REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

UNEP

ENVIRONMENTAL INDICATORS South Asia

Environmental Indicators South Asia

United Nations Environment Programme
Regional Resource Centre for Asia and the Pacific

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Definition of an indicator is not uniform across the various publications, organisations and institutions that have been referred to in this publication. Efforts have been made to standardise the data for a particular indicator from the different sources but there still might exist some discrepancies in the data-reporting method. UNEP-RRCAP does not take responsibility for the same.

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FOREWORD

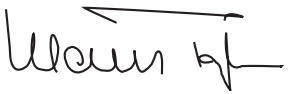
Agenda 21 emphasized the need for developing indicators to provide the solid base for decision making at local, national, regional and global levels. The Johannesburg Plan of Implementation in 2002 reiterated the need for indicators to monitor economic, social and environmental progress for sustainable development. Goal 7 of the UN Millennium Development Goals is set for countries to ensure environmental sustainability through integrating principles of sustainable development into country policies and programmes, and reverse the loss of environmental resources.

This report on 'Environmental Indicators for South Asia' has been prepared to present the trends of thirty one key indicators on air, water, land and biodiversity. It also presents trends on social and economic conditions through the selected indicators. Data have been collected for each indicator for each country in South Asia for 1990, 1995 and 2000. This report provides an assessment of economic, social and environmental conditions in South Asia based on available data and information. Successful initiatives undertaken by governments of South Asia have also been highlighted in the report. Lack of updated scientific database has been a major challenge in preparation of the report.

This report highlights that South Asia has registered an economic growth rate averaging 5.2 per cent during 1990-2000 and has the potential to become a leading economic block in Asia and the world in the decades ahead. Poverty is the greatest challenge facing South Asia with 40 per cent of world's poor living in the sub-region. The sub-region is also faced with overpopulation and exhibits a population growth rate higher than the world average. Overpopulation and poverty are inter-linked and require substantial mitigation measures.

Land degradation is a major problem in all South Asia countries causing negative impacts on arable land and posing a threat to food security. Water quality in rivers across South Asia has been consistently deteriorating and needs major interventions. Water availability per capita has been decreasing in most countries, which may seriously affect economic and social development. Air quality has deteriorated in major cities in South Asia in past decade. South Asia is the home of wide variety of terrestrial and marine biodiversity. But declining forests covers has lead to loss of natural habitat for species of plants, animals and birds, and needs considerable conservation programme.

UNEP hopes that the 'Environmental Indicators in South Asia' will be a useful document for government, non-government, regional and international organizations in the pursuit of developing policies and action plan. UNEP gratefully acknowledge the contribution of Environment Ministries, agencies, institutes and individuals in the preparation of the report.



Klaus Töpfer
United Nations Under-Secretary General and
Executive Director
United Nations Environment Programme
August 2004

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The South Asian Association For Regional Cooperation (SAARC) Secretariat, for the review of the publication.

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UNEP-RRCAP

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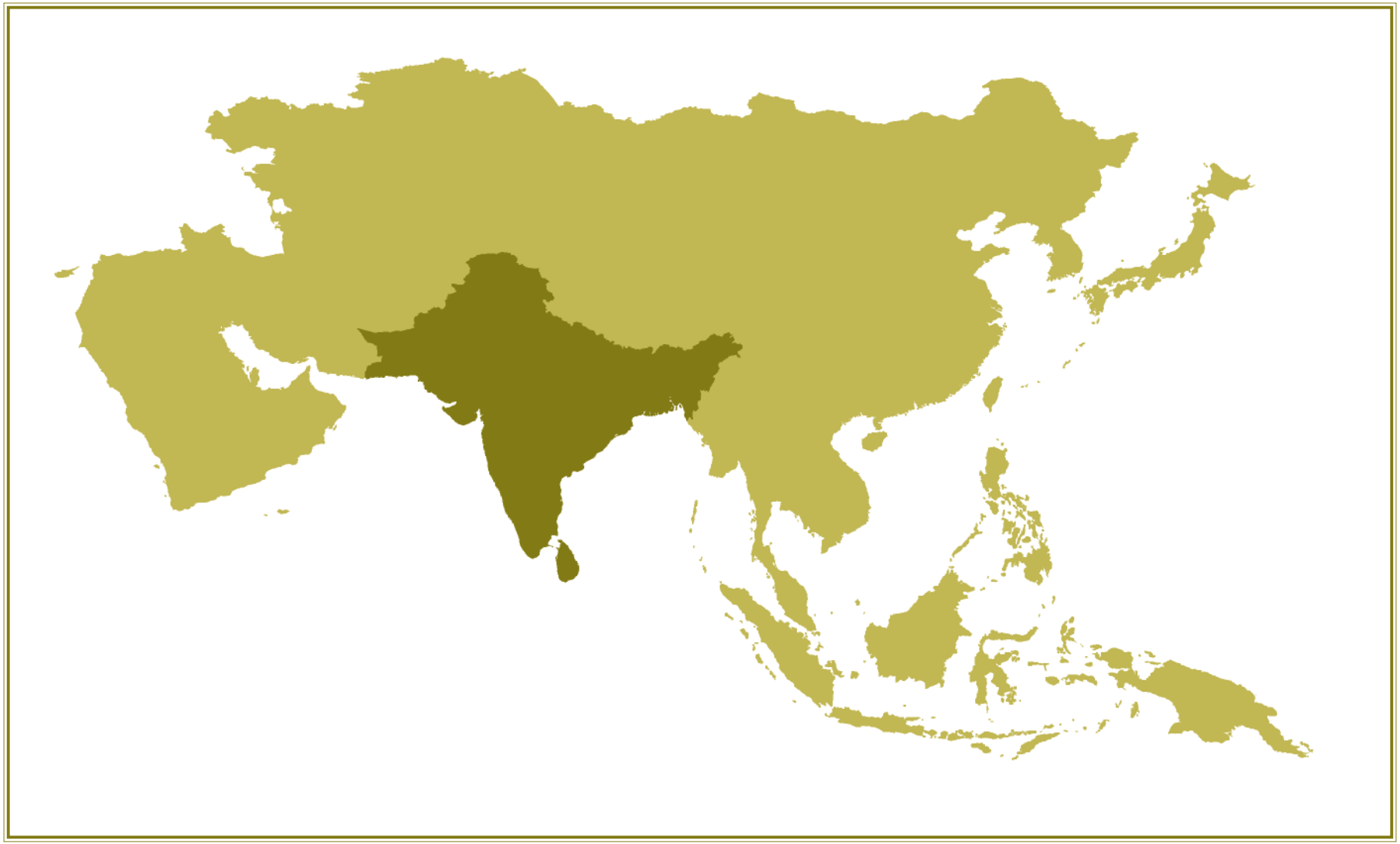
Achira Leophairatana
Twinkle Chopra

CONTENT



INTRODUCTION

South Asia is a sub-region of Asia comprising the modern states of India, Pakistan, Bangladesh, Sri Lanka, Nepal, Bhutan, and the Maldives and covering an area of about 41,26,800 sq km.

South Asia ranks among the world's most crowded places – the population density of this region is much higher than the world average. About 1.33 billion people live there—about a third of all Asians and a fifth of all the people in the world.

South Asia has the mighty Himalayas in the north and is bounded in the south by the Indian Ocean, in the south-east by the Bay of Bengal and in the south-west by the Arabian Sea. The region has a long stretch of coastline extending to about 10,000 km from Pakistan to Bangladesh. A monsoon climate, characterised by wet summers and dry winters, generally prevails over South Asia.

Indicators

Indicators can be defined as statistics, measures or parameters that can be used to track changes of the environmental and socio-economic conditions. Indicators are developed in synthesizing and transforming scientific and technical data into fruitful information. It can provide a sound base for decision-makers to take a policy decision on present as well as potential future issues of local, national, regional and global concerns. It can be used to assess, monitor and forecast parameters of concerns towards achieving environmentally sound development.

The 1992 UN Summit on Environment and Development at Rio recognized the role of indicators towards promoting sustainable development. Chapter 40 of the Agenda 21 called on countries at the national level, as well as international, governmental and non-governmental organizations to develop indicators in order to provide the solid basis for decision-making at all levels. Agenda 21 specifically called for harmonization of efforts towards developing sustainable development indicators at the national, regional and global levels.

The Commission on Sustainable Development (CSD) in 1995 undertook an initiative to assist countries with developing framework for sustainable development indicators, and building capacity for integrating indicators in policy formulation and decision-making. The overall goal of the programme was to develop country specific indicators that will be used by countries while reporting the progress on sustainable development.

International Development Goals (IDG) were formulated and agreed by the international community at different UN conferences that took place in the last decade. In order to achieve environmental sustainability, goals called upon developing countries to formulate a national strategy for sustainable development by 2005, and to reverse the current trends in the loss of environmental resources, at both global as well as national level, by 2015. These goals are merged into Millennium Development Goals (MDG).

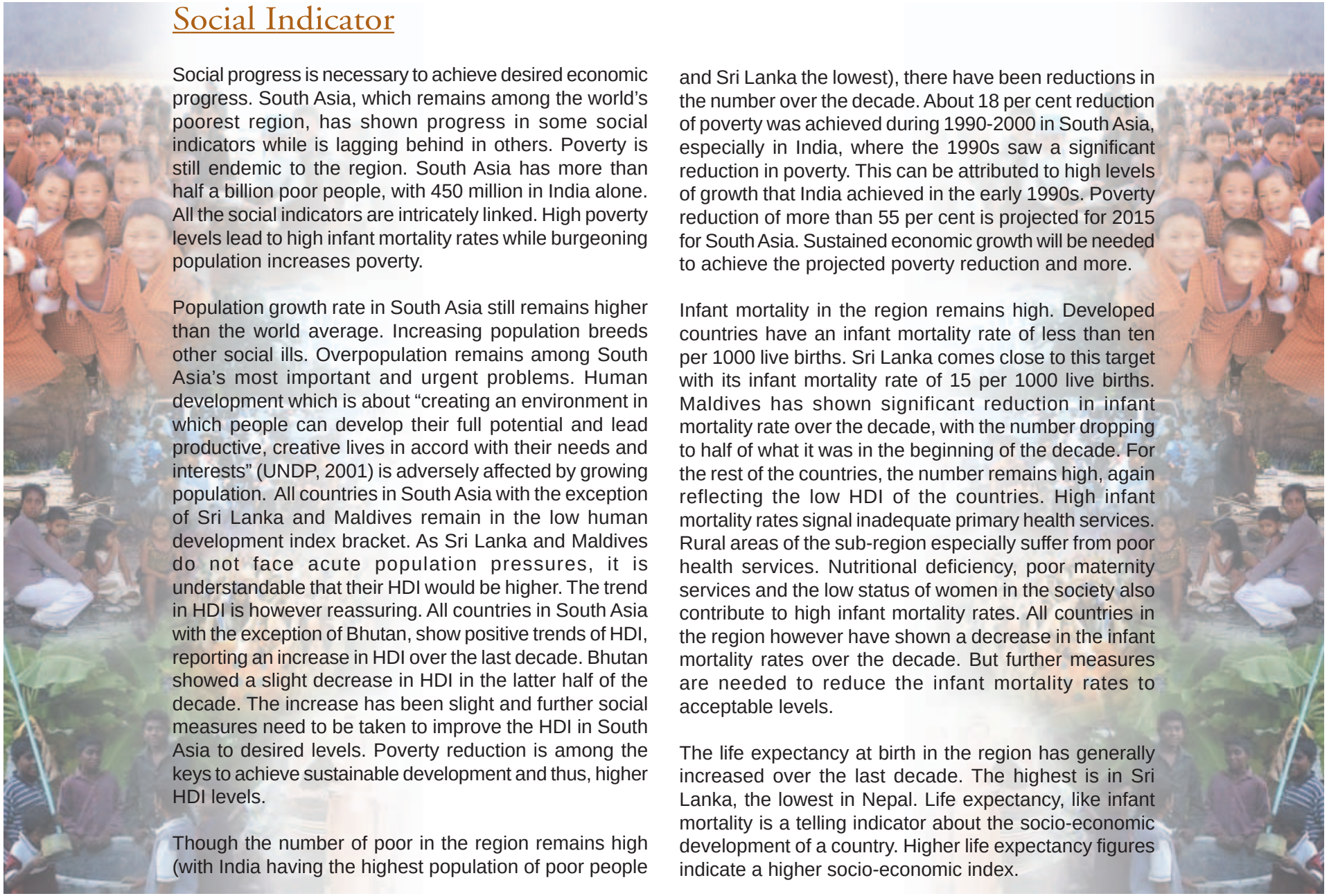
At the UN Millennium Summit held in 2000, Millennium Development Goals (8 goals, 18 targets and 48 indicators) were endorsed by the governments and civil society, in

order to improve economic, social and environmental conditions in a specific timeframe. Goal 7 is set for countries to ensure environmental sustainability through integrating principles of sustainable development into country policies and programmes, and reverse the loss of environmental resources.

The Johannesburg Plan of Implementation (JPOI), 2002 called upon countries to initiate work on indicators in order to monitor progress on sustainable development. Governments in Johannesburg committed to various goals, targets and financial assistance (through ODA and partnership) in order to achieve a measurable positive change. Indicators would be the useful tools to track the economic, social and environmental progress over the timeframe.

Environment is constituted of air, water, land and biodiversity, which are life support systems for human beings. Human activities in the pursuit of economic development have caused immense pressure on environment. Reversal of environmental degradation is the paramount essential in order to safeguard the well being of present as well as future generations. Indicators are means of measuring progress of desired actions. In order to track the progress on implementation of the Agenda 21, and Millennium Goals, there is an expressed need to develop framework for simple indicators on environmental resources, i.e. air, water, land and biodiversity.

To fulfil this need, UNEP-RRCAP has produced the Environmental Indicators report for each sub-region of Asia and the Pacific. We have painstakingly researched and collected data for a list of key environmental indicators. These indicators, which are replicated across each sub-region, were chosen after serious deliberation by our in-house experts, to best reflect the environmental concerns in and across the sub-regions. The indicators can be sub-divided in to the following categories: 1. Social 2. Economy 3. Environment. The category environment is further sub-divided into 1.Land 2.Water 3.Air 4. Biodiversity. Thus, the above categories provide a comprehensive view of the sub-regional progress on environment and sustainability.



Social Indicator

Social progress is necessary to achieve desired economic progress. South Asia, which remains among the world's poorest region, has shown progress in some social indicators while is lagging behind in others. Poverty is still endemic to the region. South Asia has more than half a billion poor people, with 450 million in India alone. All the social indicators are intricately linked. High poverty levels lead to high infant mortality rates while burgeoning population increases poverty.

Population growth rate in South Asia still remains higher than the world average. Increasing population breeds other social ills. Overpopulation remains among South Asia's most important and urgent problems. Human development which is about "creating an environment in which people can develop their full potential and lead productive, creative lives in accord with their needs and interests" (UNDP, 2001) is adversely affected by growing population. All countries in South Asia with the exception of Sri Lanka and Maldives remain in the low human development index bracket. As Sri Lanka and Maldives do not face acute population pressures, it is understandable that their HDI would be higher. The trend in HDI is however reassuring. All countries in South Asia with the exception of Bhutan, show positive trends of HDI, reporting an increase in HDI over the last decade. Bhutan showed a slight decrease in HDI in the latter half of the decade. The increase has been slight and further social measures need to be taken to improve the HDI in South Asia to desired levels. Poverty reduction is among the keys to achieve sustainable development and thus, higher HDI levels.

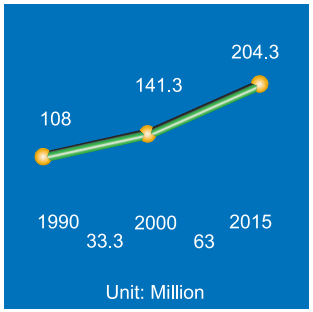
Though the number of poor in the region remains high (with India having the highest population of poor people and Sri Lanka the lowest), there have been reductions in the number over the decade. About 18 per cent reduction of poverty was achieved during 1990-2000 in South Asia, especially in India, where the 1990s saw a significant reduction in poverty. This can be attributed to high levels of growth that India achieved in the early 1990s. Poverty reduction of more than 55 per cent is projected for 2015 for South Asia. Sustained economic growth will be needed to achieve the projected poverty reduction and more.

Infant mortality in the region remains high. Developed countries have an infant mortality rate of less than ten per 1000 live births. Sri Lanka comes close to this target with its infant mortality rate of 15 per 1000 live births. Maldives has shown significant reduction in infant mortality rate over the decade, with the number dropping to half of what it was in the beginning of the decade. For the rest of the countries, the number remains high, again reflecting the low HDI of the countries. High infant mortality rates signal inadequate primary health services. Rural areas of the sub-region especially suffer from poor health services. Nutritional deficiency, poor maternity services and the low status of women in the society also contribute to high infant mortality rates. All countries in the region however have shown a decrease in the infant mortality rates over the decade. But further measures are needed to reduce the infant mortality rates to acceptable levels.

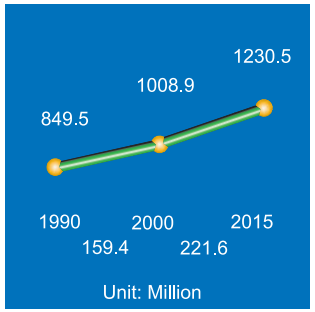
The life expectancy at birth in the region has generally increased over the last decade. The highest is in Sri Lanka, the lowest in Nepal. Life expectancy, like infant mortality is a telling indicator about the socio-economic development of a country. Higher life expectancy figures indicate a higher socio-economic index.

Social Indicator - Population

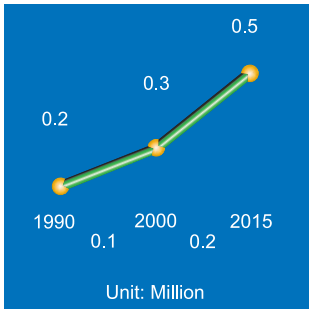
Pakistan



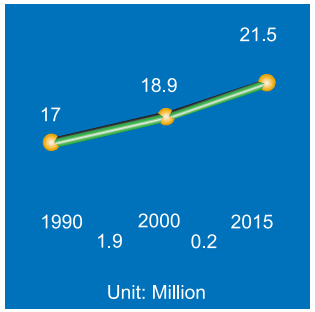
India



Maldives

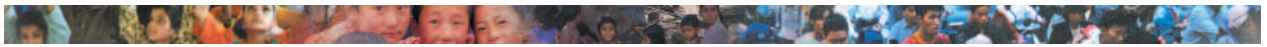


Sri Lanka



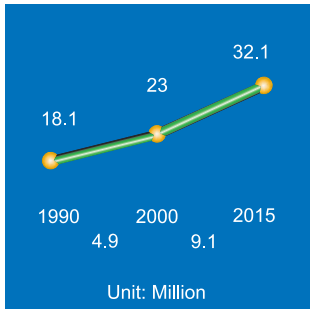
Note: All countries in the sub-region have shown a trend of increasing population during the last decade. India is the second most populous country in the world. In 2000, India had the highest population – 1008.9 million while Maldives had the least – 0.3 million.

Source: World Development Indicator 2002, UNDP HDR 2002

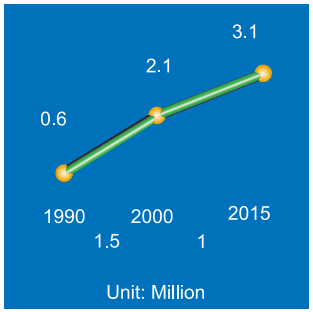


Social Indicator - Population

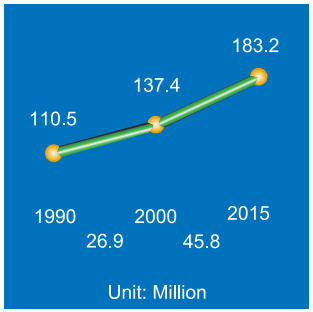
Nepal

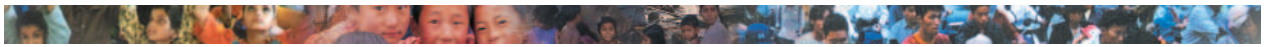


Bhutan



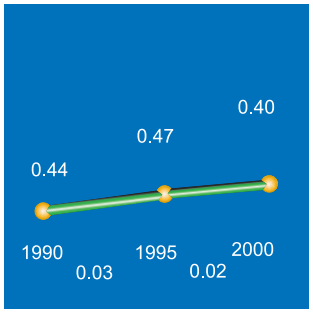
Bangladesh



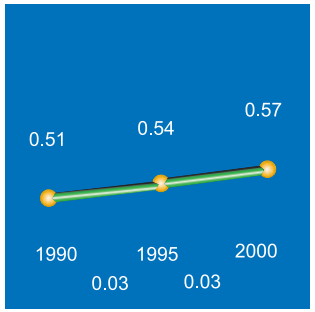


Social Indicator - Human Development Index

Pakistan



India



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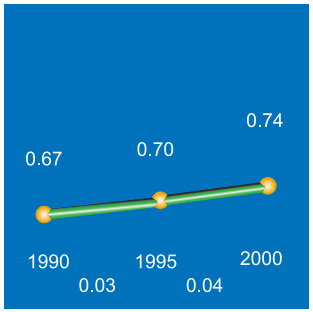
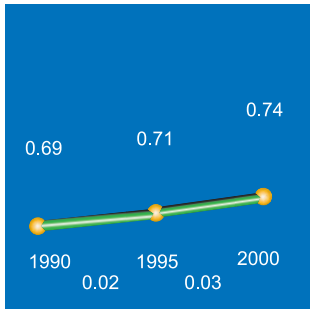


Sri Lanka



Note: With the exception of Maldives and Sri Lanka, the rest of the countries are ranked lower on the development scale. HDI has shown encouraging trend over the past decade as HDI has increased in all countries except Bhutan where it decreased slightly. The highest HDI is in Maldives and Sri Lanka at 0.74 and lowest in Bangladesh – 0.47.

Source: UNDP Human Development Report 2002

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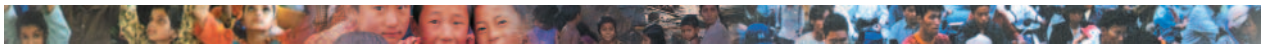
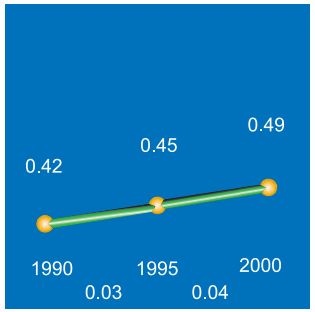


Social Indicator - Human Development Index

Nepal



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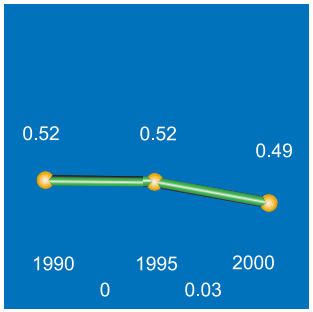
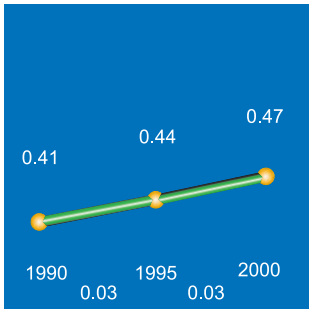
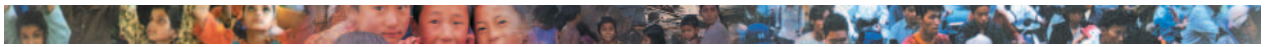
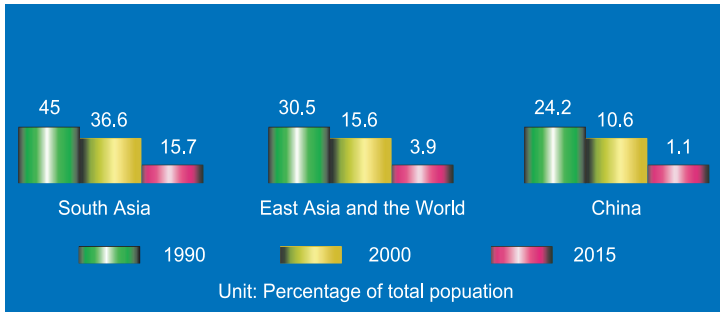


Bangladesh



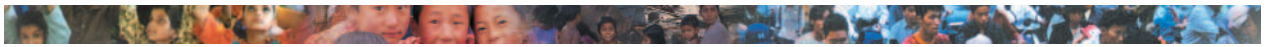


Social Indicator - Population with Income 1 USD/day (Forecast)



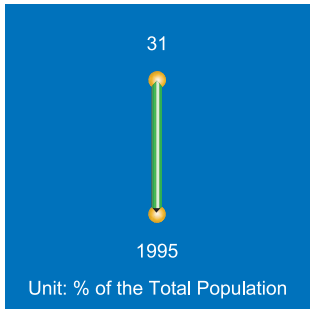
Note: About 18 per cent reduction in poverty was achieved in the 1990s in South Asia. Poverty reduction by more than 55 per cent is projected for 2015 for South Asia. Sustained economic growth would be needed to achieve the projected poverty reduction and more.

Source: Global Economic Prospects 2003, World Bank

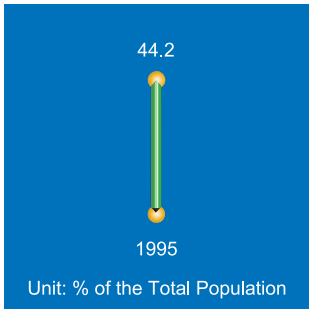


Social Indicator - Population With Income Less Than 1 USD/day

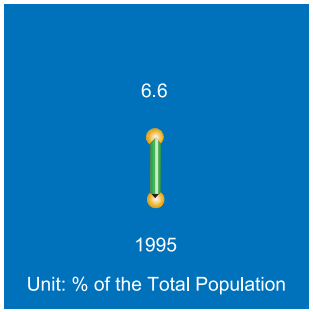
Pakistan



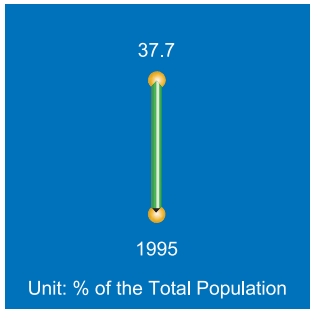
India



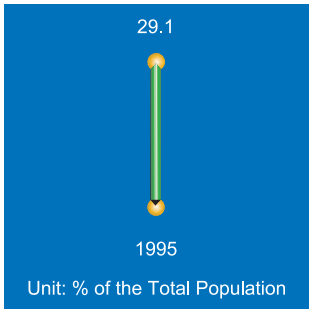
Sri Lanka



Nepal



Bangladesh

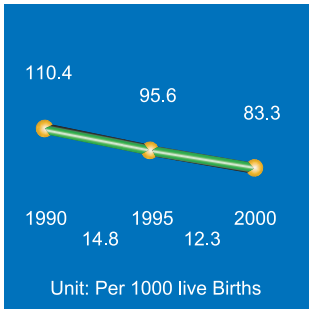


Note: Pakistan, Nepal, India and Bangladesh have sizeable parts of their population below the poverty line. The highest percentage of poverty is found in India and the lowest in Sri Lanka. Bhutan and Maldives are not stressed by high poverty levels. Poverty reduction is a key challenge facing this sub-region.

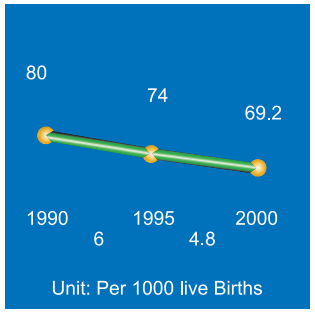
Source: World Development Indicator 2002

Social Indicator - Infant Mortality Rate

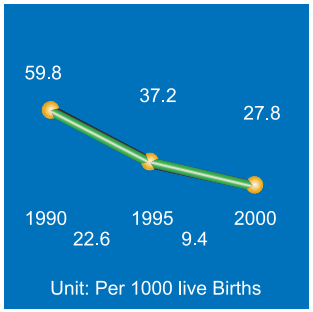
Pakistan



India



Maldives



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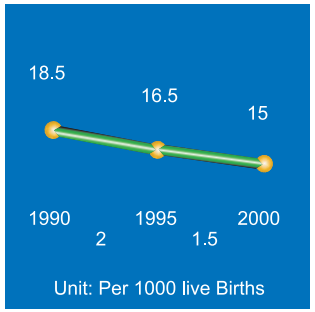

Note: Infant mortality rates in the sub-region remain high. Sri Lanka has the lowest infant mortality rate of 15 per 1000 live births. Maldives has shown significant decrease in infant mortality rates, with the number halved by the end of the decade. The highest infant mortality rate is in Pakistan at 83.3. All countries have shown decrease in infant mortality rates.

Source: World Development Indicator 2002

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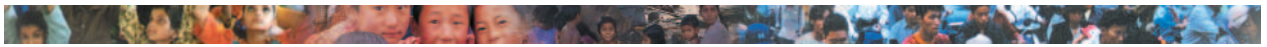
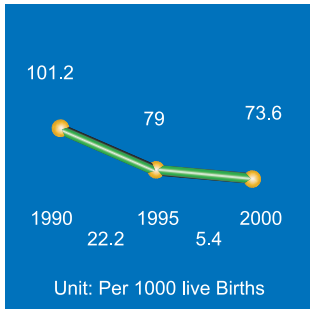
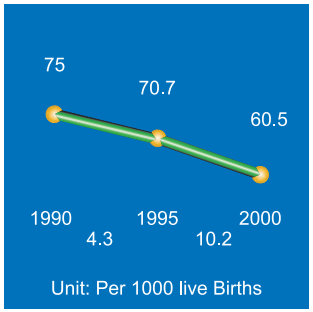


Social Indicator - Infant Mortality Rate

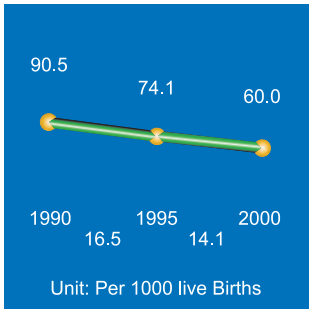
Nepal



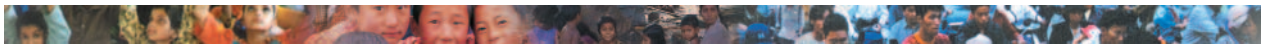
Bhutan



Bangladesh

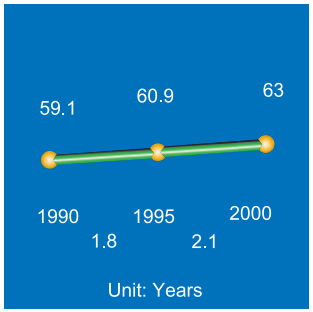


REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

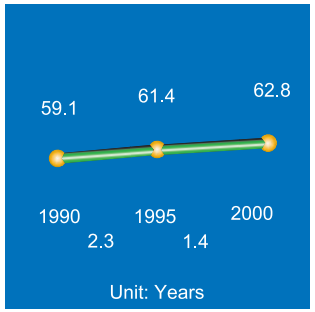


Social Indicator - Life Expectancy at Birth

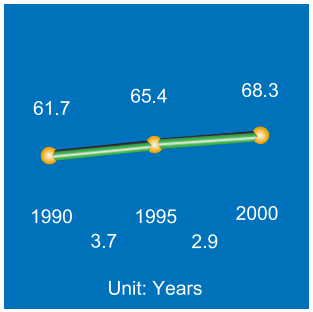
Pakistan



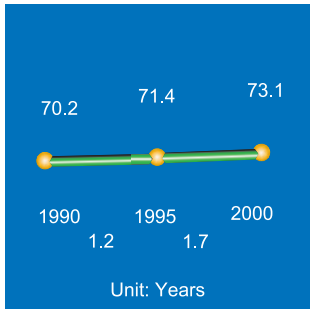
India



Maldives

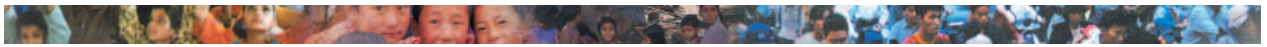


Sri Lanka



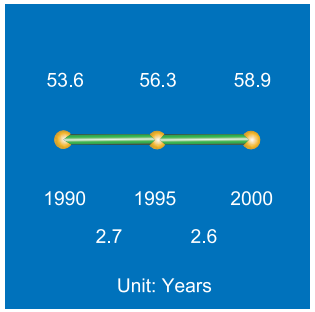
Note: Life expectancy at birth has increased for all the countries of the sub-region. This is an encouraging trend. The highest life expectancy is observed in Sri Lanka - 73.1 years, while the lowest is in Nepal at 58.9 years.

Source: World Development Indicator 2002

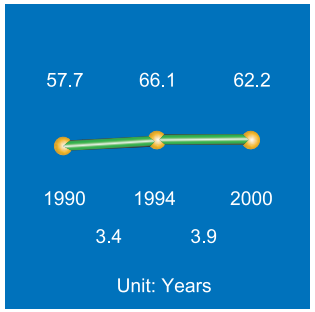


Social Indicator - Life Expectancy at Birth

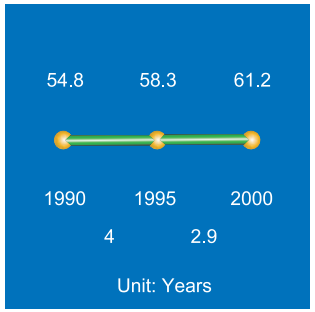
Nepal

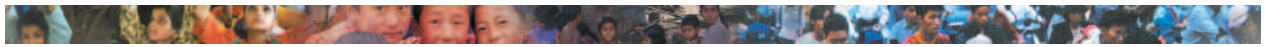


Bhutan



Bangladesh





Economy Indicator

Sustained economic growth is necessary for poverty reduction and social development. Growth rates can be effectively converted into poverty reduction measures. There is strong evidence available in Asia and Pacific, both across the region and within countries of the positive linkages between economic growth and poverty reduction. Economic growth usually has a "trickle-down" effect, with benefits flowing even to the poorest. India, for example, experienced high rates of economic growth in the early 1990s and this lead to decrease in poverty levels. The downside of economic growth is that it may increase inequality and care has to be taken to decrease inequitable distribution effects of economic growth.

South Asia has tremendous potential for economic growth. The high population presents attractive markets for investment and with sound economic policies it is possible for the region to achieve high economic growth, consequently seeing a reduction in poverty.

The highest GDP growth in the region was achieved by Maldives followed by India and Bhutan, while Pakistan had the lowest.

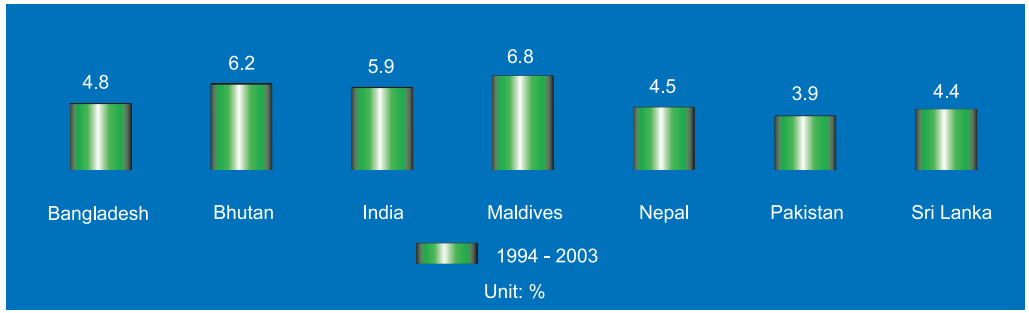
The global economy is expected to grow at 3.1 per cent during the period 2002 –2015. During the same period, the Asian economy is projected to grow at 6 per cent. East Asia and South Asia will be the leading economies in Asia. The South Asian economy has grown at an average of 5.2 per cent during the 1991 –2000 period. South Asia was mostly spared the economic crisis that hit East Asian countries in the late 1990s as South Asian economies were less open to world markets. The poor in these countries have been protected by large subsistence agriculture sectors. With increasing globalisation, protectionist measures in South Asian countries will have to be phased out. As South Asian markets open up, measures needs to be taken that the poor don't bear the worst brunt of globalisation trends.

South Asia is projected to grow at 5.4 per cent in 2002 –2015. This growth rate forecast is favourable for achieving greater strides in poverty reduction.

The Gross National Income (GNI) increased in all South Asian countries over the decade. The highest GNI was reported in India. Maldives showed a significant jump in the GNI per capita, with the number more than tripling over the decade.

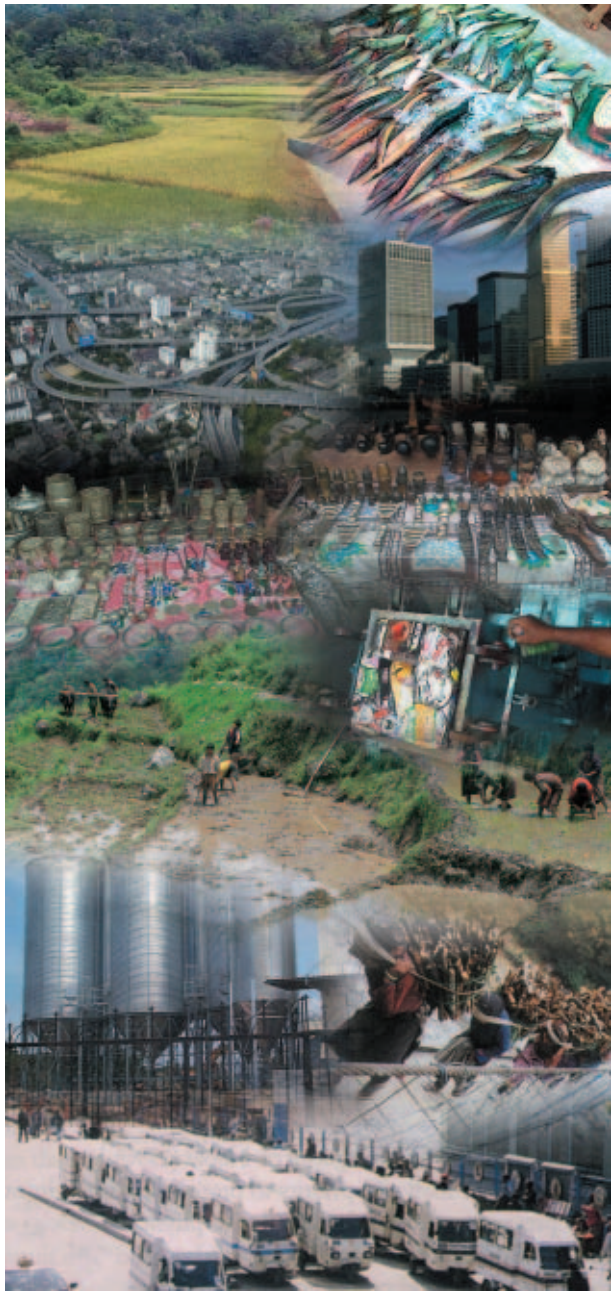
Energy consumption reflects the lifestyle trends of a country. Higher energy consumption is an indicator of the increasing dependence on convenience goods. Economic prosperity is usually accompanied by higher energy demand and consumption. This can be seen in the case of India and Pakistan. Energy consumption was low in the year 1990, but the economic growth that the countries experienced in the following years, increased energy consumption in both the countries. Energy consumption almost tripled for India and more than doubled for Pakistan by 1995. Between 1995 and 1999, the energy consumption remained stable, as economic growth had stabilized by then. Sri Lanka had the highest energy consumption in the sub-region. Nepal, which is a small country with medium-low development, had high energy consumption. The energy consumption figures of Nepal were comparable to India and Pakistan, both of which are bigger and more populous than Nepal.

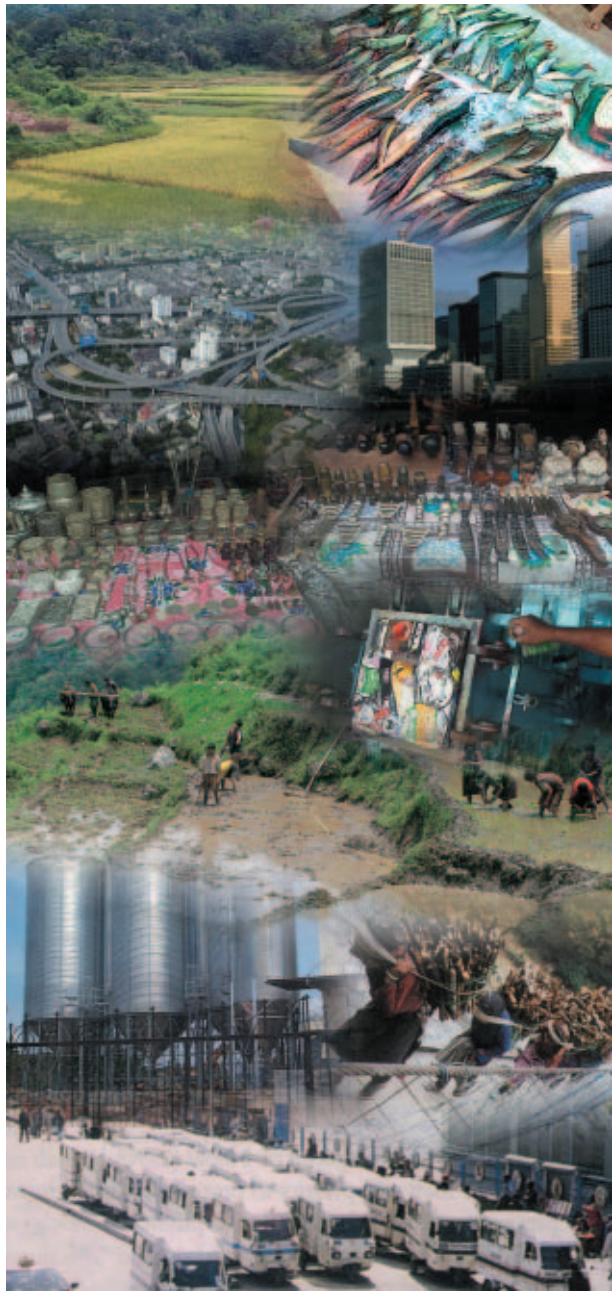
Economy Indicator - Gross Domestic Product Growth



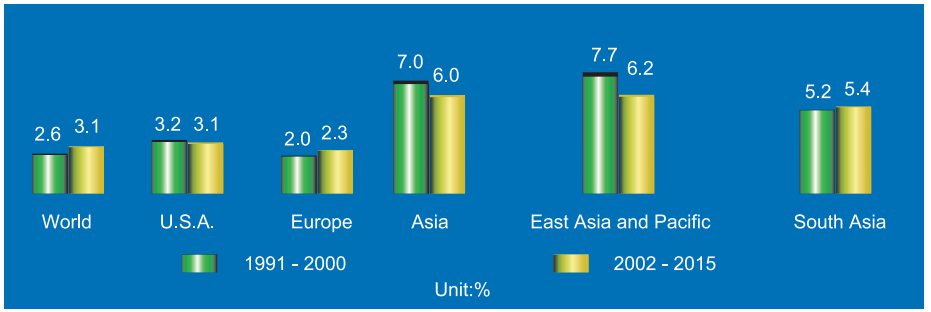
Note: Pakistan has the lowest growth rate in the subregion of 3.9 per cent. Smaller nations such as Maldives and Bhutan had high growth rates. Maldives has the highest at 6.8 per cent. On an average, the sub-region showed modest growth rates. Sustained economic growth is a pre-requisite for poverty reduction.

Source: World Economic Outlook 2003, IMF





Economy Indicator - Gross Domestic Product Growth Forecast

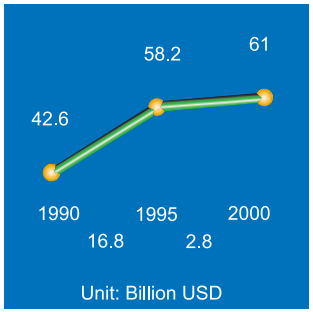


Note: The global economy is expected to grow at 3.1 per cent during 2002 –2015. Asian economy is projected to grow at six per cent during the same period. East Asia and South Asia will take the lead in Asia. South Asian economy has grown at an average of 5.2 per cent during 1991 – 2000 and is projected to grow at 5.4 per cent during 2002 – 2015.

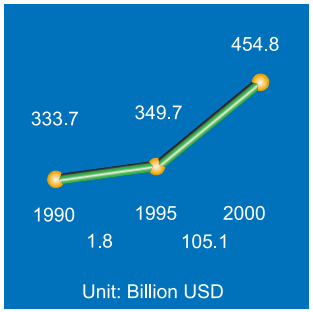
Source: Global Economic Prospects 2003, World Bank

Economy Indicator - Gross National Income

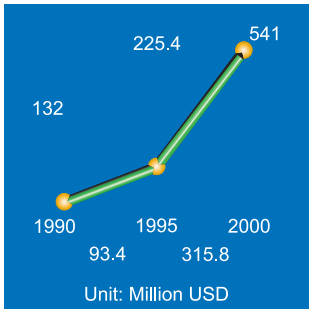
Pakistan



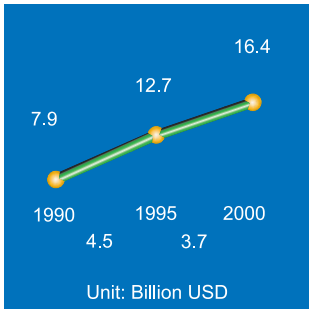
India



Maldives

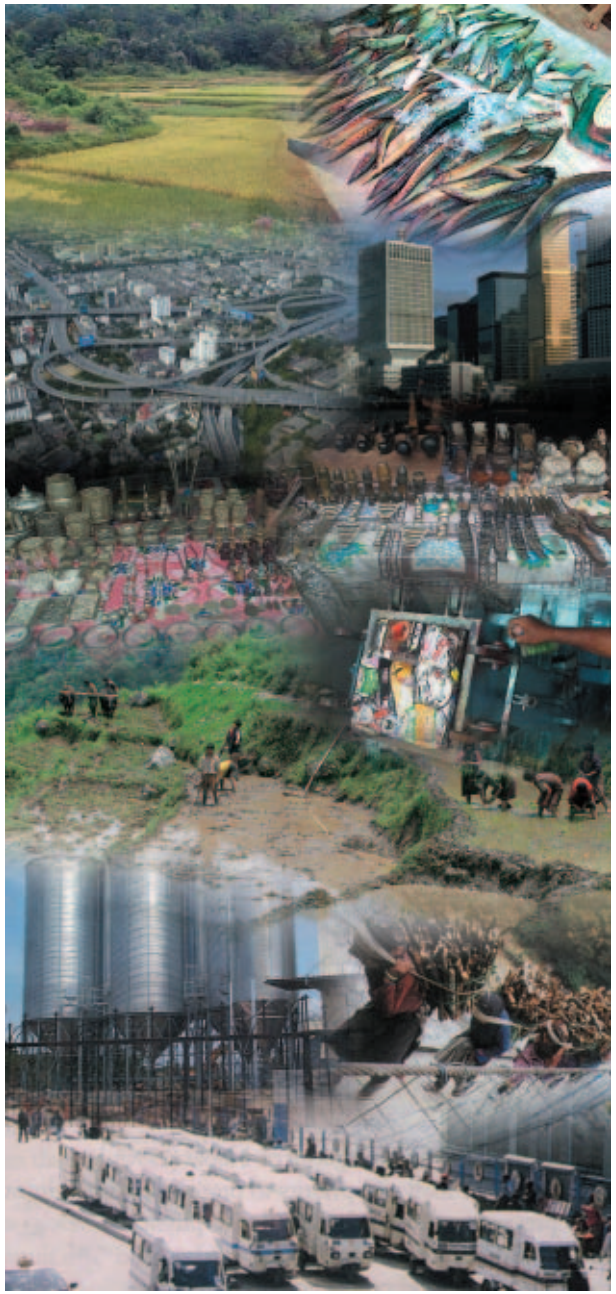


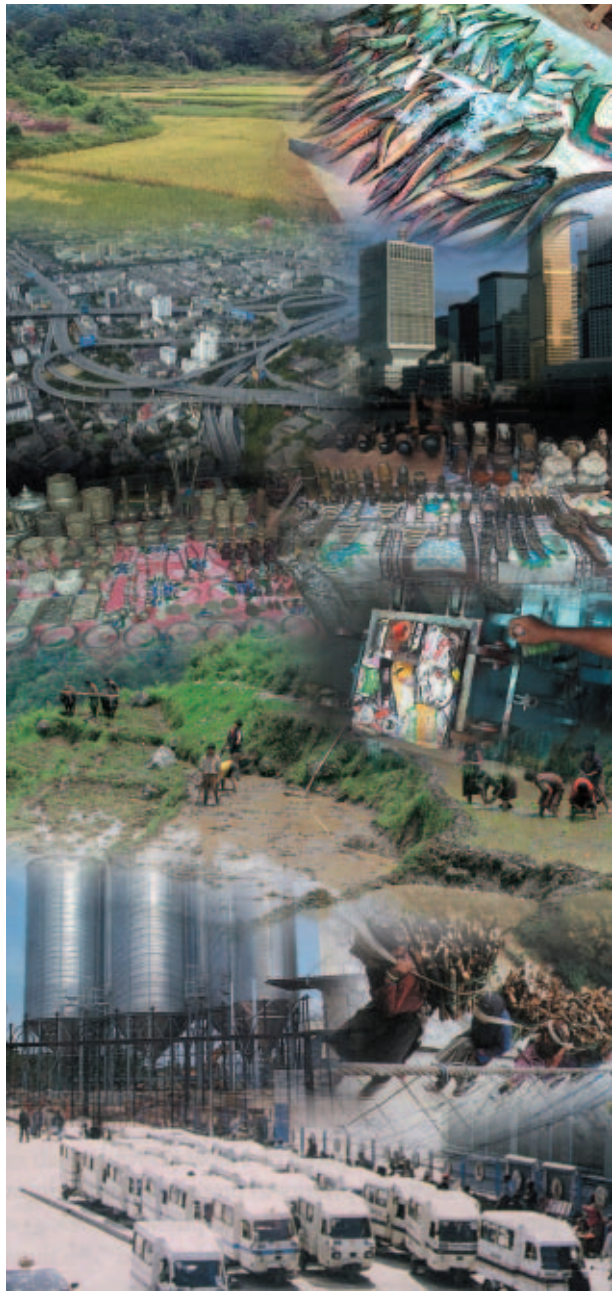
Sri Lanka



Note: The Gross National Income has increased for all countries over the past decade. India had the highest GNI in the sub-region – US$454.8 billion and Nepal had lowest – US$5.6 million.

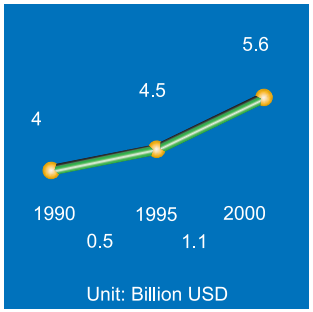
Source: World Development Indicator 2002



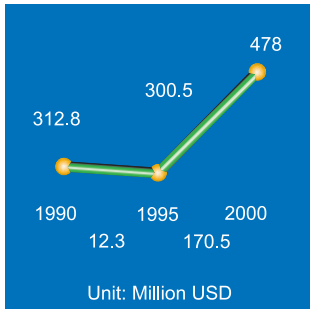


Economy Indicator - Gross National Income

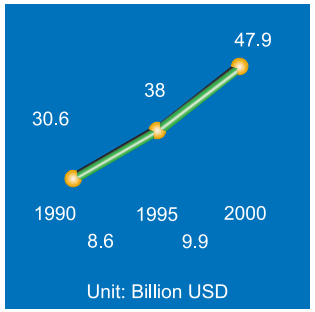
Nepal



Bhutan



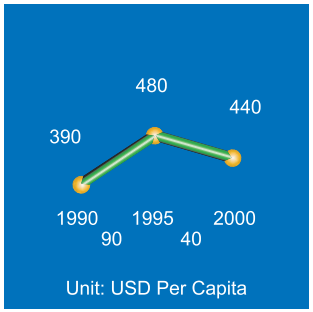
Bangladesh



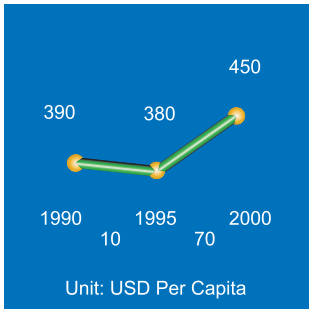
REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

Economy Indicator - Gross National Income Per Capita

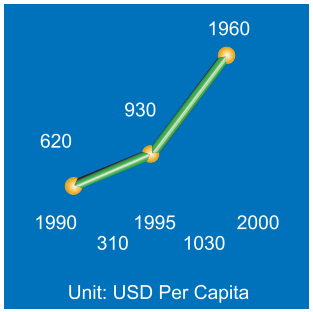
Pakistan



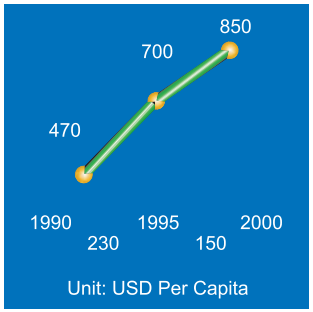
India



Maldives

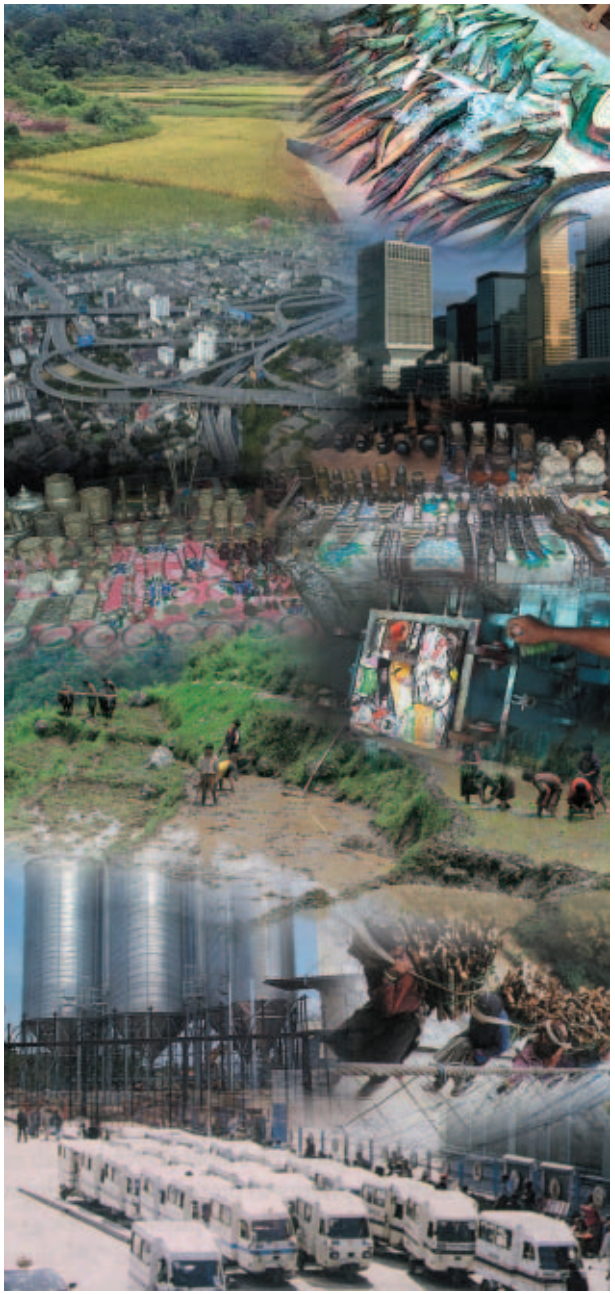


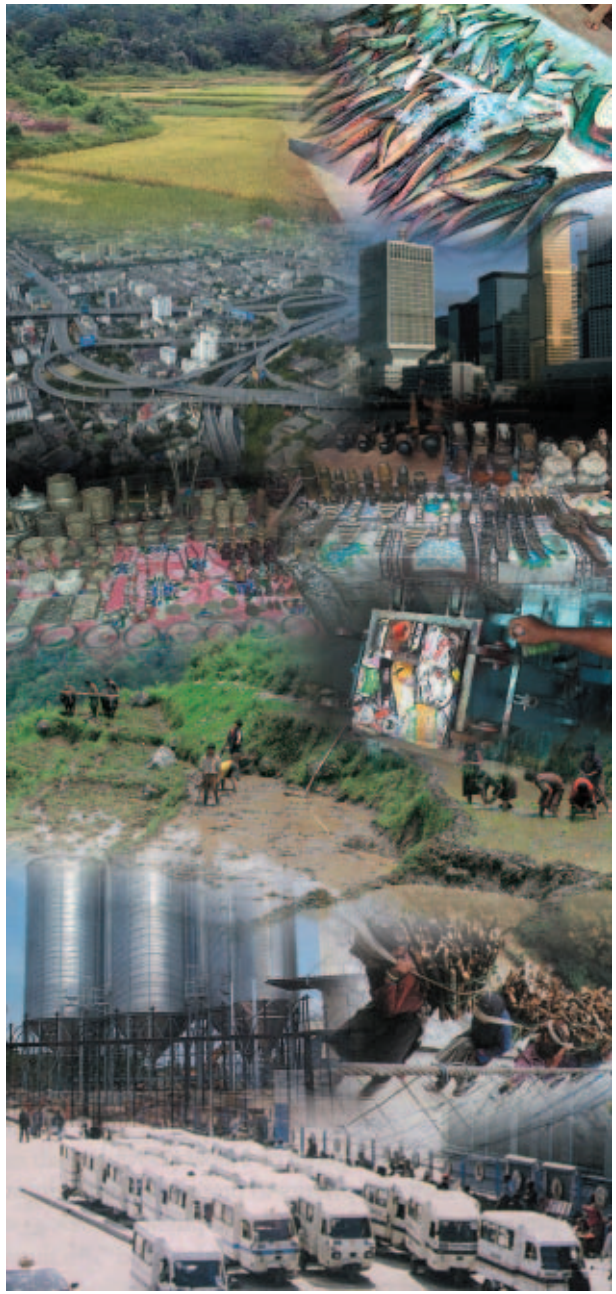
Sri Lanka



Note: GNI per capita has increased in all countries in the past decade. Maldives has the highest increase in GNI per capita, with a quantum leap during 1995 – 2000. Maldives also has the highest GNI per capita at US$1960/capita. This is two to eight times higher than the GNI/capita of the other countries. Nepal is lowest at US$240/capita.

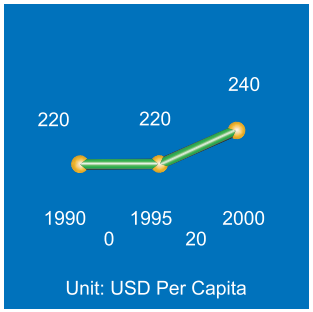
Source: World Development Indicator 2002



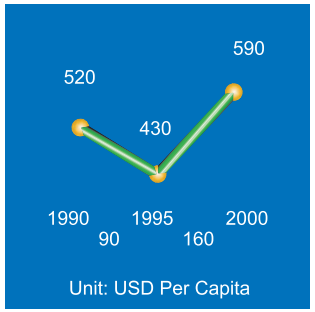


Economy Indicator - Gross National Income Per Capita

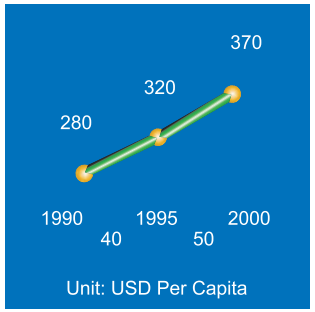
Nepal



Bhutan



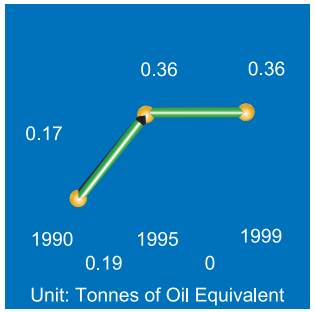
Bangladesh



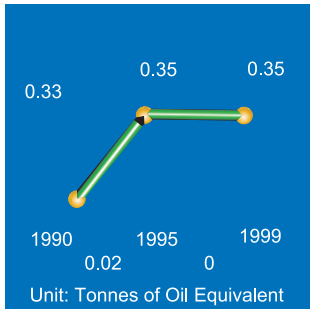
REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

Economy Indicator - Energy consumption Per Capita

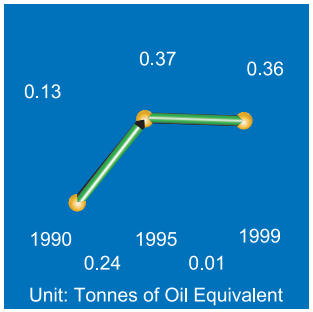
Pakistan



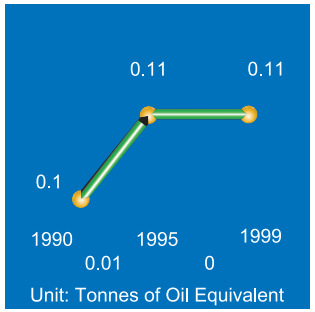
Nepal



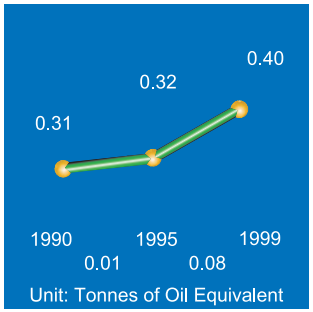
India



Bangladesh

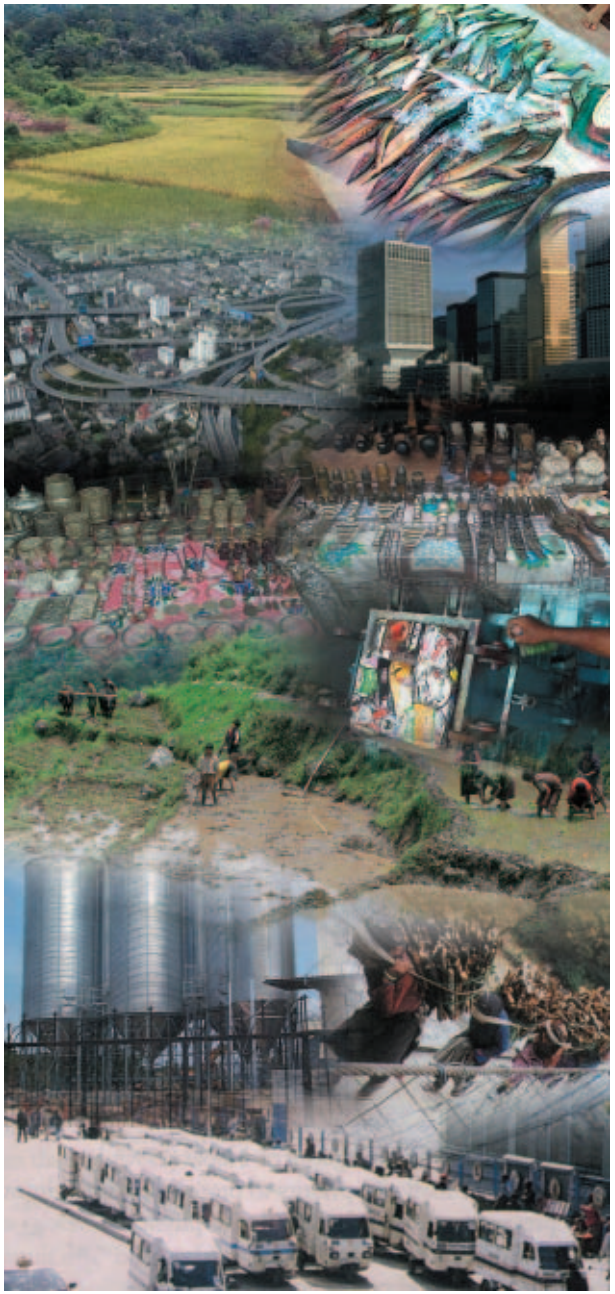


Sri Lanka



Note: The energy consumption per capita has increased in the sub-region. Sri Lanka has the highest consumption - 0.4 tonnes oil equivalent and Bangladesh has the lowest – 0.11. Even though there is a vast difference in the population numbers for India, Maldives, Nepal and Pakistan, the per capita consumption for the countries are nearly the same.

Source: GEO III Grid data UNEP



Land Indicator

South Asian economies are mostly agro-based and hence land is an important resource. South Asia occupies 4.8 per cent of the world's total land area. Out of the five sub-regions of Asia and the Pacific, South Asia has the biggest area under crops. Poorer sections of the population in South Asia depend largely on subsistence agriculture. Land degradation can thus have negative impacts on their lives. Land degradation has been defined as, "the reduction in the capability of the land to produce benefits from a particular land use under a specified form of land management" (FAO, 1999). Degradation processes include erosion, compaction and hard setting, acidification, declining soil organic matter, soil fertility depletion, biological degradation and soil pollution. Land degradation is a major problem in all South Asian countries. Modern methods of agriculture have contributed to land degradation. Practices such as overuse of fertilizer and pesticides, over-irrigation of saline lands and shifting agriculture have lead to land degradation. The highest amount of land degradation has taken place in India. Other countries also have been badly affected. It is estimated that nearly one-third of the land in Sri Lanka is subjected to soil erosion. One-fourth of Pakistan's total land area is subject to serious threats of water and wind erosion. In parts of Northern India and Bangladesh soils have become acidified and salinised. The steep terrains of Nepal are susceptible to soil erosion and landslides. The problem of land degradation needs to be addressed in South Asia.

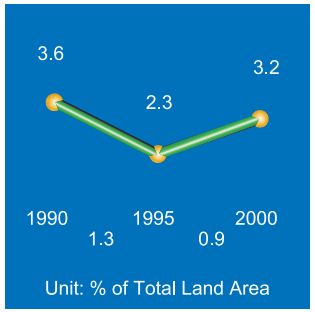
South Asia is home to diverse ecosystems and different kinds of forests ranging from the Himalayas to mangrove habitat. Increasing population, clearing of forests for agriculture and settlement purposes has put pressure on forest cover in South Asia. The forest cover in Maldives and Bhutan has remained constant while it has increased in Bangladesh, India and Pakistan over the decade. This could be because of the strong conservation programmes carried out by the governments of the latter countries. The highest forest cover loss was reported in Nepal. Bhutan is the only country in the region, which has more than 50 per cent of its land under forest cover. Two thirds of Bhutan's land is under forest cover and Bhutan has been making determined efforts to preserve its natural environment. Bhutan has promulgated and implemented strict environment conservation laws. The success of the program can be seen by the high forest cover of the country.

People and forests share a close relationship in South Asia. Indigenous people and sections of rural society depend directly on the forests for livelihood. Destruction of forests affects their income and exacerbates their poverty conditions. Loss of forestland further marginalizes these people.

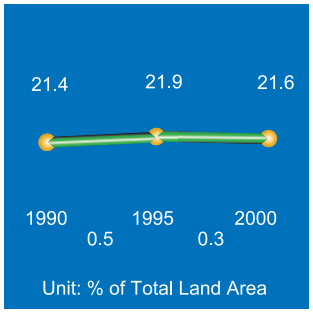
Arable land per capita is decreasing in South Asia, though agriculture is an important sector in the economies of the countries of South Asia. Urbanization, population growth, industrialization have attributed to the decrease in arable land availability. Land degradation also has negatively impacted the quality and quantity of arable land. Reduction in the arable land per capita has a negative effect on food production. This in turn is bad news for food security of the country. Decreasing arable land per capita in South Asia coupled with increasing population can pose a threat to food security of the region. Decreasing arable land also exerts pressure on the existing forests as more forests are cleared to compensate for the loss in arable land.

Land Indicator - Forest Area

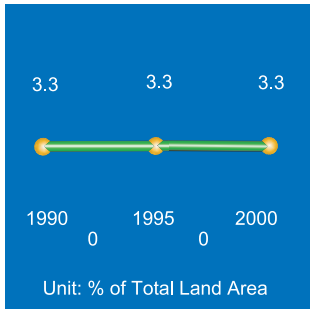
Pakistan



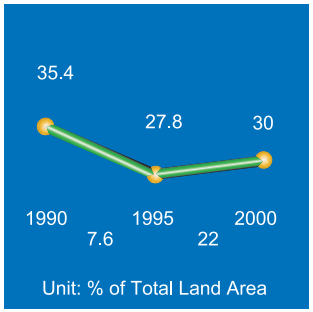
India



Maldives

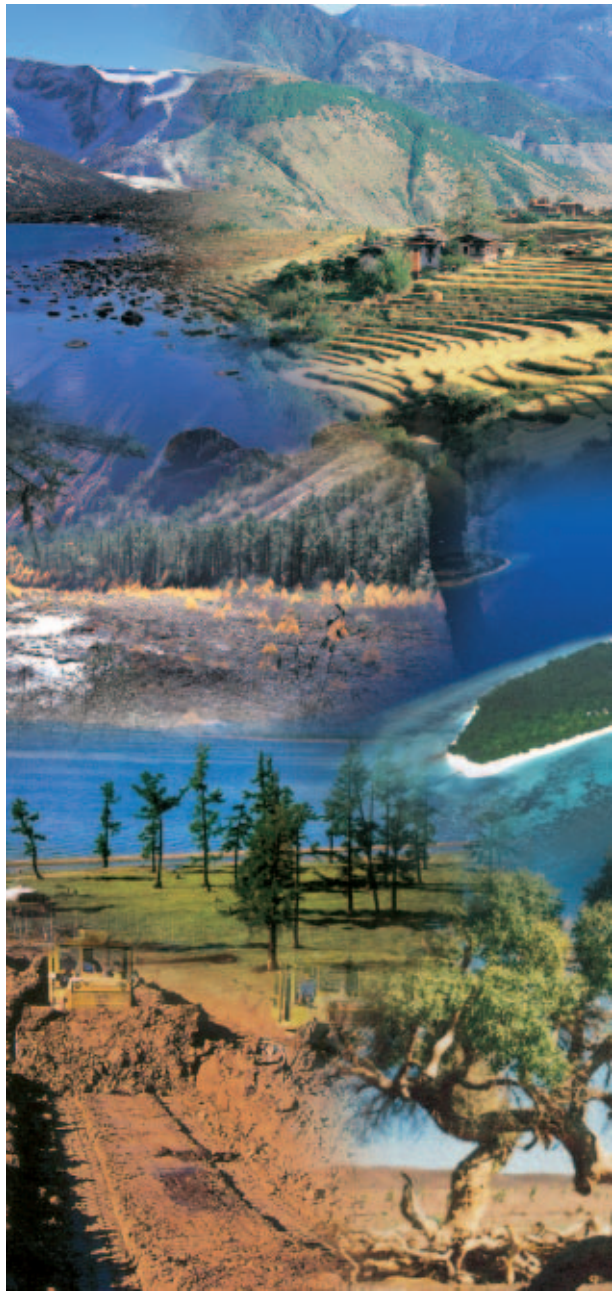


Sri Lanka



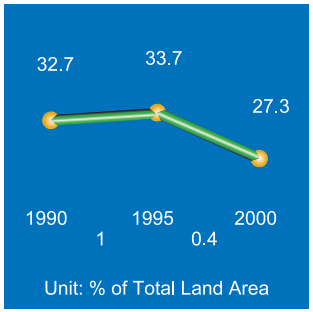
Note: Bhutan has an effective conservation policy, thus it has the highest percentage of forest area. 72.5 per cent of Bhutan is under forest cover. Pakistan has the lowest percentage of forestland at 3.2 per cent. Forest area increased in Bangladesh, India and Pakistan and decreased in Sri Lanka over the past decade.

Source: World Resource Institute 2000

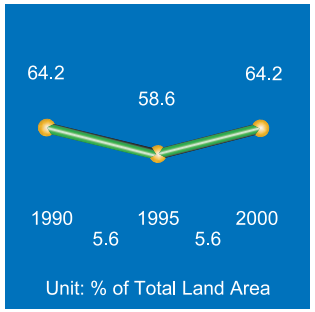


Land Indicator - Forest Area

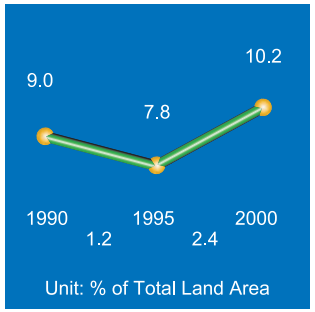
Nepal



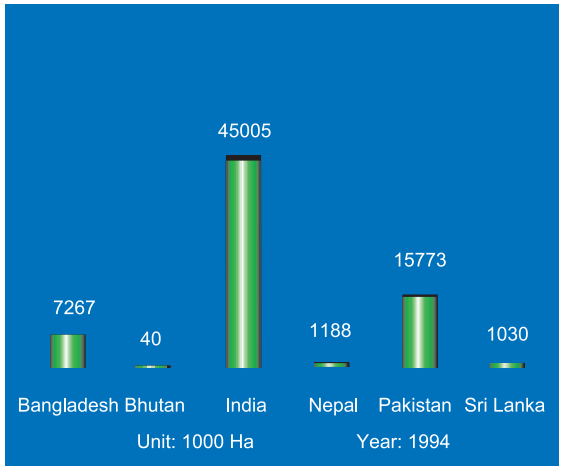
Bhutan

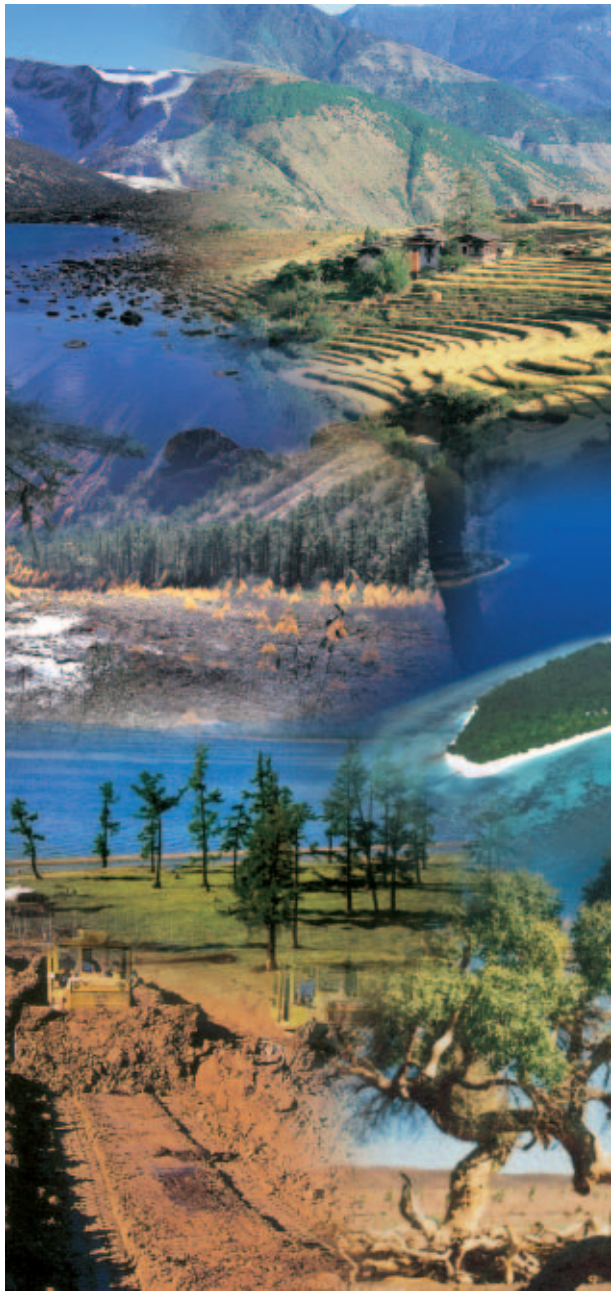


Bangladesh



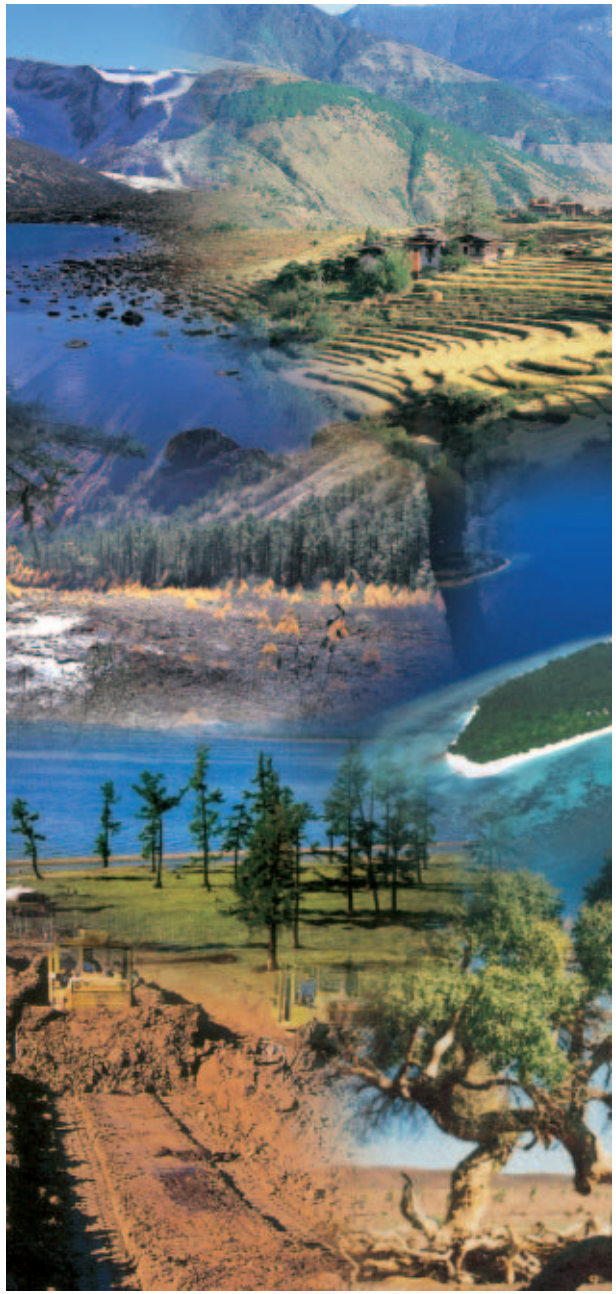
Land Indicator - Land Degradation





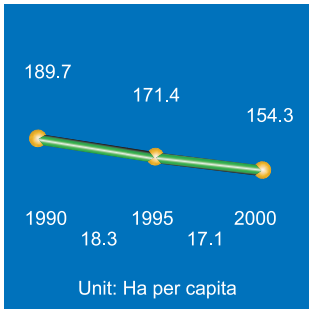
Note: Land degradation is a major problem in all countries. The highest amount of degraded land is reported in India followed by Pakistan. Land degradation has serious implications for food security of the region.

Source: World Resource Institute 2000

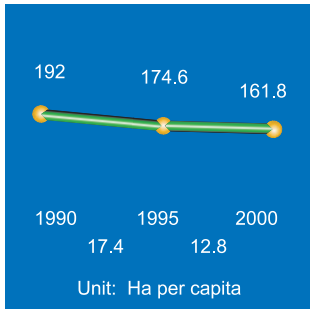


Land Indicator - Arable Land Per Capita

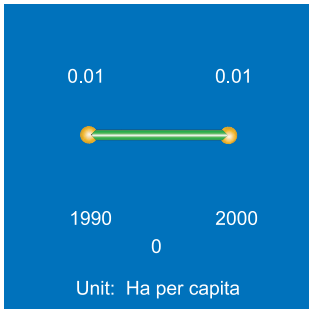
Pakistan



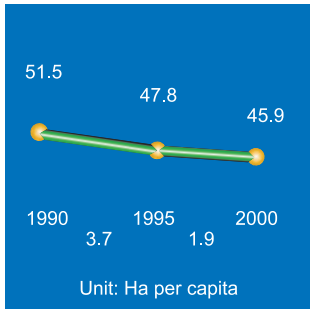
India



Maldives



Sri Lanka

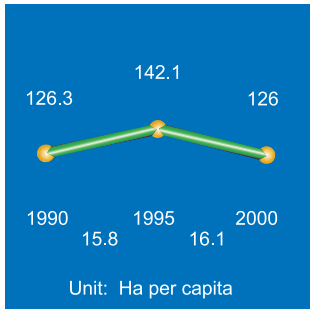


Note: Arable land per capita decreased in South Asia in the last decade. The highest decrease was in Pakistan and India. Agriculture is an important sector in South Asia and decrease in arable land will have an impact on the economy. India had the highest arable land per capita – 161.8 ha/capita; Maldives had the lowest – 0.01 ha/capita.

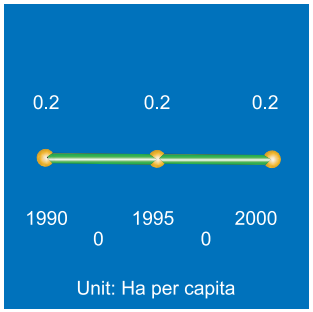
Source: http://apps.fao.org

Land Indicator - Arable Land Per Capita

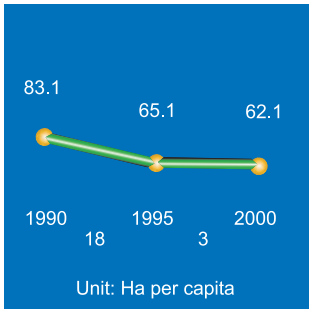
Nepal

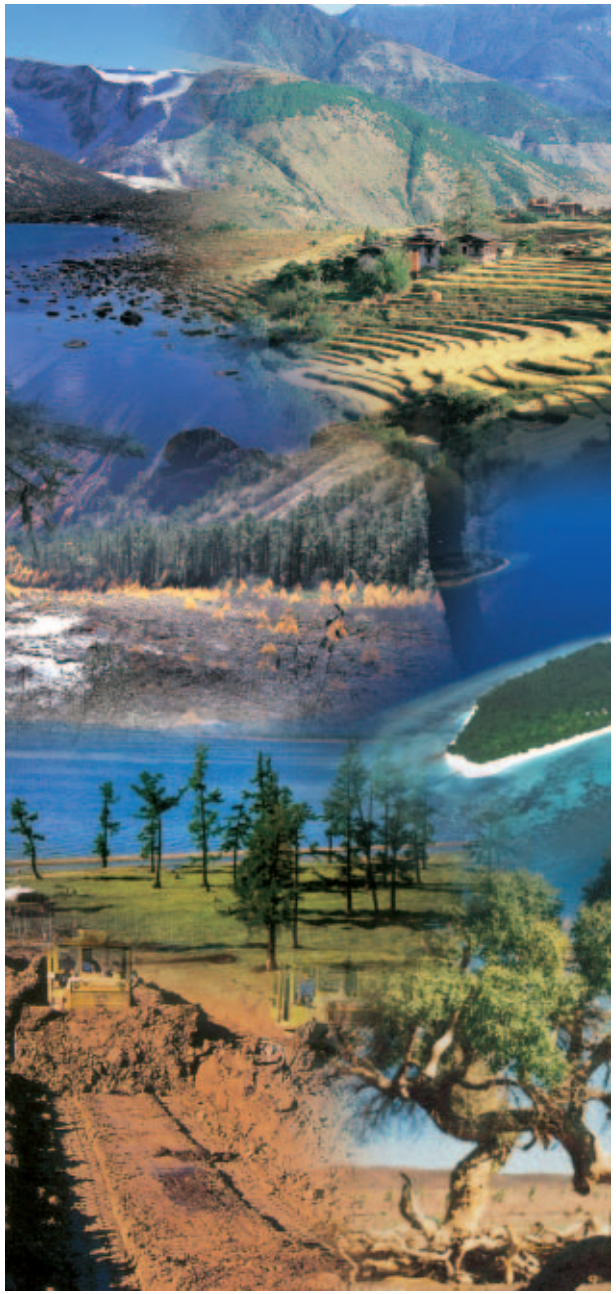


Bhutan

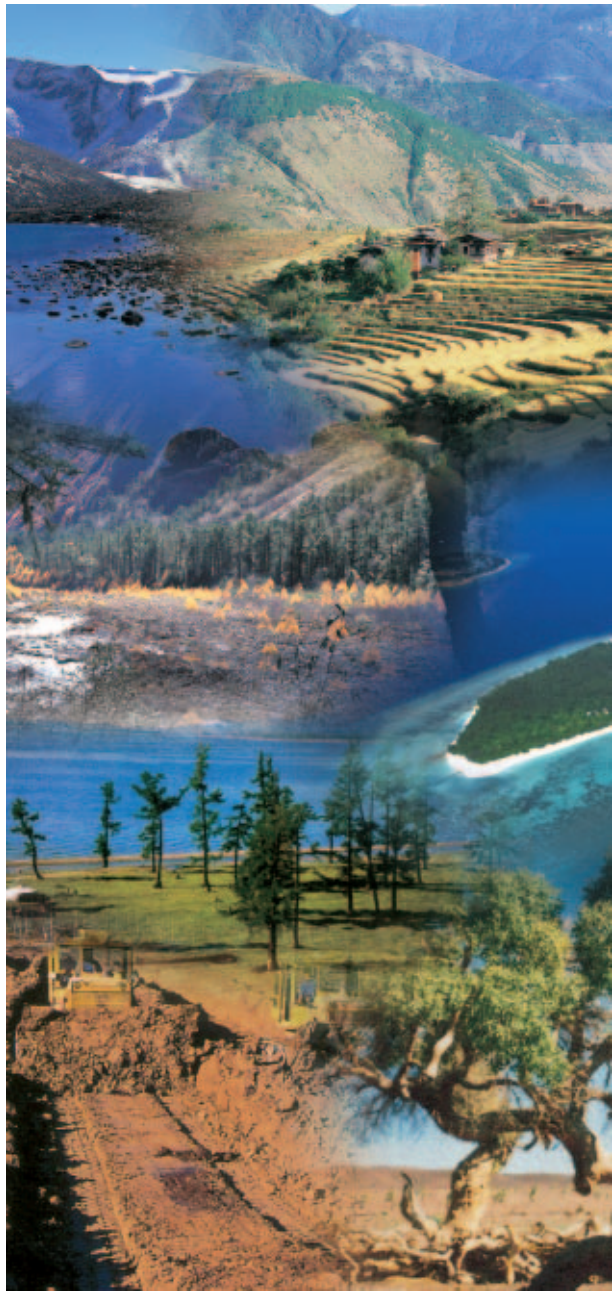


Bangladesh

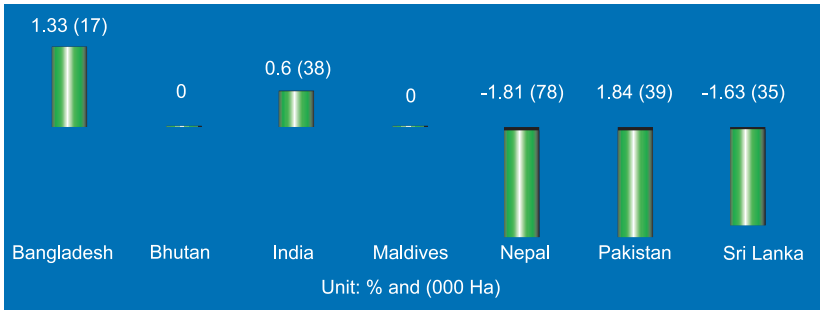




REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC



Land Indicator - Forest Cover Change (1990-2000)



Note: Pakistan had the highest increase in forest cover – 1.84 per cent, followed by Bangladesh. India also showed increase in forest cover. Forest cover decreased in Nepal and Sri Lanka with Nepal having the higher decrease – 1.81 per cent. Forest cover remained constant in Bhutan and Maldives.

Source: ADB 2002

Water Indicator

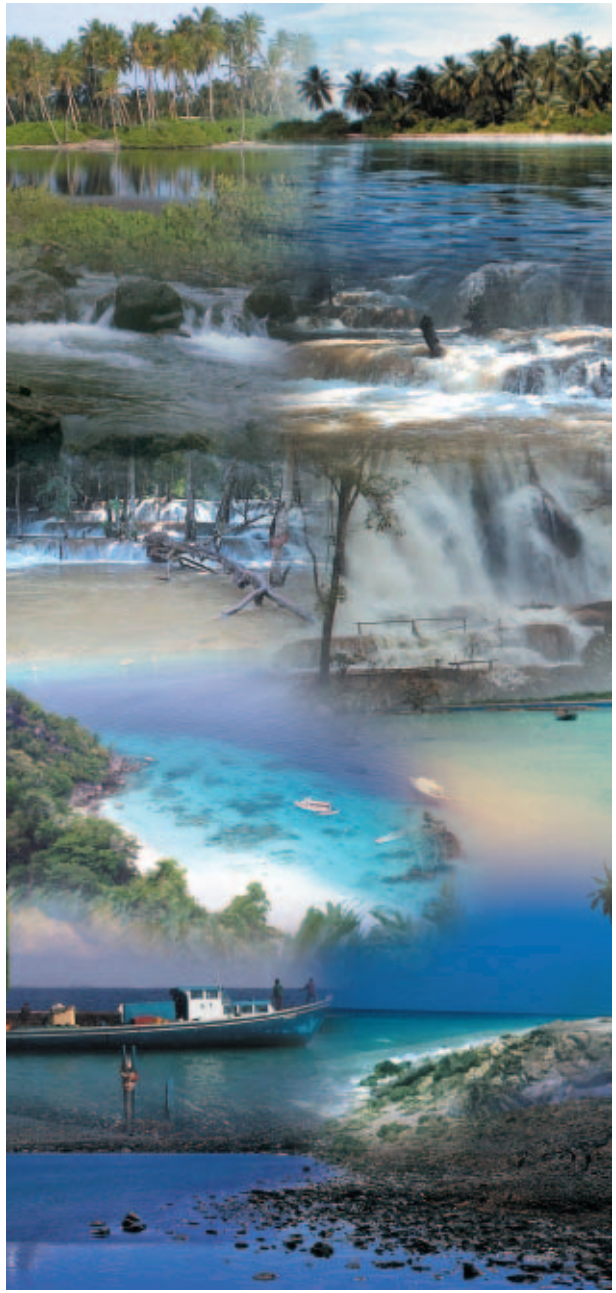
Unclean water poses a health hazard. Outbreaks of waterborne diseases such as diarrhoea, cholera, gastroenteritis can occur because of unsafe drinking water and inadequate sanitation. These outbreaks debilitate the working population, thus seriously affecting the country's economy. The poor, children and elderly are at higher risk from such outbreaks.

Rivers are the main source of drinking water for most of South Asia. Water quality in rivers across South Asia has been consistently deteriorating. Most South Asian cities lack adequate treatment facilities to pre-treat the river water prior to distribution.

Rivers in South Asia are being polluted because of a variety of reasons: urbanisation, industrialisation, agricultural run-off and improper agricultural practices, and excessive withdrawal of water. Many of the towns and cities along the banks of a river dump their sewage waste untreated into the rivers. Similarly, industries dump untreated effluent waste with high chemical/metal/BOD content into rivers. Though laws exist in certain South Asian cities against dumping of waste in rivers, enforcement is a problem. Additionally, in some parts of South Asia, religious and social practices contribute to further pollution of rivers. The BOD levels in all major South Asian rivers exceed the standards with the river Bagmati (Nepal) having the highest levels. Steps need to be taken to address continuing river pollution in South Asia. Stricter enforcement of existing laws should be carried out.

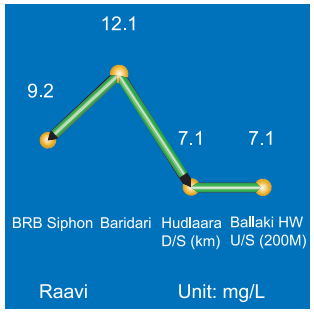
Access to safe drinking water has increased in all South Asian countries in the past decade. Full coverage is reported in Maldives for the year 2000. Access to sanitation remains insufficient in South Asia. In 2000, highest percentage population with access to safe sanitation is reported in Sri Lanka (83 per cent), whereas the lowest is in Nepal (27 per cent). Discrepancy exists between the access to safe drinking water and sanitation in rural and urban areas of South Asia. Rural areas have lesser access to safe drinking water and sanitation. Within cities, slum dwellers have lesser access to safe sanitation and drinking water. This is a hazardous situation, as it can lead to outbreaks of waterborne diseases in the crowded slums. Committed efforts will be needed in order to provide access to safe sanitation to the entire population by all the South Asian countries.

Water availability per capita has decreased in most of the countries in South Asia except in Nepal and Sri Lanka where it has increased in the past decade. Bhutan has the highest per capita water availability. This figure is much higher than the water availability for the rest of the region. Inadequate availability of water per capita can seriously affect the economic and social development of a country. Maldives is water scarce and has a chronic water scarcity, while India is projected to be reaching this limit. Per capita groundwater withdrawal is reported the highest in Pakistan and the lowest is in Bangladesh. Irrigation is by far the highest consumptive use of water in South Asia and groundwater is mostly pumped to supplement irrigation needs. Ill-conceived irrigation schemes have spillover effects on land quality. Water logging and salinity often result from irrigation and can cause land degradation. Pakistan is probably the country most affected by saline water. This has affected crop productivity and consequently the economic progress of the country. There is an expressed need to reverse the negative trends in water availability and quality through proper management and conservation of water resources.

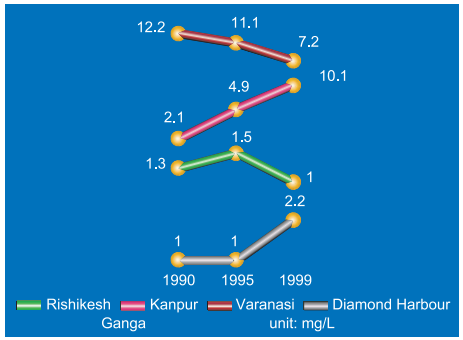


Water Indicator - BOD level in Major Rivers

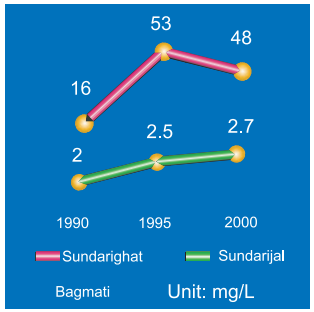
Pakistan



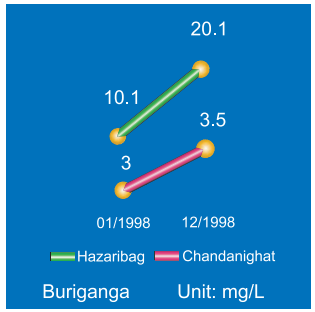
India



Nepal



Bangladesh

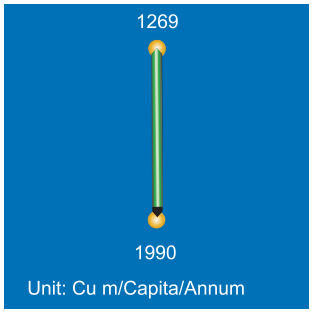


Note: Water quality of many rivers in the subregion is decreasing. Available data is not sufficient to make proper assessment and analysis of water quality in the subregion. Emphasis should be given to data generation, reporting and analysis.

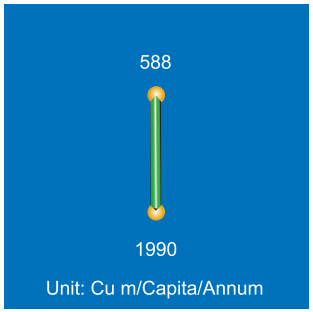
Source: CPCB, India, 2000 (India), State of Environment Reports UNEP RRCAP (Bangladesh, Nepal) and JICA 2000 (Pakistan)

Water Indicator - Annual water Withdrawal

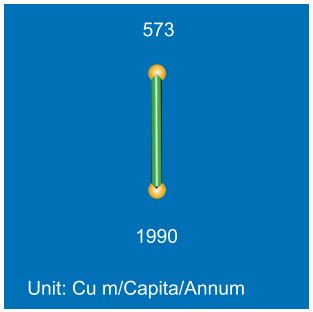
Pakistan



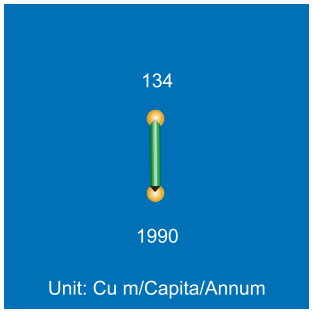
India



Sri Lanka

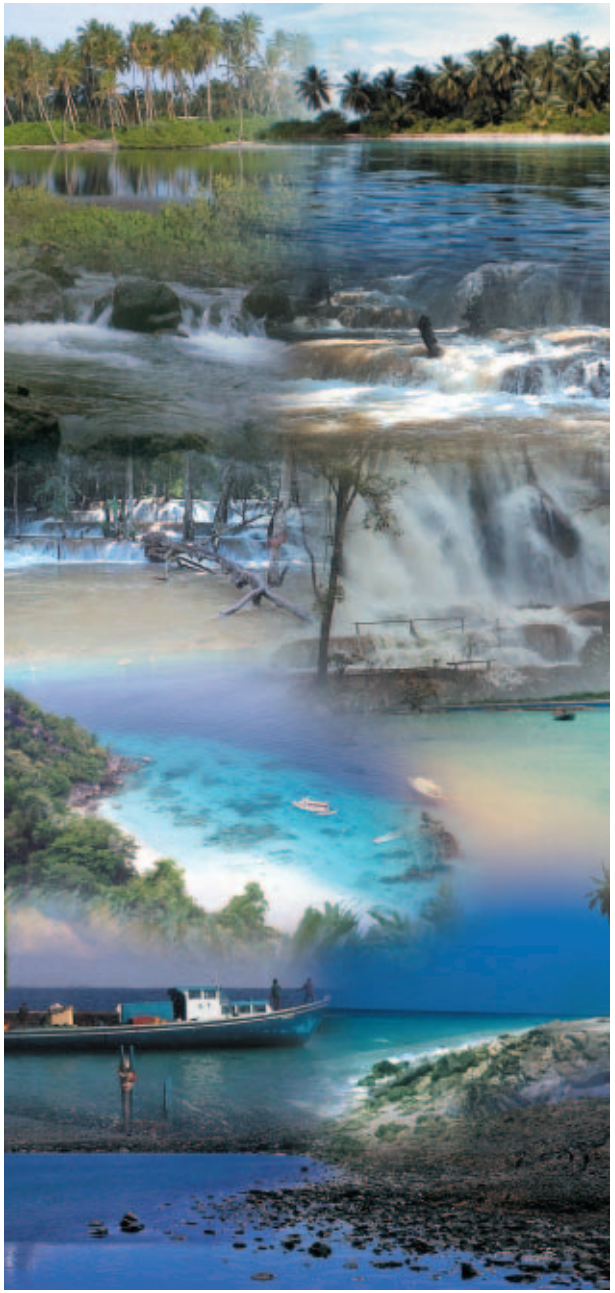


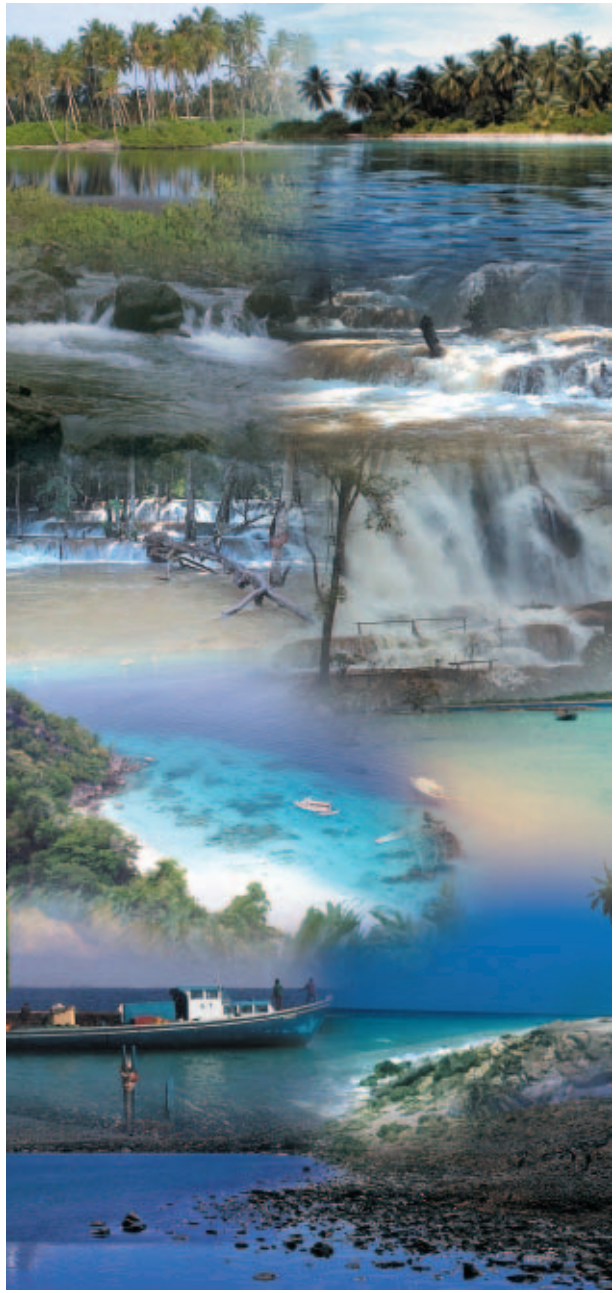
Bangladesh



Note: From the available data, it is seen that Pakistan has the highest per capita water withdrawal at 1269 cu.m/capita/annum. India and Sri Lanka have half of that. Bangladesh has the least at 134 cu.m/capita/annum. The data is limited to make proper assessment.

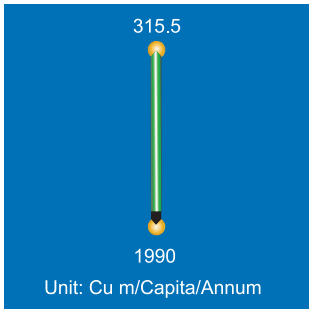
Source: World Resource Institute 2000



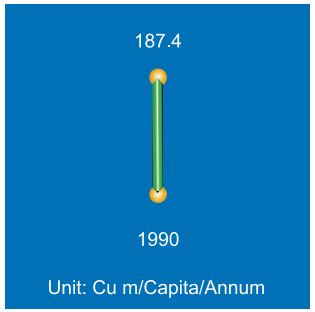


Water Indicator - Annual Groundwater Withdrawal

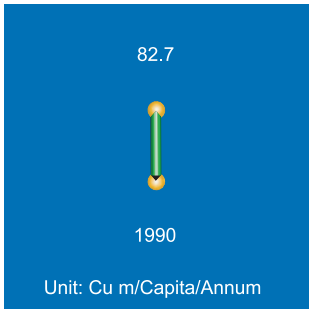
Pakistan



India



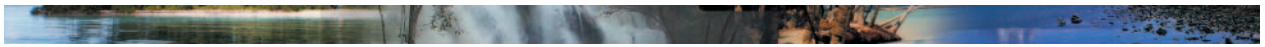
Bangladesh



Note: From the available data, it is seen that per capita groundwater withdrawal is highest in Pakistan at 315.5 cu.m/capita/annum. Bangladesh has the least groundwater withdrawal at 82.7 cu.m/capita/annum. The data is limited to make proper assessment.

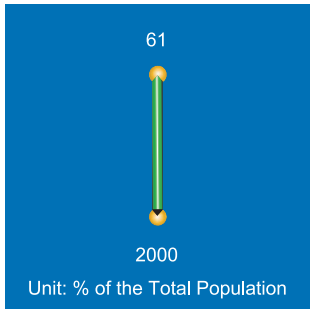
Source: World Resource Institute 2000

REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

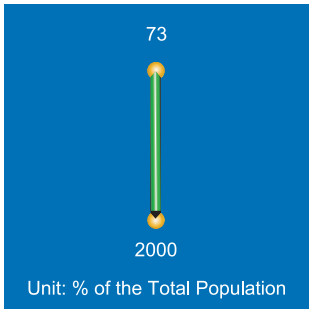


Water Indicator - Population with Access to Sanitation

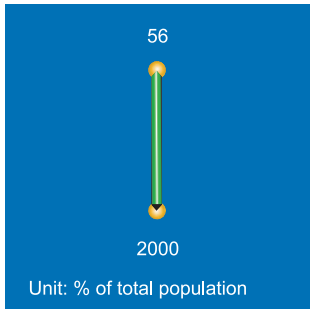
Pakistan



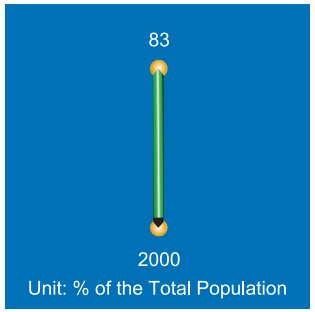
India



Maldives

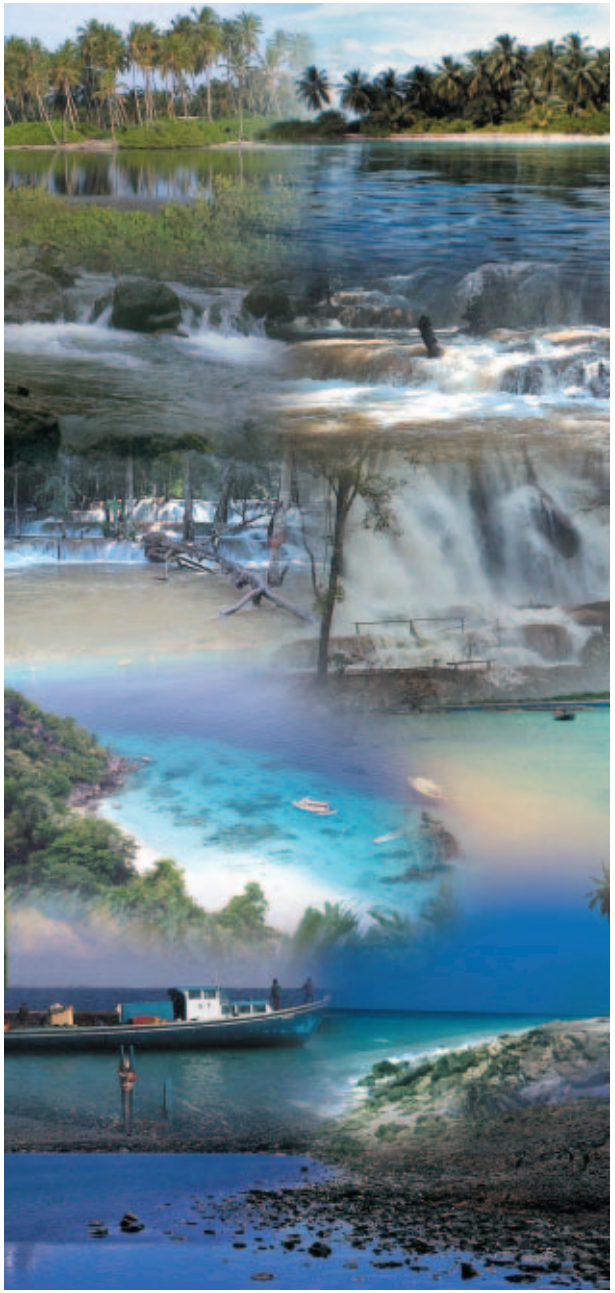


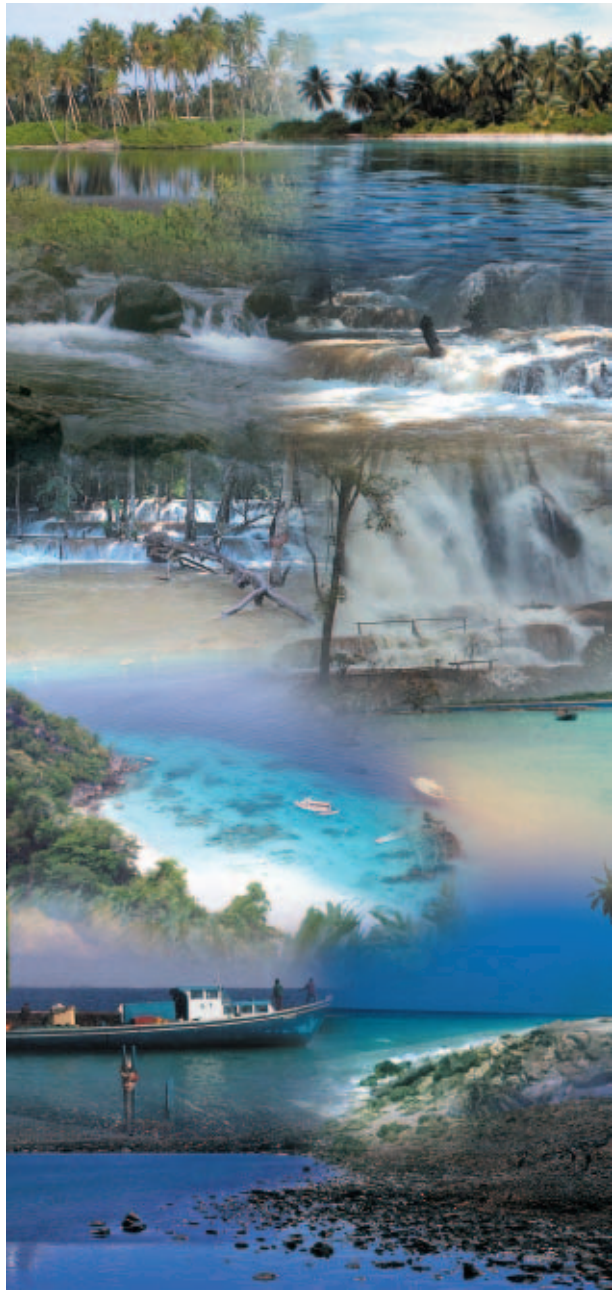
Sri Lanka



Note: Maldives, despite having high development indicators has low coverage of safe sanitation – only 56 per cent of the population. Sri Lanka has the highest percentage of population with access to safe sanitation – 83 per cent. Nepal has the lowest figure with only 27 per cent of the population having access to safe sanitation.

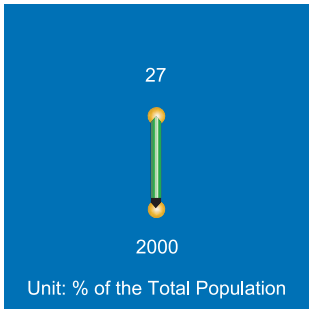
Source: World Health Organization and UNICEFUNDP Human Development Report 2002



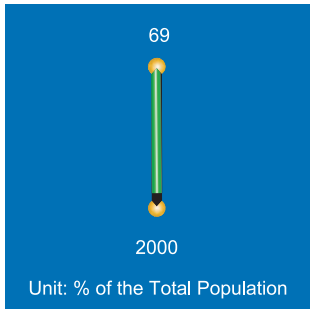


Water Indicator - Population with Access to Sanitation

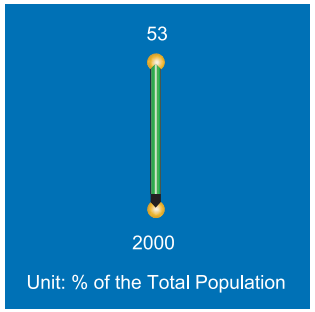
Nepal

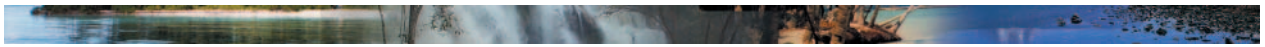


Bhutan



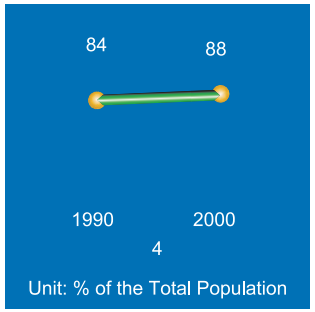
Bangladesh



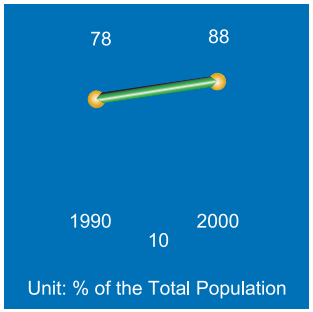


Water Indicator - Population with Safe Drinking Water

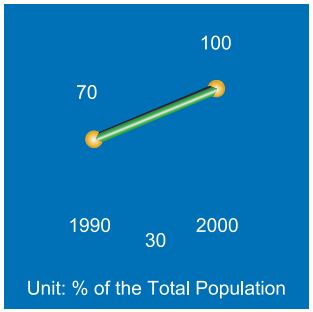
Pakistan



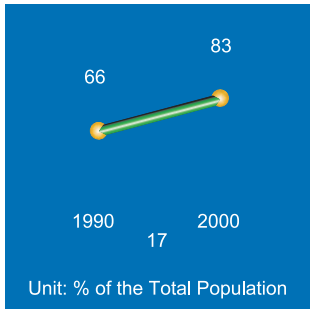
India



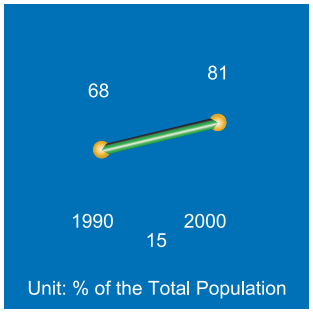
Maldives



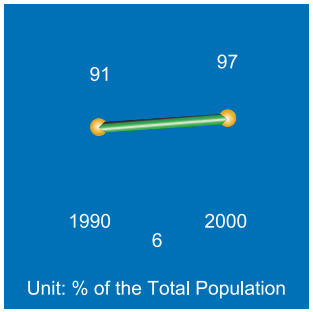
Sri Lanka



Nepal

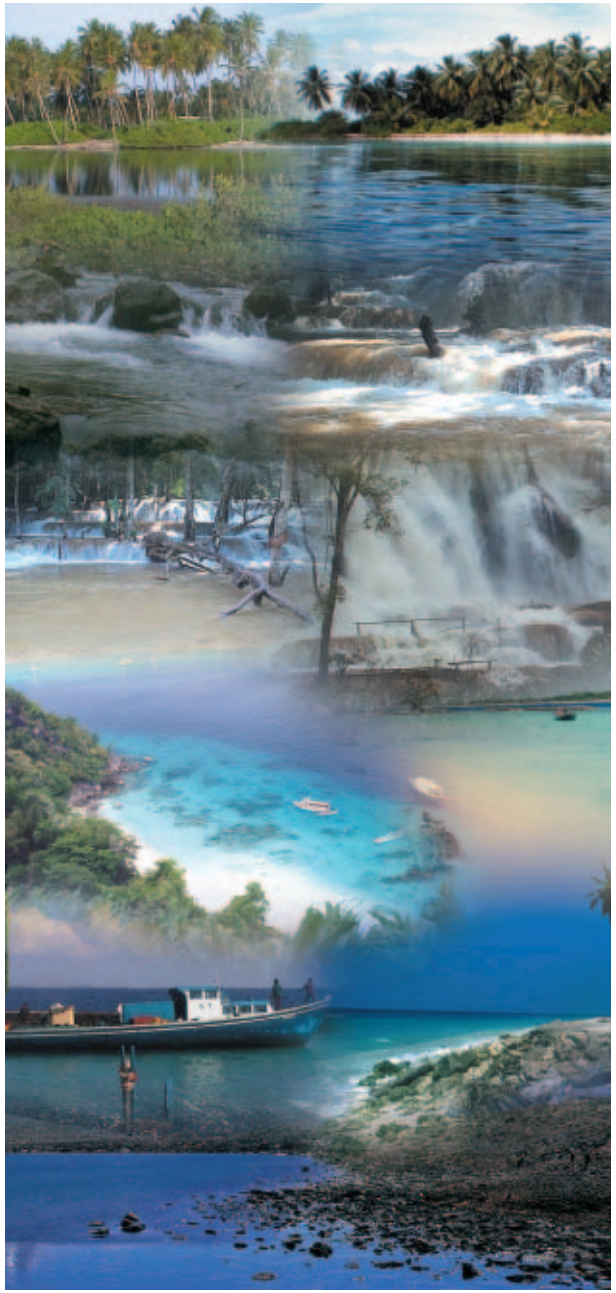


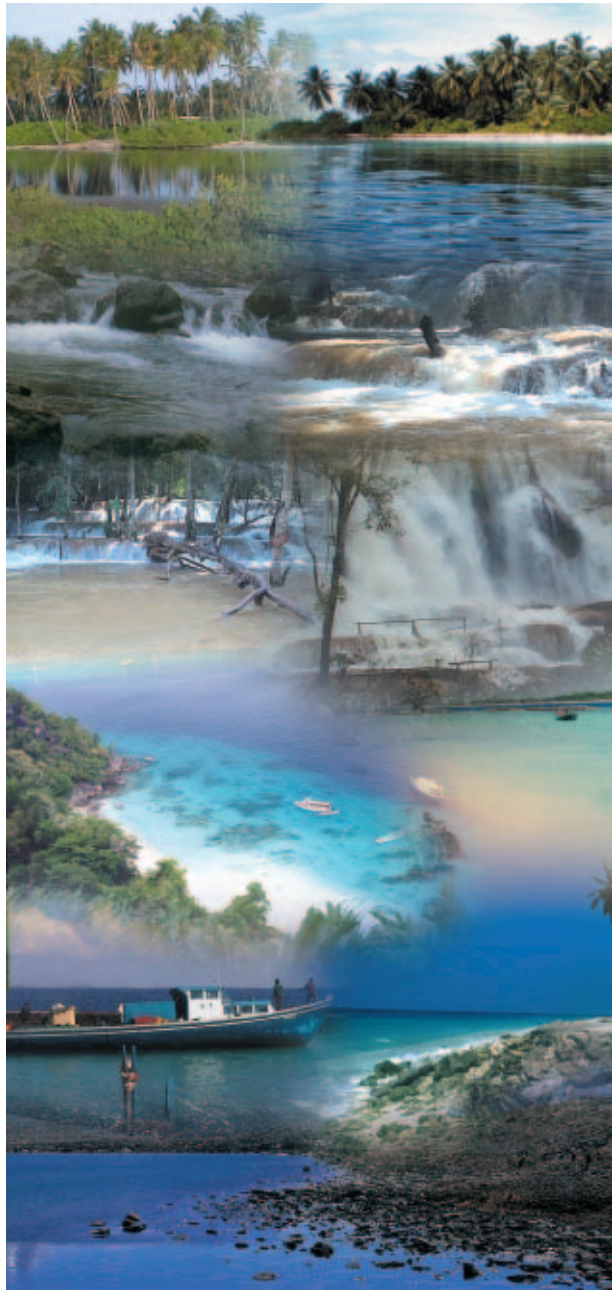
Bangladesh



Note: In contrast to sanitation coverage, Maldives has the highest coverage of safe drinking water – 100 per cent. Access to safe water has increased in all countries of the sub-region in the last decade. Maldives has shown the highest increase. The least percentage of population with access to safe drinking water is Nepal at 81 per cent.

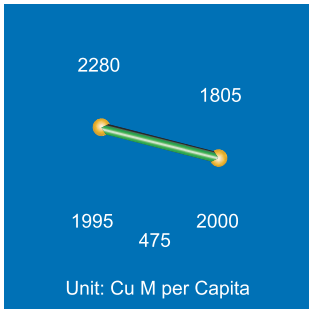
Source: World Development Indicator 2002



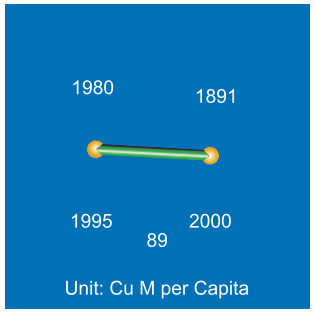


Water Indicator - Annual Water Availability

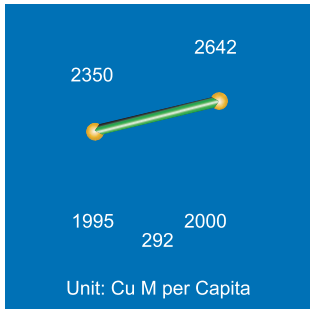
Pakistan



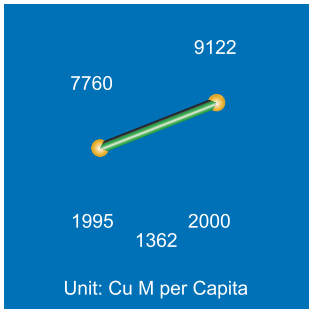
India



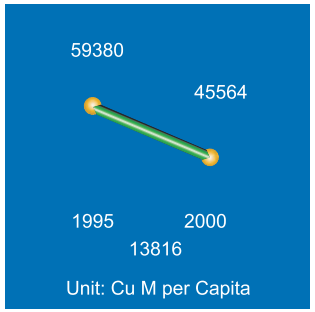
Sri Lanka



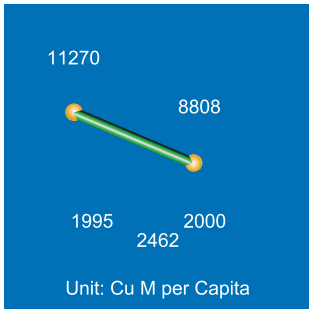
Nepal



Bhutan



Bangladesh



Note: Per capita water availability has decreased in all countries of South Asia except Sri Lanka and Nepal, signaling potential water-stress. The decrease has been the most in Bhutan. Despite the significant decrease, per capita water availability remains the highest in Bhutan – 45564 cu.m/capita. The lowest is Pakistan – 1805 cu.m/capita.

Source: http://www.adb.org

Air Indicator

Air quality in all the capitals in South Asia has deteriorated in the past decade. This can be attributed to rapid urbanization coupled with expansion in transportation, industrialization, poor fuel quality and low motor vehicle engine efficiency. The number of two wheeler and four-wheeler vehicles on the roads has increased in South Asia. There has not been a concomitant increase in infrastructure. Thus traffic congestion is the norm in most South Asian cities. Also, the design of engines is not the latest technology, thus is more polluting. The fuel quality available in the markets is poor with diesel being a popular fuel in most of South Asia. Countries in the region are making an effort to promote and provide unleaded and better quality petrol.

SPM concentrations in most South Asian capitals exceed the permissible safe standards significantly. High SPM levels lead to respiratory diseases. The old and the weak sections of society are particularly vulnerable to the ill-health effects of high SPM concentrations. High SPM concentrations also lead to poor visibility. New Delhi has experienced problem of smog during winter. Growth in vehicular traffic in Kathmandu has increased the particulate matter concentration in the ambient air.

NOx concentrations are increasing in most of the capitals, though the current levels are within WHO standards. The SO2 concentrations in the capital cities are also well within the WHO limit. Oxides of sulfur and nitrogen contribute to local as well as regional air pollution leading to transboundary air pollution problems. The data for SO2 and NOx concentrations were inadequate; hence it was not possible to make proper assessment. More emphasis needs to be given on data generation and reporting. Lack of proper data is an important limitation in analyzing and planning pollution control measures.

In South Asia, New Delhi has demonstrated an example of improving its air quality by converting its entire fleet of public transport buses to Compressed Natural Gas (CNG). CNG is the cleanest fuel and using CNG has helped reduce pollution levels in New Delhi.

CO2 emissions per capita have increased in all the countries of South Asia. This can be attributed to increasing demands of energy and combustion of fossil fuels especially by thermal power plants. Power generation in the sub-region is largely dependent on coal. Fly ash from these power plants increases particulate matter in the air.

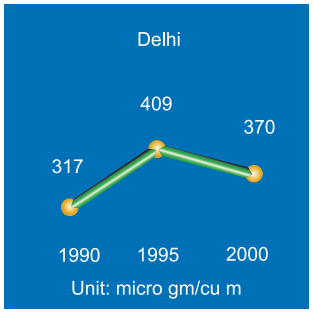
In addition to serious health problems, atmospheric pollutants such as NOx and SO2 also lead to acid rain, which has adverse ecological consequences.

Industrial emissions also contribute to air pollution. Industries in South Asia have traditionally paid scant attention to pollution control. Thus wastes are almost completely emitted to the atmosphere.

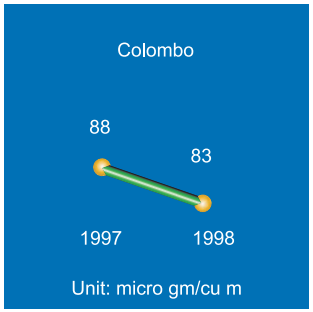
An integrated air quality plan that encompasses various factors such as proper fuel policy, transport policy and traffic management needs to be put in place in South Asian countries to effectively address the problem of deteriorating air quality. Also, stringent checks need to be enforced on industrial pollution. Air quality standards should be strictly adhered to and pollution control devices should be used.

Air Indicator - SPM Concentration in Capitals

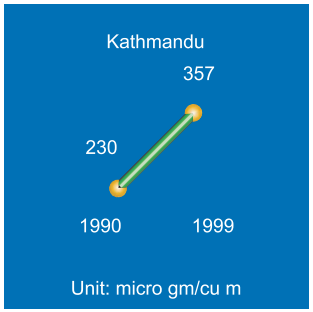
India



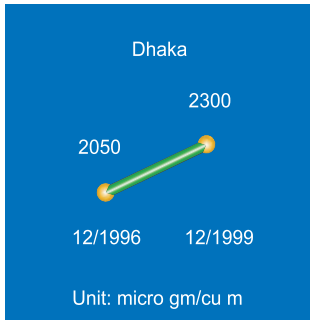
Sri Lanka



Nepal



Bangladesh

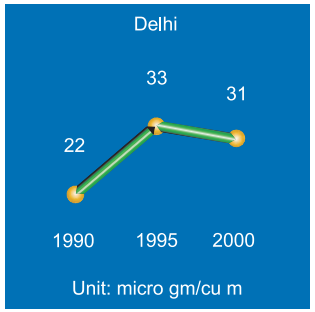


Note: SPM concentrations in most South Asian capitals exceed the WHO standards. Dhaka has the highest SPM concentration – 2300 µg/cu.m and Colombo has the lowest – 83 µg/cu.m. Vehicular emissions are the leading source of SPM concentrations. High SPM concentrations can cause respiratory diseases in the population.

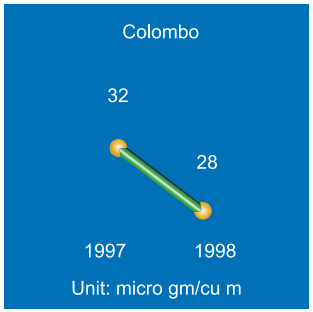
Source: CPCB, India, 2000 (India), State of Environment Reports UNEP RRCAP (Bangladesh, Nepal) and JICA 2000 (Pakistan)

Air Indicator - No_2 Concentration in Capitals

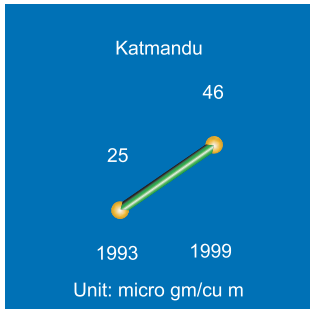
India



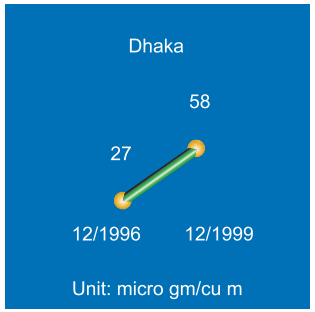
Sri Lanka



Nepal



Bangladesh

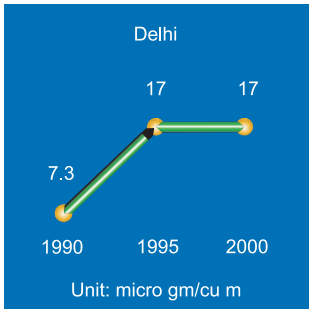


Note: NO_2 concentration decreased in Colombo in the last decade, but has been on the rise in other South Asian capitals. Available data is not sufficient to make a proper assessment of NO_2 trends in South Asia. Emphasis should be given to data generation, collection and analysis.

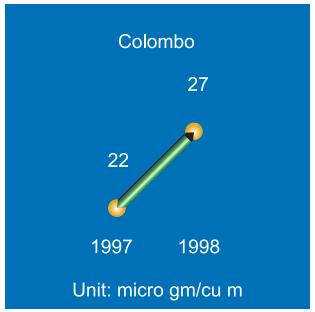
Source: CPCB, India, 2000 (India), State of Environment Reports UNEP RRCAP (Bangladesh, Nepal) and JICA 2000 (Pakistan)

Air Indicator - SO_2 Concentration in Capitals

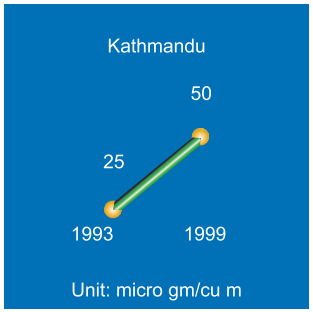
India



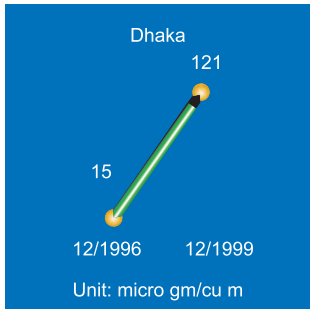
Sri Lanka



Nepal



Bangladesh

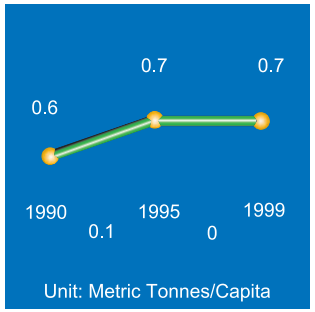


Note: SO_2 concentrations have increased in all South Asian capitals. Available data is not sufficient to make a proper assessment of SO_2 trends in South Asia. Emphasis should be given to data generation, collection and analysis.

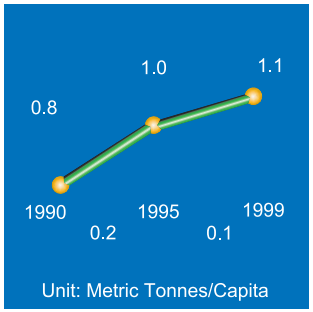
Source: CPCB, India, 2000 (India), State of Environment Reports UNEP RRCAP (Bangladesh, Nepal) and JICA 2000 (Pakistan)

Air Indicator - Carbon Dioxide Emission Per Capita

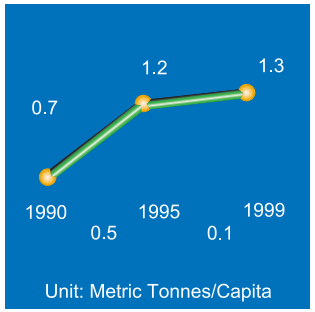
Pakistan



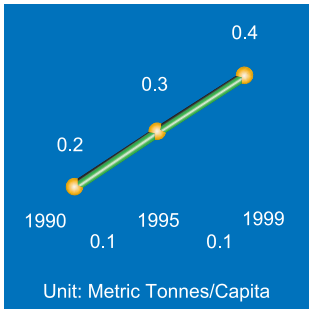
India



Maldives



Sri Lanka

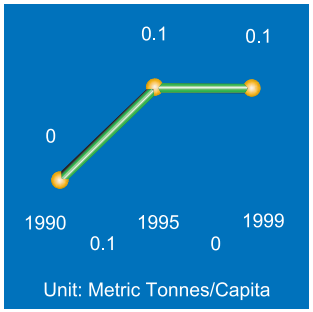


Note: Maldives, despite its smaller population, has the highest per capita emissions in the region – 1.3 metric tonnes/capita. This can be attributed to development patterns such as consumerist lifestyles. Carbon dioxide emissions have increased in South Asia during the 1990s. The lowest per capita emission is in Nepal - 0.1 metric tonnes/capita.

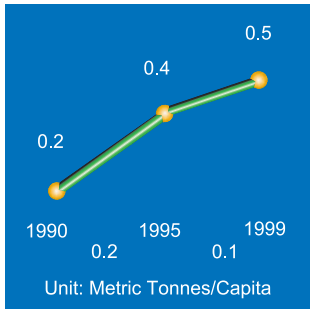
Source: World Development Indicator 2002 April 2002

Air Indicator - Carbon Dioxide Emission Per Capita

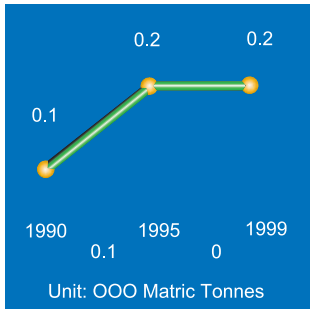
Nepal



Bhutan



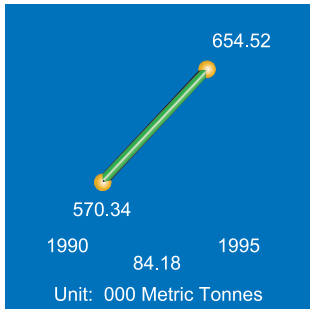
Bangladesh



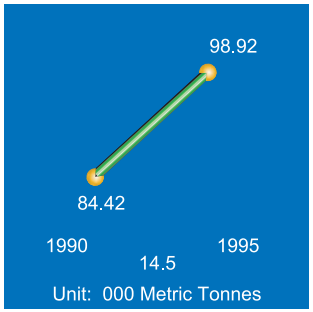
REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

Air Indicator - NO_x emissions

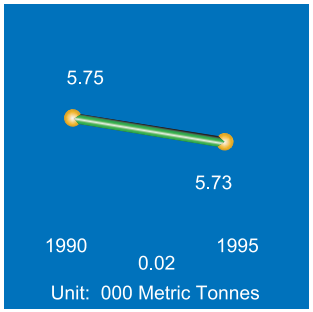
Pakistan



Nepal



Bhutan

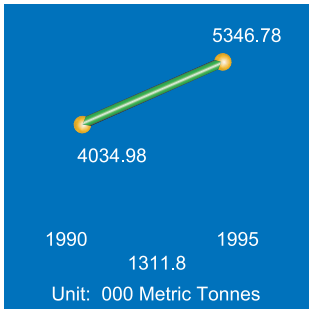


Note: NOx emissions increased for all the countries of the subregion from 1990 to 1995, except for Bhutan, where it very slightly decreased. India had the highest NOx emissions in the region – 5346.78 thousand metric tonnes, while Maldives had the lowest NOx emissions – 1.03 thousand metric tonnes.

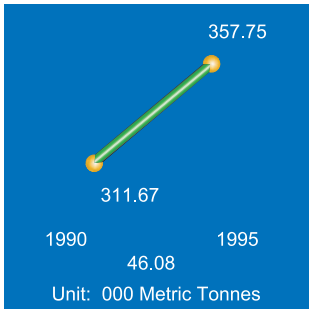
Source: GEO III Grid data

Air Indicator - NO_x emissions

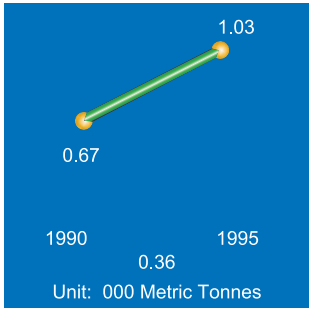
India



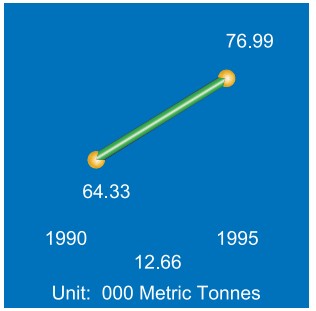
Bangladesh



Maldives

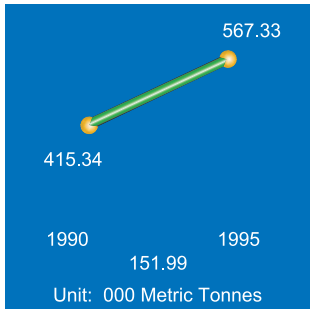


Sri Lanka

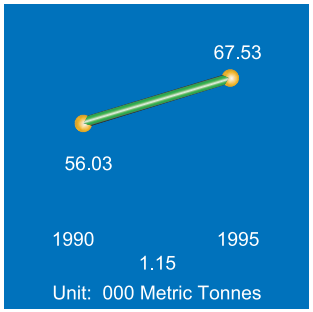


Air Indicator - SO_2 emissions

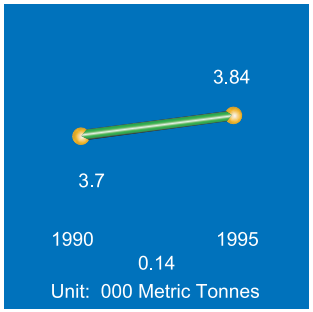
Pakistan



Nepal



Bhutan

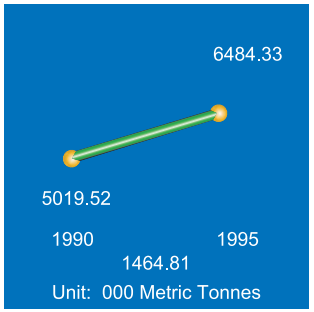


Note: There was a modest increase in the SO_2 emissions of all the countries of the region from 1990 to 1995. India had the highest SO_2 emissions in the region – 6484.33 thousand metric tonnes, while Maldives had the lowest emissions – 0.97 thousand metric tonnes.

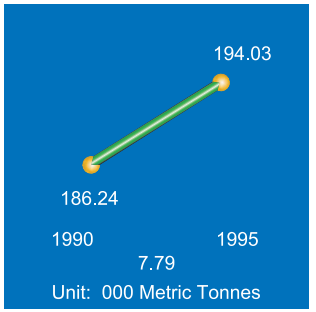
Source: GEO III Grid data

Air Indicator - SO_2 emissions

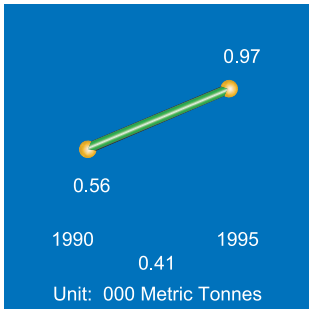
India



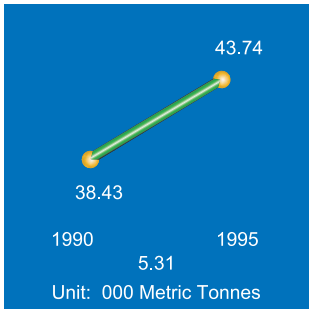
Bangladesh



Maldives



Sri Lanka



Bio-diversity Indicator

Declining forest cover has lead to loss of natural habitat for species of plants, animals and birds. South Asia is home to a wide variety of terrestrial and marine biodiversity. India has been ranked among the world's 12 mega-diverse countries. Sri Lanka is also among the most biologically diverse countries in the world. This region includes following biological "hot spots" (where the disappearance of already threatened moist tropical forest would cause the greatest losses of biodiversity): The eastern Himalayas, the Western Ghats in India and southeastern Sri Lanka. South Asia is also home to around 14 per cent of the world's remaining mangrove habitation, in addition to the highest percentage of threatened wetlands, 82 of which are in Bangladesh. South Asia is home to the mighty Himalayas, which are an important ecosystem. For example, the Hindu Kush Himalayan belt is home to some 25,000 major plant species, comprising ten per cent of the world's flora. Also, the flora found in the Himalayan zone has important medicinal properties and is widely used in Ayurvedic remedies.

Most South Asian countries have promulgated considerable preservation and conservation programmes. India, for example, has strong protection laws for conservation of natural resources. But the laws have not been entirely successful as they are plagued by weak enforcement and institutional and policy flaws. Also, increasing population, urbanisation and agricultural demands make it difficult to mark off land as "protected park area" in South Asia. People-park conflicts are inevitable. But the protected area trend has been encouraging. The protected area has increased in all countries except Pakistan during 1985 –1999; the highest protected area is reported in Bhutan, which is taking determined measures to preserve its natural resources. The highest percentage of threatened plants is reported in Sri Lanka. The highest percentage of threatened birds is found in Bangladesh. The highest percentage of threatened mammals is reported in India.

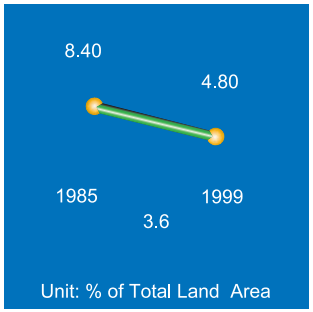
A notable successful conservation programme has been "Project Tiger" in India, which saved the Asian tiger from the brink of extinction. India has launched a similar programme – "Project Elephant"- to save the Asiatic elephant.

Wetlands are found in the Brahmaputra and Ganga plains in South Asia. The Sundarbans, found in the Brahmaputra delta, are among the world's most significant mangrove forests. They are also home to the mighty Royal Bengal Tiger. The Sundarbans are being eroded because of pressure from human settlements and shrimp farming.

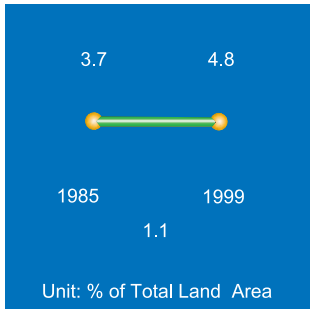
Thus, more efforts need to be taken to preserve the magnificent biodiversity wealth of South Asia.

Bio-diversity Indicator - Protected Area

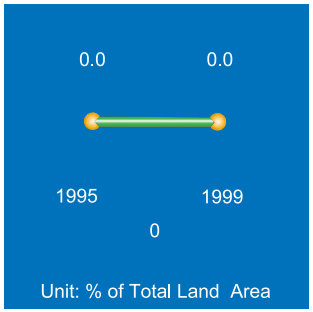
Pakistan



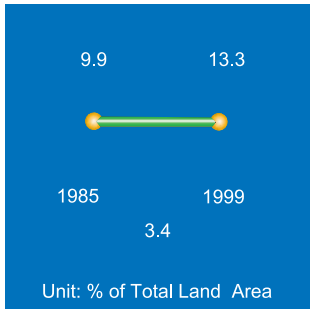
India



Maldives



Sri Lanka

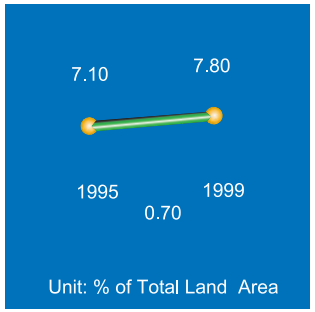


Note: Protected area (as percentage of total land area) decreased by 50 per cent in Pakistan. For other countries of South Asia, protected area increased over the last decade. The highest percentage of protected area is reported in Bhutan – 21.2 per cent. Sri Lanka has shown the highest increase in protected area in the last decade.

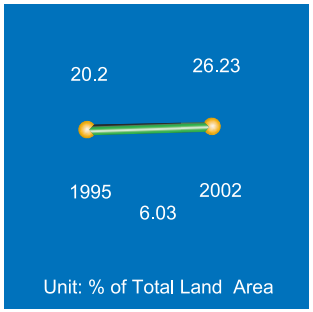
Source: World Resource Institute 2000

Bio-diversity Indicator - Protected Area

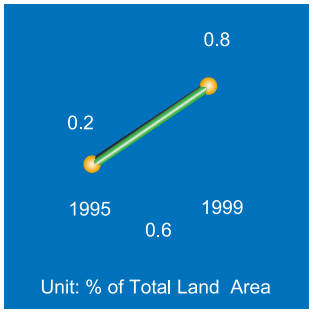
Nepal



Bhutan

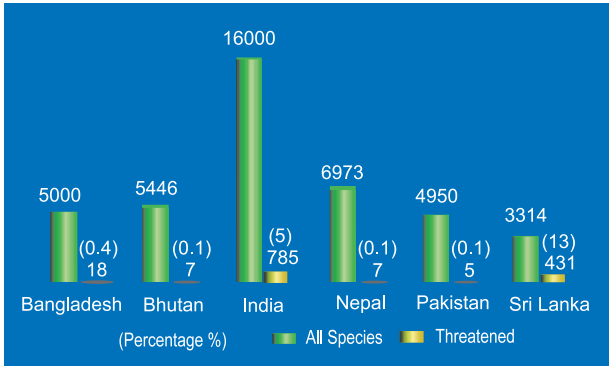


Bangladesh



REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

Bio-diversity Indicator - Threatened Plants

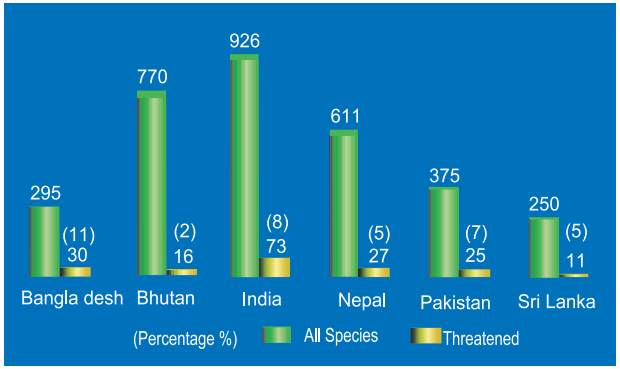


Note: The highest percentage of threatened plants is reported in Sri Lanka. The highest number of threatened plants is reported in India.

Source: World Resource Institute 2000

REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

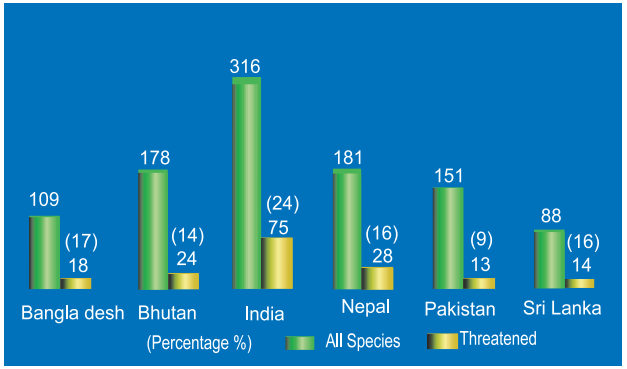
Bio-diversity Indicator - Threatened Birds



Note: The highest percentage of threatened birds is reported in Bangladesh. The highest number of threatened birds is reported in India.

Source: World Resource Institute 2000

Bio-diversity Indicator - Threatened Mammals

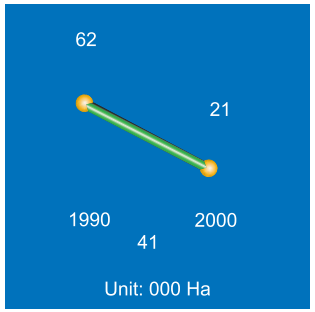


Note: The highest percentage of threatened mammals is reported in India. The highest number of threatened mammals is also reported in India.

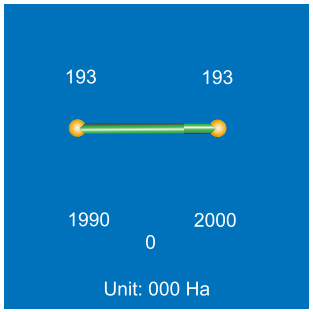
Source: World Resource Institute 2000

Bio-diversity Indicator - Wetlands of International Importance

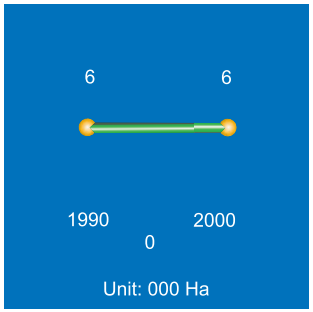
Pakistan



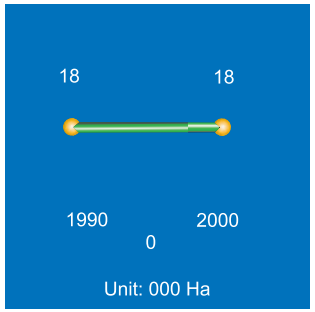
India



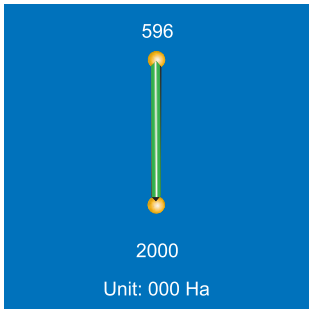
Sri Lanka



Nepal



Bangladesh



Note: Wetlands have decreased in Pakistan over the last decade. For the rest of South Asia, wetland area has remained constant. The highest area of wetland is in Bangladesh. The mangrove forests of Sundarbans in the Brahmaputra delta are among Bangladesh's main wetlands.

Source: World Resource Institute 2000

Reference

World Bank (2002). World Development Indicators. http://www.developmentgoals.com/. World Bank.

UNDP (2002). Human Development Reports. http://hdr.undp.org/reports/global/2002/en/. United Nations Development Program.

World Bank (2003). Global Economic Prospects and the Developing Countries: Investing to Unlock Global Opportunities. World Bank.

Economic and Social Commission for Asia and the Pacific (2003). Promoting the Millennium Development Goals in Asia and the Pacific. United Nations.

IMF (2003). World Economic Outlook. International Monetary Fund.

ESCAP, ADB (2000). State of the Environment in Asia and the Pacific. United Nations.

World Resources Institute (2000). World Resources 2000 – 2001: People and Ecosystems: The fraying web of life. World Resources Institute.

Agarwal, Anil; Narain, Sunita; Sen, Srabani (1999). State of India's environment - 5th citizens' report - Part II: statistical database. Centre for Science and Environment.

UNEP (2001). Nepal: State of the Environment 2001. United Nations Environment Programme.

UNEP (2001). Bangladesh: State of the Environment 2001. United Nations Environment Programme.

United Nations Environment Programme (2002). Global Environment Outlook 3. http://www.grid.unep.ch/data/other/GEO3_Comp_www/index.htm Earthscan Publications.

FAO (2000). Global Forest Resources Assessment. http://www.fao.org/forestry/fo/country/nav_world.jsp?lang_id=1. Food And Agriculture Organization of the United Nations.

ADB (2003). Basic Water Sector Information. http://www.adb.org/Water/Indicators/. Asian Development Bank.

TERI (1996). Environmental Information Database. The Energy Research Institute.

UNEP (2001). South Asia: State of the Environment 2001. United Nations Environment Programme.

FAO (1994). Land degradation in south Asia: Its severity, causes and effects upon the people. http://www.fao.org/docrep/V4360E/V4360E00.htm. Food And Agriculture Organization of the United Nations.

Planning Commission (2000). Bhutan National Human development Report (2000). Royal Government Of Bhutan.

ADB (2002). The Key Indicators of Developing Asian and Pacific Countries 2002. http://www.adb.org/Documents/Books/Key_Indicators/2002/default.asp. Asian Development Bank.

Department of Forestry Services (2002). Forestry in Bhutan, Facts and Figures. Royal Government Of Bhutan.

Central Statistical Organization (1997). Statistical Yearbook of Bhutan, Planning Commission. Royal Government Of Bhutan.

Ministry of Agriculture (2002). Biodiversity Action Plan of Bhutan, 2002. Royal Government Of Bhutan.

Department of Forestry Services (1995). Forest and Nature Conservation Act, 1995. Royal Government Of Bhutan.

Planning Commission (2000). Bhutan at a glance, Planning Commission. Royal Government Of Bhutan.

Planning Commission (2001). Bhutan at a glance, Planning Commission. Royal Government Of Bhutan.

Public Health Engineering Section (2001). Rural water and Sanitation Sector Policy; Background Information Document, June 2001. Ministry Of Health, Royal Government Of Bhutan.

Japan International Cooperation Agency (2000). Pakistan.

Central Pollution Control Board, India (2000). Ambient Water Quality in India. http://www.cpcb.nic.in/waterdata.htm. CPCB.

Central Pollution Control Board, India (2000). Ambient Air Quality in India. http://www.cpcb.nic.in/data.htm. CPCB.

ADB (2001). Asian Environmental Outlook 2001. Asian Development Bank.

UNEP (2001). Asia-Pacific Environment Outlook 2. United Nations Environment Programme.

National Planning Commission Secretariat (2002). A Handbook of Environment Statistics, Nepal-2002. Central Bureau of Statistics, Nepal.

APPENDIX I

Definitions

The indicators in this publication are well-known and well-accepted. In the following section, the definition of some of the indicators used in this publication is given.

Total population-is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship--except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin.

Population below US$1 a day-is the percentage of the population living on less than US$1.08 a day at 1993 international prices (equivalent to US$1 in 1985 prices, adjusted for purchasing power parity). Poverty rates are comparable across countries, but as a result of revisions in PPP exchange rates, they cannot be compared with poverty rates reported in previous editions for individual countries.

Infant mortality rate-is the number of infants dying before reaching one year of age, per 1 000 live births in a given year.

Life expectancy at birth-indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

GNI (formerly GNP)-is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. Data are in current U.S. dollars. GNI, calculated in national currency, is usually converted to U.S. dollars at official exchange rates for comparisons across economies, although an alternative rate is used when the official exchange rate is judged to diverge by an exceptionally large margin from the rate actually applied in international transactions. To smooth fluctuations in prices and exchange rates, a special Atlas method of conversion is used by the World Bank. This applies a conversion factor that averages the exchange rate for a given year and the two preceding years, adjusted for differences in rates of inflation between the country and the G-5 countries. The GNI data here follows the World Bank methodology.

GNI per capita (formerly GNP per capita)-is the gross national income, converted to U.S. dollars using the World Bank Atlas method, divided by the midyear population. GNI is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. GNI, calculated in national currency, is usually converted to U.S. dollars at official exchange rates for comparisons across economies, although an alternative rate is used when the official exchange rate is judged to diverge by an exceptionally large margin from the rate actually applied in international transactions. To smooth fluctuations in prices and exchange rates, a special Atlas method of conversion is used by the World Bank. This applies a conversion factor that averages the exchange rate for a given year and the two preceding years, adjusted for differences in rates of inflation between the country and the G-5 countries.

Proportion of land area covered by forest-is land under natural or planted stands of trees of whether productive or not, as percentage total land area.

Access to an improved water source-refers to the percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, and rainwater collection. Unimproved sources include vendors, tanker trucks, and unprotected wells and springs. Reasonable access is defined as the availability of at least 20 litres a person a day from a source within one kilometre of the dwelling.

Access to improved sanitation facilities-refers to the percentage of the population with at least adequate excreta disposal facilities (private or shared, but not public) that can effectively prevent human, animal, and insect contact with excreta. Improved facilities range from simple but protected pit latrines to flush toilets with a sewerage connection. To be effective, facilities must be correctly constructed and properly maintained.

BOD level in Major Rivers – The biochemical oxygen demand (BOD) is used as a measure of the degree of water pollution.

Nationally protected areas-are totally or partially protected areas, as the percentage of total land area, of at least 1 000 hectares that are designated as national parks, natural monuments, nature reserves or wildlife sanctuaries, protected landscapes and seascapes, or scientific reserves with limited public access. The data do not include sites protected under local or provincial law.

Carbon dioxide emissions per capita-are those stemming from the burning of fossil fuels and the manufacture of cement. They include contributions to the carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring.

Wetlands of International Importance is defined under the Wetlands Convention, signed in Ramsar, Iran, in 1971. In order for an area to qualify as a Ramsar site, it has to have "international significance in terms of ecology, botany, zoology, limnology or hydrology."

APPENDIX II

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