consumption that accompany economic growth.

Much of Asia and the Pacific is in the midst of an urban-industrial transition unprecedented in scale and intensity. The development growth trends for the region outlined earlier in this Chapter make the challenge of achieving sustainable development particularly significant, not just for the Asian and Pacific Region, but for the global economy as a whole. Fortunately, those same trends also provide significant opportunities for addressing the challenge of clean (i.e. green) and shared (i.e. pro-poor) growth in the region over the next two decades.

B. Sectors and Mechanisms for Action

In response to the sustainable development challenges facing the region, a number of key sectors (or areas) for action, and mechanisms for implementing these actions, can be identified, as discussed below.

1. Environmental Quality and Human Health

Among the most significant environmental challenges for the region are those facing the region’s cities. Despite their potential to offer a better quality of life, the cities are often beset by growing problems of environmental deterioration relating to the loss of natural resources, the lack of adequate shelter and dwelling, deteriorating ambient air and water quality conditions, inadequate infrastructure, and an increasing deterioration in urban services provision, including water supply and sanitation facilities, and municipal, industrial and hazardous waste management. These conditions impact directly upon the health and welfare of urban residents, and in particular the poor, leading to the widespread incidence of infectious diseases, including acute respiratory infections.

2. Globalization and Policy Integration

Economic development in Asia and the Pacific over the next two decades will occur in an international context. From flows of capital, technology, ideas and information, to the increasing global reach of corporations, non-governmental organizations, and regulatory organizations, development is now a global process. Linkages among businesses, consumers, citizens, and organizations are becoming both more extensive and more intensive in their character. For some, these processes of globalization will usher in a world with more inequality and more volatility, where the costs and benefits do not fall equally among the rich and the poor (Greider 1997), and where deepening environmental problems are the inevitable result. For
3. **Energy Efficiency and the Promotion of Clean Technology**

A major concern for the region is that the current environmental policy does not effectively address the escalating demand for energy. From agriculture to energy supply, transportation to tourism, the sustainability transition requires a substantial acceleration in current trends towards efficiency improvements in economic processes. The place to begin such an initiative is with the calculation of current levels of environmental performance and the identification of aggressive but attainable goals for reducing energy, materials, pollution and waste intensity. The policy tools for assessing these trends, such as life-cycle analysis and materials flow analysis, are now available (Allenby 1999; Graedel and Allenby 1995; Socolow et al 1994). In industry this entails assessing and reducing energy and materials use in a dynamic of continuous improvement, as well as reducing pollution and waste discharges throughout the entire process of production or manufacture. In agriculture it entails tracking the use of chemicals, energy, water and other materials in the production of food. Importantly, goals for reducing energy, materials, pollution and waste intensity need to be examined within broad industrial sectors, such as the manufacturing industry, and need to be adopted by the industrial ministries responsible for the development of these economic sectors.

Perhaps the key opportunity related to environmental intensity lies in shaping the pattern of new urban-industrial investment. Attracting and promoting clean technology investment in industry and in urban development will be critical to reducing the energy, materials, pollution and waste intensity of economic activity as a whole. To some degree, this goal will be met through the attraction of new investment and capital turnover. Evidence suggests that within many sectors of economic activity new capital tends to be cleaner than old. Nevertheless, the sustainability transition requires improvements that go beyond the modest improvements in environmental performance secured through capital turnover *per se*. Investments in research and development, in accelerated technology transfer, and in the enhanced modification and extension of clean technologies will also be required.

4. **Poverty Reduction Strategies**

Efforts to reduce poverty must be comprehensive enough to address all of its many causes, and their success is fundamentally linked to sound economic management and good governance, at all levels. To be effective, poverty reduction strategies must simultaneously address the combined goals of ensuring that all poor households are provided with the opportunity to earn a sustainable livelihood, while ecologically-vulnerable areas are handled in an integrated manner encompassing resource management, poverty alleviation and employment generation. They also need to be complemented by social development policies that permit access by the poor to education, health, social protection and other basic services.

A range of activities need to be undertaken by individual countries (including governments, NGOs and other citizen’s groups), for instance, to investigate the environmental implications of investment in poverty reduction strategies, and to examine the effectiveness, practicality and appropriate forms of policy aimed at achieving poverty reduction and sustainable environmental management in different agro-ecological zones and urban environments. The concept of zoning enables different strategies to be developed to suit different zones. For example, in areas of low agricultural potential, in which the thresholds of ecological sensitivity and resilience have not yet been crossed, social welfare transfers to the poor could be channelled through public works programmes geared at supplementing natural
resilience, such as tree-planting by means of rainwater harvesting in drylands.

From an international perspective, the world has, in recent decades, become increasingly interdependent with the emergence of a global economy. The formation of this economy has been accompanied by policies and practices whereby the developed countries now heavily influence the terms under which the developing countries participate in the international system (United Nations 1995). This could potentially have significant negative impacts for poverty and the environment. There is, therefore, an urgent need to examine the effects of developed countries’ macroeconomic and trade policies on environmental management behaviour also remains, in particular the consequences for the poor.

5. Strategic Environmental Management

(a) Integrating Economic and Environmental Policy

To secure the progress in environmental performance needed to offset future growth in economic activity, policy-makers will need to focus on the fundamentals of investment, technology and production, or what have been labelled elsewhere as the “denominators” of economic activity. Traditionally environmental policy-makers have focused on pollution and other negative outputs of economic activity, and has not taken a strategic approach which recognizes core economic processes as part of the domain of responsibility. Investment, technology choices, land use planning and other key elements of economic activity have been influenced only indirectly, by means of environmental regulation, taxes, and subsidies of one form or another. Focusing directly upon core economic processes opens up the range of policy instruments that can be brought to bear on the sustainability challenge, from education to industrial policy, from trade to technology policy. It also allows for the strategic coordination of policies across a variety of areas, such as agriculture, urban, trade and environment policy. Careful coordination of economic and environmental policy will be crucial if countries are to balance competing priorities, such as the desire to reduce pollution while also improving industrial output. The goal of reducing poverty while improving environmental performance will require careful coordinated economic planning at the national level around issues of investment and infrastructure development within urban and rural areas. The economies of the region will also need to integrate economic and environmental policy at the highest levels of government, and internalize environmental performance into the core of investment and technology planning.

(b) Setting Clearly Defined Goals

The experience of the past decade has confirmed the importance of clearly articulated and consistently implemented goals for sustainable development, as well as effective monitoring and reporting of the progress that is made toward achieving these goals. It is for this reason that organizations such as the ADB, UNDP and ESCAP have placed a high priority upon the specification of measurable goals at the national level for such issues as reducing pollution, eliminating poverty, and improving social welfare. These goals must be supported by a low cost, transparent, and scaleable programme of performance measurement that reaches up from the individual organization to the industrial sector and to the economy as a whole. Clear and consistent goals are crucial to the creation of a stable enabling environment for research, investment, and strategic planning on the part of communities, firms, industries, and financiers. A key priority for countries of the region must be the further development and specification of short and medium term goals for sustainable development, and funding of the necessary research and monitoring capability to identify indicators and to track progress toward these goals.

(c) Influencing New Investment and Technology Choices

The very processes of urban and industrial growth, which potentially constitute a shadow on the environmental future of the region, also create significant opportunities to influence processes of new investment and technological change. Much of the capital stock and infrastructure that will be in place in the region twenty years from now is not on the ground today. The opportunity exists for many developing economies in Asia and the Pacific to turn the trajectory of urban-industrial investment toward a pathway that is dramatically less energy, materials, and waste intensive, i.e. to shape the process of urban-industrial development as it happens. When the OECD countries moved to strengthen environmental regulation during the 1960s and 1970s, the challenge was one of improving the environmental performance of mature industrial economies, typically through the retrofit application of end of pipe pollution control. In Asia and the Pacific today the challenge however is one of influencing the technology and planning choices of new industrial and urban investment. Already across a wide variety of industrial sectors, newer cleaner technologies are economically viable alternatives to older dirty technologies. If the process of new industrial and urban investment in the region is based on the development, deployment and use of ever-cleaner technology and infrastructure, this will
go a long way toward moving the region toward a pathway of sustainable development.

(d) Promotion of Non-Regulatory Mechanisms

One of the important corollaries of globalization is the increasing importance of non-regulatory drivers of environmental performance in economic activity. Tighter links between consumers and producers, and the growing availability of environmental performance information, are enhancing the significance of eco-labelling and similar programmes. Within large production networks, supply chain management is now an important tool for environmental management, and increasingly, issues of environmental performance are beginning to influence investment decisions. The full impact of non-regulatory drivers on environmental performance is hard to assess accurately at this time. However, it is understood that the effectiveness of non-regulatory drivers is likely to depend on the quality of information on environmental performance that is available within and among organizations. Therefore, public policy can most effectively promote non-regulatory drivers by supporting a programme of low cost, standardized and transparent environmental performance information disclosure for firms and industries.

6. Governance, Institutions and Capacity Building

Whether or not the challenges will be met and whether the opportunities for sustainable development will be taken depends to a significant extent upon the evolution of structures of governance within the Asian and Pacific Region and the global economy as a whole. The successful implementation of a more transformative policy framework in support of sustainable development will require broad engagement of multiple stakeholders and a strong commitment to collaborative and participative governance (see Box 22.4). The bedrock of such collaborative governance is access to information and a commitment to democratic decision-making.

Box 22.4 ECO ASIA and the Promotion of Regional Cooperation for the Environment

In order to promote regional cooperation on environmental issues, and thus to contribute to sustainable development in Asia and the Pacific, the Environment Agency of Japan has been working hard to promote regional dialogue on environmental policy. To this end, in 1991, Japan initiated the Environment Congress for Asia and the Pacific, or ECO ASIA in short, which has convened eight times since then.

ECO ASIA is regarded as one of the leading forums for environmental policy dialogue in Asia and the Pacific region. Key activities to date which have been implemented under ECO ASIA include the following.

- ECO ASIA ’99 (the eight session), held in Sapporo, Japan in September 1999, was attended by 111 participants from 17 countries in the region, including 8 Environment Ministers and 12 representatives from 11 international organizations. In addition to allowing individual countries to present their own environmental status reports, some of the key outcomes of the sessions were the common points of agreement which emerged between members, which, for example, included: that links should be strengthened between ECO ASIA and parliamentarians or parliamentary groups around the region, to promote common policy responses and raise environmental awareness in the political arena; the importance of promoting “win-win” approaches to combating climate change, and the wider and more effective participation of both developing and developed countries in this process; and the need for enhanced technology transfer to developing countries by the private sector, inter-governmental and scientific networks, for example, the Acid Deposition Monitoring Network in East Asia (EANET).

- The ECO ASIA Long-term Perspective Project was initiated at ECO ASIA ’93. It aimed to provide decision-makers in the region with a scientific basis for policy formulation in order to support the process of sustainable development through to 2025. To achieve this, it forecasts, on a continuing basis, the probable state of the environment in Asia and the Pacific in 2025, and identifies policy options for the realization of sustainable development. In Phase I (1993-1997) it evaluated current and future environmental and socio-economic issues in the region and offered ‘Asia-Pacific Eco-Consciousness’ as a conceptual tool for building partnerships. Objectives of Phase II (1998-2001) include capacity-building for personnel and institutions of the participating countries.

- Establishment of the Environmental Information Network for Asia and the Pacific (ECO ASIA NET) was proposed by the Environment Agency of Japan at ECO ASIA ’96. ECO ASIA NET aims at supporting sustainable development in the region through information sharing and dissemination by using Internet and other available communications technology. It provides a vital forum for information sharing on the environment among stakeholders, including policy-makers, businesses and NGOs across the region.

Source: [http://www.ecoasia.org](http://www.ecoasia.org)
Collaborative governance will need to link effectively with multiple scales of decision-making, from international organizations such as the World Trade Organization and the ADB, to decentralized systems of local and regional representative government. Only in this way will the goals and aspirations of the people of Asia and the Pacific be met.

Many of the decisions and initiatives required to promote sustainable development will take place on a local, regional and urban scale. From land use controls to approaches to water and energy supply, effective decision making requires mobilization of knowledge regarding local context, challenge and opportunity. Over the next two decades, decentralization and devolution of decision-making below the national scale is likely to accelerate within many countries of the region. As decentralization takes place, it is critically important that this process be matched by the investment of resources and building of local and regional institutional capacity. Many advances in improving environmental performance during the 1990s have derived from policies that are implemented at the local level. Much remains to be done in decentralizing and enhancing capacity, especially in the areas of sustainable forest management, rural development financing, and integrated coastal resource management.

Finally, the aforementioned integration of environmental concerns into economic policy should be accompanied by continued efforts to strengthen environmental regulation and resource management systems within the region. As indicated, evidence in this report suggests that where environmental policies are effectively designed and consistently enforced, improvements in environmental performance result. The state of environmental regulatory capability and practice is quite variable within the region. Some countries already have widely developed environmental regulatory systems and enforcement capacity, and the emphasis in these cases should be on the pushing beyond compliance, and on the use of 2nd and 3rd generation policy instruments, such as information disclosure and market-based instruments. In many of the region’s developing countries, the key priority is on strengthening policy implementation and enforcement of basic systems of environmental protection. Throughout the region, environmental protection systems will be called upon to protect public health through the establishment of clear and consistently enforced ambient environmental standards.

**CONCLUSION**

This analysis of the state of environment in Asia and the Pacific in the year 2000 demonstrates that overall environmental conditions continue to deteriorate. Deterioration can be seen in over a third of the region’s croplands, its falling water tables, and it’s diminishing forests. Recent and unprecedented forest fires not only destroyed thousands of hectares of forests, but also perpetuated the polluting haze from Indonesia to India. Perhaps, the most significant single indicator of the region’s deteriorating environmental health is the declining biodiversity from wilderness, oceans, and cultivated landscape.

In this gloomy scenario, hopeful trends are evident in the decline in birth rates and fertility levels, increased life expectancy, somewhat reduced poverty levels, improved levels of nutrition, growing public awareness and participation, an improved policy environment and an enhanced role of the private sector in environmental protection, and the promotion of sustainable development. For example, some developing countries have dramatically lowered birth rates and moved forward towards population stabilization. However, with its heavy base even before stabilization, the population growth momentum is likely to continue in sheer scale and number at least in the early part of the 21st Century.

Implementation of appropriate policies and programmes, enactment of laws, rules and standards for enforcement of policies, and creation of appropriate delivery mechanisms are the key policy challenges for the region. Moreover, in the wake of development needs, the resources for investment in environment are low, which poses a daunting challenge in generating resources by innovative means. A new policy model based on a mix of command and control and market-based mechanisms with a strong but limited government steer is gaining ground in countries like Malaysia and the Philippines. This is characterized by the role of government as a facilitator rather than provider; by a prominent private sector and civil society; and by a pricing reform on environmental goods and services and improved management. The model appears to have great potential for developing countries of Asia and the Pacific as it can be achieved by a government that is deficit of financial resources.

If a strategy to promote sustainable development in the region is to succeed, it must also focus on poverty eradication. Although there is a repeated acknowledgment of both the vicious “cycle of poverty” and its intrinsic linkages with the environment and the urgency to address poverty alleviation, little evidence has emerged to show that effective and concerted actions that have been taken in that direction. Empowerment of communities and provision of access to resources could be most powerful mechanisms towards alleviation of poverty while improving the environment.
The entry into the new millennium has also brought forward the key limits to economic growth in terms of natural resources, such as freshwaters, forests, rangelands, fisheries and biological diversity. There is a need to recognize these natural limits and adjust national economies accordingly, promote efficiency in the use of water, energy and materials, curb growing profligacy in the use of resources, and reflect the cost of loss of natural resources and enhancing pollution in the estimation of national incomes. It is extremely important not to let accelerating change outstrip the assimilative capacity of the natural environment, and overwhelm political institutions through an extensive breakdown of the ecological system on which the economy depends.

These issues are enshrined in Agenda 21, which advocates utilization of natural resources in harmony with nature. The ultimate realization of the objectives of Agenda 21 depends to a large degree on national and local governments because they are in the forefront of development actions. They create and enforce legislation on the use of natural resources. They formulate and implement development plans. They maintain institutions that embody and monitor the implementation of environmental and development policies. However, the supportive role of the developed countries in the provision of financial resources and technology transfer remains equally important.

Globalization, while opening the awareness for development has also made developing countries of the region vulnerable to trade sanctions and international pressures. These sanctions could be provoked by countries’ perceptions of a regional violation in environmental standards. Moreover, new and emerging issues and challenges have now surfaced as a result of bioprospecting and recent developments in biotechnology (particularly those related to genetically modified organisms). Multinational companies are exercising property rights and patent regimes presenting dangers of biopiracy, and monopolization of improved varieties of seeds which are threatening the cultural and traditional rights of indigenous communities and oriental farmers.

Whilst Agenda 21 and Rio+5 clearly recognized the principle of “common but differentiated responsibilities”, translation of this principle into reality has not risen beyond the narrow self-interest of states. The commitments made by developed nations regarding financing and technology transfer are still far from their realization.

Under these troublesome scenarios, the need for acquiring information and promoting regional and subregional cooperation was never so pressing in Asia and the Pacific as it is today. Regional cooperation is vital for providing opportunities for ensuring a coordinated response to continuously increasing pressures of globalization. Moreover, the dwindling availability of international financial resources, technology transfers, and unfavourable trade regimes, demand enhanced regional unity in a proactive response.