World Summit for Sustainable Development
International Eminent Persons Meeting on

Inter-linkages
Strategies for bridging problems and solutions to work towards sustainable development

Sustainable development of China, India and Indonesia: Trends and Responses
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United Nations University Centre
3-4 September 2001
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I. Introduction

1. This paper presents an overview of trends, of policies already established and of new policy directions related to critical socio-economic and environmental issues identified in Agenda 21. It explores both positive trends pointing towards greater sustainability and negative trends or issues in which progress has proved more elusive. It also identifies policy gaps and trade-offs and suggests options for future policy directions. A special perspective of this paper is its integrated approach to social, economic and environmental issues. This paper focuses mainly on China, India and Indonesia. However, in some cases, it extends the analysis to cover few other large developing countries. The topics were chosen to reflect critical issues unique to the large developing countries in terms of size, population and resource endowments. It covers a broad range of topics critical to sustainable development, including population growth, urbanisation, human development, long-term growth, Green GDP, sustainable agriculture, sustainable industrialisation, energy management, natural resource management, and environmental conditions.

2. During the last two or three decades, China, India and Indonesia have made substantial progress in most spheres of development. These countries have been among the fastest growing in the world. Social indicators have improved. Literacy and enrolments have risen. Morbidity and mortality have declined. Gender gap declined. Poverty rates have fallen steadily. These countries, particularly India, have attained food sufficiency in spite of their growing population. They have also created a large base of skilled scientific and technical manpower with a diversified industrial base. However the benefits of this impressive progress on socio-economic front have been substantially offset by environmental degradation. The spread of input-intensive green technology has given a certain degree of food security in these countries, but it has been at the cost of falling water tables, degrading soils, poor management of irrigation systems and the harmful side-effects of increasing use of pesticides and fertilisers. Similarly, rapid industrial growth and uncontrolled urbanisation polluting water, air and land as well as causing a change in people lifestyles (such as increasing use of automobiles, plastics etc.) that put immense stress on resources (energy) and environment. All these raise the issue of how to achieve an environmentally sustainable economic development in China, India and Indonesia. With large in size, population and resource endowments, the decisions made by these countries will have major ramifications on the world’s markets, resource base, and environment. And what is learned from these development experiences will also give...
a valuable insight for other developing countries for moving towards environmentally sustainable development. In this context, the time has come for a comparative assessment of their progress towards sustainable development. Moreover, such a assessment might also be useful in the context of the forthcoming the World Summit on Sustainable Development (also known as Rio + 10) in Johannesburg, South Africa as the meeting also aims to review of progress towards sustainable development by countries, regions and the world.

II. Demographic Dynamics and the Environment

3. Demographic dynamics (population growth, urbanisation etc) are key elements in the context of sustainable development. The issue was subject of the chapter 5 of Agenda 21. The growth of population combined with unsustainable production and consumption patterns places increasingly severe stress on the life-supporting capacities of the earth. These interactive processes both degrade and deplete the environment and natural resources (land, water, air, energy etc). Therefore, demographic dynamics have to be taken into consideration in policies for sustainable development.

Source: Unless otherwise stated, the data for charts were taken from the World Development Indicators 1999 or 2000 (World Bank)

4. **Population continued to grow but at a lower rate**- In China, the total population, which was about 1.27 billion in 2000, is projected to rise to 1.37 billion in 2010, and 1.45 billion by 2020. Some time between 2035 and 2040, the population is likely to be stabilised. As the Chinese Government recognised the importance of the population control, as early as 1982, it put family planning and population control in its basic state policy and included these in the long-terms plans for national socio-economic development. In the 1990s, it improved the family planning polices and adopted an integrated population control polices with that of human development, poverty alleviation, educational promotion, women and infant medical care etc. In order to implement these policies, it established Family Planning Commission at various levels. As a result, it has succeeded in slowing its population growth. Population growth rate is declined from a high of 2.8 % per annum in the mid-1960s to 0.90 % per annum in the late 1990s. It is likely to go down further to 0.63% and 0.34 % in 2010 and 2020 respectively.
5. India’s population reached 1.00 billion in 2000. It is projected to increase to 1.15 and 1.27 billion respectively in 2010 and 2020. If current trend continue, India may overtake China in 2045, to become the most populous country in the world. If current policy initiatives are succeed, the country may achieve replacement level of fertility by 2010. If it is happen, India’s population may stabilise by 2045. Since 1970, population growth rate continues to decline. It declined from 2.25 % per annum in the 1970s to 1.69 % in the late 1990s. It is projected to decline to 1.11 % and 0.92 % by 2010 and 2020 respectively. Population growth rate, though declining, is still high in India compared to many countries due to the following reasons: (1) large size of the population in the reproductive age- group, (2) large unmet need for contraception, and high infant mortality rate.

Stabilising population is an essential requirement for promoting sustainable development and its equitable distribution. Since India recognised this, it launched a Family Planning Programme as early as 1952- first in the world. Over the last five decades, it has improved this programme by introducing new polices. In 2000, it announced a new National Population Policy. A key objective of this policy is to bring down total fertility rates to replacement levels by 2010. In pursuance of the national population policy 2000, a National Commission on Population has been set up. State level commissions on population have also been set up with the objective of ensuring implementation of the policies.

6. Indonesia is the fourth most populous nation in the world after China, India, and United States. According to the latest United Nations estimates, Indonesian population was estimated at 212 million in 2000, up from 80 million in 1950, and 120 million in 1970. Indonesian population is projected to grow to about 239 and 264 million in 2010 and 2020 respectively. Overall, the population growth rate has decreased from 2.34 % per annum in the 1970s to 1.98 % and 1.66 % in the 1980s and 1990s. According to 2000 Population Census, however, Indonesia has only an estimated population of 203.4 million (which is considerably less compared to many recent estimates). It means that in the 1990s, Indonesian population grew only by 1.35 % per annum. This reveals that Indonesia has succeeded in lowering its population growth through the ongoing national family planning programme. In recent years, contraception has become more widespread and effective, making it easier to plan families; and sterilisation of men and women has
also become more common. Several other factors including a rising living standard and higher educational level has also contributed for the declining population growth. The annual population growth rate is projected to go down further to 1.01% in 2010 and 0.82% in 2020 respectively.

7. **Rapid Urbanisation**- An important dimension of demographic transition in these countries has been the process of urbanisation. Although more than two-thirds of the China’s population still lives in the rural areas, the country has experienced a rapid urbanisation over the last two decades. The urban population more than doubled between 1975-1995, increasing from 160 to 370 million. Currently, China’s urban population officially stands at 400 million that is 30% of the population. However, some analysts agree that the actual Chinese urban population is much larger—about 455 million, or 36% of the total population (The World Bank 2001). During the 1990s, it grew by about 10 million each year. Half of the Chinese population is projected to stay in urban areas by 2020.

8. During the last 50 years, India’s total population increased by about 2.8 times while the urban population swelled by 4.6 times. As a result, the share of urban population increased from 17% to about 30% during this period. The rate of growth of urban population increased from 2.35% per annum in the 1950s to 3.8% per annum in the 1970s and continued to grow well above 3% per annum during the subsequent decades. By 2020, about 38% of the India’s population are expected to stay in urban areas. The poverty that has become commonplace in the India's rural areas has led many to flock to urban areas in search of relatively better schools, health care facilities and economic opportunities. Since urban areas have become magnets for foreign and domestic investment in labour-intensive industries, millions of these rural workers have been lured to urban centres by the prospects of employment opportunities and better living conditions.

9. Indonesia also experiences a rapid urbanisation. The share of Indonesian urban population was 12% in 1950; it increased slowly to 17% in 1970. But thereafter it is growing rapidly. Now the rate is doubled and, by the year 2020, half of the population (about 133

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**Percentage of Urban Population**

![Graph showing percentage of urban population over time for various countries, including India, China, Indonesia, Brazil, Russia, Japan, U.S, and Germany. The data points are marked with different colors for each year from 1950 to 2030.](image-url)
million) may reside in urban areas. The urban transition is occurring more rapidly on Java, which is already 36% urban and could reach 60% by 2020.

10. Environmental Problems due to demographic changes - Higher population growth undermines Chinese, Indian and Indonesian efforts to promote sustainable development. Fortunately, declining population growth in the 1990s allows these countries more time to adjust to future population increases. This also increases their ability to invest in human development, combat poverty and protect environmental and build the base for future sustainable development. The problem of ageing population is not that serious in India and Indonesia during the next two decades; But it may be a problem for China. Rapid urbanisation and a growing number of mega-cities overwhelm the environmental resources of urban areas. The concentration of pollution from human and economic (industrial) activities in urban areas poses a serious threat to the people health. However, sustainable urbanisation would generate more economic benefits. Economic sustainability will not only help for social and human development but also help for environmental improvements. For example, urbanisation is likely to reduce the pressure on rural areas and pollution treatment costs, while expanding the opportunities for more efficient energy and natural resource consumption. In recent years, urban environmental problems are intensifying in China, India and Indonesia. The most important urban problems are air pollution, water pollution, waste management and the traffic congestion.

11. In China, most important urban problem is air pollution. The concentration of Total Solid Particulates (TSPs) in China’s cities generally exceeds world standards. In 1996, the TSP average concentration was 309 micrograms per cubic meter (mg/ m³) in Chinese cities, with 387 mg/ m³ in Northern cities and 230 mg/ m³ in Southern cities. The TSP levels in most cities have actually been brought down considerably from the high levels seen in the early 1980s. However, they still greatly exceed the WHO guidelines of 60-90 mg/ m³. The atmospheric pollution in Northern cities is more severe. Similarly, Sulfur Dioxide (SO₂) concentrations are also relatively high in many Chinese cities. In 1996, the annual average concentration of SO₂ in urban areas was 79 mg/ m³, with 83 mg/ m³ in the Northern cities and 76 mg/ m³ in the Southern cities. In cities such as Chongqing and Guiyang, SO2 concentrations are substantially higher than the WHO standards for 24-hour exposures.
India has 23 cities of over one million people, and ambient air pollution levels exceed WHO health standards in many of them. Urban air pollution is worsening due to upward trends in power consumption, industrialisation, use of vehicles, and refuse burning. Six of ten largest cities in India – Bombay, Calcutta, Delhi, Ahemedabad, Kanpur and Nagpur – have severe air pollution problems with annual average levels of TSP at least 3 times as high as the WHO standard. In Delhi, Calcutta and Kanpur, annual average values of TSP are over 5 times the standard (see Table). In India, the SPM levels are generally higher in cities in Northern, Western and Central India as compared to Southern and Eastern parts of the country. A number of cities for which data is available from 1987, indicate that SPM levels were higher in 1987 than most, if not all, of the subsequent years. It is observed that the SPM levels exceed the prescribed national standards. On the other hand the observed levels of SO\(_2\) and NO\(_x\) are within in the prescribed standards. The estimates of air pollution related health impacts show a reductions in the rates of morbidity and mortality in India if pollutant levels in 36 cities were reduced to the WHO annual average standard. About 40,000 premature deaths could be avoided, with 7,500 (19%) in Delhi, 5,700 (14%) in Calcutta, and 4,500 (11%) in Bombay (UNU/IAS). An economic
valuation of these premature deaths suggests a monetary estimate of the loss of between $170 and $1,615 million. In terms of sickness, reducing particulate levels down to WHO standards would reduce new cases of chronic lung disease and reduce respiratory tract infections, especially in children. Asthma attacks would also be reduced. The estimates are: (a) 19 million fewer respiratory hospital admissions, emergency room visits, and sickness requiring medical treatment; and (b) 1.2 billion fewer restricted activity days, respiratory symptom days, cases of lower respiratory illnesses in children, and other minor sicknesses. A low estimate of the social value of these impacts, using a cost-of-treatment approach is $350 – 490 million per year (UNU/IAS). Of total impact costs, premature mortality represents approximately 68% of the total value, and morbidity represents 32%.

Air Pollution in Different Cities in the world (1995)

<table>
<thead>
<tr>
<th>City</th>
<th>Total SPM</th>
<th>SO$_2$</th>
<th>NO$_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shanghai</td>
<td>246</td>
<td>53</td>
<td>73</td>
</tr>
<tr>
<td>Beijing</td>
<td>377</td>
<td>90</td>
<td>122</td>
</tr>
<tr>
<td>Bombay</td>
<td>240</td>
<td>33</td>
<td>39</td>
</tr>
<tr>
<td>Calcutta</td>
<td>375</td>
<td>49</td>
<td>34</td>
</tr>
<tr>
<td>Delhi</td>
<td>415</td>
<td>24</td>
<td>41</td>
</tr>
<tr>
<td>Madras</td>
<td>130</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>Jakarta</td>
<td>271</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


13. In Indonesia, urban air pollution is one of the greatest environmental challenges. Jakarta, with a population of over 9.5 million, ranks as one of the most polluted cities in the world. Only cities in China and India are usually more polluted than Jakarta, especially in terms of suspended particulate matter (see table ). Primary sources of air pollution are recurring forest fires and large fleet of highly polluting vehicles. Air quality in Jakarta suffers more from vehicle emissions than from forest fires. There are more than three million vehicles in Jakarta. In Indonesian cities, air pollution conditions exceed national ambient quality standards for several pollutants. Given the expected growth of urban populations, industrial activities and lifestyle changes including use of more automobiles, the air pollution in urban areas is likely to worsen dramatically in the future. The World Bank (1994) estimate of the health effects of pollution in Jakarta varies widely, due to data and methodological problems, but its central value estimate is more than US$500 million for 1990. Moreover, there is huge economic cost due to urban pollution. Economic cost includes raising of the operating costs of economic activities as well as high opportunity cost in terms of foregone output, tourism etc.

14. Another major urban environmental problem is high levels of water pollution due to poor waste disposal, inadequate sewage and drainage and improper disposal of industrial effluents. In China, most water pollution in urban areas is caused by inadequate treatment of municipal sewage. According to Chinese National Environmental Protection Agency, only 5 % of the total sewage discharged annually treated. Of the 27 largest Chinese cities, only six supplied drinking water that met government standards; groundwater did not meet state standards in 23 of these cities. (Smil, Vaclav. 1995, cited in Maurer, Crescencia, 1998). The situation is just as bad—or even worse—in Chinese medium-sized cities. Given the lack of water treatment in China, it is not surprising that several million people are afflicted with intestinal diseases every year. Approximately 1.5 million
Chinese contract schistosomiasis annually, and several thousand of these suffer acute schistosome infections. Hepatitis A, bacterial dysentery, infectious diarrhea, para-cholera, and typhoid are also common. An increased reliance on groundwater supplies in many urban areas has also become problematic. More than 300 of China's 640 cities are facing water shortages, with a total annual shortage of nearly six billion cubic meters. According to NEPA, of these 300 cities, 100 are experiencing severe shortages. This problem is most acute in northern China (Maurer, Crescencia, 1998).

15. In India, limited availability of water in many cities make urban water pollution a matter of great concern. Access to safe drinking water remains an urgent need as only 70% of the households in the urban area receive organised piped water-supply and the rest have to depend on surface or ground water which is untreated (Statistical Abstract of India, 1998). According to Central Pollution Control Board of India, water quality in urban areas, which is gone down in the late 1980s, improved in the 1990s. In India, major sources of urban water pollution are discharge of domestic sewage and industrial effluents. Facilities treat wastewater is woefully inadequate. In metropolitan cities, only 5% of total wastewater are collected of which only 25% are treated. Recent data show that about 21% of all communicable diseases in India (11.5% of all diseases) are water borne diseases. Since India recognised the importance of water pollution control, as early as 1962, the government had begun to address water pollution issues by appointing a study committee. In 1969, a bill, the Prevention of Water Pollution, had been introduced in the parliament. A modified version, the Water (Prevention and Control of Pollution) Act, passed in 1974. This Act established the Pollution Control Boards at central government and state government levels.

16. In Indonesian cities, there is no shortage of water. For example, in Jakarta, a dozen rivers and several canals go through the city. Groundwater is also accessible within a few meters of the surface throughout the city. But, much of the water has become too polluted for human consumption. Few Indonesian cities have even a rudimentary sewage system. Wastewater receives little treatment. It is discharged directly into the rivers and canals or into septic tanks that are poorly maintained to prevent groundwater contamination. As a result, an estimated 1.44 million cases of diarrhoea reported each year in Jakarta alone (Borelli 1998). The cost of this one health aspect is estimated at an average $300 per year (The World Bank 1994).

17. Third important urban problem is waste management. Solid waste collection, transfer and disposal have become a major concern in many developing countries. In many cities conventional systems are able to collect between 30 to 50% of solid wastes and most cities these solid wastes are disposed in ways detrimental to the environment. At the same time solid waste recycling provides jobs and income to many of the urban poor. It is estimated that between 20 to 30% of the solid wastes in large Asian cities is recycled in the informal sector. Because the conventional systems do not take the involvement of the urban poor into account they often cause damage to the economies and livelihoods of the poor and at the same time instead of protecting the environment end up damaging it. In China, due to rapid urbanisation and industrialisation, there is an equally rapid increase in industrial and municipal solid wastes. In 1981, solid wastes in China totalled 380 million tonnes; in 1994, the figure jumped to 646 million tonnes, occupying 55,700 hectares of land; in 1995 the number increased again to 800 million tonnes, resulting in a 10% accumulation rate for solid wastes in China. In addition to occupying valuable land,
accumulated solid wastes pollute groundwater. The Government has made several concerted efforts to fight the growing problem. In 1991, it implemented enforced solid waste registration requirements in 17 big cities. In 1994 it began a nationwide out-reach programme to provide people with basic data on solid waste composition, production, and treatment options. In recent years, the Government has also promulgated regulations how to get rid of solid and toxic chemical wastes.

**Urban MSW Generation in 1995 and 2025 (Kg./capita/day)**

<table>
<thead>
<tr>
<th></th>
<th>1995</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>0.46</td>
<td>0.7</td>
</tr>
<tr>
<td>China</td>
<td>0.79</td>
<td>0.9</td>
</tr>
<tr>
<td>Indonesia</td>
<td>0.76</td>
<td>1.0</td>
</tr>
</tbody>
</table>


18. In India, no systematic and reliable estimates of urban wastes are available. An estimate by CREED (1995) puts this figure at 30 million tonnes per annum based on average daily per capita figure at 0.33 Kg. According to this estimate, considering the annual urban population growth rate of 3.5 % and annual per capita urban income growth rate of 1.3%, an overall annual growth rate for urban wastes is placed at 5 %. Another estimate (The World Bank 1999) places the total MSW generation rate at 42 million tonnes per annum in 1995 (daily per capita rate of 0.46 Kg.) This study projects that daily per capita rate of Waste generation will rise to 0.7 Kg. by 2025 AD. This combined with the increase in urban population will result in a MSW generation of 165 million tonnes per annum in 2025, thereby representing a four-fold increase over a period of 30 years (AITD 2000). Recently, a government publication (The Economic Survey 2000) put this figure at 48 million tonnes in 1997.

19. Indonesian cities generate a large amount of solid waste. Its solid waste is wetter and denser than that of its richer counterparts in developed countries. This makes disposal both more urgent and more difficult. Much solid waste is collected from paying households by handcart and is transported to local depots. At the local depots, or dumpsites, thousands of scavengers pick over the waste. This unsubsidised activity produces recycling and reduces pressure on collection and land filling processes. The solid-waste disposal process works less efficiently at the second stage. Only 40 % of the
urban population have its solid waste collected. Given the rapid urbanisation, the generation of solid wastes is projected to increase dramatically. This will pose serious environmental and social challenges given the already low collection and management rate. Solid waste generation is projected to increase 500% by 2020 for the domestic sector and 1000% for the manufacturing sector.

20. There is unequivocal evidence that the poor waste management is associated with increased health problems in all the sections of the population. The poor solid waste management may at times trigger off epidemics of some vector borne or food borne infections. It is however, difficult for quantify the health hazards posed by poor urban solid waste management because very few epidemiological studies have been undertaken to obtain the data. Problems such as infections due to pathogenic organisms, vector borne diseases, and ground/subsoil water pollution – can all be readily avoided or controlled by proper waste management. Although, in per capita terms, urban waste generation is low in China, India and Indonesia, compared to developed countries, the actual quantum of waste is large owing to the enormous size of population in these countries.

21. Fourth important urban environmental problem is traffic congestion. Traffic congestion is a serious problem in major cities of China, India and Indonesia. The number of motorised vehicles in these countries more than doubled during the last 10 years. Most of these vehicles are in cities. Although these countries have only one car for every 100-200 inhabitants (the United States has one for every two), that still means a huge number of cars. Jockeying for space alongside cargo trucks, old buses, and an endless fleet of bicycles is a big problem. Since no vehicle seems capable of forward motion without frequent beeps of its horn, making one's way across town is a stressful adventure. Public transportation is very bad. Traffic congestion in these countries must be understood in the context of the unique traffic pattern itself. Slow-moving vehicles and MTWs do not move in columns and have freedom to move laterally as well. The variation in vehicle sizes and their differing velocities and acceleration permits them to advance through the roadway network by accepting lateral gaps (width) preceding them. This results in “conflicts” and congestion. A more and bigger roads alone will not solve the problem. A network of strategies is needed to address this increasing urban congestion. All this congestion is expensive. Among the costs are the toll on nerves, increased wear-and-tear on vehicles, time lost from other activities, and damage to the environment. The World Bank (1994) reveals that nearly a third of the Bangkok’s potential GDP is lost due to congestion-induced travel delays. The same might hold true for the cities of China, India and Indonesia as they also experiencing serious traffic congestion.

22. **Policy Gaps and future challenges** – Resource constraints in these countries have constrained the efforts of governments to address these urban problems. During the recent years, these countries have made good progress in fully integrating population and urbanisation issues into sustainable development planning and programme. Nevertheless, much remains to be done. Policy makers, especially working at the city level, need support in developing a better understanding of the causes and cumulative effects of urbanisation and environmental linkages. The participation of NGOs in managing urban environment, particularly urban waste collection, recycling, public awareness etc, needs to be encouraged and strengthened. Similarly, partnerships between public and private organisations for urban environmental management need to be intensified.
III. Sustainable Human Development

23. The term "Sustainable Development" links the two concepts of "environment" and "development". This term has been further developed within the UN system, which tends to use the term “sustainable human development” (SHD). Principle of the Rio Declaration on Environment and Development states that “Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature”. Therefore, SHD is a development that brings improvement in incomes, education, and health to disadvantaged segments of the population including women, ethnic and religious minorities, and the poor. SHD remains a substantial challenge for most developing countries. Some critical SHD issues that are relevant to developing countries are poverty, health and education.

24. Poverty- Rio Declaration on environment and development adopted at UNCED in 1992 states, inter alia, that "Eradicating poverty and reducing disparities in living standards in different parts of the world are essential to achieve sustainable development and meet the needs of majority of people." Poverty in the midst of plenty is one of the central challenges in today’s global economy and society. Fighting poverty is both a moral imperative and a necessity for a stable world. In recognition of this, the United Nations organised many conferences and summits such as the 1995 World Summit for Social Development and the 2000 Millennium Summit to discuss ways and means to combat poverty. The Millennium Declaration included a commitment to reduce the poverty levels by half by the year 2015. In recent decades, poverty rates have declined across the world. However, 1.2 billion people are estimated to still live on less than $1 per day, and almost 3 billion on less than $2 per day.

25. China has achieved great success in anti-poverty struggle in past two decades. In terms of the number of people escaping absolute income poverty, China has made the largest contribution to global poverty reduction of any country in the last 20 years. According to official poverty estimates, the number of people living below the poverty line dropped from 250 million in 1978 to around 34 million in 1999 (Stern, 2001). In fact, about half of gain was achieved during the first 7 years between 1978 and 1985. According to China's State Statistical Bureau (SSB), 250 million people, 31% of the rural population, were living in poverty in 1978, all of them in the countryside. By 1985 this number was cut in half to 125 million by SSB measure, even more sharply to 89 million by World Bank reckoning, based on a poverty line of 200 yuan or 2,000 calories. In contrast to India and Indonesia, poverty in China is largely a rural phenomenon with heavy spatial concentration in mountainous regions. Since 1986, Chinese government has launched various anti-poverty programmes in these areas. In the 1990s, China initiated the projects with an aim to encourage the development of township and enterprises in the poor central and western parts of the country. Similarly, the Government has organised a voluntary resettlement scheme for those who are willing to leave those areas, which are poor in natural conditions and resources. Under this scheme, nearly one million people have managed to find better food and clothing supplies. In general, Chinese government adopted three prolonged strategies for poverty eradication. First strategy was a targeted poverty alleviation programme. It began at the State level by designating 331 counties as poor. Individual provinces designated 468 additional counties as poor. It was these 799 counties were targeted under a special poverty alleviation programme. Another strategy was extending loans to poor farmers or for rural enterprises, which were designed to
benefit poor farmers. A major fund of one billion yuan was set aside in 1986, with some Y 800 million added to it annually. As a largely revolving fund, the capital input was thus considerable over the total period. A third strategy was a co-ordination and implementation structure. The State Council established a Leading Group for Economic Development in Poor Areas. This Group brought together more than 20 ministries; in effect it contained all of the government agencies whose work was relevant to poverty alleviation, thus providing a mechanism which could both influence the initiatives taken by the various ministries and seek to co-ordinate their work in this particular area (ESCAP, 1997).

26. In India, poverty alleviation is one of major goal of governments since independence in 1947. To measure its success in achieving this goal, the government has set up the National Sample Survey organisation (NSSO) to collect and analyse household consumption expenditure data. Indian Planning Commission, largely according to a methodology suggested by the government commissioned Expert Group, computes poverty lines. In India, the percentage of population living in poverty has been fluctuated during the 1950s and 1960s, without a clear trend. In 1951-55, the average head count index of poverty was 53 %, about the same as in 1970-74. Then, from 1973-74 to the mid-1980s, poverty rates declined steadily from 54 % to 38 % in 1986-87, a decline of about 2 % per annum. Poverty reduction slowed in the early 1990s due to economic crisis. Recent NSS data covering the period July 1999 to June 2000 show that there is a very significant decline in poverty in the 1990s. The rates now stand at 26 % based on a 30-day recall and 23.3 % on a 7-day recall methodology. These estimates may not be strictly comparable to the earlier estimates of poverty. Nonetheless, they provide clear evidence indicating a substantial decline in the overall poverty ratio in India during the 1990s. However, given population growth during this period, the number of poor has roughly remained stable or declined marginally. India continues to have the highest concentration of poverty of any country. India accounts for about one fourths of the world poor. Moreover, some countries such as China and Indonesia, which had similar socio-economic conditions few decades ago, seem to have been more successful than India in reducing poverty.

<table>
<thead>
<tr>
<th>Poverty Estimates (%)</th>
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<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Rural</td>
</tr>
<tr>
<td>1973-74</td>
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<tr>
<td>1977-78</td>
</tr>
<tr>
<td>1983</td>
</tr>
<tr>
<td>1987-88</td>
</tr>
<tr>
<td>1993-94</td>
</tr>
<tr>
<td>1999-00</td>
</tr>
</tbody>
</table>

Source: Economic Survey 2001-01, Ministry of Finance, Government of India

27. India has taken a range of measures to implement the Programme of Action at the national level. India has established a National Committee for Social Development and has adopted a three pronged strategy for poverty eradication. The strategies are: (1) Economic growth and overall development; (2) Human development with emphasis on health, education and minimum needs; and (3) Directly targeted programmes for poverty alleviation through employment generation. Some of the targeted programmes in the area of poverty eradication and social sector include:
- National Social Assistance Programme (NSAP). This covers: National Old Age Pension Scheme (NOAPS), National Family Benefit Scheme (NFBS), National Maternity Benefit Scheme (NMBS)
- Nutritional Support Primary Education (NSPE). This is mid-day meal scheme for school children and covers all Government, local body and private aided schools (classes I to V).
- Indira Mahila Yojana. This has three components namely Convergence of inter-sectoral activities, Income generating activities, and Sustained process of awareness generation/education.
- Pension Scheme for Provident Fund Subscribers (PSPFS).
- Social Security for Construction Workers.
- Rural Group Life Insurance Scheme. This scheme has a subsidised policy available to one member of a rural poor family below the poverty line. The subsidy is to the extent of 50%.
- Prime Minister's Integrated Urban Poverty Eradication Programme.
- Revamped Rural Employment Programme. There are four programmes under this category namely Employment Assurance Scheme (EAS), Jawahar Rozgar Yojana (JRY), Indira Awaas Yojana (IAY), and Million Wells Scheme (MWS).
- Revamped Integrated Rural Development Programme

28. Indonesia, like China, has had an outstanding record of reducing poverty during the last 20 years. It reduced poverty from the 70% range in the early 1970s to below 10% in the early 1990s; even after the East Asian crisis, Indonesia’s poverty was still less than 20% (World Bank, 2000). The number of people living on $1 dollar a day (in 1985 dollars) dropped from 87.2 million in 1970 to 21.9 million in 1995. Of those deemed 'poor', one third live in urban areas and two thirds live in rural areas. A great deal of Indonesia’s successful reduction of poverty lay with policies that promoted long run growth. It may be noted that Indonesia experienced a rapid growth in per capita incomes of about 4.8% per annum over 30 years. Government has also implemented various special programme and 'policy' of sectoral and regional development during the First Long-term Development Programme (PJPT). The special programme consists of:
- Financial Assistance for Least Developed Villages (IDT)
- Community Welfare Saving-Business Credit for Community Welfare (Takesra-Kukesra)
- Social Welfare Programme
- Strengthening the Poverty Eradication Programme

Sectoral and Regional Programme includes
- The improvement of small-scale fishermen and farmer’s income project (P4K) implemented since 1986 covers the supporting fund programme given to small scale farmers whose income is below the poverty line.
- The Community Self-Reliance Group and Bank Relations Project (PHBK) set up in 1989 by Bank Indonesia
- The Savings and Loan Programme of Village Enterprises (UED-SP) to give loans to institutions and the village community who need working capital for their business

29. **Health (Life Expectancy)**- Promoting and protecting human health is a central concern in sustainable development. This concern is reflected in chapter 6 of Agenda 21 as well as
in the Rio Declaration on Environment and Development. Human health cannot be maintained without ecologically sustainable development. Moreover, health and development are intimately interconnected. Critical human health related issues are (a) meeting primary health care needs, particularly in rural areas, (b) control of communicable diseases, (c) protecting vulnerable groups, (d) meeting the urban health challenge and (e) reducing health risks from environmental pollution and hazards. During recent decades, significant progress has been made towards the eradication of various major infectious diseases. Consequently, over the last two decades, average life expectancy has been increased; infant and child mortality rates have declined.

30. China has had significant developments in human health over the last 50 years. Life expectancy has literally doubled -- from 35 years in 1950 to 70 years today. The mortality rate of pregnant women and new mothers has dropped to 62 people per 100,000 people, down from 1,500 per 100,000 in 1950. The death rate of infants lowered to 36 per 1000 from 250 per 1000 in the same period. This is a very impressive performance for that level of development. However, many difficulties and problems still exist. Problems, such as imbalances in the development of health care, the backwardness of rural health care, and the ageing of population affect people’s health. China developed a medical and family planning network to improve urban residents’ health. A co-operative medical

![Life Expectancy at Birth](chart)

31. India has achieved a substantial progress in human health over the last three decades. Smallpox has been eliminated. Plague is no longer a problem. Mortality from cholera and related diseases has decreased and malaria brought under control to a considerable extent. A fairly extensive network of dispensaries, hospitals and institutions providing specialised curative care has developed and a large stock of medical and health personnel has become available. Significant indigenous capacity has been established for the production of drugs and pharmaceuticals, vaccines, hospital equipment, etc. Because of this, the average life expectancy has gone up from 37 years in 1970 to 63 years in 1997 over the last 50 years. The infant mortality rate (per thousand live births) declined from
16

146 to 71 for the same period. In spite of such impressive progress, the health indicators are still very poor against many countries, which have similar development stage. The mortality rates for women and children are still very high. Communicable and non-communicable diseases have still to be brought under effective control and eradicated. Blindness, Leprosy and TB continue to have a high incidence. Furthermore, the continued high emphasis on the curative approach has led to the neglect of the preventive aspect of health care. Recognising this problem, government is introducing various health programmes to control/eradicate these major communicable and non-communicable diseases.

32. HIV/AIDS is a newly emerging threat to India’s public health. India is currently experiencing one of the most rapidly progressing HIV epidemics in the world. Even if the HIV prevalence rate reaches a ‘low’ level of 5 % seen in many other countries, more than 37 million people in India would be carrying the HIV virus. Despite the active government intervention, the absolute number of HIV-infected people is bound to increase. The increase could be as large as 1-2 million every year with the total number of infected persons doubling every 2-3 years (Klein and Palanivel, 2000). India presents a fertile ground for the spread of the virus, because of its high levels of poverty and inequality, its historical migrant labour system, and a lack of adequate access to basic services by the majority of the people. Of the 180-odd million migrant workers in India, many are men living away from their wives and families and are most likely to have unsafe sex. Then, there are the hundreds of truckers who ferry goods from one end of the country to the other. This sector is also prone to get infected, due to their unsafe sex practices. This mobility of the male population has brought the virus to the rural areas. What is frightening for India is that 89 % of reported cases are in the sexually active age group of 18-40 years. The sexually active age group is also the most economically productive group. Since sexual behaviour is a private and sensitive subject, possibilities of intervention to arrest the spread of the disease is limited. What is more frightening is that HIV infection is spreading rapidly in more advanced states such as Maharashtra, Tamil Nadu, Andhra Pradesh and Karnataka in the southern and western parts of India, where heterosexual sex was the predominant mode of transmission. The rapid spread of AIDS in more advanced states will pose a serious threat to sustaining higher economic growth in India over the next several decades (see details, Klein and Palanivel, 2000). In India, government expenditure in health aspect is very low at 1.2 % of its GDP. This figure places India among the lowest quintile of countries. On a per capita basis, it is far less than the amount recommended providing basic health services (World Bank 2000).

33. The strategy of Indian Health Planning is two pronged - first to build up a primary health care infrastructure, and the other for tackling specific diseases. The primary health care infrastructure, consisting of Sub-centres, Primary Health Centres (PHCs) and Community Health Centres, has been built with a population of 30,000 as unit. This mechanism provides for a sustained and continuous outreach of all health and family welfare programmes in the country. The disease specific strategy consists of programmes aimed at prevention and control of specific diseases. These programmes are targeted for specific regions depending upon the circumstances/spread of the disease. Some of the programmes are National Malaria Eradication Programme, National Tuberculosis Control Programme, National AIDS Control Programme, and National Blindness Control Programme.
34. Indonesian Agenda 21 emphasis the improvements in health services as part of Indonesia’s drive to sustainability. During the last two decades, many of Indonesian health indicators improved significantly. The average life expectancy increased from 41 years in 1960 to 65 years in 1998. The infant mortality rate decreased from 145 per 1000 live births in 1967 to 62 per 1000 in the early 1990s. A significant improvement in the physical health infrastructure improved significantly during 1973 to 1993. The number of general hospitals increased from 581 to 801 (an increase of 38%) and the number of beds from 63,643 to 94,966 (an increase of 49%). The ratio of health personnel to population had also increased since 1986, but then slowed down following the 1990 government policy of zero growth for civil servants. However, the demand for public health services has increased, necessitating the allocation of adequate financial resources for health. However, the government’s capability to provide adequate funds is very limited. The total national health expenditure as a proportion of the GNP declined from 2.5% in 1986 to 1.65% in 1995. The total government health expenditure as a proportion of the GNP declined from 0.7% to 0.6% between 1986 and 1995.

35. In Indonesia, the NGOs and foreign aid plays a very important role in public health. Since the fourth plan (Pelita IV), 20-30% of public health expenditure has been borne by foreign aid. To ensure the availability and timely supply of high quality essential drugs at low cost, government owned companies have been designated as the main source of supply. Essential drugs are either controlled or subsidised by the government. In its efforts to promote the development of health care, the government also recognises the role of the private sector. The increasing role of the private sector in health, however, will pose questions related to access and equity, though private facilities are required to provide subsidised services to the poor. This situation will warrant introduction of effective regulatory mechanisms. Substantial institutional changes will also be needed in the Ministry of Health.

36. **Education** - Education is an essential tool for achieving a sustainable future. Simply providing more education, however, is not the answer for creating a sustainable society. Current global consumption patterns show that the most educated societies leave the deepest ecological footprints. An appropriate basic education, therefore, should be reoriented to include more knowledge, skills, perspectives, and values related to sustainability than are currently included in schools. Importance of the education has been emphasised repeatedly in the conferences and summits: the World Declaration on Education for All in Jomtiem, Thailand (March 1990), the World Conference on Children organised by UNICEF in September 1990, The 1992 Rio Summit (Chapter 36 of Agenda 21), the Population Conference in Egypt in 1994, the World Conference on Social Development in Copenhagen in March 1995, and the Conference on Women in Beijing in 1995. And yet, little progress has been made in creating and implementing programmes. According to the International Consultative Forum on Education for All (see, UNESCO, *Education for All 2000 Assessment: Global Synthesis*, which made an in-depth evaluation ever undertaken for basic education), none of the targets set at Jomtiem in 1990 had been met. Even the fundamental goal of achieving “universal access to, and completion of” basic education by 2000 has not been fulfilled.

37. China's education system is the largest in the world. Through sincere efforts in the past five decades, China has made significant progress in its education sector. Since 1978, China has adopted the education policy of "nine-year compulsory schooling system", 
which means all children are required to attend school for at least nine years. China’s education system is composed of 4 components, i.e. basic education, occupational/polytechnic education, higher education and adult education. There are 582,300 primary schools countrywide and about 136 million children enrolled in these schools in 1999. By 1999, there were 64,400 junior middle schools nationwide with enrollment of 58 million; similarly, there are 14,100 high schools nationwide with enrollment of 10 million. In 1999, there were 1,520 special schools opened for deaf-mutes and mentally disabled children, with an enrollment of 371,600. There were 33,464 occupational and polytechnic schools nationwide by 1997 with an enrollment of 19 million. Up to 1999, there were 1,071 colleges and universities countrywide offering 2,754,500 seats to those applying for junior college and bachelor programmes, 19,900 seats to those applying for doctoral programmes and 72,300 seats to master programme applicants, and accommodating 54,000 doctoral candidates and 179,500 master candidates. Up to 1999, there were 871 colleges and universities destined to adult education and some 800 correspondence-based and evening adult education programmes launched by common colleges, offering 1,157,700 seats to those pursuing junior college and bachelor programmes, and granting diploma to 888,200 people.

Education Imbalances - Net Enrolment Ratio (1997)

![Bar chart showing enrolment ratio for various countries]

38. In recent decades, the enrolment rate of school age children has increased significantly. In 1996, the enrolment rate of school-aged children increased to 98.8%, the enrolment rate of middle school aged children rose to 82.4%. The percentage of adult literacy rate rose from 51% in 1970 to 83% in 1998. Surprisingly its workers have relatively low levels of scientific education. In 1989, among those workers whose technical skills levels were graded, 71% were graded class 1-3, 23% class 4-6 and only 2% for class 7 to 8, the highest (China report to UN for Rio+5 meeting). Yet, the educational system is still faced with many problems; a rising dropout in primary and middle school, educational imbalance in some areas, a lack of financial support in rural areas and a stereotyped education system centring around exams.

39. In India, since independence, primary enrolment rates have steadily been increased. India today has the world’s second largest education system after China, with 108 million children aged 6-10 attending primary school. As against this, there are about 44 million
children never enrolled in the school. About 40% children are also dropping out in class 1-5. One of the reasons for this is non-availability or access to primary school within a walking distance of habitations. Though 83% of the habitations in the country were served by a primary school within 1 KM of walking distance, there is sill as high as 173,000 habitations have no primary school as per the norm of 1-KM distance. The enrolment rates for higher education (6%) in the 18-23 age group are also low compared to many developing countries. Insufficient financial resources and poor quality of education with little relevance to practical life are common in the higher education.

<table>
<thead>
<tr>
<th>Literacy rate and Government Expenditure</th>
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<tr>
<td>Percentage of (15+) illiterate Population – 1995</td>
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<tr>
<td>World</td>
</tr>
<tr>
<td>China</td>
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<tr>
<td>India</td>
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Source: Ministry of Human Resources Development, Government of India

40. Government expenditure on education as percentage of Gross National Product has steadily increased from 0.8% in 1951-52 to 3.8% in 1994-95. The Ninth Five-Year Plan (1997-2002) has called for increasing the share of GDP allocated to education from 4% - which was among the lowest in the Asia – to 6%, with half of total outlays to be allocated to primary education. While the increase in resource allocation is important, this is clearly not enough. The government run public schools need to be reformed such a way to avoid teacher absenteeism, shirking class through peer monitoring effects, competition, decentralisation of supervision at local/village levels. This would make teachers more accountable to local communities that will raise their attendance levels and performance. Similarly, low enrolment of girls, high dropout rates, lack of physical infrastructure like school buildings, teachers, learning equipment are required to be tackled on an urgent basis. Average educational conditional has significantly improved over the period. A major indication of India progress in education is the significant rise in literacy rates. From 1951 to 1997 the overall literacy rate increased from 17 % to 62 %, rising from 25 % to 73 % for males, and from 8 % to 50 % for females. Although India has raised literacy rates, it still has a long way to go. Many countries, including China and Indonesia, have overtaken India in literacy rates. For example, China had problems of illiteracy in 1950 that were similar to India at that time. Today, China has virtually eliminated illiteracy in the younger age groups. Indonesia has also achieved a remarkable success in basic education with literacy rate of 86%.

41. Investing in education has been one of the cornerstones of Indonesia's development policy. As a result, the adult literacy rate increased dramatically from 56 % in 1970 to 86 % in 1998. In the early 1970's, 74 % of the population had less than a primary education; today, that figure is 34 %. Indonesia has a compulsory education for children aged between 7 and 13. The character of Indonesia's educational system reflects its diverse religious and the challenge of resource allocation in a developing nation with rapidly growing population. Although a draft constitution stated in 1950 that a key government goal was to provide every Indonesian with at least six years of primary schooling, the aim of universal education had not been reached by the late 1980s, although great improvements had been made. In 1973 government issued an order to set aside portions of oil revenues for the construction of new primary schools. This act resulted in the
construction or repair of nearly 40,000 primary school facilities by the late 1980s, a move that greatly facilitated the goal of universal education. After completion of the six-year primary school programme, students could choose among a variety of vocational and pre-professional junior and senior high schools. Indonesia's institutions of higher education have experienced dramatic growth since independence. In 1950 there were ten institutions of higher learning, with a total of 6,500 students. In 1990 there were 900 institutions with nearly 1,486,000 students.

42. Recent years have seen a shift in the development perspective from just economic growth to human development, encompassing improvements in both the economic and social well being of people. The UNDP Human Development Report, which was first presented in 1990, was instrumental in placing the objective of development in its proper perspective. These reports, which are published annually, have evoked a great deal of interest and debate not only on the elements constituting human development, but also on the parameters suitable for comparing and assessing the attainments in this sphere over space and time. China, India and Indonesia have made substantial progress in the overall human development during the last three or four decades. While China and Indonesia achieved a significant progress during the 1960 to 1980, India experiencing a similar progress during the last two decades. Another thing to be noted is that all three countries stresses the importance of improved human well-being as the central goal of their national development. In promoting improved well-being through reduction of poverty and increased employment opportunities for the population, they stress rapid, properly managed economic and social development sensitive to environmental protection and the conservation of scarce natural resources.

<table>
<thead>
<tr>
<th>Trends in Human Development Index (HDI)</th>
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<tr>
<td>Country</td>
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<tr>
<td>India</td>
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<td>China</td>
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<td>Indonesia</td>
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Sources: Human Development Report (various issues)

IV. Sustainable Economic Development

43. Sustainable development cannot be achieved, especially in the developing countries, without substantial economic growth. Agriculture and industry are important drivers to achieve the economic growth that could make sustainable development possible. At the same time, not all-economic growth supports sustainable development. Indeed, a harmful effect of economic growth is one of the sources of tension with the environmental and development communities. At times, there is trade-offs between short-term economic growth and environmental quality. But sometimes even economic benefits are not commensurate with the loss on the environmental front. Such environmental losses are not justified on any grounds.

44. China’s economic growth during the last 50 years, particularly over the last 20 years, is a remarkable one. During the period 1949 to 1998, China's GDP increased by 50 times (between 1980 and 1998, it increased by 5.4 times), industrial output by 381 times, and agricultural output by 20.6 times. China's economy in real terms has been growing at an annual rate of 7.7 %, more than doubling the world's average of 3.3 %. In the external
sector, China's annual import and export values in the early 1950s stood at only several hundreds of millions of U.S. dollars. By 1998, the figure had risen by more than 300 times to reach 324 billion dollars. Its foreign exchange reserve, which was a mere 840 million dollars in 1979, soared to 150 billion dollars in 1999. The rapid economic growth has brought down the number of people living below the poverty line from 250 million in 1978 to 34 million in 1999. Most of this impressive growth could be attributed to four main factors: Economic reforms, high domestic savings rate, large foreign investment and rapid productivity growth. Prior to 1978, China maintained a centrally planned economy. A large share of the country's economic output was directed and controlled by the state. During the 1960 to 1978, its real GDP grew at an estimated average annual rate of about 5.3%. Beginning in 1979, China implemented (in stages) various economic reform measures in agriculture, industry and trade sectors. Domestic savings rate, which was at 32% in 1978, had gradually risen to 42.7% in 1998. In addition to large domestic savings, China's economic reforms and incentives brought a large foreign direct investment (FDI) from $636 million in 1983 to $45.6 billion in 1998. About two-thirds of FDI in China has come from Hong Kong and Taiwan. As a result, real GDP grew at 9.7% per annum from 1979 to 1999, making China one the world's fastest growing economies. This caused anxieties in the rest of the world. In particular there have been warnings of severe consequences for international agricultural markets.

**Economic Performance- GNP Annual Growth Rate, 1975-95**

45. In India, the annual economic growth rate in the 1950s was 3.94% followed by a growth rate of 3.74% in the 1960s and 3.17% in the 1970s. It was only in the 1980s that the growth rate crossed 5% per annum. During the 1980s India’s growth in real GDP was at an annual average of 5.6%. This is better than world output growth of 3.3%, that of developing countries at 4.3%, and of Asia, excluding China and India, at 5.1%. In the early 1990s, growth declined sharply in response to the contractionary fiscal and monetary policies adopted to address the macroeconomic crisis. The reforms and good monsoons helped growth rebound to 5% in 1992-94. For three consecutive years, 1994-97, real GDP grew by more than 7%, placing India among the world’s best performing countries. Growth fell to 5% in 1997-98, but it picked up to 6.8% 1998-99, due to fluctuations in agricultural production. There has been a significant shift in the sectoral share of GDP over the last 50 years. Tough the agricultural sector share has been declining (from 55 to 25%) over the years, it is still account more than one fourths of the
GDP and has had a significant impact on industrialisation, employment and incomes. While there are year-to-year variations caused by drought and floods, the agricultural trend growth show some improvement over the last 50 years. The share of industrial sector and service sector in GDP has been increasing steadily from 16 and 28% in 1951 to 32 and 43% respectively in 1999. The manufacturing sector witnessed a faster growth in productivity compared to other sectors. Agriculture sector also shows a significant increase in productivity. Other activities including services and public administration showed a relatively slow growth in productivity.

46. Indonesian economic performance during the last 30 years is impressive and, in some respects, comes close to the success stories of East Asia. In 1967, it was one of the poorest countries in the world with a per capita income of only $50, which was less than half that of India. In 1996, its per capita income was $1,150, which was three times higher than that of India. This record should not be discounted because per capita income is measured in current prices and at current exchange rates. The performance was just as impressive in real terms. During this period, real per capita income increased at a rate of 4.8% per annum. Real GDP growth averaged more than 6% per annum during 1970 to 1996. This spectacular growth enabled Indonesia to transform itself from a low-income country in the 1960s into a middle-income country in the early 1990s. A breakdown of the economy’s growth performance by sector shows that industry was the prime engine of growth. Both manufacturing and infrastructure grew more rapidly than the economy as a whole. Other sectors provided strong support. Prudent economic management enabled Indonesia to record consistently high rates of economic growth for more than three decades. When the New Order Government was established, the economy was in a desperate state. Real growth in GDP had averaged around 2% per annum in 1950-65, less than the rate of growth of the population. Manufacturing accounted for less than 10% of GDP. A reappraisal of economic objectives took place and stability, growth and equity, collectively described as the "trilogy of development". The means of attaining these objectives was a series of five-year development plans known as Repelita in short, designed to establish development priorities and set specific growth targets. From the mid-1970s the government's economic policy represented a blend of two separate development strategies. The first called for priority to be given to sustainable economic development through the efficient allocation of resources, and the maintenance of
macroeconomic balance and international competitiveness. The second placed greater emphasis on promoting Indonesia's development as a technologically sophisticated industrial power, irrespective of the economic costs of achieving this goal.

47. **Sustainable Agriculture** – During the last 50 years, agriculture in developing countries has changed substantially. Food and fibre productivity soared due to new technologies, mechanisation, increased chemical use, specialisation, and government policies. Although these changes have had many positive effects, there have also been significant costs. Cost includes topsoil depletion, groundwater contamination, increasing costs of production, and large economic and health cost due to subsidies & overuse of fertilisers and pesticides. Therefore, Agenda 21 states

"Major adjustments are needed in agricultural, environmental and macroeconomic policy, at both national and international levels, in developed as well as developing countries, to create the conditions for sustainable agriculture and rural development. The major objective of sustainable agriculture and rural development is to increase food production in a sustainable way and enhance food security. This will involve education initiatives, utilization of economic incentives and the development of appropriate and new technologies, thus ensuring stable supplies of nutritionally adequate food, access to those supplies by vulnerable groups, and production for markets; employment and income generation to alleviate poverty; and natural resource management and environmental protection (Agenda 21, 1992).

It must be mentioned that land and water constraints operating on Chinese, Indian and Indonesian agriculture are being aggravated by competing demands for these resources from other sectors (municipal and industrial). This means that vast increase in food production must take place while enhancing and conserving land, water and other resources. This is the challenge of sustainability, which was not a central feature of agricultural development in the past. Moreover, these issues must be addressed in the context of rapidly changing external environment (world trade liberalisation) as well as declining public sector support for agricultural research and development.

48. Who will feed China? The question has sparked intense debate in China and international level ever since American environmentalist, Lester Brown (the President of Worldwatch Institute), first raised it in 1995. He asserted in his book that China's demand for enormous food imports would trigger a serious world food crisis by the year 2030 due to growing population, shrinking cropland, the threat of water scarcity, the restraints on raising land productivity in small-scale production, backward agricultural technology, insufficient agricultural inputs and so on. It is true that in China, arable land is scarce. The per capita availability of land is one of the lowest in the world. Even the limited land is declined due to population growth and land reduction for non-agriculture use. The total losses of cultivated land due to degradation and conversion to non-agriculture use over the period 1979-95 were 14.6 million hectares. These losses were partially offset by reclaiming wasteland. The net losses of land were 4.5 million hectares (AMC 1995, 1996). The land loss was slower after 1987, mainly due to the government control on land using, and the faster reclamation. Land area per rural labour dropped from 0.32 to 0.21 hectares during 1978-96, or from 0.45 to 0.29 hectares (adjusted area). The limitation of per capita land area makes great difficulties in increasing labour productivity in agriculture. In recent years, China intensified capital construction for agriculture
development with focus on water conservation. The government has set the target for the total amount of cultivated land. Since 1997, it tightened conversion of agriculture land for non-agriculture use. The Government also encouraging reclaiming wasteland for cultivation, promoting advanced agro-technology, and introducing large-scale land operations through the transformation of small-scale production modes. In addition, the government harnesses major rivers and tanks. Practical measures have also been taken to encourage more mechanisation. Consequently, land productivity is increasing and the multiple-crop index is rising. As a result, China's grain output hit 490 million tonnes in 1998, while current annual consumption is 463.5 million tonnes. China has been able to achieve a surplus of grain in the past three years. Grain reserves now stand at historically high levels. Compared to India and Indonesia, China achieved a relatively high level of grain yields, much higher than world average. However, it is lower than UK, Germany, France, and Japan by 40-50 %. China's grain consumption requirements in the year 2020 will be between 675 and 700 million tonnes, with projected production of 616-675 million tonnes. So the country could face a maximum shortfall of about 60 million tonnes. Though projections vary considerably, one thing is very clear: China's future grain supply can not keep pace with demand and there will be rising imports over the next two or three decades.

![Cereal Yield Graph](image)

49. In India, agriculture remains the key sector. It is critically important for ensuring food security, alleviating poverty and as a means to larger goals, such as, employment led economic growth through its linkages and multiplier effects. A dynamic farm economy can make significant contribution to overall rural development and also forge being rural-urban linkages. The agriculture sector, however, faces some important challenges. Estimates show that foodgrain requirements including seed, food and storage requirements given the food security imperative, would have to rise from 192 (1994-95) to 250 million tones by 2010 and 325 million tones by 2025. The spread of green revolution, which was rather slow during the first twenty years (1962-65 to 1980-83), gathered momentum during the eighties. The period 1980-83 to 1992-95 marks a major departure from the earlier trend in several aspects. Firstly the growth rate of the value of output not only accelerated during this period, but also spread to many areas which had hitherto been left out. Another important development during this period was that there was a distinct change in cropping pattern away from coarse cereals towards oil-seeds and...
other commercial crops. The third important development during 1980-83 to 1992-95 was a significant increase in the productivity of (male) agricultural workers across all the regions of India.

50. India’s cereal yield has significantly lower than that of China and Indonesia (see Chart). It shows that India still has a large potential for further increase in cereal yield. Estimates show that annual foodgrains demand in 2025 under different assumptions varies from 331 million tonnes to 365 million tonnes. The total feed demanded varies in a narrow range of 11 to 14 million tonnes. Another study estimates of foodgrains demand under different normative considerations. For example, a poverty free or well-fed India, along with slow growth and traditional feed practice would require 293 to 301 million tonnes of foodgrains. However, if other things remain the same, but life styles changes (feed practice changes like Chinese, i.e., Chinese coefficient) requirements would range from 358 to 407 million tonnes. The foodgrain demand implications may not be dissimilar to the later case, even if poverty removal or well-fed India objectives are not attained, in case burgeoning middle class and rural and urban elite's changing consumption pattern force the land-constrained economy to respond to its needs. A higher per capita income growth (5.5%) and modernising animal husbandry sector would lead to foodgrains demands that by 2020 would range from 485 to 616 million tonnes.

51. In Indonesia, agriculture is of vital importance for sustainable development. As Indonesia becoming industrialising, the share of GDP from agriculture has declined. In the early 1970s agriculture contributed 40-50% of GDP, but by 1997 this had fallen to 14.8%. A contraction in the industrial economy, which was not reflected in agriculture, pushed the latter's share back up to 17.3% in 1998 and 1999. It employs about 40-45 % of labour force. Rice is the main food staple in most areas, with the exception of some parts of eastern Indonesia. However, production of rice has been declining since Indonesia briefly gained self- sufficiency in 1985, and the country now buys around 3.5m tonnes (roughly 10% of its needs) on the open market every year, making it one of the world's largest rice importers. With demand expected to rise by 38% over the next 25 years, according to International Rice Research Institute (IRRI) forecasts, much will need to be done to
address this shortfall in production. Since 1967, agricultural policy in Indonesia has been primarily focused in achieving self-sufficiency in rice. This goal was reached in 1984 (but could maintain only for briefly), when, for the first time, domestic rice production exceeded domestic rice consumption. Unfortunately, this goal was achieved at huge economic and environmental costs. The economic cost includes large irrigation investment and fertiliser and pesticides subsidies. According to Panayotou (1993), during the early 1980s the government subsidised pesticides at 82% of the retail price, at an annual cost of US$128 million. In addition, there is also a large fertiliser subsidies given to farmers that reached about US$221 million in 1986-1987 (Barbier 1989). This led to inappropriate and overuse of fertilisers and pesticides. In addition to large economic cost, there is also a substantial external cost for achieving food self-sufficiency in rice. The external cost resulted from fertiliser and pesticide pollution, as well as from the depletion of natural resources (i.e. water resources). As government recognised this problem in the mid-1980s, it issued a decree that banned 57 brands of pesticide, and established the integrated pest management (IPM) programme. This programme involved controlling pests through the use of the pests' natural predators. Three planting seasons after the decree, the Food and Agricultural Organization (FAO) reported that pesticide use had declined by 90%, while average rice yields had risen from 6.1 tonnes per hectare to 7.4 tonnes per hectare (Panayotou, 1993).

52. **Sustainable Industrialisation**- Sustainable industrialisation is central to sustainable economic development and improved prospects for human well-being. During the last two or three decades, many developing countries experiencing a rapid industrialisation. A substantial share of industrial growth in developing countries revolves around the transformation of raw materials into industrial products such as steel, paper, and chemicals. Not only are these processes resource-intensive, but also industries such as chemicals and petroleum refining, mining, paper production, electricity generation, and leather tanning tend to produce a disproportionately large amount of hazardous and toxic wastes. In recent decades, industrial production has been a major source of pollution in urban areas. Many factors determine the effects of industrialisation on the environment, including the scale of economic activity, the sectoral composition of industry, the geographical distribution of production, the energy, materials, and pollution intensity of production processes, and the effectiveness of policy in regulating industrial activity.

53. In China, industry is the largest productive sector, accounting for 48% of its gross domestic product (GDP) and employing 15% of the country's total labour force. Industrial output growth averaged 12.6% a year in the 1980s. In the 1990s, industrial output growth was 18% per annum (World Resources 1998-99). Industrial growth was led by township and village enterprises (TVEs). They grew at the rate of about 25% per annum over the last two decades. Meanwhile, the role of non-state enterprises increased substantially, while the role of state-owned enterprises declined. In the 1990s, the share of state-owned enterprise output in the gross industrial output declined from 55% to 28%. The non-state enterprises increased their share from 14% in 1980 to 45 in 1990. They now account for about 72% of national industrial output (The World Bank 2001). In terms of the structure of industrial output, the trend has been for a gradual shift away from the heavy industrial products to consumer goods. In recent years, however, there is a problem of overproduction in some consumer products. The positive economic and social results of industrial growth have been accompanied by serious environmental degradation. TVEs are traditionally heavy polluters. During the 1990-1995, they increased their combined pollutant emissions by about 120%,
while emissions from state enterprises declined by 9% (The World Bank 2001). TVEs have a poor record of compliance with environmental regulations. The strong relationship between TVEs and their local governments hinders the implementation of environmental policy. In 1996 the central government adopted strict new pollution control measures for TVEs and close down many polluting enterprises. This produced a considerable reduction in emissions from this sector (The World Bank 2001).

54. Indian industry, since independence, has developed rapidly. India has now had a diversified industrial system. Industry has become the dominant force in the national economy and has provided the facilities and impetus for economic development in India. Nevertheless, the overall level of industrial development in India is very low. The overall level of industrial technology in India is very low, resulting in the waste of resources and pollution of the environment. The Industrialisation strategy that India has adopted was largely based on the Mahalanobis model. Three distinct elements of this model influenced the course of industrialisation in India: self-reliance, emphasis on basic and heavy machine and the dominant role of the public sector in basic and heavy industries. Doubts about the effectiveness of this policy regime arose as early as in the mid-1970s. After considerable thinking, a process of reorientation of the policy framework began in the late 1970s and gathered some momentum in the 1980s. The most important changes related to reducing the domestic barriers to entry and expansion. Larger scope was also provided for big business groups to participate in the process of industrialisation. Attempts were made to shift from direct physical controls to indirect financial incentives and disincentives. Overall, the 1980s witnessed a gradual and definite deregulation from domestic controls. Trade policy also liberalised to some extent in the 1980s. Consequently, the second half of the 1980s witnessed a record growth of industrial production of 8-9% per annum. The acceleration of growth during the 1980s was achieved with distinctly better productivity performance. During the 1990s, the industrial sector played an important role, both in accelerating and decelerating economic growth. The easing of constraints in the early 1990s led to a steady increase in industrial growth. However, it has sharply decelerated from 12% in 1995-96 to 6% or less in the last three years. There are now encouraging signs that industrial production is picking up again. Growth of GDP from manufacturing will almost double to 7% in 1999-2000 from 3.6% in 1998-99. The growth in GDP from the construction sector is likely to accelerate to 9% in 1999-2000 from 5.7% in 1998-99. Despite this encouraging sign, low overall productivity of investment, excessive fragmentation of markets, shortage of investible funds, and the poor infrastructure may pose significant problems to sustained higher industrial growth. In India, industrial pollution is regarded the worst. The Bhopal (India) tragedy clearly demonstrated one of the world's worst industrial accidents. The significance of this accident, however, extends well beyond avoiding such a disaster and a need to move beyond just polluting the environment. Like China, small and medium industries in India are main polluter. Although they are promoted in a large way by the Indian government and play an important role within the economy with their prime role and vast scope in employment, the unsafe environmental practices of these industries for a long time have gone unnoticed. The collective environmental damage done by small industries can obviously be much higher than envisaged. India has various environmental laws to control air and water pollution but the problem lies in enforcement.

55. Indonesia places great emphasis on industrialisation. Industrial production, as a share of total GDP, grew from 13% in 1965 to 43% in 1997. Despite its increasing significance, the industrial sector employed only about 10% of the work force. Indonesia’s manufacturing
sector is diverse. Much of it is made up of small-scale and cottage industries, mainly producing consumer goods such as food products, beverages, tobacco products, and textiles and related products. These activities are carried out primarily by private enterprise. Cement, fertiliser, petrochemicals, and basic metal products have gained relative importance in recent years and are produced primarily by state-owned enterprises. During the last 30 years, the manufacturing sector growth was much higher than overall economy. It share rose from 8.3% in 1965 to about 16 by 1985, and reached 20.8% in 1991, surpassing that of agriculture (19.6%) for the first time. Currently, it stands at about 26%. However, much of the industrial expansion has taken place without due regard to the environment, and this led to serious environmental degradation, particularly in Java where 75% of industry is located. This degradation has become increasingly evident in the form of contaminated water, air and land, adverse health impacts, and damage to both "downstream" activities, and coastal and marine ecosystems (The World Bank, 1994, *Indonesia: Environment and Development*, Chapter 3)

56. **Energy Management**- Energy is a critical factor for the economic growth and individuals. It contributes directly to meeting both basic needs and more sophisticated human needs. Energy poses a basic dilemma for sustainable development in that it is necessary for socio-economic growth, yet it is associated with environmental degradation, especially with regard to atmospheric pollution. Affordable energy is key to poverty reduction. There are still 2 billion people who lack access to commercial energy. Energy security is a big issue during period of the oil crises in 1973-1974 when prices first tripled in response to an Arab embargo and in 1979-1980 when prices nearly doubled after Iran dethroned its Shah, but has been more or less ignored since then. The fact that the then-anticipated energy supply shortages did not materialise does not justify optimism for the future. Energy security is of particular importance to country like India owing to its physical unavailability to meet its demand.

57. China is the second largest consumer of the energy in the world, after the United States. It is the world’s third largest producer of energy, the largest producer of coal and the sixth largest producer of crude oil. China leads the world in biomass consumption. It is the world’s second largest emitter of carbon, accounting for 14% of the world’s total emissions and is projected to become the largest over the next few decades. There is no doubt that China’s
near-term energy behaviour matter critically not only to its own citizens but to the world at large. Though the China has made serious efforts to exploit its domestic resources to meet its demand, a rapidly rising energy demand due to high economic growth has made China to become a net oil importer since 1993. Gas imports are also projected to increase as China switches to cleaner energy. It is estimated that the primary energy demand will rise to a coal equivalent of 3.42 billion tonnes by 2050. Eighty % of oil consumption will rely on imports. China consumes three times as much energy per dollar of gross domestic product (GDP) as the world average, and twice the average for all developing countries. Its energy efficiency improved (energy/GDP ratio declined) by about 50% since 1980. It is expected that the trend will continue. Another feature is its per capita energy consumption is low, but it is rising. China consumes only about one-eighth the energy per person in developed economies. However, China accounts for about 13% of world carbon emissions, ranking behind the United States. Per capita emissions, however, are significantly lower than in the United States (0.7 metric tonnes/person compared with 5.42 metric tonnes/person in the United States). In confronting rising energy demand and environmental constraints, China should pursue a long-term energy strategy that will limit the severe environmental consequences of future energy consumption while maintaining a sufficient energy supply.

58. With respect to the future energy demand, the industrial sectors will continue to be the largest user. The total energy demand in 2050 will amount to 920 Mtonnes, more than double the 1990 level. The share of the industrial energy consumption will decline to 39 % by 2050. The transportation sector represents the fastest growing sector in the future. In 1990, the transportation sector consumed 45 Mtonnes, merely 4.7 % of the total final energy demand. The experience of industrialised countries indicates that the demand for automobiles will increase extensively as income grows. The estimates show that under the business as usual scenario, SO2 emissions would continue to rise in the future and reach 32 MtS by 2050, more than twice as much as the 1990 level. On the other hand, with the implementation of the hypothetical emission charges and standards, the growth of SO2 emissions would slow down and stabilise in the year 2010, then decline despite increasing energy consumption and the coal-dominant energy structure. The SO2 emissions would be expected to shrink to 17.7 MtS by 2050 from its peak level in 2010. Compared with the 1990 figure, this represents only an 18 % increase. The sharp contrast of the two different scenarios implies that effective environmental polices are vital to prevent environmental degradation in the process of industrialisation. Moreover, it reveals the possibility of curbing SO2 emissions while the consumption of high content coal continues to rise.

59. India meet its energy needs through commercial and non-commercial sources. While coal, oil, natural gas, hydropower and nuclear power are among the primary commercial sources, agricultural residue, firewood, and animal waste are major non-commercial energy sources. The share of commercial energy in total energy consumption has increased from about 30 % in the early 1970s to about 70 % in early 1990s. Though the consumption of commercial energy is increasing at a faster rate during the last two or three decades, per capita consumption is still very low in India if we compares with many other countries in the world. India’s per capita consumption of commercial energy is only one-eighth of the world average. Given the prospects of high economic growth and rapid urbanisation, India’s future energy demand will be very high. The energy intensity of growth is extremely high while energy efficiency remains low. With one unit input of energy, India produces only half of what is produced in the developed countries. Further, for one % growth in GDP, the country requires about two % of energy growth.
Coal is the major energy resource of the country. It accounts for about 58% of the total primary sources of commercial energy. It is expected to last for over 212 years at the present consumption levels. Indian coal has a very high ash content and poses a grave threat to India's environment. Coal burning is responsible for many environmental problems such as air pollution, Greenhouse Gas emissions and land degradation due to ash deposition. India has abundant hydropower potential. The Central Electricity Authority has assessed a large hydro potential in the country, to the tune of 84,000 MW, at a plant load factor of 60%. In 1997, hydropower accounted for 18% of India's electricity output and 2.6% of the primary commercial energy consumption. A huge potential exists for developing hydropower capacity as a substitute for coal, but hydropower development in India has been hampered for various reasons. Stiff opposition from environmentalists and long construction periods are the primary reasons hindering hydropower development. Oil consumption in India is steadily increasing. The aggregate consumption of petroleum products has risen at an annual rate of 6.1% from 1980/81 to 1997/98. At the same time India's production of petroleum products has risen at a rate of 11.3% from 1980/81 to 1997/98. The remaining consumption of petroleum products was met through imports. As a result there has been an ever-growing concern about India's continued dependence on energy imports, especially oil. In 1997/98, nearly 22% of the energy supply was through import in the form of cooking coal, crude oil, and petroleum products. India's oil imports are expected to further increase in future as current proven reserves of oil are expected to last only 15.6 years at the current rate of production. India's proven natural gas reserves are estimated at 692 billion cubic metres (BCM) in 1997/98. The advancement in gas utilisation technologies as well as environmental concerns is driving the growth in gas demand in India. India's nuclear power programme started in the 1960s. However, so far only 2225 MW of nuclear capacity is under operation. Natural gas is an efficient and environmentally clean fuel, but limited domestic availability constrains its use for power generation.

India’s final commercial energy consumption increased from 68.7 mtoe in 1980/81 to 176.08 mtoe in 1997/98 and the per capita commercial energy consumption increased
from 101.2 kgOE (kilogram of oil equivalent) to 184.7 kgOE. Factors contributing to the increase in commercial energy consumption are the increasing urban population and the increase in the use of commercial energy by the industry and transport sectors. Increasing per capita incomes and constrained availability of traditional sources also contributed to the growth of commercial energy consumption. Sectorally, the industrial sector is the largest consumer of commercial energy followed by the transport sector. However, the share of the industrial sector in total energy consumption is declining due to the faster growth of energy demand in the agriculture and transport sectors. India’s energy intensity (tonnes of oil equivalent per 1000 rupees of GDP at 1993 prices) declined during the 1990s, although the energy demand has been rising. Generally, energy intensity increases in developing countries because almost all the major changes associated with economic development—industrialisation, increases in the capital-to-labour ratio, substitution of commercial energy for traditional energy, urbanisation, changing consumption patterns—point towards an increase in intensity. The Indian economy has grown at the rate of 5.7% in between 1990 to 1997, while the energy consumption has been growing at 5.6% over the same period, a little less than the economic growth rate. Some of the factors contributing to this decline are the structural change in the economy, a shift towards thermodynamically efficient fuels such as natural gas and technological changes in energy-sensitive industries.

62. Under the baseline scenario, the primary commercial energy demand will increase by an average 4.7% annual growth rate between 1997 and 2025, rising from 271 mtoe to 1047 mtoe by 2025. Coal will maintain its dominant role in economy. However, the dominance of coal would reduce and natural gas and oil would take its share. Coal share would reduce to 47% by 2025 and share of oil and natural gas would rise to 38% and 12% respectively. According to the forecast surge in gas and oil demand would exceed the demand for coal. Gas consumption would rise to 145 billion cubic metres and oil consumption to 396 million tonnes in 2025. Given the current reserves for oil and gas, this demand cannot be met indigenously and a large percentage of oil and gas demand would be met through imports. Future demand for primary power, the combination of nuclear power, hydropower (including imports from Nepal and Bhutan) and renewable options will be subject to the constraints of installation of capacities for these sources. As
earlier discussed it is expected that hydropower and nuclear capacity in 2025 will be 27.7 GW and 10 GW respectively. The primary power consumption in 1997/2025 will grow at an annual rate of 5.2%. To meet the challenge of rising energy demand and environmental constraints arising due to higher usage of fossil fuels, India should pursue a long-term energy strategy. This not only limits the severe environmental consequences of future energy consumption but also maintains a sufficient energy supply to fuel the economic growth in the country. Of the several measures that are available, improving energy efficiency, reducing T&D losses, promoting clean coal technologies, substituting 'dirtier' coal with 'cleaner' fuels like natural gas or coal bed methane and promoting renewable are the ones that are suggested for implementation.

63. Indonesia's energy sector is a backbone of the its economic and human development. It meets the country's energy needs and contributes significantly to government revenue and foreign exchange earnings. About 70% of Indonesia's annual oil production were exported on average during the late 1980s, but domestic consumption was increasing steadily and reached half of annual oil production by 1990. Indonesia was the world's largest producer and exporter of liquefied natural gas. Although most of Indonesia's natural gas was supplied to liquefying plants for export in the early 1990s, about 20% were used for domestic consumption, primarily in fertiliser plants, where it was processed into ammonia and urea. Coal production declined in the 1970s because of increasing use of subsidised petroleum fuels. However, total coal production rose steadily in the 1980s to reach 11 million tonnes in 1990. One of the major problems in the Indonesian energy sector is non-targeted energy subsidy that could be spent on social sectors such as health and education. Since the crisis, the Government of Indonesia faced with international intervention (IMF) to improve their energy policy (subsidy reduction).

V. Sustainable Natural Resources and Utilisation

64. In developing countries, sustainable economic and human development is possible only with a reliable and sustainable supply of domestic natural resources. Yet, these vital resources are threatened by extreme poverty, rapid population growth, inequitable access to land and other resources, pollution of the air and water, soil toxicity and erosion, shortsighted economic policies, and political instability. In this context, sustainable management and use of natural resources are key elements of sustainable development. This has been duly recognised in Agenda 21, where it is stated that: "Special attention should be paid to the demand for natural resources generated by unsustainable consumption and to the efficient use of those resources consistent with the goal of minimising depletion and reducing pollution." The key elements are the utilisation of natural resources at a sustainable level with a focus on minimising depletion and the reduction in input of pollutants to these resources.

65. **Land Resources**—Land is one of the most precious resources of a country. In developing countries, land resource is a major issue of concern, since it cuts across so many other issues, such as the use of land for urban and industrial, agricultural, and forestry purposes. Moreover, a significant portion of this important resource is getting degraded by both natural and human activity. In China, arable land is about 130 million hectares, which is only 13.57% of the national total land areas. Since 1957, China’s arable land has been declining. Arable land was lost mainly due to conversion to non-agricultural use. Meanwhile, some of land was reclaimed which amounted to 3 million hectares. Various
studies show that China could add about 4 to 5.45 million hectares of arable land by 2050. China is very limited in its per capita acreage of cropland. Soil erosion affected about 1.16 million km$^2$ (square kilometers) in China in 1949, or 12% of the national area. In 1973, this reached 1.18 million km$^2$, and in 1996, 1.83 million km$^2$, or 19% of the total land area. During the 23 years from 1973 to 1997, erosion expanded by an average of 28,300 km$^2$ each year. The area of land under desertification expanded from 0.67 million km$^2$ or 7% of the national land area after 1949, to 2.622 million km$^2$ by the end of 1996. This is still increasing and currently it affects 400 million people and causes an estimated annual economic loss of around 16.5–25.0 billion yuan (Lo and Xing, 2000). Twenty-five major soil erosion controlled areas have been established at the national level. Soil and water conservation projects have been carried out in the seven large river basins. The accumulated eroded soil area under control is 67 million hectares. Since 1988, when the Chinese Government promulgated the Regulations on Reclamation of Land, great progress has been made in the rehabilitation of abandoned land.

66. In India, over the last five decades, land use has undergone a drastic change- Land under agriculture has almost doubled, forest cover has dwindled to less than half, large tracts of fertile agriculture and forest land have been diverted by the so-called "developers" for urbanisation and settlements. However, most of these changes have taken place during the first two decades i.e., 1950-51 to 1970-71. Land use pattern is more or less stable between 1980-81 and 1995-96. The substantial increases in some of the components like area under forests, net sown area are due to abolition of Zamindari system, reclamation of lands from one category to another and implementation of better reporting system. Since 1970-71, net sown area remained more or less stagnant at 140 million hectares. In India, both human activity and natural factors are degrading land. More than half of the country’s total geographical area is suffering from degradation. More importantly, the extent of degradation is not only increasing over time but also growing at an increasing rate. Land degradation takes place largely in the form of soil erosion due to water. The data available on land degradation are normally approximates and even qualitative in nature. According to these estimates, extent of soil degradation in India is about 187.8 million hectares in 1994 and estimated to be 200 million hectares in 1997. This is more than 60% of the geographical area, which appears to be an over estimate. About 75% of
this area are degraded due to water erosion and another 10% of the area due to water
logging and salinity (TERI, 1999). The costs of land degradation range between Rs.
448640 million and Rs.88700 in the case of loss of production. As a proportion to GDP
the replacement costs account for about 2% while it is 5-6% in terms of loss of
production.

67. Indonesia’s total area is about 181.2 million hectares. During the 1980s Arable land and
land under permanent crops increased from 26 to 32 million hectares; but it declined to
30.2 and 30.9 million hectares in 1995 and 1999 respectively. (Statistics Division, United
Nations Economic and Social Commission for Asia and the Pacific (ESCAP). The
dominant land resource management concern is the conversion of agricultural to non-
agricultural land. During 1980 to 1995, the urban area in Indonesia increased by an
estimated 367,500 hectares, an average of 25,100 hectares per year. Almost 60% of that
development - just under 15,000 hectares per year - occurred in Java. The World Bank
estimates that by 2010 roughly 13% of Java's 3.4 million hectares of rice fields may be
converted into non-agricultural land. In Indonesia, land reclamation was not successful.
Given the importance of land resources, Government has adopted various initiatives on
land resource management. It includes land administration and spatial planning,
establishing an effective land administration system, improving institutions for land
management, and information and data systems.

68. **Forest Resources**- Forests are a renewable resource and contribute substantially to the
economic development by providing goods and services to people at large including poor.
Forests also play a vital role in cleaning environment. Comprehensive assessment of the
forest resource involves measurement of numerous parameters such as forest cover,
growing stock, annual increment, species composition, bio-diversity and non-timber
forest products. China's forests and forest consumption are of global significance because
of the country's size and population. Analysis of three sets of forest census data gives
considerable reason for optimism about China's forests. Available data suggest that forest
cover in China increased 15% between 1980 and 1993, and forest volume has recovered
In the past decade, there has been a significant increase in forest areas managed for production, especially in forest areas managed for production. These reflect the rapid development of plantations and increased tree planting in China. The annual net growth rate in the area of plantations by afforestation is about 5%, reaching 31.01 million hectares, or 25.9% of China’s national forest area. While total wood reserves are increasing, per unit acreage reserves of wood (in the forested areas), as well as the total area and reserves of both near-mature and over-mature timber forests, are all declining considerably. Generally, there is also a decreasing quality of forestry resources and reserves of wood per acreage of forestry. As noted earlier, China’s forest resources are becoming increasingly unbalanced. During the 1984–1988 period, the annual net production of timber woods was 0.223 billion m³, while the consumption was 0.32 billion m³, exceeding the production by 97 million m³. In part, this was due to various conflicts between supply and demand of timber (Lo and Xing 2000).

In India, with growing population, the relentless pressure to convert forest lands for agriculture, cattle grazing, fuel & fodder collection, industries and irrigation projects, housing, and urban development gone up substantially. The remaining good forest cover is, therefore, estimated to be just 16% against the desirable 33% of the total land area as per the National Forest Policy. Up to the late 1970s, forestland was a prime target for diversion for resettlement, agriculture and industrialisation, and this trend was contained only by the Forest (Conservation) Act, 1980. Till 1980, India’s forest cover was being lost at the rate of 144,00 hectares a year. Although it slowed down to 25, 533 hectares between 1980-1995 (see TERI 1998). According to the FAO estimates, annual deforestation rate was 0.6% during 1981 to 1990, implying a loss of 3.37 million hectares over the period. At the same time, 1.44 million hectares was re-forested every year during the same period (Ravindranath and Hall 1994). In 1999, the forest cover of the country has been estimated to be 637,293 sq.km. which is 19.39% of the geographic area of the country. The dense forest, open forest and mangrove constitute 11.48%, 7.76% and 0.15% of geographic area respectively (Forest Survey of India 1999). Realising the role of forests in controlling soil erosion, moderation of floods, recharging of ground aquifers, as habitat for wildlife, conservation of bio-diversity etc., programmes were launched as
early as the Second Five Year Plan for extensive Watershed Management followed later by establishment of a Protected Areas Network. This Network today comprises of 10 Biosphere Reserves, 89 National Parks, 504 Sanctuaries, along with such dedicated conservation programmes as Project Tiger, Crocodile Rehabilitation and project Elephant. The Central Zoo Authority caters to the ex-situ conservation of wildlife through 275 zoos, deer parks, safari parks and aquaria, etc.

70. In Indonesia, about 75% of total land area were classified as forestland, and tropical rain forests made up the vast majority of forest cover, particularly in Kalimantan, Sumatra, and Irian Jaya. Indonesia has 10% of the world's tropical forests, 60% of Asia's tropical forests and perhaps 90% of the world's remaining virgin stands. It ranks seventh in the world in terms of forest coverage, but ranks third in terms of tropical forests (behind Brazil and Zaire). Currently, the nation's forests cover stand at 140.4 million hectares. Of the total, 30.7 million hectares are protected forests, 18.8 million hectares are nature reserves or national parks, 64.3 million hectares are production forests, and 26.6 million hectares are “convertible forests” designated for non-forest uses such as agriculture, settlement, and transmigration (Thompson, 2001). Forests resources have been an important contributor to growth. The forest products such as plywood, sawn timber, rattan, and paper—are the most important non-oil export earners. They account for about 25% of total industrial exports. This makes timber the second most important export earner, after oil and gas. Wood products also comprised the biggest share of manufactured goods in value-added terms. It is estimated that forestry provides 3.7 million jobs and sustains at least 15 million Indonesians. The gains in economic growth, however, have come at a significant environmental cost: sustained and rapid destruction of the natural forests. According to recent estimates, the annual rate of deforestation has now reached unprecedented levels of over 1.5 million hectares per year. In Indonesia, the most serious forest-related problem is the country’s high rate of deforestation. The government repeatedly says that it is committed to bring the rate of deforestation at sustainable levels. Recently at the 1999 Consultative Group of Indonesia, the Indonesian government made a commitments to establish an interdepartmental Committee on Forestry as well as to formulate a national forestry programme. But the progress on these commitments has been slow and uneven. (The World Bank 2000a). A comparative account of percentage of forest cover and per capita availability is given in the Table below. It shows that per capita forest in China and India is very low as compared to world’s average.

<table>
<thead>
<tr>
<th>Region/Country</th>
<th>Percentage of forest cover to land area (1995)</th>
<th>Per capita forest(ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>26.6</td>
<td>0.64</td>
</tr>
<tr>
<td>Asia</td>
<td>16.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Africa</td>
<td>17.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Europe</td>
<td>41.3</td>
<td>1.3</td>
</tr>
<tr>
<td>China</td>
<td>14.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Indonesia</td>
<td>60.6</td>
<td>0.6</td>
</tr>
<tr>
<td>India</td>
<td>15.7</td>
<td>0.06</td>
</tr>
</tbody>
</table>

*Source: State of World Forest, FAO, 1999.*
71. **Bio-Diversity Resources** - Biodiversity conditions in developing countries are a cause of great concern. Despite the continued efforts of the governments and international community, widespread biodiversity losses continue to occur. Biodiversity is important for the survival and development of human beings. It provides foods and industrial products such as timber, fibre, oil and rubber for human beings. China has one of the richest biological diversities on earth. It is also one experiencing a rapid destruction of biodiversity in recent years. It possesses more than 30,000 species of higher plants and 6347 species of vertebrates, constituting 10% and 14% of world's total, respectively. China initiated the construction of nature reserves in 1950s. Over last 50 years, a relatively perfect, reasonable, nature reserve network was established which effectively protects natural ecosystems with representative, typicality and scientific importance, as well as rare and endangered species. By the end of 1997, 926 nature reserves of different types and classes have been set up in China, with a total area of 76,980,000 ha or 7.64% of the land area of China. The Government has formulated China's Biodiversity Conservation Action Plan and carried out comprehensive assessments of its biodiversity, indexed endangered animals and plants. China was one of the earliest countries to sign and ratify the Convention on Biological Diversity. It is also actively participating in the drafting, discussion and negotiation of the Convention.

![Bio-Diversity (Species)](image)

72. India also has very rich reserves of biodiversity in the world. It is a repository of genetic resources of several life supporting plants of food and medicinal value that form a base for future crop improvement. The drive for increased agricultural production has resulted in the loss of genetic diversity in India. For instance, by 2005, India is expected to produce 75% of its rice from just 10 varieties compared with the 30,000 varieties traditionally cultivated. As one of the 12 mega centres of biodiversity, the biological wealth in India is estimated to have over 45,000 plants and 65,000 animal species. There is an abundance of wild relatives of food crops, cereals, mallets, leguminous crops, vegetables, oil seeds, spices and condiments in India. About 60 of the 250 wild crop relatives in India are either rare or threatened. Declaration of eco-sensitive zones, introduction of Biological Diversity Act and other initiatives are expected to help in conservation & sustainable use of biological resources. About 4.2 % of the total geographical area of the country have been so earmarked for conservation of biodiversity.
73. Indonesia is another centre of mega-biodiversity in the world, with 47 ecosystem types ranging from ice fields and alpine meadows in Irian Jaya to the humid lowland forests of Kalimantan and Sumatra. Although Indonesia occupies only 1.3% of the world's land area, the country possesses about 10% of the world's flowering plant species, 12% of all mammal species, 17% of all reptile and amphibian species, 37% of the world's fish, and 17% of all bird species (National Development Planning Agency, 1993). In terms of absolute numbers, it contains over 4,000 species of tree, 500 species of mammal, 3,000 species of fish and over 1,500 species of bird. However, there remains much to preserve, protect, and utilise sustainably. It is estimated that only 61% of original natural habitat remain in Indonesia, although this may be as low as 9% in Java and Bali (GOI report to UN in 1997). Indonesia has enacted several pieces of legislation. For instance, in 1990, Indonesia promulgated Act No.5 on the Conservation of Natural Resources and their Ecosystems. This Act encompasses policies on protection of biological diversity in accordance with the various treaties signed by Indonesia at the international levels. To support these commitments, Indonesia established 368 units of as protected areas by 1995, covering 49.1 million hectares. The current proposal includes the protection of an additional 15.7 million hectares in 308 additional sites. These existing and proposed sites, however, do not assure biodiversity conservation.

74. **Water Resources** - Water is a prime natural resource, a basic human need and a precious asset, in the absence of which no socio-economic developmental activities can sustain. Most of the developing countries facing a serious problem not only to meet the rapidly growing demand for water resources but also to sustain water quality. New sources of water are generally expensive which limit options of these countries to increase water supply. Despite this problem, substantial portion of water resources is wasted due to poor infrastructure and pricing policies. In China, water resources are characterised by a large supply, low per capita and uneven spatial and temporal distributions. Particularly, the Northern China region is severely lacking in water resources. With the continuous rapid growth of the economy, the population and urbanisation, there is a large gap between water supply and demand. Amongst water-related issues, water shortage is the most pressing one for China. Its annual surface and underground water resources are 2711.5 and 828.8 billion cubic meters (m³), respectively. It ranks seventh in the world in terms of water availability. In spite of the large quantity of total water resources, China per capita and per acreage water availability is very low (only one-fourth of the world average). The water-scarce North accounts for 63.5% of the national total land area with only 19.8% of the national water resources; while the South takes up 80.2% of water resources with only 36.5% of the land area. Due to rapid industrialisation and urbanisation, industrial and residential water use has increased dramatically from 45.7 billion m³ and 6.8 billion m³ in 1980 to 112.1 billion m³ and 525 billion m³ in 1997, respectively. The share of industrial and residential water use rose from 11.8% in 1980 to 29.6% in 1997. Despite the water shortages, there is large water wastage. Agriculture, which consumes a substantial portion of water availability, wastes half of the water. With regards to future, projections show that the total water demand in 2050 will reach 700 billion m³, or about 50% higher than the current consumption. One of the most effective options for addressing the water shortage in the long run may be demand-side (Lo and Xing, 2000). In the 1990s, the Chinese Government has strengthened the integrated development and management of major rivers and lakes. It is also planning to construction of trans-basin water-transferring projects to overcome water scarcity in northern China.
75. India is rich in water resources, being endowed with a network of rivers and vast alluvial basins to hold groundwater. Besides, India is blessed with snow cover in the Himalayan range, which can meet a variety of water requirements of the country. However, with the rapid increase in the population of the country and the need to meet the increasing demands of irrigation, human and industrial consumption, the available water resources in many parts of the country are getting depleted and the water quality has deteriorated. In India, water pollution comes from three main sources: domestic sewage, industrial effluents and run-off from agriculture. The most significant environmental problem and threat to public health in both rural and urban India is inadequate access to clean drinking water and sanitation facilities. Almost all the surface water sources are contaminated and unfit for human consumption. The diseases commonly caused by contaminated water are diarrhoea, trachoma, intestinal worms, hepatitis etc. Many of the rivers and lakes are getting contaminated from industrial effluents and agricultural run-off, with toxic chemicals and heavy metals, which are hard to remove from drinking water with standard purification facilities. Even fish and shellfish in such water get contaminated and their consumption may cause diseases. Since independence, the main principle guiding the water resources development in India has been to ensure adequate supplies of water for various uses such as irrigation, drinking, sanitation, industrial use, etc., while preserving the eco-system. India receives an annual rainfall of about 4000 cubic metres and an estimated 19 billion kilolitres of fresh water is available in the rivers. With the onset of green revolution in the mid-sixties in some parts of the country, groundwater depletion has emerged as a major problem in India. Agriculture accounts for as much as 93% of total water withdrawals in comparison with mere 4% for industrial use. The projections on total water requirements vary from 616.12 to 905.16 BCMs. Total availability of water for agriculture as estimated above from sustainable groundwater extraction and planned surface water is likely to be of the order of 657.48 BCMs in 2020.

76. Water pollution is a major environmental concern in India. The main sources of water pollution are discharge of domestic sewage and industrial effluents, which contain organic pollutants, chemicals and heavy metals, and run-off from land-based activities such as agriculture and mining. With increasing use of fertilisers and pesticides in
agriculture, the run-off from irrigated lands has been adding to the water bodies a variety of organic and inorganic pollutants. Further, bathing of animals, washing of cloths and dumping of garbage contribute to water pollution. All these factors have led to pollution of rivers, lakes and coastal area and thus affected the eco-systems. The increasing discharge of domestic and industrial wastes and the increasing use of fertilisers and pesticides in agriculture has also led to the contamination of groundwater at many places making it unfit for human consumption. An analysis of water quality during twelve years, 1986 to 1997, undertaken by the Central Pollution Control Board (CPCB) has brought out that water quality has deteriorated over the years. While Biological Oxygen Demand (BOD) values were below 3 mg/l in 60 % of the observations for the period 1986-91, the relevant proportion was 54 % in 1994-95. There was a gradual increase in the number of observations having BOD in excess of 6 mg/l, which increased from 7 % of the total observations in 1989 to 16 % in 1997. (Economic Survey, 1998-99, p. 160).

Turning to the sources of water pollution, the most important one is the wastewater generated in the cities and towns. Treatment of municipal wastewater is woefully inadequate. Currently about 200 cities and towns in India (out of a total of 3245) have a sewerage system and some of them only partially. Discharge of industrial effluents is another major source of water pollution. Some major water polluting industries are fertilisers, refineries, pulp and paper, leather, sugar, distilleries, chemicals, iron and steel, and metal plating. A fairly large part, if not the dominant part, of industrial water pollution is caused by small-scale units. At the all India level, the estimated BOD load is 4290 thousand tonnes in 1995 and 16714 thousand tonnes in 2020. This implies that pollution load in 2020 will be about four times that in 1995.

77. In Indonesia, there is large water availability. But clean water is a scarce resource in Indonesia. The agricultural sector dominates fresh water consumption, using about 98% of Indonesia's water resources. In the early 1990s, it consumes about 74.9 billion cubic meters. This is projected to rise to 116.96 billion cubic meters by 2015. It is uncertain whether this projected volume can be supplied through existing collection and storage systems. Domestic water use, which was at 3.1 billion cubic meters in the early 1990s, is expected to increase by 7-10 % per annum. The Indonesia Agenda 21 proposes that water resources be managed in a much more co-ordinated manner, and be planned on a watershed basis. It also proposes a shift from a research orientation to one of more active management of the water resource.

VI. The Cost of Environmental Degradation

78. In recent years, developing countries face serious environmental problems. The problems fall in two categories: (i) issues related to natural resource management including land, water, forests, biodiversity etc., and (ii) issues related to water pollution and air pollution mainly in urban areas. The degradation of natural resources, or loss in the quality of the environment imposes a burden on present and future generations. Degraded land gives less output for the same levels of inputs. One may even have to forgo output for some time to permit natural process to regenerate the land. Similarly degraded or depleted forests leads to loss in forests resources and to alternative land uses with little economic value. Pollution leads resource scarcities, decline in tourism etc. A need clearly exists for a realistic assessment of the costs of environmental pollution and ecosystem degradation. The costs include not only a human health cost but also cost involved in the loss of efficiency or production. However, converting this need into a reality presents a daunting
challenge, even for developed countries with traditions of good statistical services and a growing interest in environmental problems. Four categories of environmental costs are commonly mentioned in the literature. They are (i) economic loss due to higher water supply costs, soil degradation, deforestation, and reduced tourism, (ii) public health costs due to air and water pollution, (iii) loss in amenity values, and (iv) loss in intrinsic values. There are some attempts to estimate first two categories. But hardly any study exists for last two categories, as they are extremely difficult to quantify.

79. The U.S. Embassy in Beijing in December 2000 reviewed the studies undertaken to measure the cost of environmental degradation in China. The review shows that pollution costs the Chinese economy anywhere from 3 to 8 % of GDP each year. Ecological damage potentially costs another 5 to 14 %. Even at the low end of these estimates, environmental damage is roughly equivalent to annual economic growth meaning that the economy is producing little or no new net national wealth. However, the studies all suffer from lack of reliable data, and the results largely depend on the assumptions and calculation methods employed. The UNU/IAS study for the year 1992 reveals that the imputed environmental costs in China to be 129.7 billion yuan, which is equivalent to 4.8 % of its GDP or 5.6 % of its NDP. The estimates also show that depletion of forest accounted for more than 40% of total environmental degradation. This was followed by water pollution, which accounted for 31% of total imputed environmental cost. Air pollution was the third largest source of environmental degradation accounting about 17 % (Akita and Nakamura, 2000).

Estimates of the Cost of Environmental Damage in China (% of GDP)

<table>
<thead>
<tr>
<th>Author</th>
<th>Year of Estimate</th>
<th>Air</th>
<th>Water</th>
<th>Other</th>
<th>Damage to ecology</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Bank</td>
<td>1995</td>
<td>7.1*</td>
<td>0.6</td>
<td>n/a</td>
<td>n/a</td>
<td>7.7</td>
</tr>
<tr>
<td>CASS/EDRC</td>
<td>1993</td>
<td>1.4</td>
<td>1.6</td>
<td>0.2</td>
<td>6.9</td>
<td>10.0</td>
</tr>
<tr>
<td>Smil</td>
<td>1990</td>
<td>0.9</td>
<td>0.7</td>
<td>0.5</td>
<td>5.4</td>
<td>7.5</td>
</tr>
<tr>
<td>SEPA</td>
<td>1992</td>
<td>2.5</td>
<td>2.0</td>
<td>0.0</td>
<td>n/a</td>
<td>4.5</td>
</tr>
<tr>
<td>Guo-Zhang</td>
<td>1983</td>
<td>2.2</td>
<td>4.5</td>
<td>0.0</td>
<td>8.9</td>
<td>15.6</td>
</tr>
<tr>
<td>Jin Jianming</td>
<td>1985</td>
<td>N/a</td>
<td>n/a</td>
<td>n/a</td>
<td>12.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Smil-Mao</td>
<td>1992</td>
<td>2.4</td>
<td>1.5</td>
<td>0.2</td>
<td>13.9</td>
<td>18.0</td>
</tr>
<tr>
<td>Xu Songling</td>
<td>1993</td>
<td>1.1</td>
<td>0.9</td>
<td>0.8</td>
<td>6.9</td>
<td>9.7</td>
</tr>
</tbody>
</table>

* Based on “willingness to pay” valuation method; the study also uses a more conservative “human capital” method, which yields an air pollution cost estimate of 3.1 %.
? Midpoint estimates; Smil provides a confidence interval of 1.7-2.5 % of GDP for pollution costs and 3.8-7.0 for ecological damage.


80. For India, one of the first attempts to quantify the economic cost of environmental degradation was made by Carter Brandon and Kirsten Hommann (1994) of the World Bank. Their estimates show that water and air pollution in India has economic and social costs of approximately US$ 7 billion per year. Soil erosion and deforestation cost about US$ 2.7 billion. Major environmental costs from all sources have been estimated to be $9.715 million per year in India amounting to 4.53 % of GDP. The magnitude is enough to offset most of the country’s annual growth, as reflected in the national accounts. This also indicates that this magnitude would even higher if such
problems as toxic, waste, biodiversity, river and coastal resources, the rapidly increasing cost of providing clean water etc. were included. Similarly, Tata Energy Research Institute has made some estimation that showed India is losing over 10% of its GDP in the form of environment damage. Recently, Jyoti Parikh and Kirit Parikh have carried out a systematic estimation on behalf of the UNU/IAS, which show that the imputed environmental cost for India could be in the range of 3.58 to 4.99% of GDP in the mid-1990s. The details are given are summarised in the following table.

### Major Environmental Costs estimated for India (1995)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Impacts on Health and/or production</th>
<th>Low estimate (Million US$)</th>
<th>High Estimate (Million US$)</th>
<th>Average (Million US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban air pollution</td>
<td>Urban health impacts</td>
<td>517</td>
<td>2,102</td>
<td>1,310</td>
</tr>
<tr>
<td>Water pollution (health impacts)</td>
<td>Urban and rural health impacts, esp. diarrhoea diseases</td>
<td>3,076</td>
<td>8,344</td>
<td>5,710</td>
</tr>
<tr>
<td>Solid degradation</td>
<td>Loss agricultural output</td>
<td>1,516</td>
<td>2,368</td>
<td>1,642</td>
</tr>
<tr>
<td>Range Land degradation</td>
<td>Loss of livestock carrying capacity</td>
<td>238</td>
<td>417</td>
<td>328</td>
</tr>
<tr>
<td>Deforestation</td>
<td>Loss of sustainable timber supply</td>
<td>183</td>
<td>244</td>
<td>214</td>
</tr>
<tr>
<td>Tourism</td>
<td>Decline in tourism revenues</td>
<td>142</td>
<td>283</td>
<td>213</td>
</tr>
<tr>
<td>Total costs of environmental degradation</td>
<td></td>
<td>5,672</td>
<td>13,758</td>
<td>9,715</td>
</tr>
<tr>
<td>Total cost As % of GDP</td>
<td></td>
<td>2.64%</td>
<td>6.41%</td>
<td>4.53%</td>
</tr>
</tbody>
</table>

Source: Carter Brandon and Kirsten Hommann (1999)

### Annual Cost of Environmental Degradation in India 1994-1997

<table>
<thead>
<tr>
<th>Resource</th>
<th>Range (% of GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>0.4</td>
</tr>
<tr>
<td>Forests</td>
<td>1.1 – 1.6</td>
</tr>
<tr>
<td>Soil</td>
<td>0.30 – 0.80</td>
</tr>
<tr>
<td>Water</td>
<td>1.70 – 2.1</td>
</tr>
<tr>
<td>Total</td>
<td>3.5 – 4.9</td>
</tr>
</tbody>
</table>

Source: Jyoti Parikh and Kirit Parikh (2001)

81. For Indonesia, Repetto et al. have done a study on estimating environmental cost of forest, oil, gas and soil resources degradation. The results of this study, based on the "green" GDP of Indonesia from 1971 to 1984, indicate a lower rate of growth (4% per year) for the Indonesian economy relative to that of the conventional GDP (7.1% per year). Since Repetto's study, much attention has been directed toward Indonesia in resource and environmental accounting. Ministry of State for Population and Environment as well as various institutions and scholars carried out estimation of environmental cost. These estimates show that imputed environmental cost during early 1990s is in the range of about 5% of NDP (see example Akita and Nakamura 2000, p45).
What does this imply for the growth rate of environmentally adjusted NDP or GDP? It would depend on whether damage to environment and natural resources is accelerating or not? If the percentage of cost of environmental degradation in the GDP or NDP has remained the same over the years, then the growth rate is not affected. On the other hand, if the cost of degradation was nil or negligible five years ago and is now 5% of NDP or 10% of GDP, the growth rate of NDP or GDP over the five-year has to be reduced by 5-10 percentage points.

VII. Conclusion

82. China, India and Indonesia during the last 50 years have travelled a long way in their drive towards modernisation of the economy. All three countries are transforming themselves from a largely agrarian economy into one based on a fairly developed and diversified industrial economy. These countries also changing from a planned and essentially supply-driven economy into a more market oriented and demand-driven economy. Population continued to grow in these countries but the growth rate of the population is declining. An important dimension of demographic transition in these countries has been the process of urbanisation. Although more than two-thirds of the population still lives in the rural areas, these countries have experiencing a rapid urbanisation in recent decades. These countries also experiencing a rapid economic growth. Consequently, the population living under poverty line declined significantly from about 60-70% to 15-25%. Life expectancy at birth has been increased by 25 years (about 50%). Adult literacy rates have also been increased substantially. Though these countries are still regarded as low-income countries, their economic reforms and progress on human development are expected to a base for sustainable economic and human development.

83. However, the rapid paces of urbanisation, industrialisation and commercialisation of agriculture have led to significant changes in the stock and the quality of the environment and natural resources. It is true that this is general phenomenon in many developing countries. Perhaps these trends are far more visible in these countries than other developing countries because of substantial increase in population. For these poor countries with large population, economic growth remains the paramount goal of all policies and actions. It would be naïve to suggest that growth should be halted merely so that these countries have time to improve and rebuild the conditions and quality of natural resources. Moreover, this would not also possible as any improvement or rebuilding natural resources requires substantial financial and human resources. In this context, there is a need for some innovative policies that can be put in place immediately for timely and desirable results.

84. These countries (China, India and Indonesia) have already taken various measures to promote sustainable development. First of all, there is a growing use of economic instruments for environmental management. Secondly, these countries are eliminating or reducing subsides to activities or sector that are environmental unsound. Thirdly, these countries allow public participation in decision making in selected cases. Recent planning documents place great emphasis on integrating energy, environment and economic policy decisions for sustainable development. Environmental concerns are being integrated into development projects through mandatory Environmental Impact Assessments. But, it is obvious that the Government alone cannot protect the environment and promote
sustainable development. There has to be meaningful participation from the public as well as the business community. Industry can play a vital role in protecting the environment as well as promoting social and human development. Measures for improving productivity by more efficient energy use, recycling of wastes etc can lead to savings, besides yielding environmental benefits. There is a need to undertake awareness and training programmes to promote the concept of sustainable development. These countries also are developing an environmental publicity and educational campaign. These countries have actively playing a constructive role in international arena by signing a number of international environmental conventions and agreements. However, lots need to be done.

85. Mitigating widespread environmental problems requires a broad array of actions. First of all, setting priorities across a wide range of problems and options. In this context, accounting the environmental cost of economic activities will be important as this help in ranking of alternative policies and expenditures. Second, policy makers, at various levels, need support in developing a better understanding of the causes and cumulative effects of population, development and environmental linkages. Third, the participation of NGOs needs to be encouraged and strengthened. Fourth, partnerships between public and private organisations for urban environmental management need to be intensified. Fifth, a system must be established to ensure integration of environmental consideration into the development process. Sixth, more transparency and accountability are needed in establishing as well as implementing environmental laws and policies. Seventh, an overarching co-ordinating agency is needed to coordinate the work of various ministries and agencies to reduce overlapping and contradictions as well as to maximise synergies.
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