REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

UNEP

ENVIRONMENTAL INDICATORS Central Asia

Environmental indicators
Central 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

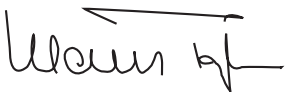
Agenda 21 emphasized the need for developing indicators to provide the solid base for decision making at local, national, regional and global levels. The Johannesburg Plan of Implementation in 2002 reiterated the need for indicators to monitor economic, social and environmental progress for sustainable 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 Central Asia' has been prepared to present the trends of twenty nine 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 Central Asia for 1990, 1995 and 2000. This report provides an assessment of economic, social and environmental conditions in Central Asia based on available data and information. Lack of updated scientific database has been a major challenge in preparation of the report.

This report highlights that the Central Asian economies, which were adversely affected by the political changes in the Soviet Union in the earlier half of the 1990s, picked up during the second half of the decade. By the year 2000, the GDP growth rate in Central Asia had exceeded the average growth rate of Asia and Pacific, and the World. Poverty is a growing concern in the Central Asian republics and steady economic growth is needed to mitigate poverty.

Land degradation is an issue of concern in the Central Asian republics, leading to a reduction in the amount of arable land. Agricultural run-off is the main cause of water pollution. Central Asian republics are also facing air pollution in their major cities as well as transboundary air pollution. The biodiversity in this sub-region is under increased pressure due to environmental degradation.

UNEP hopes that the 'Environmental Indicators for Central 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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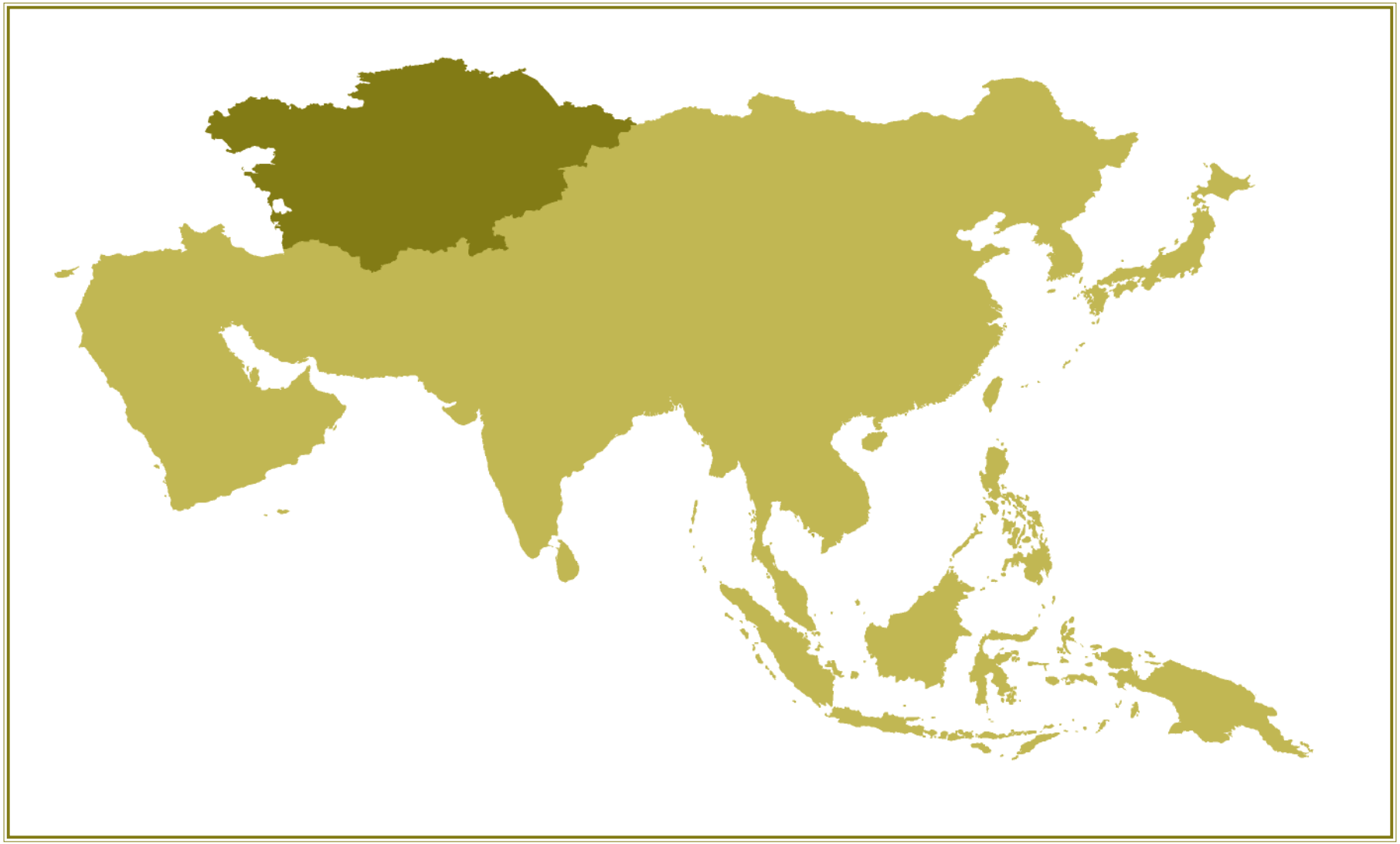
CONTENT



INTRODUCTION

Central Asia is a sub-region of Asia and the Pacific consisting of republics of the former Soviet Union: Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan and Tajikistan. The sub-region covers about four million sq km. and has a total population of just under 64 million people.

The sub-region occupies the intersection of Europe and Asia. It has northern taiga forests and large southern deserts, as well as the largest mountains in the former Soviet Union. Natural conditions of the sub-region are considerably heterogeneous. On the lowland, which stretches from north to south for more than 3,000 km, there is a change of landscape zones as follows: mixed zone, zone of deciduous forests, forest steppe and steppe zones, semiarid and arid zones. The climate is sharply continental with a high amplitude of summer and winter temperatures. The main river arteries are the Amudarya River, Syrdarya River, Ili River, Chu River, Zaravshan River, Murgab River and others.

Indicators

Indicators can be defined as statistics, measures or parameters that can be used to track changes of 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 were 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 both at global as well as national level, by 2015. These goals were merged into Millennium Development Goals (MDG).

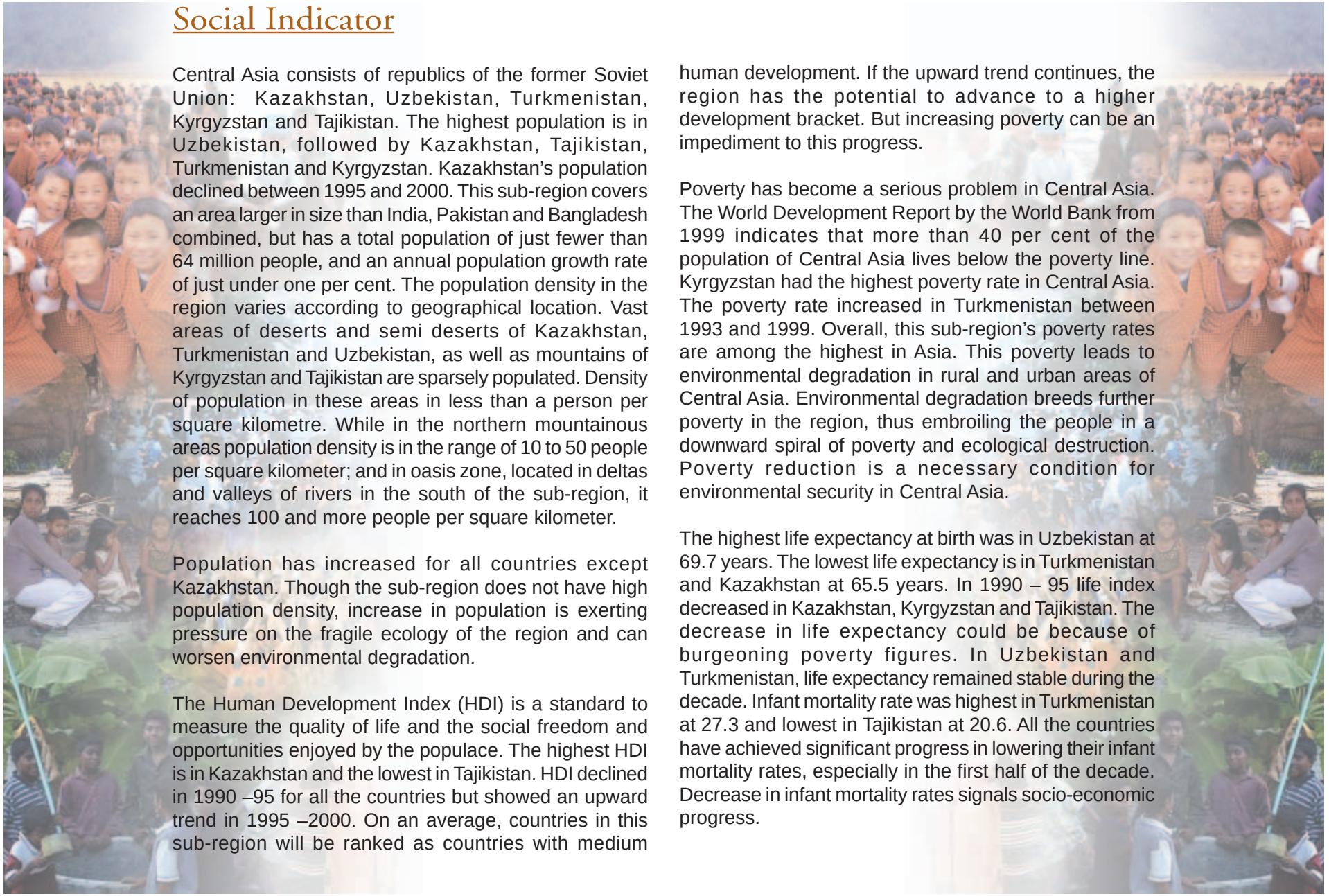
At the UN Millennium Summit held in 2000, Millennium Development Goals (8 goals, 18 targets and 48 indicators) were endorsed by the governments and civil society, in

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 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 fulfill this need, UNEP-RRCAP has produced the Environmental Indicators report for each sub-region of Asia and 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

Central Asia consists of republics of the former Soviet Union: Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan and Tajikistan. The highest population is in Uzbekistan, followed by Kazakhstan, Tajikistan, Turkmenistan and Kyrgyzstan. Kazakhstan's population declined between 1995 and 2000. This sub-region covers an area larger in size than India, Pakistan and Bangladesh combined, but has a total population of just fewer than 64 million people, and an annual population growth rate of just under one per cent. The population density in the region varies according to geographical location. Vast areas of deserts and semi deserts of Kazakhstan, Turkmenistan and Uzbekistan, as well as mountains of Kyrgyzstan and Tajikistan are sparsely populated. Density of population in these areas in less than a person per square kilometre. While in the northern mountainous areas population density is in the range of 10 to 50 people per square kilometer; and in oasis zone, located in deltas and valleys of rivers in the south of the sub-region, it reaches 100 and more people per square kilometer.

Population has increased for all countries except Kazakhstan. Though the sub-region does not have high population density, increase in population is exerting pressure on the fragile ecology of the region and can worsen environmental degradation.

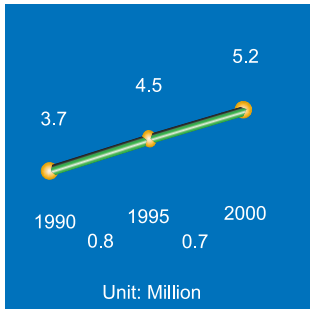
The Human Development Index (HDI) is a standard to measure the quality of life and the social freedom and opportunities enjoyed by the populace. The highest HDI is in Kazakhstan and the lowest in Tajikistan. HDI declined in 1990 –95 for all the countries but showed an upward trend in 1995 –2000. On an average, countries in this sub-region will be ranked as countries with medium human development. If the upward trend continues, the region has the potential to advance to a higher development bracket. But increasing poverty can be an impediment to this progress.

Poverty has become a serious problem in Central Asia. The World Development Report by the World Bank from 1999 indicates that more than 40 per cent of the population of Central Asia lives below the poverty line. Kyrgyzstan had the highest poverty rate in Central Asia. The poverty rate increased in Turkmenistan between 1993 and 1999. Overall, this sub-region's poverty rates are among the highest in Asia. This poverty leads to environmental degradation in rural and urban areas of Central Asia. Environmental degradation breeds further poverty in the region, thus embroiling the people in a downward spiral of poverty and ecological destruction. Poverty reduction is a necessary condition for environmental security in Central Asia.

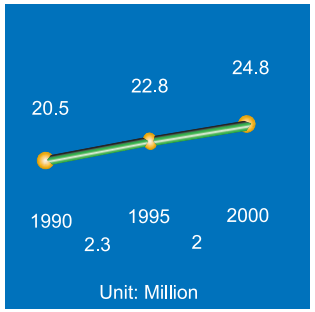
The highest life expectancy at birth was in Uzbekistan at 69.7 years. The lowest life expectancy is in Turkmenistan and Kazakhstan at 65.5 years. In 1990 – 95 life index decreased in Kazakhstan, Kyrgyzstan and Tajikistan. The decrease in life expectancy could be because of burgeoning poverty figures. In Uzbekistan and Turkmenistan, life expectancy remained stable during the decade. Infant mortality rate was highest in Turkmenistan at 27.3 and lowest in Tajikistan at 20.6. All the countries have achieved significant progress in lowering their infant mortality rates, especially in the first half of the decade. Decrease in infant mortality rates signals socio-economic progress.

Social Indicator - Population

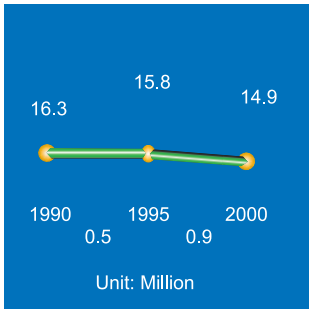
Turkmenistan



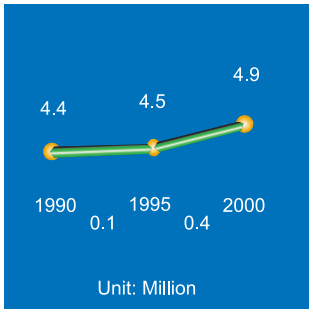
Uzbekistan



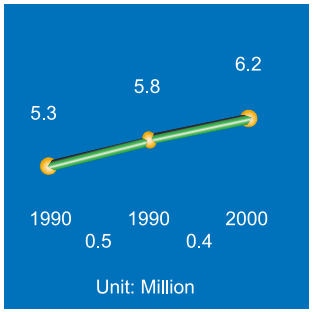
Kazakhstan



Kyrgyzstan

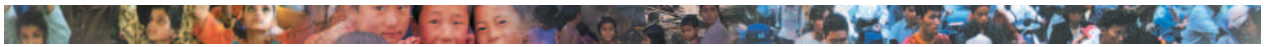


Tajikistan



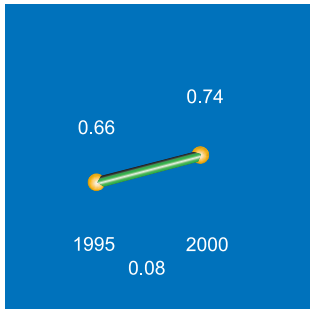
Note: Uzbekistan is the most populated country, with its population being more than the combined population of Kyrgyzstan, Turkmenistan and Tajikistan. Kazakhstan is the second most populated and its population also is significantly higher than the lower three. All countries except Kazakhstan showed increase in population during the 1990s.

Source: United Nations Environment Programme. (United Nations Population Division). Global Environmental Outlook Data Portal. http://geodata.grid.unep.ch. June-July 2003.

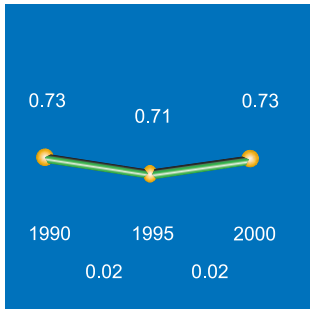


Social Indicator - Human Development Index

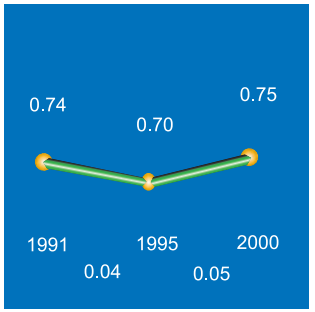
Turkmenistan



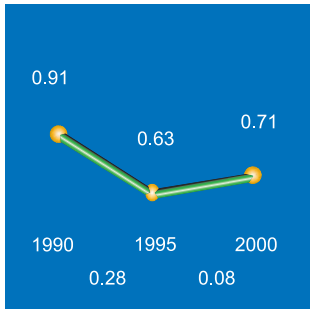
Uzbekistan



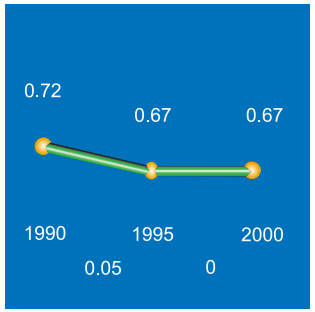
Kazakhstan



Kyrgyzstan



Tajikistan

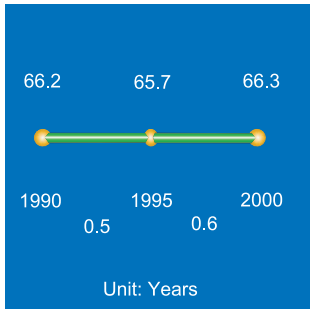


Note: HDI decreased in the region in the first half of the decade. HDI fell by a third during 1990 – 95 for Kyrgyzstan. HDI increased for all countries in the second half of the decade. Turkmenistan, Uzbekistan, Kazakhstan, and Kyrgyzstan had similar HDI values. Kazakhstan had the highest at 0.76 and Tajikistan is lowest at 0.67.

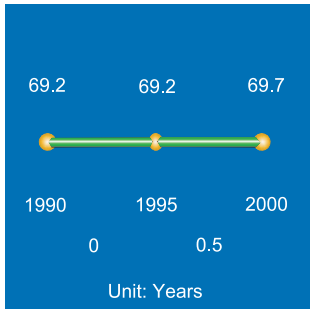
Source: United Nations Development Programme. Human Development Indicators http://hdr.undp.org. June-July 2003.

Social Indicator - Life Expectancy at Birth

Turkmenistan

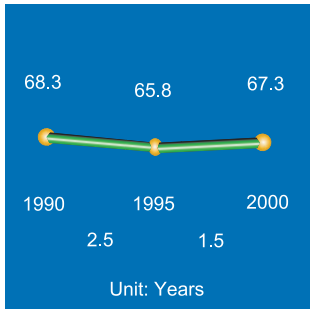


Uzbekistan



Kazakhstan

Kyrgyzstan



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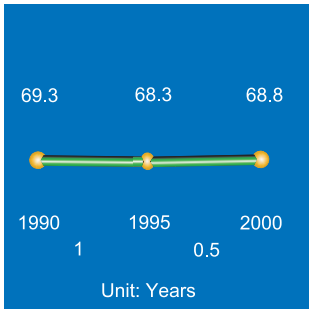
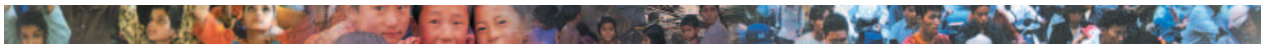


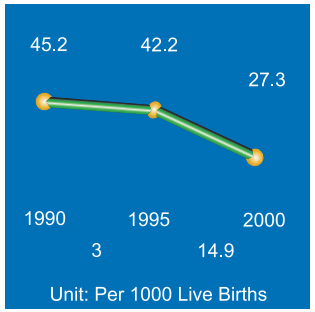
Note: Life expectancy at birth decreased between 1990 and 1995 in Kazakhstan, Kyrgyzstan, Turkmenistan and Tajikistan, but increased in the latter half of the decade. Life expectancy remained stable for Uzbekistan over the decade. Uzbekistan had the highest life expectancy at birth – 69.7 years, while Kazakhstan has the lowest at 65.5 years.

Source: Millennium Development Goals http://www.developmentgoals.org. June-July 2003 (Country data)

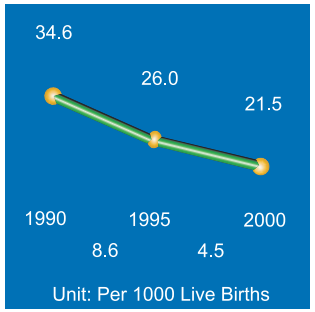


Social Indicator - Infant Mortality Rate

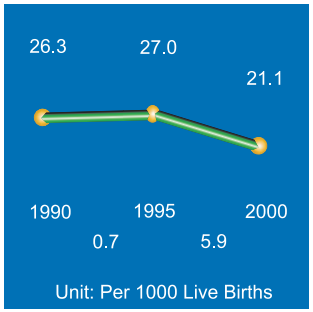
Turkmenistan



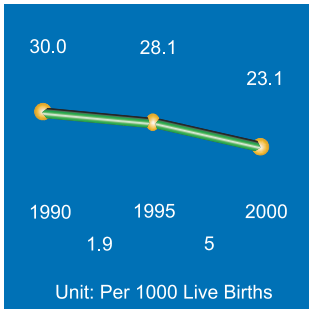
Uzbekistan



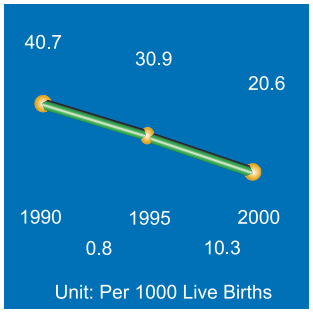
Kazakhstan



Kyrgyzstan



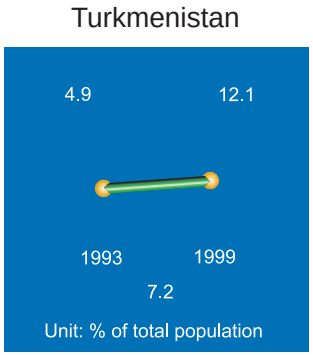
Tajikistan

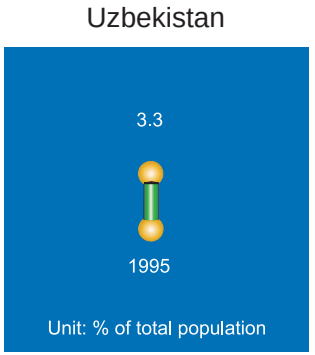


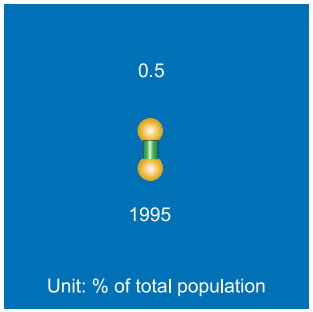
Note: Infant Mortality rate decreased for all countries during the 1990s. The infant mortality rate nearly halved in Turkmenistan and Tajikistan over the decade. The highest infant mortality per 1000 live births was in Turkmenistan – 27.3, while the lowest was in Tajikistan – 20.6 years.

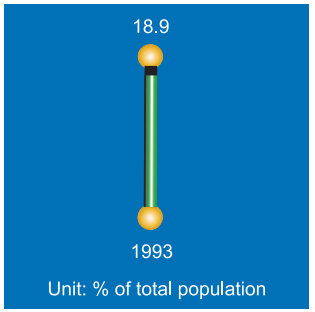
Source: Millennium Development Goals http://www.developmentgoals.org. June-July 2003 (Country data)

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









Note: Data is not available for the same year for all the countries. In 1995, the highest rate of poverty was in Uzbekistan – 3.3 per cent which is lower than the poverty rate in 1999 in Kyrgyzstan – 18.9 per cent and Turkmenistan – 12.1 per cent. From the available data, it is seen that Turkmenistan had high increase in poverty in the 1990s.

Source: Millennium Development Goals . http://www.developmentgoals.org. June-July 2003 (Country data)

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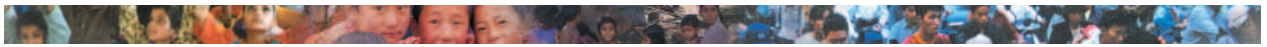


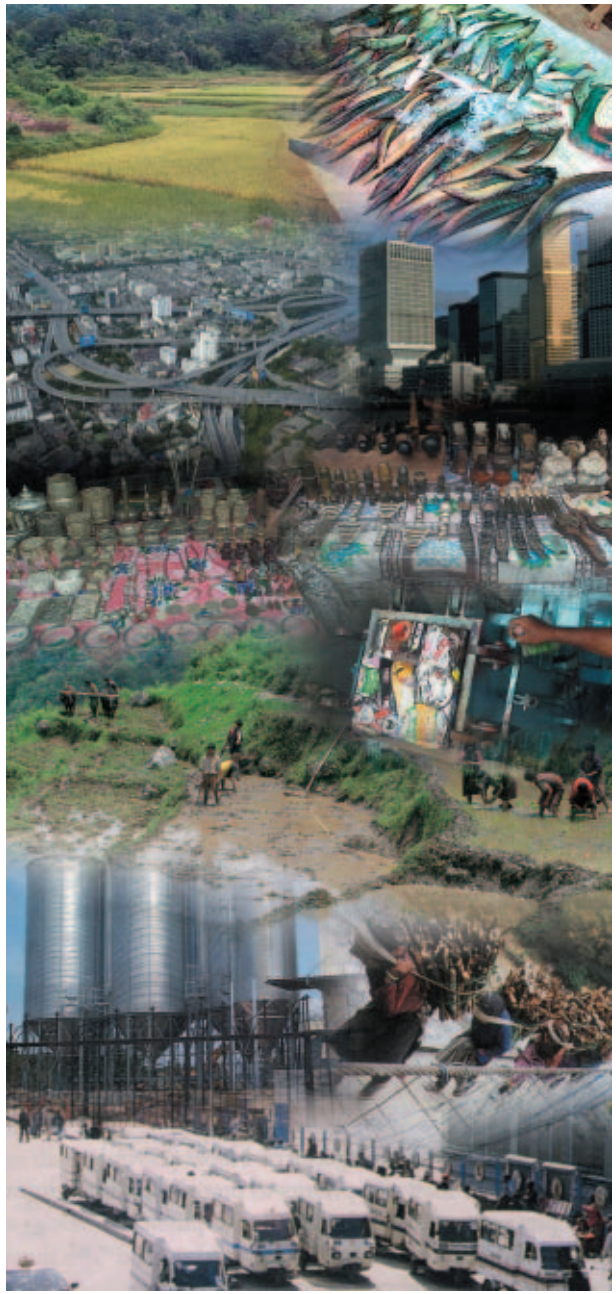
Economy Indicator

Economic growth is necessary to lower poverty rates. Accelerated economic growth is among the surest way to reduce poverty. But it is not the only way. Complementary regional, international and national strategies for poverty reduction are also essential. Institutional support and regulatory mechanism are also needed. In 1995, Central Asian countries had a negative GDP growth rate. The problems of transition from Soviet Union to independent republics made high economic growth difficult in the 1990s for Central Asia. GDP per capita growth rate in Central Asia during 1990 – 95 registered negative growth rate and was below the world average. From 1996 onwards, however, economic growth started to revive at different rates in the countries of Central Asia. In 2000, the highest GDP growth rate was in Turkmenistan (17.6 per cent) followed by Kazakhstan, Kyrgyzstan and Tajikistan. The lowest growth rate was in Uzbekistan – 4 per cent. In 2000, the GDP growth rate in Central Asia had exceeded the average growth rate of Asia and Pacific, and the World.

On basis of Gross National Income (GNI) figures, Tajikistan, Turkmenistan and Kyrgyzstan are grouped together while Kazakhstan and Uzbekistan are bracketed together. Kazakhstan and Uzbekistan form the higher GNI bracket. Kazakhstan had the largest GNI in the sub-region at US$18.8 billion and Uzbekistan was second. Tajikistan had the lowest sub-regional GNI at US$1.1 billion. GNI growth in all the countries, in contrast to GDP growth, declined in the last half of the 1990s. An exception was Kyrgyzstan, where GNI growth accelerated. Data was not available for Uzbekistan, Turkmenistan and Kyrgyzstan for the years 1990 to 1995.

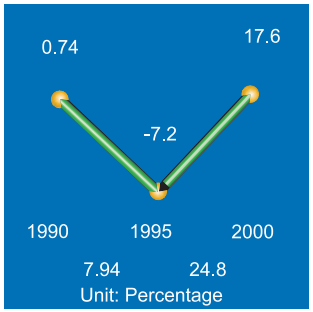
GNI per capita was the highest in Kazakhstan at US$ 1260 per capita. GNI per capita figures for the rest of the sub-region were half or lesser of Kazakhstan's. The lowest GNI per capita was US$180 in Tajikistan. In the years 1990 – 95, GNI per capita decreased in Kazakhstan and Tajikistan. Data was not available for Uzbekistan, Turkmenistan and Kyrgyzstan in 1990 – 95.

Energy consumption per capita data is available only for the latter half of the last decade. Based on these figures, it is seen that the energy consumption per capita more than doubled for Kazakhstan between 1995 and 2000. This can be attributed to the economic development experienced by Kazakhstan. The GDP for Kazakhstan picked up during the latter half of the decade and the economic progress was causal of the higher energy consumption. The energy consumption per capita decreased slightly for Kyrgyzstan and Tajikistan during the same time period. The highest energy consumption per capita was in Kazakhstan – 4.3 tonnes of oil equivalent per person while the lowest was is Kyrgyzstan – 0.49.

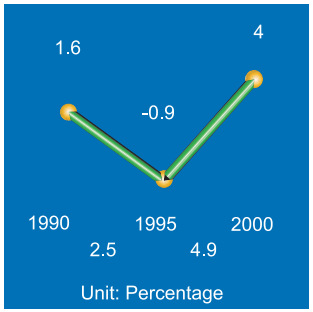


Economy Indicator - Gross Domestic Product Annual Growth

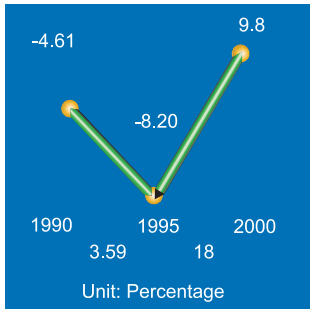
Turkmenistan



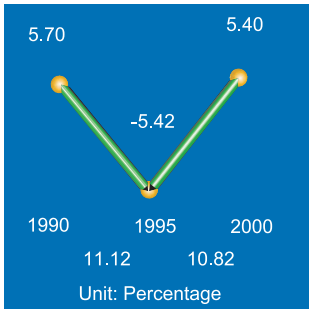
Uzbekistan



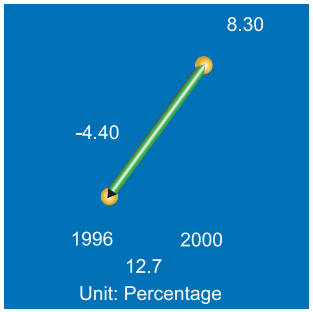
Kazakhstan



Kyrgyzstan



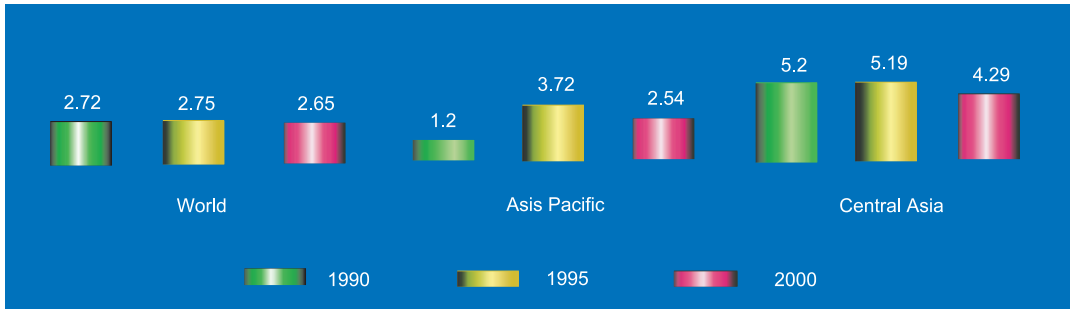
Tajikistan



Note: Between 1990 and 1995, all the countries showed negative GDP, with Kazakhstan having the highest negative GDP of –8.20 per cent. In the latter half of the decade, all the countries showed a remarkable turnabout and had positive GDP. Kazakhstan and Turkmenistan had rates as high as 18 and 17.6 per cent respectively.

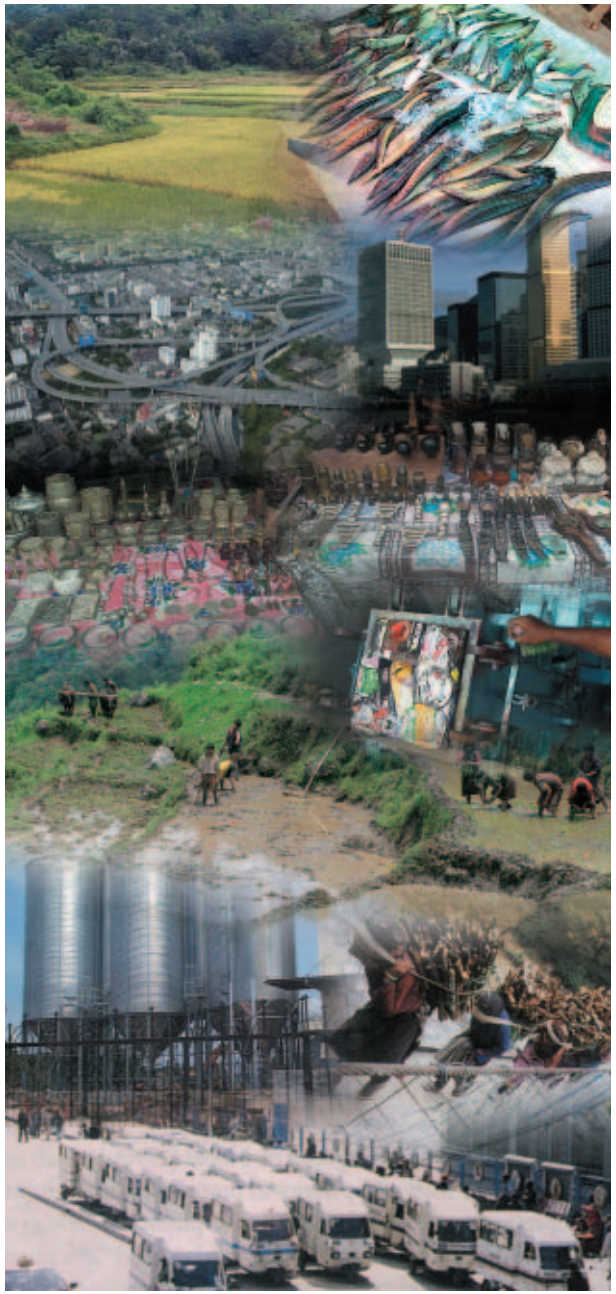
Source: Global Environmental Outlook Data Portal . http://geodata.grid.unep.ch. June - July 2003.

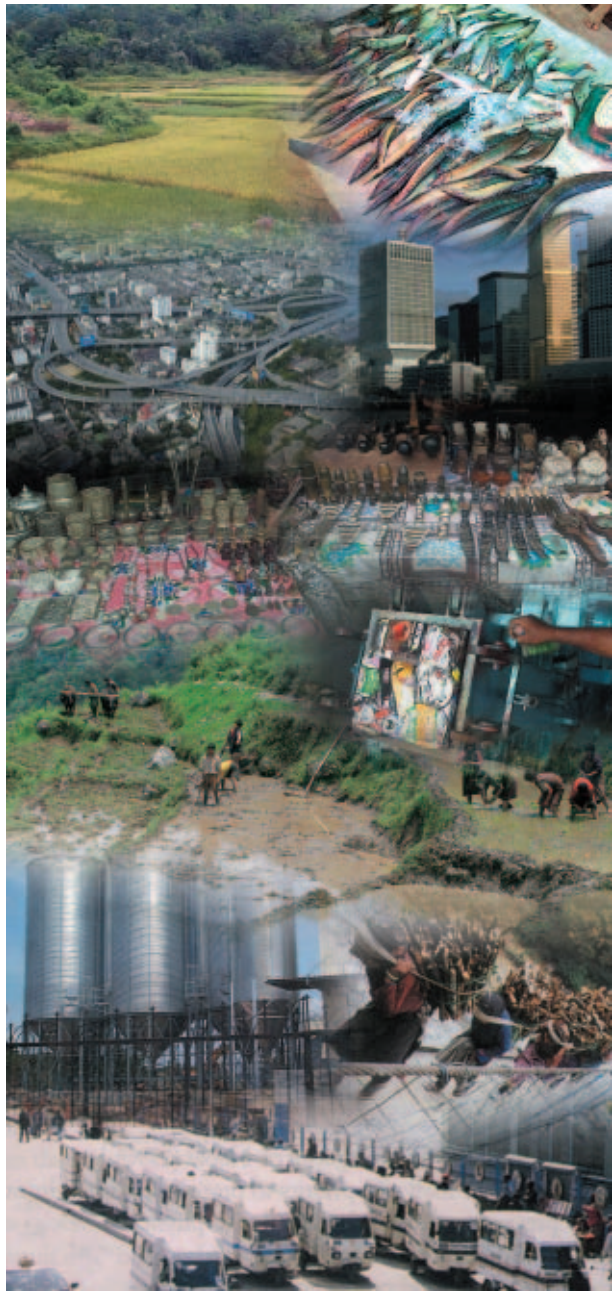
Economy Indicator - Gross Domestic Product Comparison



Note: GDP per capita growth rate in Central Asia registered negative rate between 1990 and 1995 and was significantly below the world average. In 2000, the GDP growth rate in Central Asia exceeded the average growth rate of the world and of Asia and the Pacific.

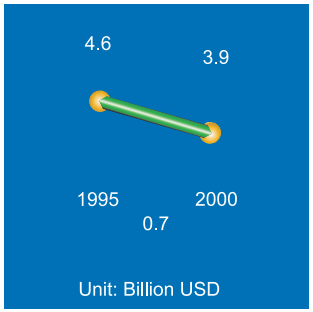
Source: GEO-3 Data Compendium, UNEP 2002



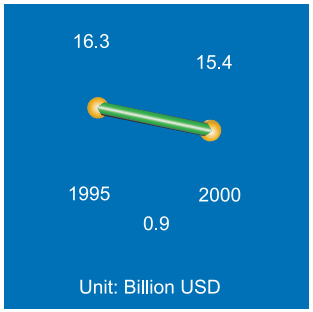


Economy Indicator - Gross National Income

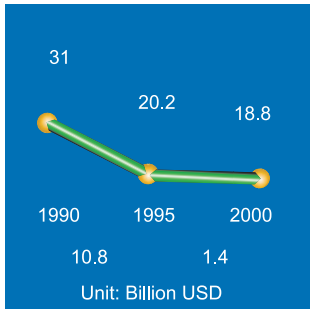
Turkmenistan



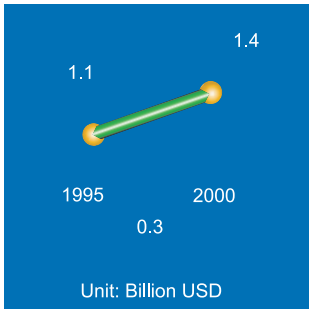
Uzbekistan



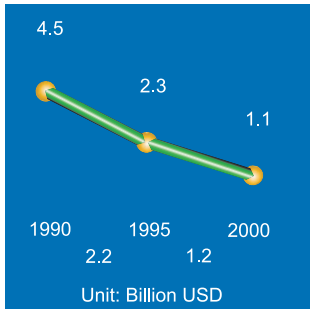
Kazakhstan



Kyrgyzstan



Tajikistan

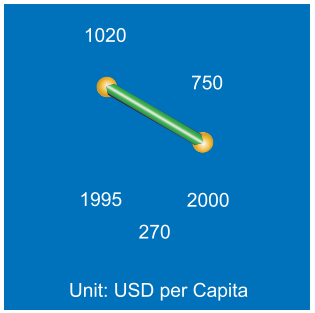


Note: GNI decreased for all countries of the region except Kyrgyzstan. The decrease was highest in Tajikistan and Kazakhstan. GNI was highest in Kazakhstan – US$18.8 billion and lowest in Tajikistan – US$1.1 billion. For both Kazakhstan and Uzbekistan, their respective individual GNI was more than the combined GNI of Tajikistan, Turkmenistan and Kyrgyzstan.

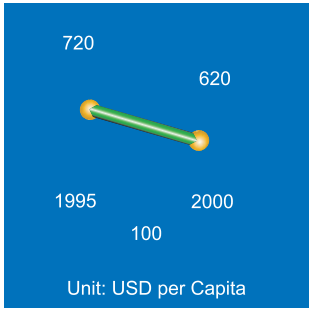
Source: World Bank. Millennium Development Goals . http://www.developmentgoals.org. June-July 2003

Economy Indicator - Gross National Income Per Capita

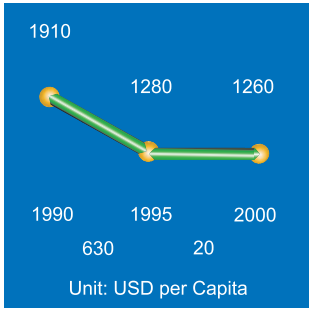
Turkmenistan



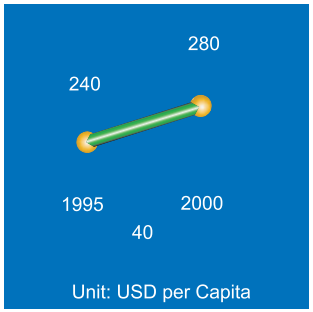
Uzbekistan



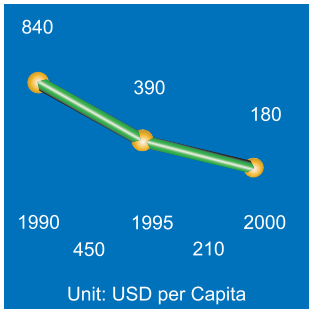
Kazakhstan



Kyrgyzstan

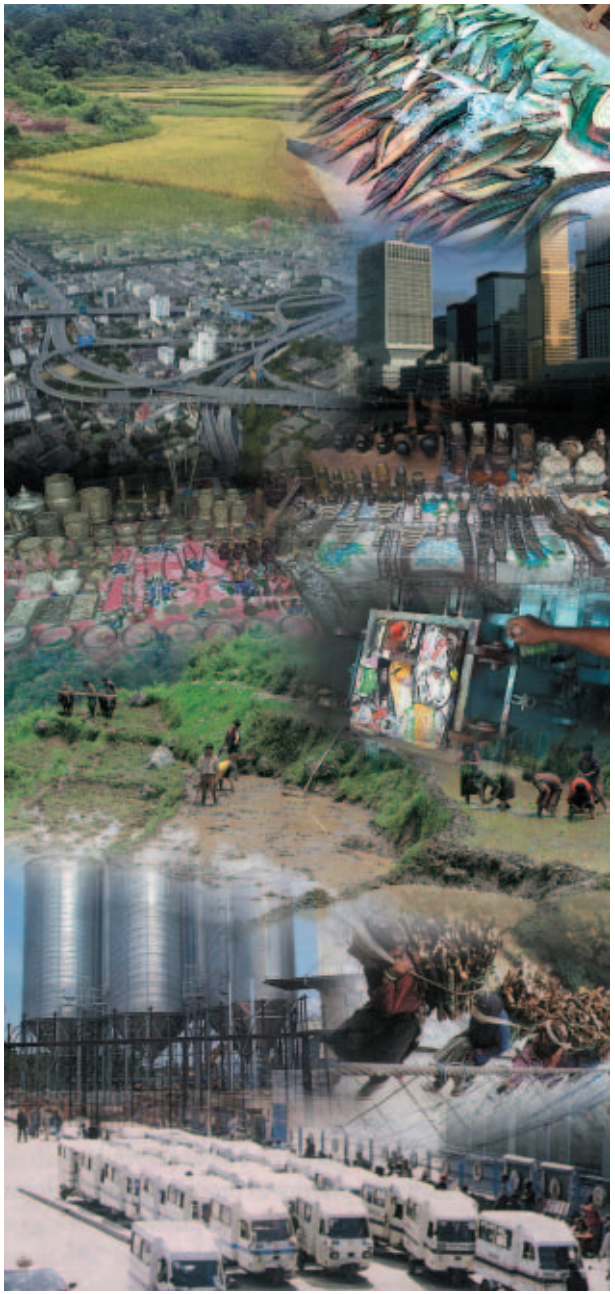


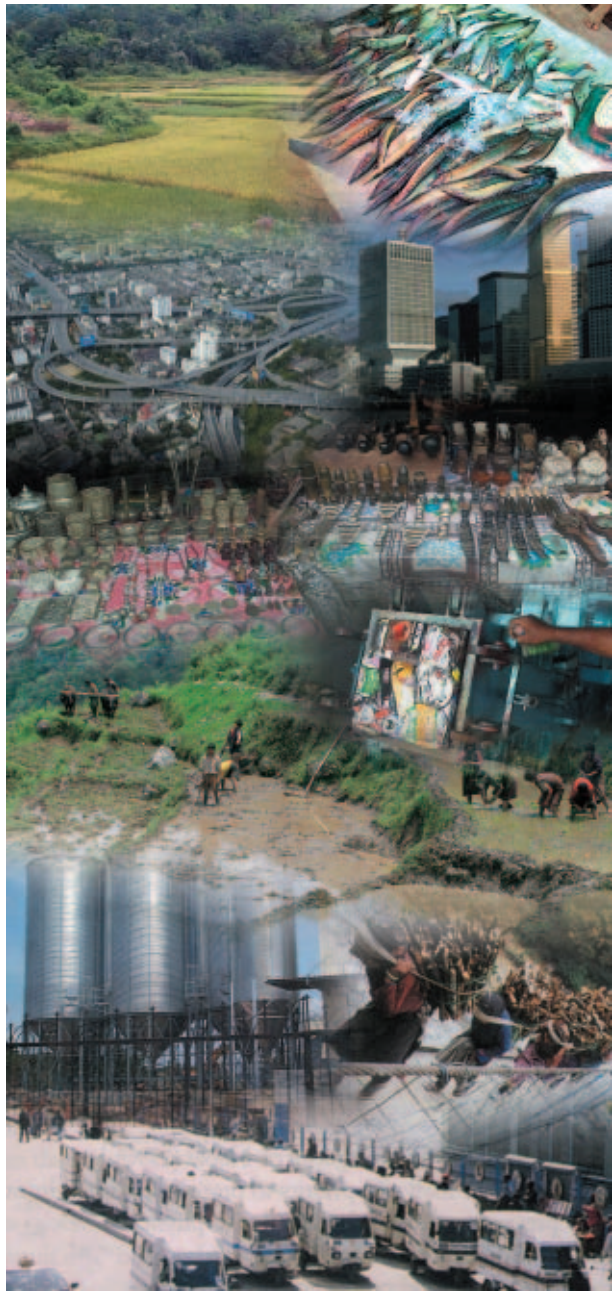
Tajikistan



Note: In Tajikistan, the GNI per capita dropped to almost one eighth during the 1990s. The GNI per capita decreased for all countries except Kyrgyzstan, but the decrease has not been as high as Tajikistan's. The highest GNI per capita was in Kazakhstan – US$1260/capita while the lowest was in Tajikistan – US$180/capita.

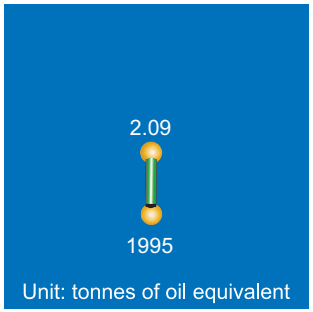
Source: World Bank. Millennium Development Goals . http://www.developmentgoals.org. June-July 2003



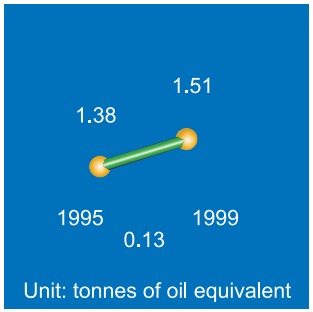


Economy Indicator - Energy Consumption Per Capita

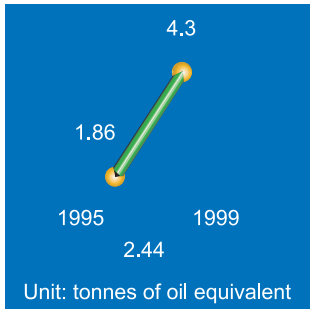
Turkmenistan



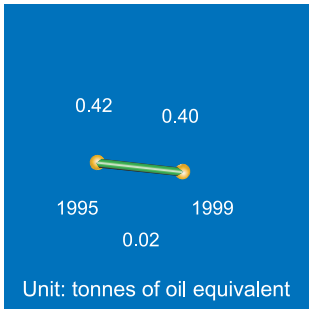
Uzbekistan



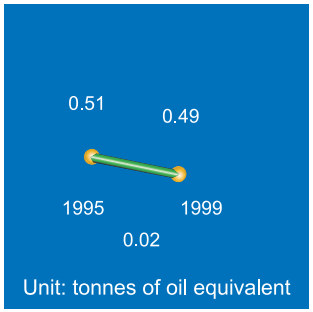
Kazakhstan



Kyrgyzstan



Tajikistan



Note: Energy consumption more than doubled for Kazakhstan while it decreased slightly for Kyrgyzstan and Tajikistan, during the latter half of the decade. The highest energy consumption per capita was in Kazakhstan – 4.3 while the lowest was in Kyrgyzstan – 0.49.

Source: GEO III Grid data UNEP

Land Indicator

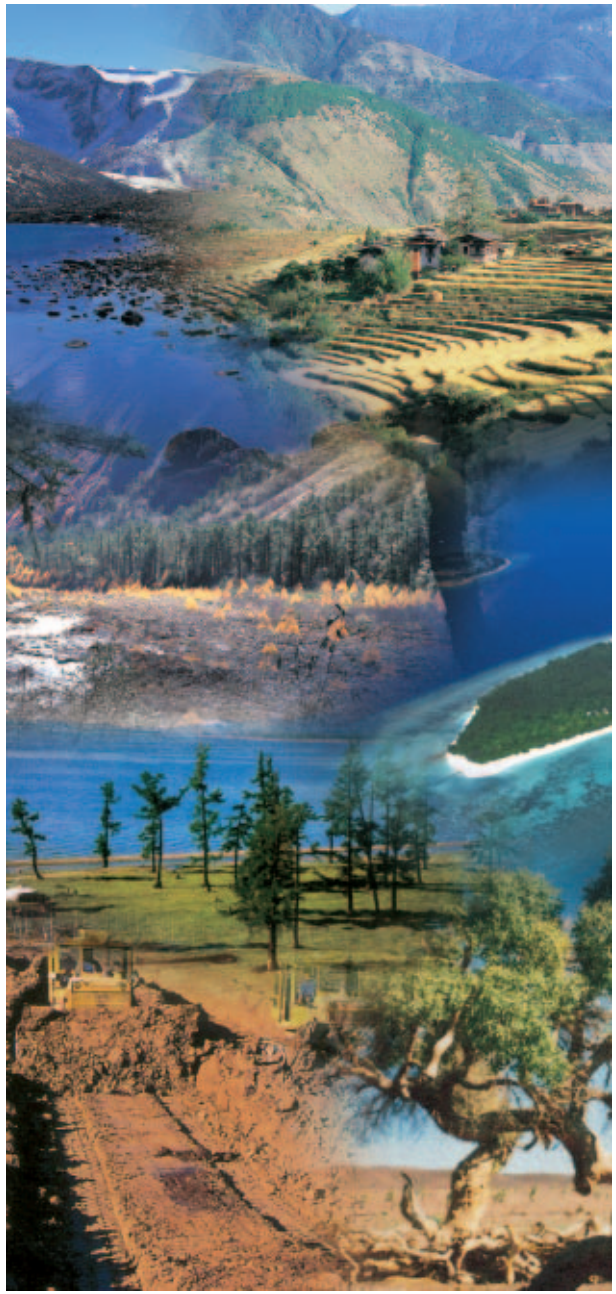
Central Asia occupies approximately three per cent of the World's total land area. Around 76 per cent of the land in Central Asia has been developed or is used for agricultural purposes.

Arable land per capita was highest for Kazakhstan at 1.45 ha/capita in the year 2000. It was the lowest for Tajikistan at 0.12 ha/capita. Arable land per capita decreased for all countries in Central Asia over the past decade. Land degradation is one of the causes. Land degradation is caused by problems such as erosion, contamination, deforestation, salinization etc. These problems are caused by natural climatic factors and by human activities. For example, it can be seen that in Turkmenistan human induced factors such as over-irrigation, heavy use of machinery, cultivation of unsuitable slopes, non-rotation of crops, as well as excessive use of nitrogenous fertilizer have all had a major contribution towards soil degradation. At present, 77 per cent of the lands currently in use or fit for use in Central Asian countries are experiencing vegetative cover degradation, 9.1 per cent are affected by irrigation caused salinization, 3.6 per cent by soil salinization due to Aral Sea desiccation, 5.9 per cent by water erosion, 1.5 per cent by soil drifting and 2.4 per cent by human caused desertification. The decrease in fertility of agricultural lands poses a serious threat to food security in the region. Marginal agricultural lands have been taken out of production in many areas, further reducing agricultural yields.

Desertification has become a pressing problem in the sub-region. The total area of desertified lands in Kazakhstan is over 66 per cent of its total territory. In Kyrgyzstan about 40 per cent of pastures are degraded, a large part of its arable land is subject to water and wind erosion. Turkmenistan fully lies in the zone of Central Asian deserts, and its northern territory is a part of the Aral Sea "ecological disaster". In the case of Uzbekistan, deserts and semi-deserts occupy some 80 per cent of the territory. Overgrazing and cutting of forests for firewood and other uses over the years, has led to a considerable reduction in the arboreal-shrub vegetation in the desert zone.

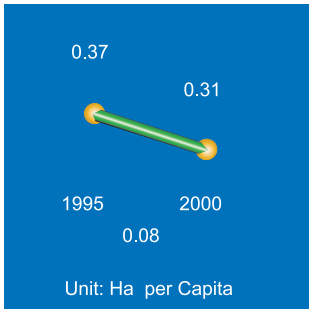
Forest area change in Central Asia was not drastic during the 1990s. Central Asia contains a well-developed network of nature reserves inherited from the USSR. Kyrgyzstan showed the largest rate of increase in forest cover with an annual increase of 2.5 per cent. Turkmenistan showed no change in forest cover during the last decade while the rest of the countries of Central Asia showed a positive change in forest cover. Turkmenistan had the highest percentage of land under forest cover (eight per cent) while Tajikistan had the lowest (2.8 per cent).

Mountainous forests and mountain ecosystems are particularly vulnerable to degradation. Anthropogenic pressure has resulted in reduction of forest density, degradation of soil and loss of biodiversity. All these factors eventually lead to desertification. In Tajikistan, as a result of industrialization and expansion of agricultural lands, only 20 – 25 per cent of natural forests remain untouched. Anthropogenic impacts are affecting even the sparsely populated mountains of Pamir and Tien-Shan, leading to degradation, particularly the loss of biodiversity and soil erosion.

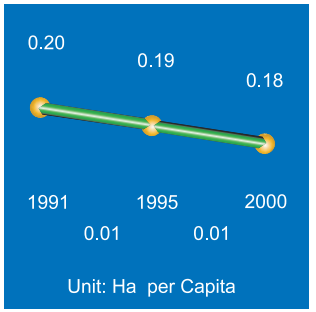


Land Indicator - Arable Land Per Capita

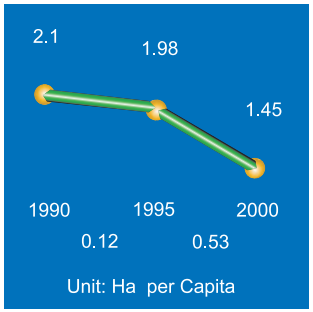
Turkmenistan



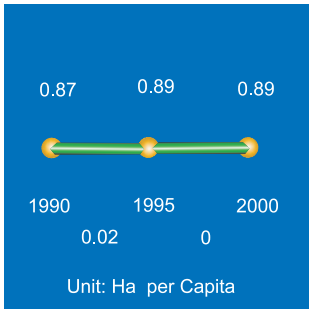
Uzbekistan



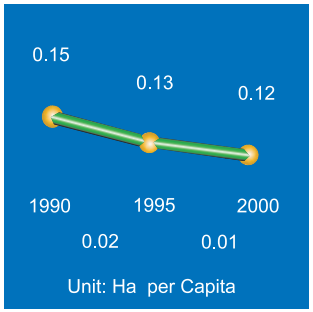
Kazakhstan



Kyrgyzstan



Tajikistan

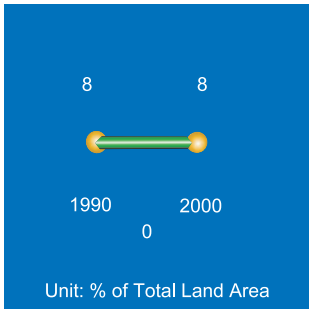


Note: Arable land per capita has decreased in all countries during the 1990s except Kyrgyzstan where it has slightly increased between 1995 and 2000. Kazakhstan had the highest arable land per capita despite having the most decrease in arable land over the decade. Arable land per capita was 1.45 ha/capita in Kazakhstan, and it was the lowest in Tajikistan at 0.12 ha/capita.

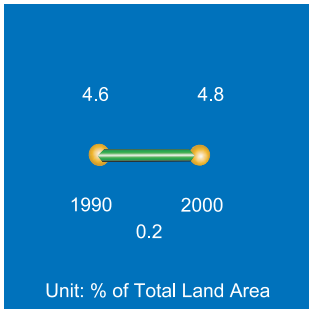
Source: SIC ISDC CA, 2003

Land Indicator - Forest Area

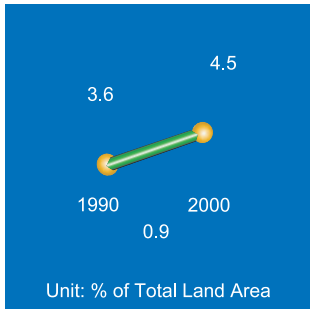
Turkmenistan



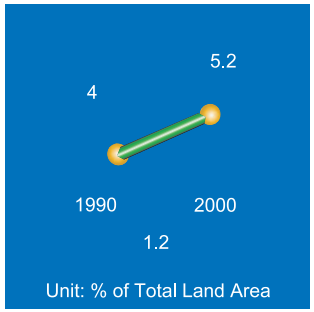
Uzbekistan



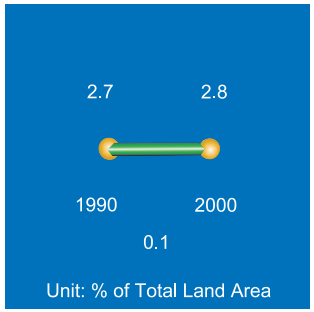
Kazakhstan



Kyrgyzstan

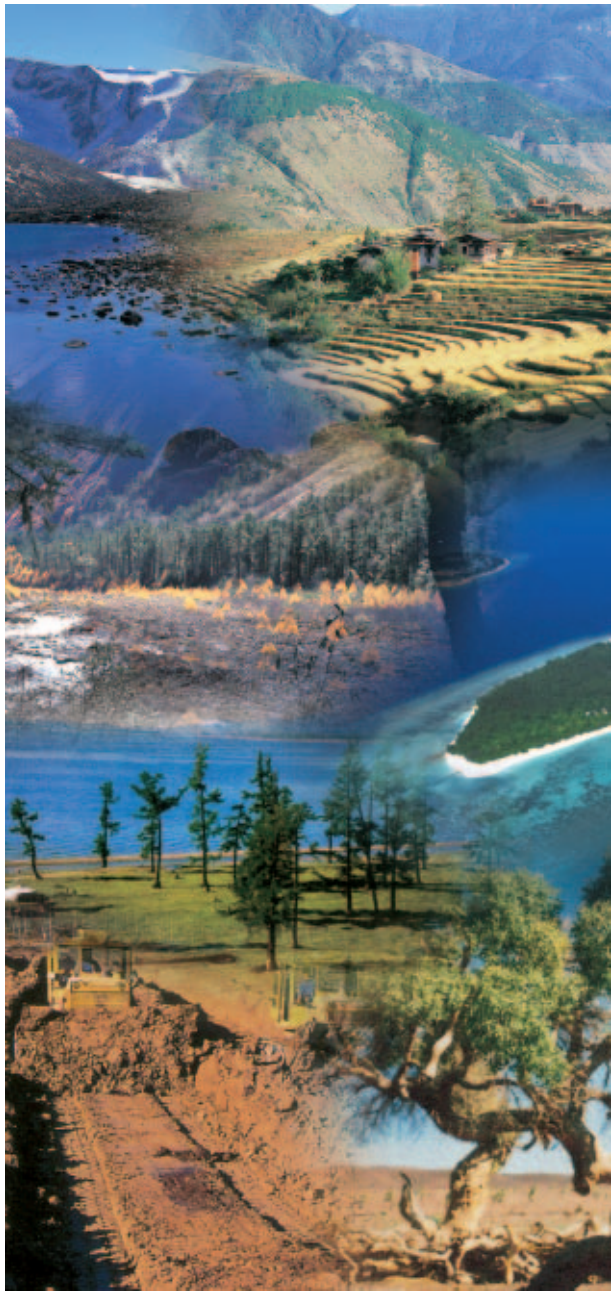


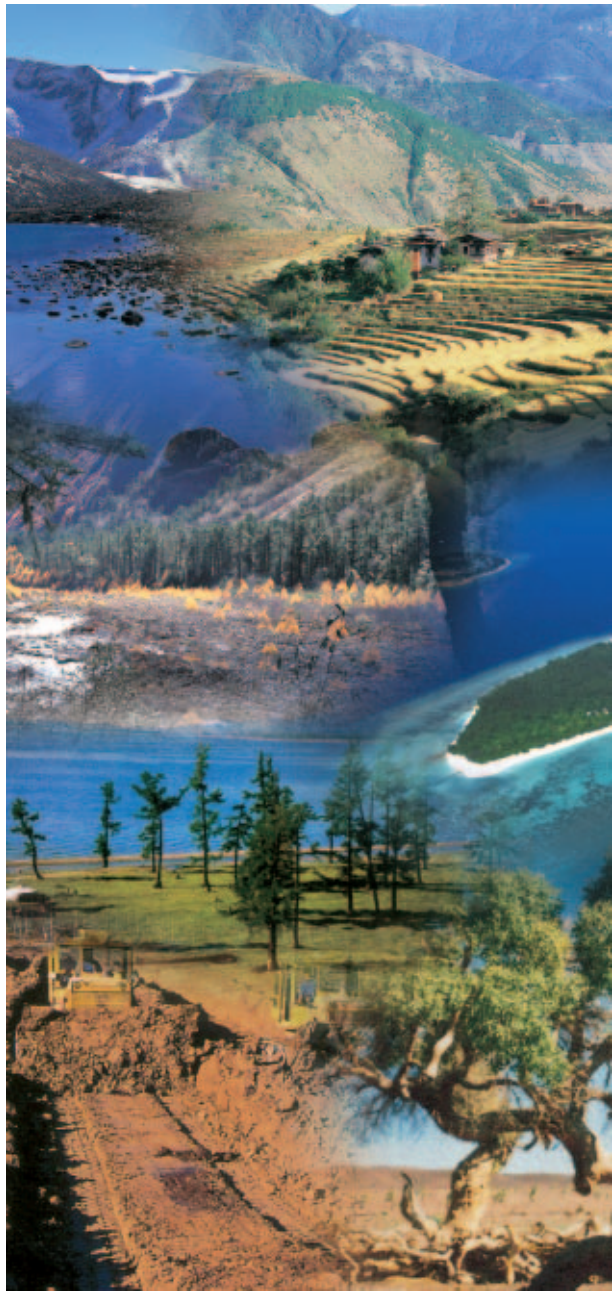
Tajikistan



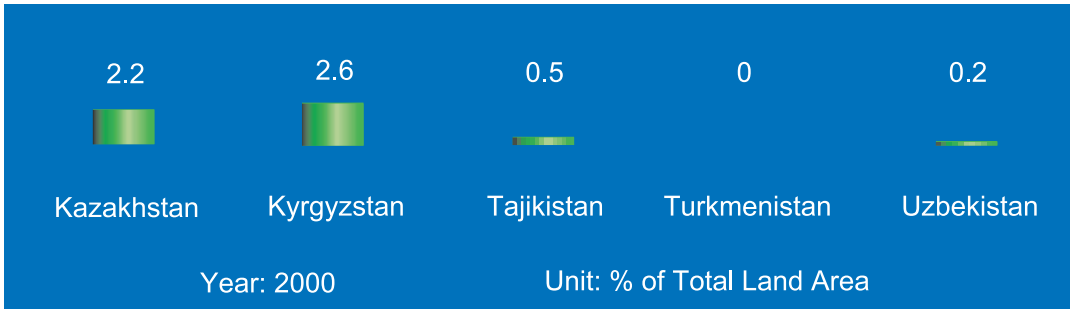
Note: In contrast to other sub-regions, forest area increased in Central Asia during the 1990s. The highest percentage of forest area was in Turkmenistan – eight per cent. This was higher than the other countries as for the rest of the countries, percentage of forest area was between five and two per cent. The lowest percentage of forest area was in Tajikistan at 2.8 per cent.

Source: Global Environmental Outlook Data Portal . http://geodata.grid.unep.ch. June - July 2003.





Land Indicator - Forest Cover Change



Note: In the year 2000, Kyrgyzstan showed the highest rate of forest cover change, with an annual increase of 2.6 per cent. Kyrgyzstan had the second highest rate of increase of 2.2 per cent. Uzbekistan and Tajikistan showed slight increase in forest cover change, while Turkmenistan had no change in forest cover during the last decade.

Source: Global Environmental Outlook Data Portal . http://geodata.grid.unep.ch. June - July 2003.

Water Indicator

Water quality and availability are sound indicators of the standard of living of a country. Clean, safe and adequate water supply and sanitation are necessary for the well-being of the population. Unsafe and dirty water puts the population at risk of disease and epidemic. Increasing population, urbanization and industrialization have put stress on water quality and availability. Industrial effluents and sewage loads have polluted rivers while withdrawal of water for agricultural and industrial sectors has reduced the quantity of water available.

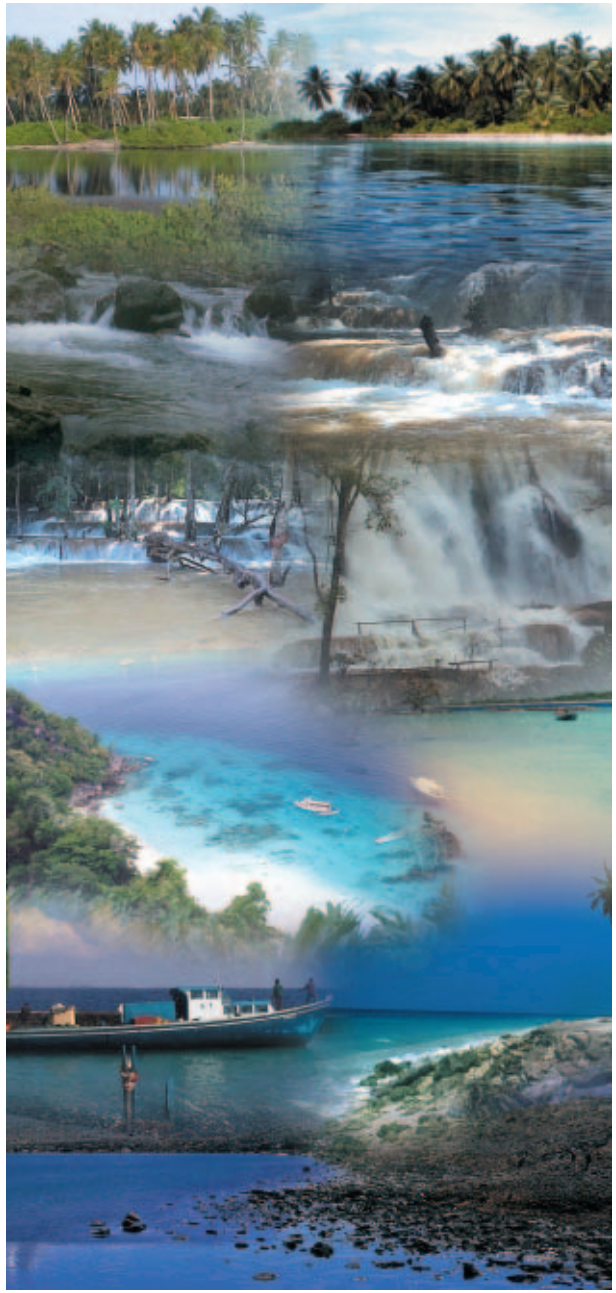
With regard to water resources, agricultural run-off is the main source of water pollution in the Central Asian sub-region. Pesticides, nitrogen and phosphate compounds are present in the drainage water, which are a threat to potable water and ecologically sensitive areas. It has been estimated that run-off from irrigated fields washes an average of 25 per cent of the nitrogen, five per cent of the phosphates and four per cent of the pesticides used in the field into the rivers and other water-bodies. The concentration in the run-off is five to ten times higher than the maximum allowable concentration.

BOD levels in the Syr Darya river in Uzbekistan, Irtysh river in Kazakhstan, Chui river in Kyrgyzstan, Pyandj and Isfara rivers in Tajikistan and Amur Darya river in Turkmenistan were within acceptable limits during the 1990s. Enough data was not available for proper assessment of water pollution trends in the major rivers of the region. The Caspian Sea is severely polluted from a concentration of the 100 or so rivers that enter it and the uncontrolled oil and gas extraction from it. Withdrawal of water from the Aral Sea has caused a catastrophic regression in the sea's water levels.

In 2001, the highest water withdrawal is in Uzbekistan at 58.1 billion cu m/annum, followed by Kazakhstan, Turkmenistan, Tajikistan and Kyrgyzstan at 10.09 billion cu m/annum. Between 1990 and 2001 water withdrawal noticeably decreased in Uzbekistan and Kazakhstan. No data was available for 1995. In 1998, per capita water availability was highest in Tajikistan followed by Kyrgyzstan, Turkmenistan, Kazakhstan and Uzbekistan. During the last decade, per capita water availability decreased in all Central Asian republics. No data was available for 1990 to 1995 for all Central Asian republics.

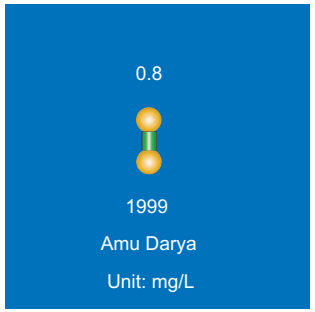
In 2000, the highest proportion of population with access to safe drinking water supply was Tajikistan at 97 per cent, followed by Kazakhstan, Kyrgyzstan, Uzbekistan and Turkmenistan. From 1995 to 1999 the percentage of population with access to safe drinking water dropped for Turkmenistan from 100 per cent in 1995 to 58 per cent in 1999. From 1995 to 2000, population with access to safe drinking water decreased in all Central Asian countries except for Uzbekistan where it increased.

Kazakhstan and Kyrgyzstan had 100 per cent access to improved sanitation in the year 2000. Over the decade the percentage population with access to improved sanitation increased in Uzbekistan and Tajikistan. Turkmenistan showed a downward trend with the percentage of population with access to improved sanitation decreasing over the decade. It was 91 per cent in 1997 and was only 58.6 per cent by 2000.

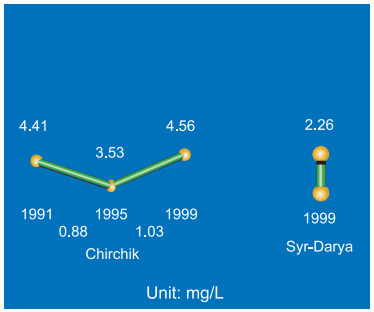


Water Indicator - BOD levels in Major Rivers

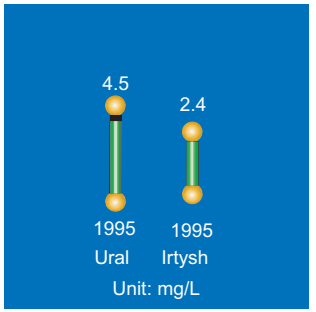
Turkmenistan



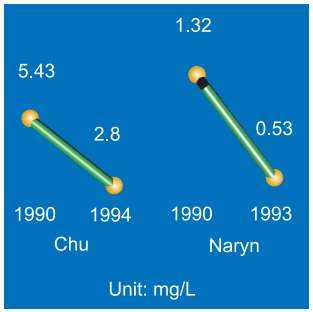
Uzbekistan



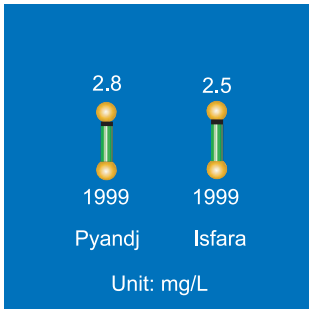
Kazakhstan



Kyrgyzstan



Tajikistan

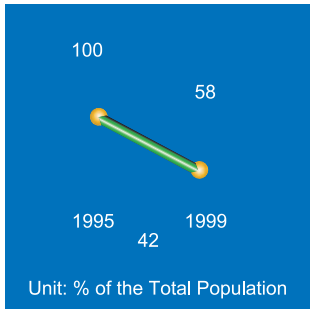


Note: Available data is not sufficient to make proper assessment of BOD levels in the major rivers of the region. Emphasis should be put on data generation and reporting. BOD levels have decreased in Chui river (Kyrgyzstan) and slightly increased in Chirchik river (Uzbekistan).

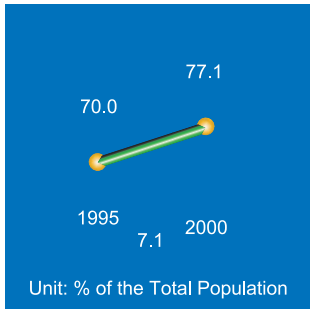
Source: Central Asian Environments in Transition. ADB 1997, Draft REAP CA 2002,

Water Indicator - Population with Access to Safe Drinking Water

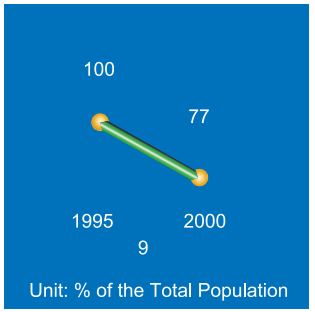
Turkmenistan



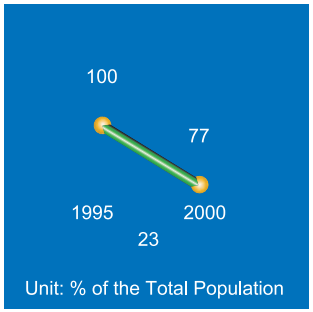
Uzbekistan



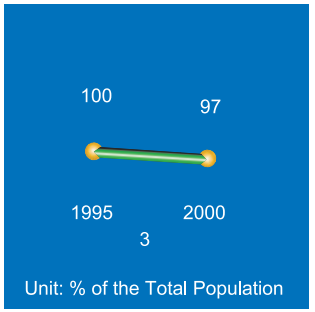
Kazakhstan



Kyrgyzstan

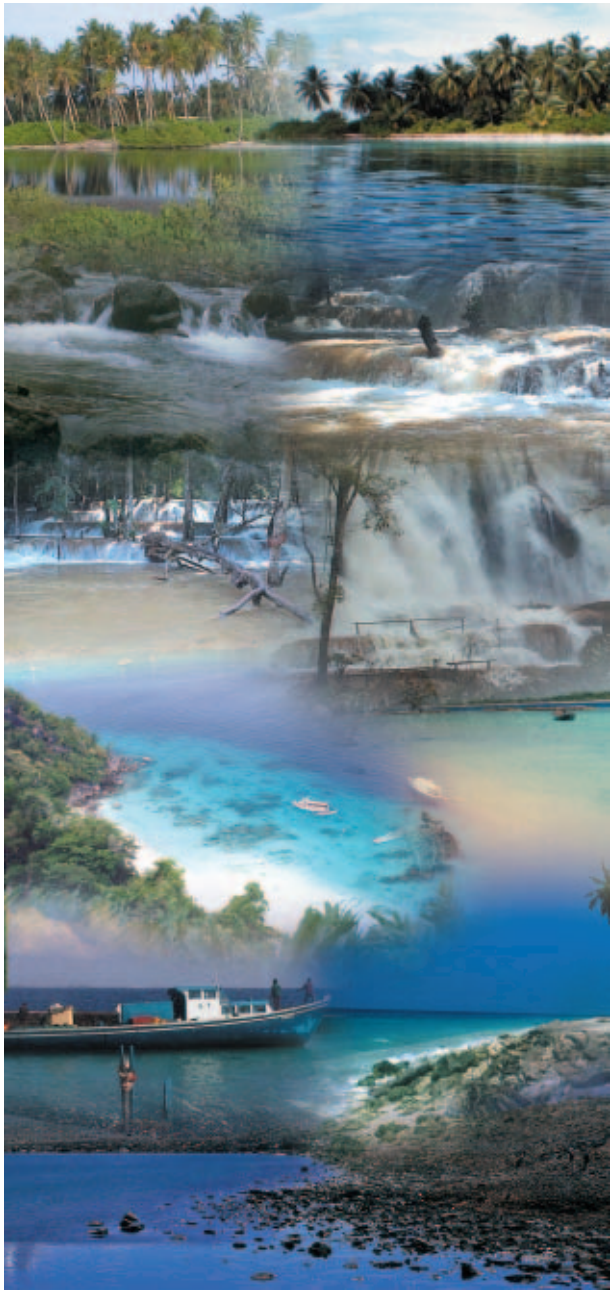


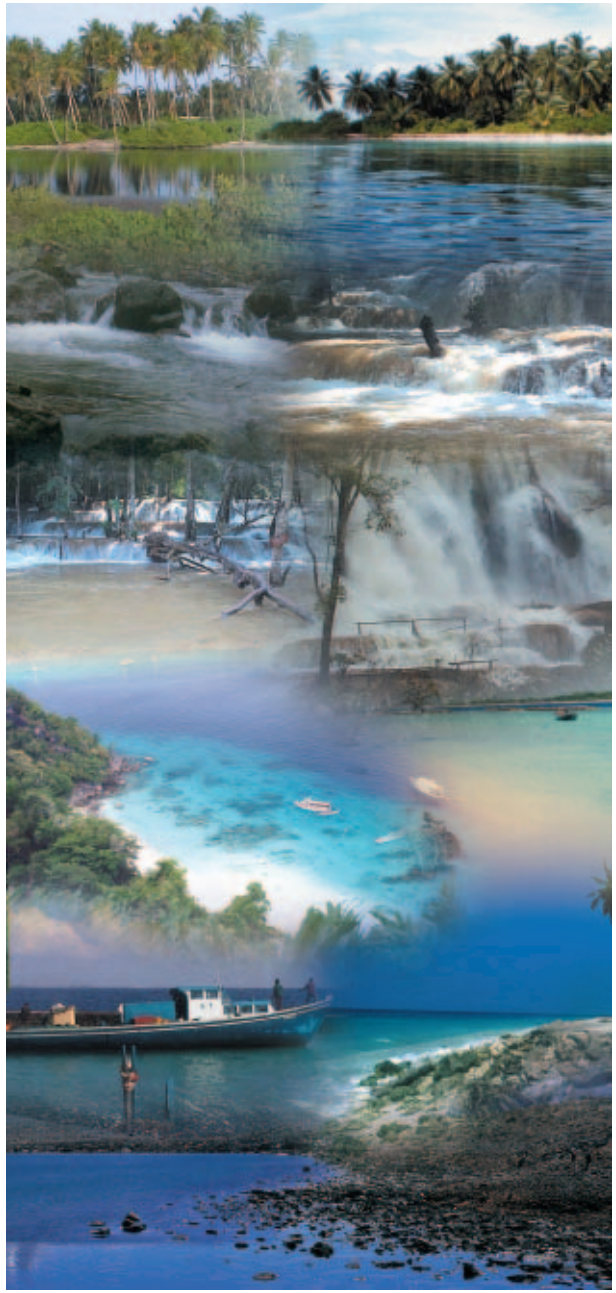
Tajikistan



Note: In the latter half of the 1990s, the percentage of population with access to safe water decreased in all countries except Uzbekistan where it increased. The decrease was highest in Turkmenistan, where the percentage reduced to almost half. In 2000, the highest percentage of population with access to safe drinking water was in Tajikistan – 97 per cent.

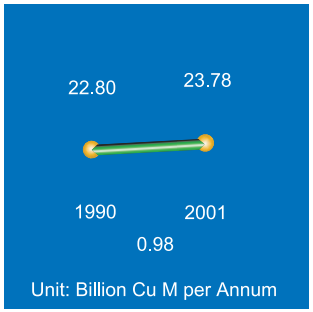
Source: Global Environmental Outlook Data http://geodata.grid.unep.ch. June -July 2003., United Nations Statistics Division. http://www.unstats.org. June 2003., World Bank 2000. http://www.developmentgoals.org. June 2003. SIC ICSD CA 2003.



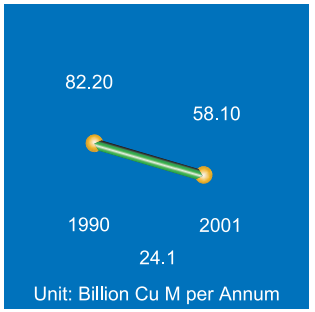


Water Indicator - Total Water Withdrawal

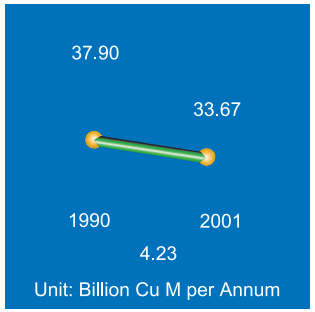
Turkmenistan



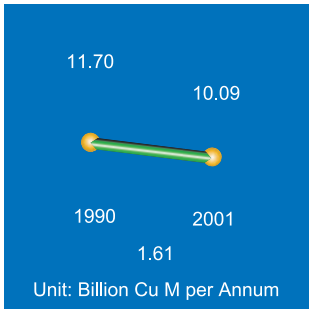
Uzbekistan



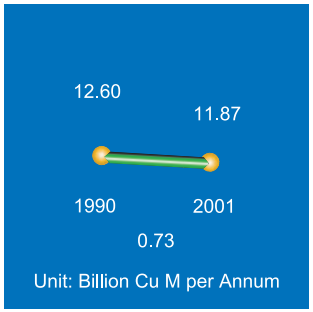
Kazakhstan



Kyrgyzstan



Tajikistan

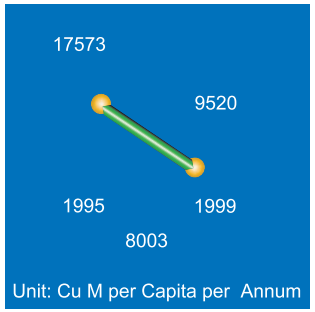


Note: During the 1990s, water withdrawal decreased in all countries except Turkmenistan where it increased slightly. The decrease was highest in Uzbekistan. In 2000, the highest water withdrawal was in Uzbekistan – 58.10 billion cu.m/ annum. The lowest water withdrawal was in Kyrgyzstan – 10.09 billion cu.m/annum.

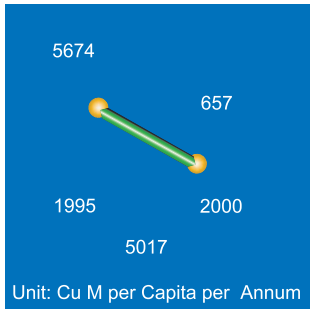
Source: World Resources Institute. 1992. World Resources 1992-93: A Guide to the Global Environment. Oxford University Press, Oxford, UK. 1992. http://geodata.grid.unep.ch (FAO), United Nation Environmental Program. (Citing the UN Food and Agriculture Organization). Global Environmental Outlook Data Portal . June-July 2003

Water Indicator - Total Water Availability

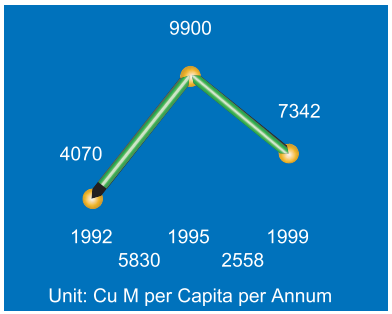
Turkmenistan



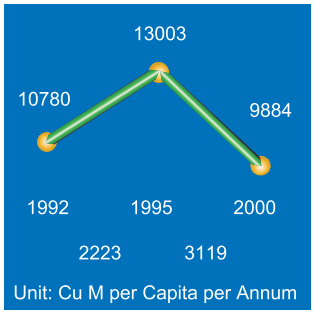
Uzbekistan



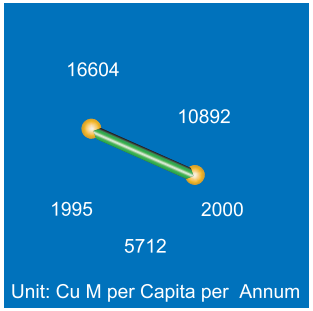
Kazakhstan



Kyrgyzstan

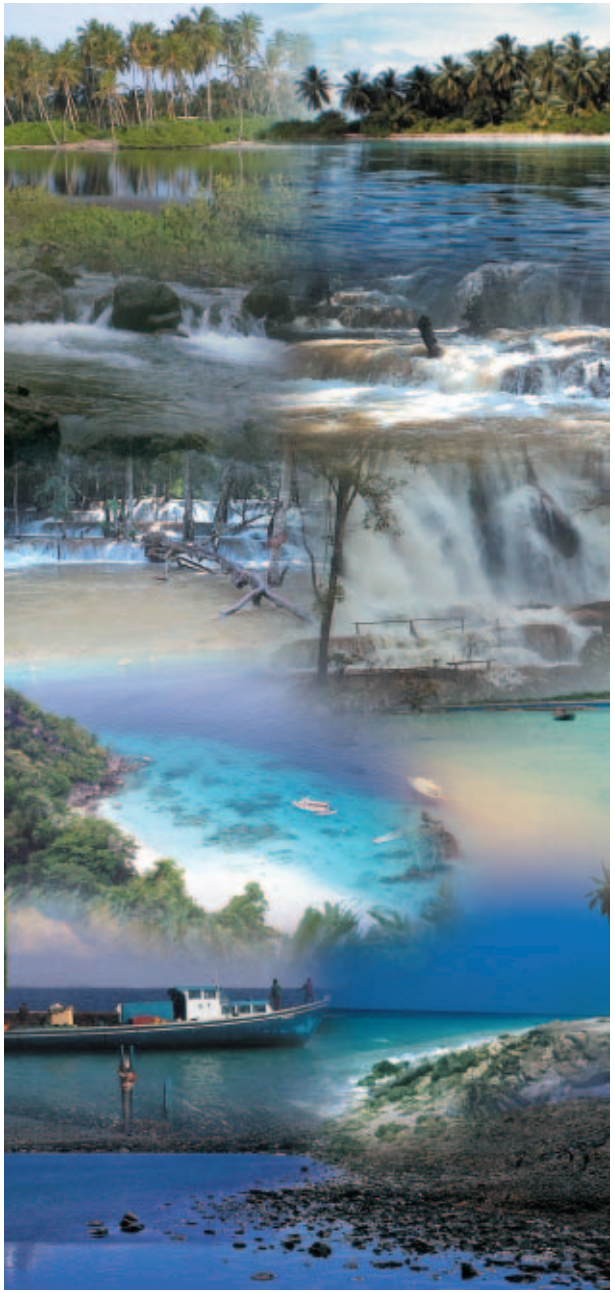


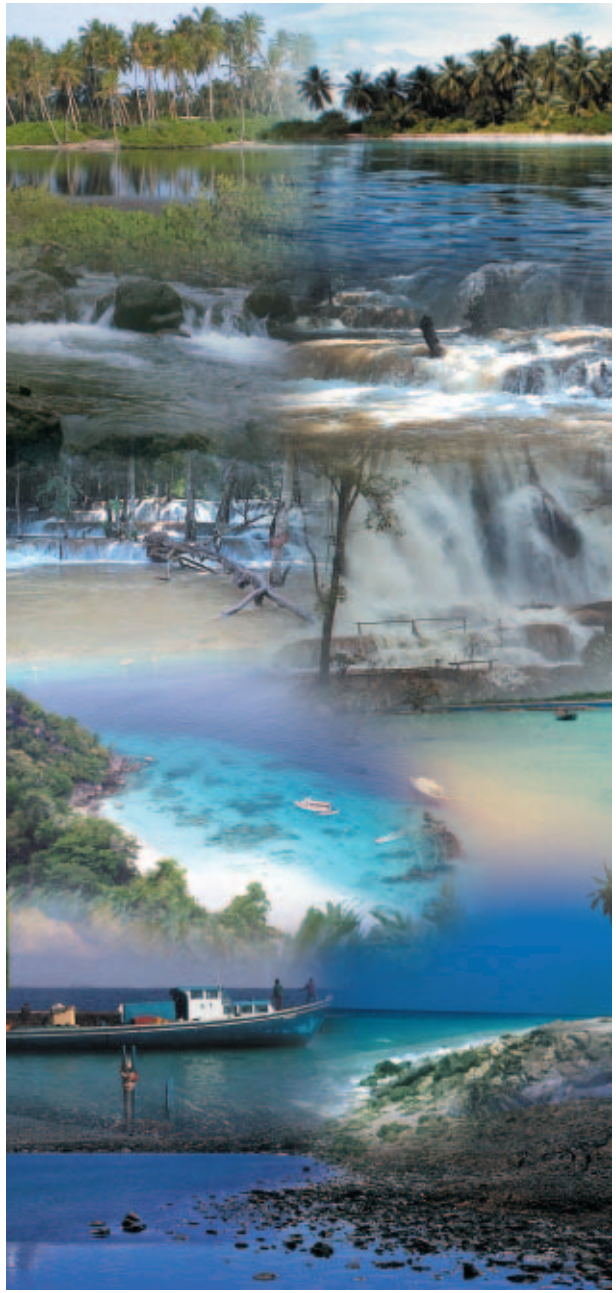
Tajikistan



Note: Per capita water availability decreased in Uzbekistan from 1995 – 2000, with there being an 88 per cent decrease in the water available in 2000 from the water available in 1995. Water availability has decreased in all countries by the end of the decade. Between 1992 and 1995, available water doubled in Kazakhstan, only to decrease in 1995 –2000.

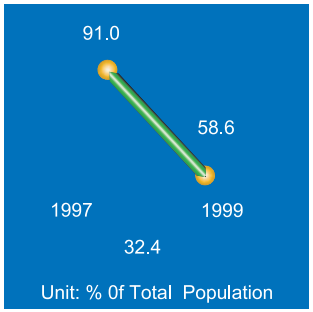
Source: World Resources 1998-99: A Guide to the Global Environment. Oxford University Press, Oxford, UK., World Bank. 1998, 2000, 2001. World Development Indicators.. (1999 data), United Nation Environmental Programme. (Citing the UN Food and Agriculture Organization). Global Environmental Outlook Data Portal . http://geodata.grid.unep.ch. June-July 2003 (2000 data)



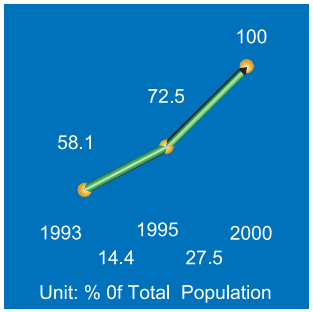


Water Indicator - Population with Access to Safe Sanitation

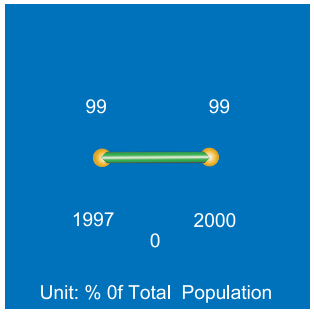
Turkmenistan



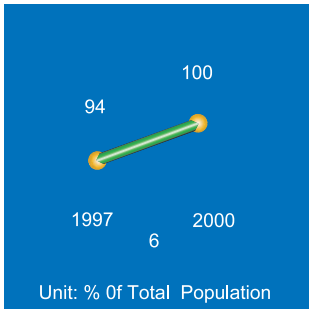
Uzbekistan



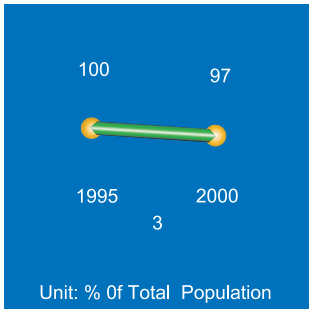
Kazakhstan



Kyrgyzstan



Tajikistan



Note: The sub-region except Turkmenistan showed increase in population with access to improved sanitation. By 2000, the coverage was total or nearly total in Uzbekistan, Kazakhstan, Kyrgyzstan and Tajikistan. In Turkmenistan, the percentage of population dropped from 91 per cent to only 58.6 per cent between 1997 and 2000.

Source: http://www.geodata.grid.unep.ch (WHO/UNICEF), United Nation Environmental Programme. (Citing the World Health Organization/UN Children's Fund). Global Environmental Outlook Data Portal . June-July 2003, World Resources Institute. 1996-97: A Guide to the Global Environment. Oxford University Press, Oxford, UK. 1997. SIC ICSD CA, Ashhabat, Turkmenistan. 2003

Air Indicator

Clean air is a necessary requisite for the healthy development of a country. Respiratory diseases, lung problems and other similar disorders are caused by atmospheric pollution. Also, atmospheric pollution is not confined by geographical borders but has transboundary effects. Thus, cooperation on atmospheric pollution issues is vital to mitigating atmospheric pollution.

Air pollution in industrial and urbanized areas, as well as transboundary air pollution is an important concern in Central Asia. In 1999, the volume of pollutant emissions from industrial, coal burning, inefficient power plants and transport sources in the five Central Asian countries amounted to 7.5 million tonnes. The maximum total volume of pollutant emissions came from Kazakhstan at 43.7 per cent, followed by Uzbekistan at 28.7 per cent, Turkmenistan at 22.9 per cent, Kyrgyzstan at 3.0 per cent and Tajikistan at 1.6 per cent.

In Uzbekistan, the worst polluted city is Navoi, which has major metallurgical, chemical and construction material production plans. In Kazakhstan, ten cities fall with the category of cities with high pollution. In Kyrgyzstan, Tajikistan and Uzbekistan a decrease in the volume of atmospheric pollution from stationary sources was accompanied by an increase in pollutant emissions from transport vehicles, while in Kazakhstan and Turkmenistan, discharges from motor transport accounted for less than 25 per cent of the total discharge.

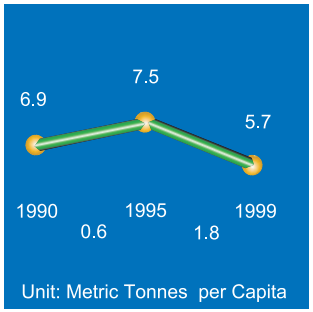
Kazakhstan had the highest per capita emission of CO_2 at 8.2 metric tonnes/capita, followed by Turkmenistan, Uzbekistan and Kyrgyzstan. Tajikistan had the lowest per capita emission of CO_2 of 0.8 metric tonnes/capita. Between 1990 and 2000 all countries of Central Asia showed decreasing trends in the per capita emission of CO_2. For Turkmenistan, CO_2 emissions peaked in 1995, but decreased thereafter.

In 1990, the largest net increase in NO_2 emissions occurred in Kazakhstan, followed by Uzbekistan and Turkmenistan. The lowest level of nitric oxide emissions occurred in Tajikistan. In 1995, emission of NO_2 increased in Uzbekistan and decreased in Kazakhstan and Turkmenistan. In 1990 – 95, Kazakhstan has the highest SO_2 emission in the sub-region, followed by Uzbekistan, Turkmenistan, Kyrgyzstan and Tajikistan. Concentrations of Total Suspended Particulate (TSP) in Kazakhstan's former capital and largest city – Almaty ranged from 270 to 175 µg/cu m between 1990 and 95; from 8 440 to 5 920 µg/cu m in the urban areas in Uzbekistan and from 400 to 800 µg/cu m in Bishkek (Kyrgyzstan). By the end of the decade, concentrations in Almaty and urban areas in Uzbekistan had decreased but increased two fold in Bishkek.

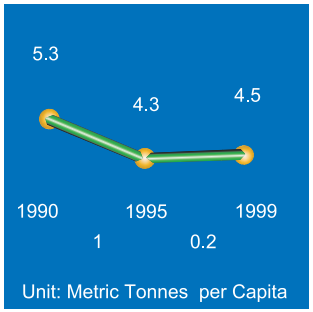
Countries of Central Asia have ratified and joined the main international conventions on the atmosphere such as "Framework Convention on Climate Changes", "Vienna Convention on Ozone Layer Protection" and "Montreal Protocol on Substances Destroying Ozone Layer".

Air Indicator - CO_2 emissions per capita

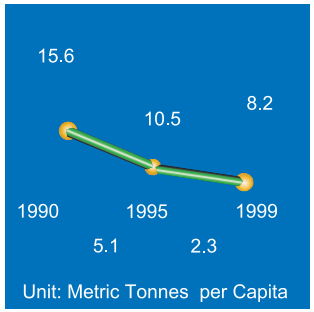
Turkmenistan



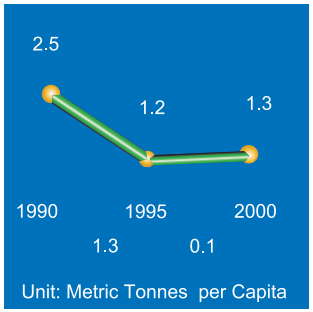
Uzbekistan



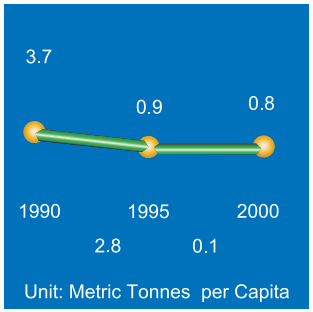
Kazakhstan



Kyrgyzstan



Tajikistan



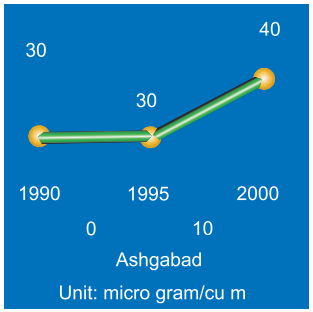
Note: Kazakhstan, which had the highest CO_2 emissions per capita in 1990, reduced its emissions by nearly half by 2000. Tajikistan has shown similar decrease in CO_2 emissions. Kazakhstan had the highest CO_2 emissions – 8.2 metric tonnes/capita while Tajikistan had the lowest – 0.8 metric tonnes/capita. Emissions have decreased for all countries

Source: United Nation Environmental Program. (Citing the Carbon Dioxide Information Analysis Center). Global Environmental Outlook Data Portal . June-July 2003, World Bank. Millennium Development Goals . June-July 2003, WRI 00-01, WRI 96-97

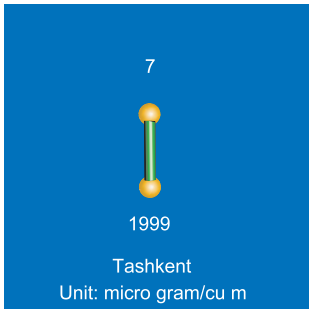
REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

Air Indicator - NO_2 Concentration

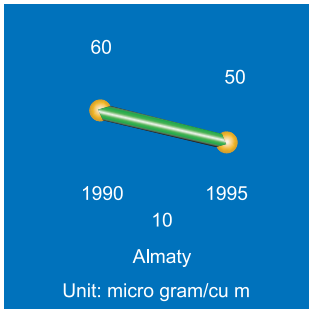
Turkmenistan



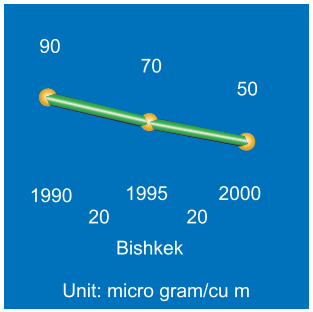
Uzbekistan



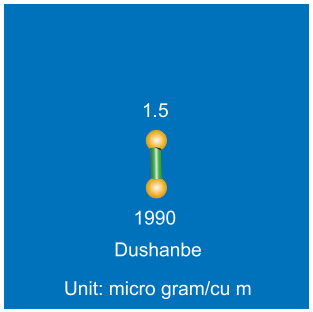
Kazakhstan



Kyrgyzstan



Tajikistan

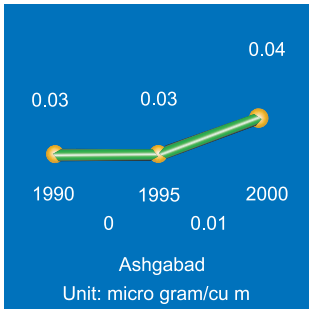


Note: Available data is not sufficient to make proper assessment. Emphasis needs to be put on data generation and reporting. Bishkek and Almaty have shown decrease in NO_2 concentration during the 1990s. NO_2 concentrations have increased Ashgabat (Turkmenistan).

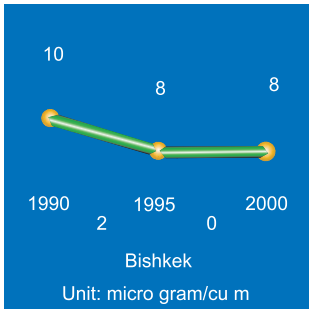
Source: United Nation Environmental Program. (Citing the National Institute of Public Health and the Environment (RIVM)). Global Environmental Outlook Data Portal . June-July 2003.

Air Indicator - SO_2 Concentration

Turkmenistan



Kazakhstan



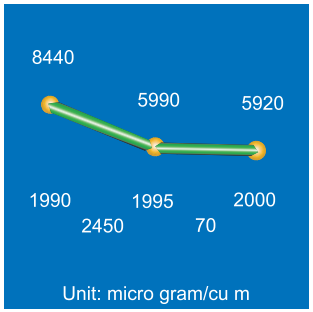
Note: Available data is not sufficient to make proper assessment. Emphasis needs to be put on data generation and reporting.

Source: United Nation Environmental Program. (Citing the National Institute of Public Health and the Environment (RIVM)). Global Environmental Outlook Data Portal . June › July 2003.

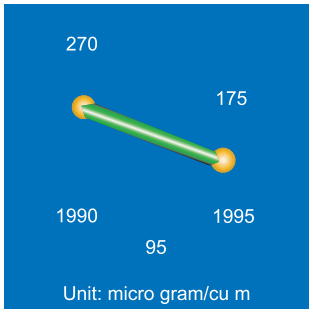
REGIONAL RESOURCE CENTRE FOR ASIA AND THE PACIFIC

Air Indicator - SPM Concentration

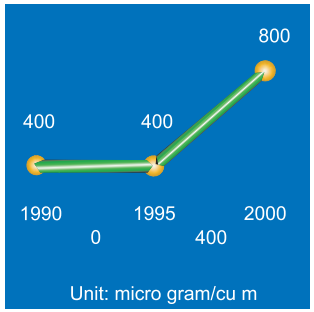
Uzbekistan



Kazakhstan



Kyrgyzstan

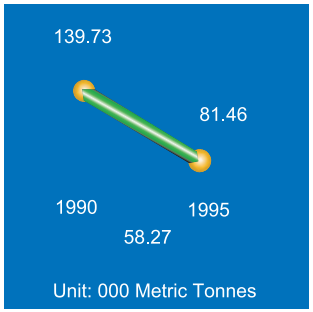


Note: Available data is not sufficient to make proper assessment. Emphasis needs to be put on data generation and reporting. From the available data, SPM concentrations in all the three countries are high, with Uzbekistan being significantly higher. SPM concentration decreased in Uzbekistan and Kazakhstan, while it doubled in Kyrgyzstan during the 1990s.

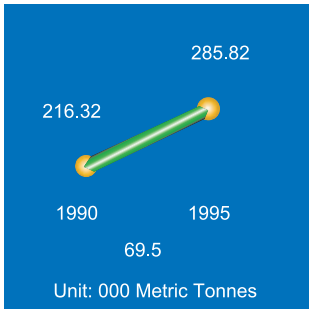
Source: World Bank. . http://www.worldbank.org/wbi/cleanair June 2003.

Air Indicator - NO_X Emissions

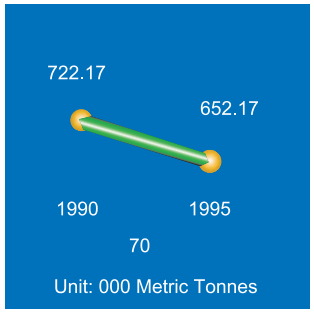
Turkmenistan



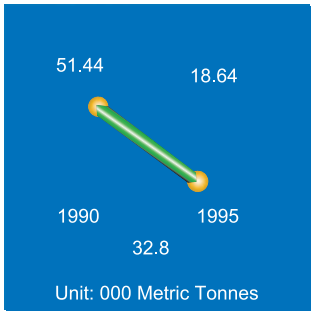
Uzbekistan



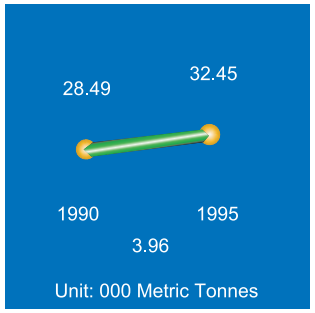
Kazakhstan



Kyrgyzstan



Tajikistan

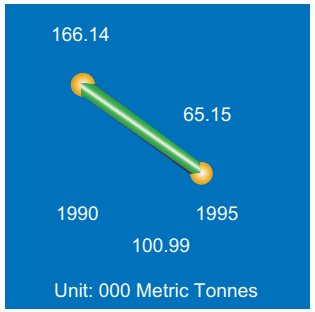


Note: NO_x emissions decreased for most of the countries of the region from 1990 to 1995. The decrease was the highest for Kyrgyzstan, followed by Turkmenistan. Kazakhstan had the highest NO_x emissions - 652.17 thousand metric tonnes. This is much higher than the NO_x emissions of the other countries of the region.

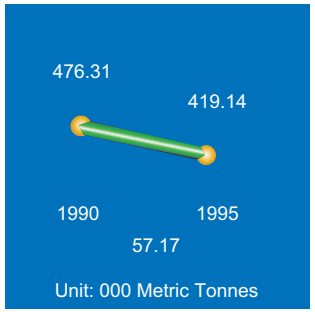
Source: GEO III Grid data UNEP

Air Indicator - SO_2 Emissions

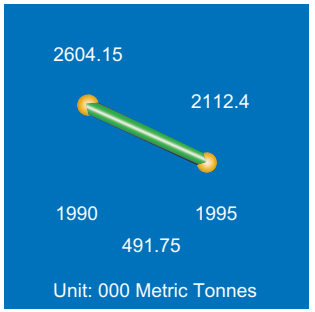
Turkmenistan



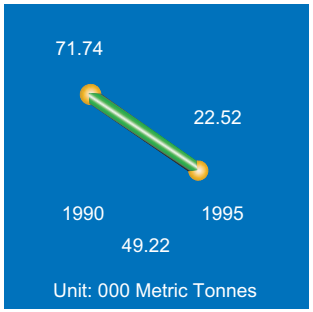
Uzbekistan



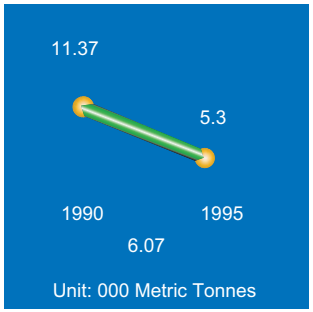
Kazakhstan



Kyrgyzstan



Tajikistan



Note: SO_2 emissions decreased for all the countries of the region from 1990 to 1995. Kazakhstan had the highest SO_2 emissions of 2112.4 thousand metric tonnes. This is much higher than the SO_2 emissions for the other countries – the lowest was in Tajikistan at 5.3 thousand metric tonnes. Exhaust from thermal power plants, industrial processes and vehicles are the main sources of SO_2 emissions.

Source: GEO III Grid data UNEP

Bio-diversity Indicator

This sub-region occupies the intersection of Europe and Asia. The region consists of northern taiga forests, large southern deserts, as well as the largest mountains in the former Soviet Union. Central Asia has a great diversity of ecosystems and species include more than 7 000 flowering plants, and in some areas up to twenty per cent of plant species are endemic. The region also has nearly a thousand species of vertebrates, including one hundred species of reptiles.

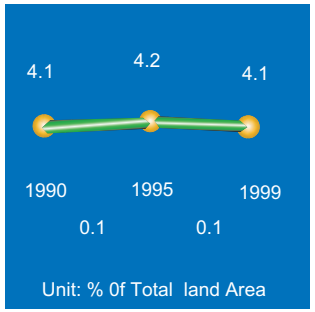
Environmental degradation in the region has lead to the degradation of the Aral Sea, once the world's fourth largest lake with a thriving fishery. Pollution of the Caspian Sea has lead to deterioration in the quality of the sea.

In 1999, the highest percentage of protected land was in Tajikistan and Turkmenistan, followed by Kyrgyzstan, Kazakhstan and Uzbekistan. Kyrgyzstan achieved notable progress in increasing the percentage of protected land over the last decade. The greatest threat to higher plants in the sub-region was in Kazakhstan. In 1997, 1.18 per cent of Kazakhstan's higher plan species were categorized threatened or vulnerable; in Tajikistan the percentage of higher plants exceeded one per cent, followed by Uzbekistan. The lowest rate was in Kyrgyzstan in 1997. The countries showed an increasing trend of threatened plants with the number increasing over the decade for all the countries.

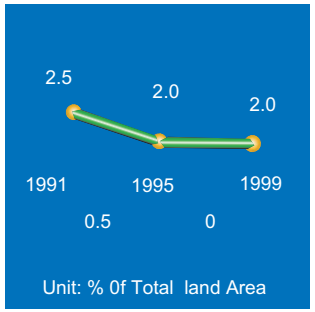
The highest number of threatened and vulnerable bird species was in Kazakhstan, followed by Tajikistan and the lowest rate was in Kyrgyzstan in 1996. The number of threatened mammals was highest in Turkmenistan in 1996, followed by Kazakhstan, Kyrgyzstan, Uzbekistan and Tajikistan. In 1994 – 96 the number of threatened mammals decreased in Uzbekistan while it increased in Kazakhstan, Kyrgyzstan and Turkmenistan.

Bio-diversity Indicator - Protected Area

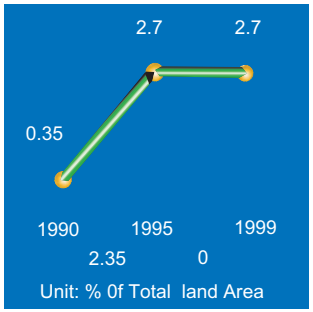
Turkmenistan



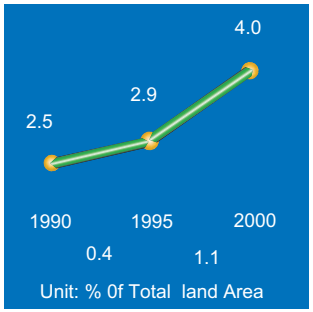
Uzbekistan



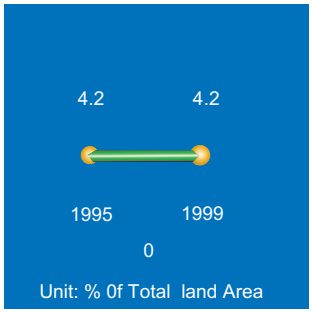
Kazakhstan



Kyrgyzstan



Tajikistan

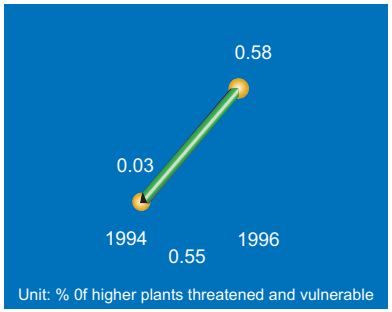


Note: Protected area decreased in Uzbekistan but increased significantly in Kazakhstan and Kyrgyzstan during the 1990s. The highest percentage of protected area was in Tajikistan – 4.2 per cent and the lowest was in Uzbekistan – 2 per cent.

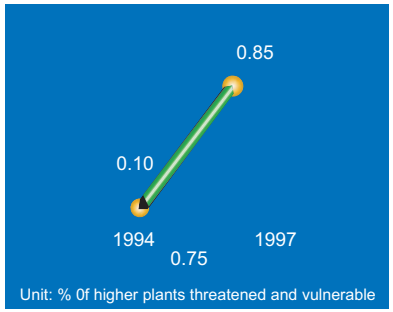
Source: World Bank. 1998. World Development Indicators. (1994 data), World Bank. Millennium Development Goals . June-July 2003. (1995, 1999 data), World Bank. 2000. World Development Indicators. (1996 data).

Bio-diversity Indicator - Threatened Plants

Turkmenistan



Uzbekistan



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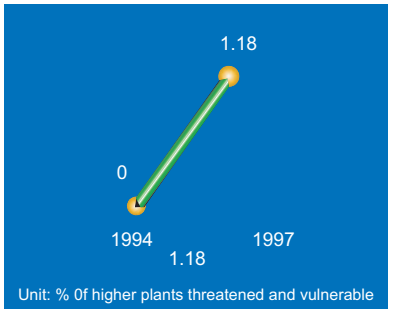

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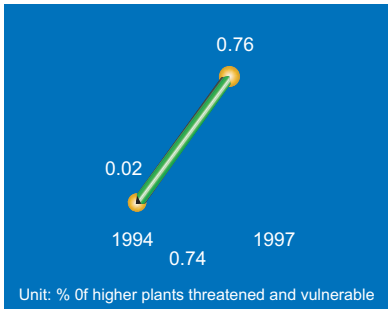

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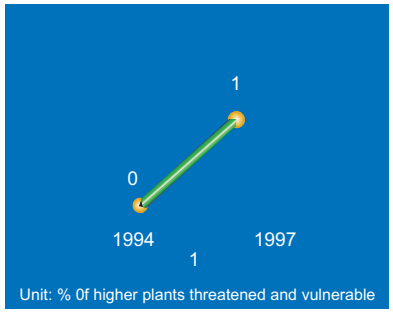
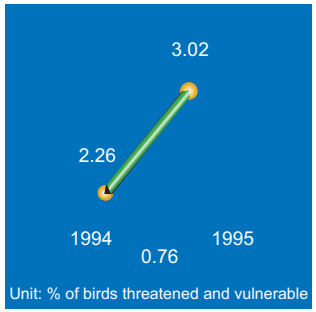


Note: Kazakhstan had the highest percentage of threatened plants. The percentage of threatened plants increased for all countries of the region.

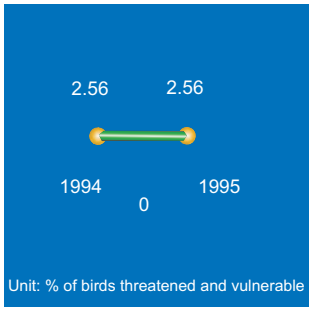
Source: World Bank. 1998, 2000. World Development Indicators. 1994, 1997.

Bio-diversity Indicator - Threatened Birds

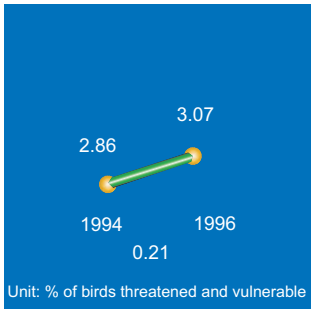
Turkmenistan



Uzbekistan



Kazakhstan



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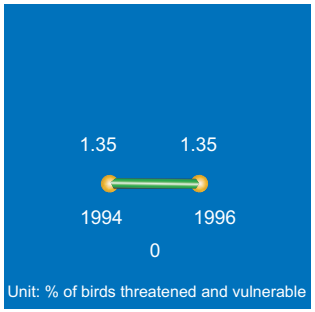

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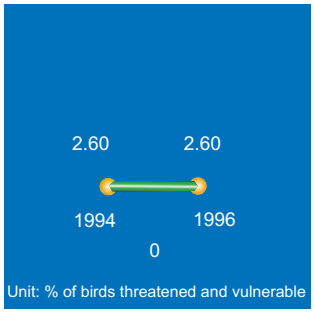
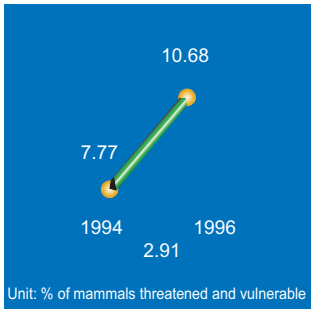


Note: Threatened birds, as a percentage of total species was the highest in Kazakhstan at 3.07 per cent. Turkmenistan came close with 3.02 per cent. There was an increase in the percentage of threatened birds in Kazakhstan and Turkmenistan. For Uzbekistan, Tajikistan and Kyrgyzstan, the percentage of threatened birds remained constant.

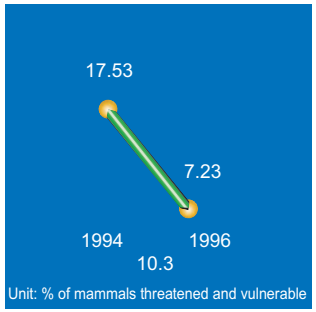
Source: World Bank. 1998, 2000. World Development Indicators. 1994, 1996.

Bio-diversity Indicator - Threatened Mammals

Turkmenistan



Uzbekistan



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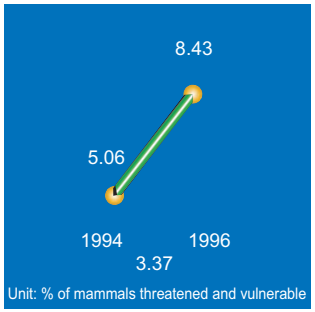

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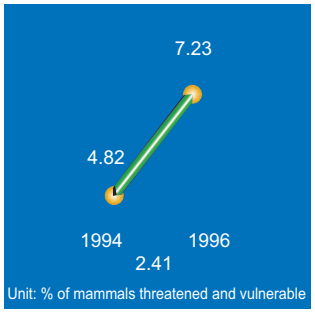

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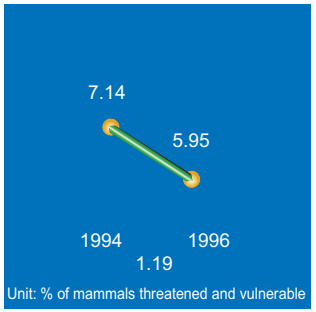
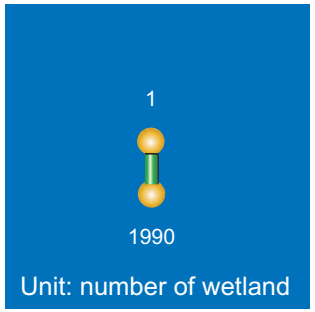


Note: Uzbekistan saw a significant decrease in the percentage of threatened mammals. The number more than halved between 1994 and 1996. Threatened mammals, as a percentage of total species was the highest in Turkmenistan.

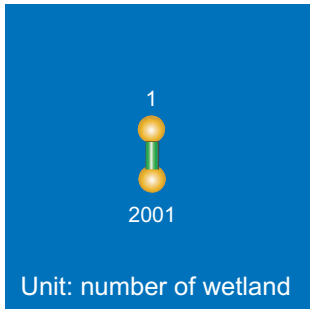
Source: World Bank. 1998, 2000. World Development Indicators. 1994, 1996.

Bio-diversity Indicator - Wetlands of International Importance

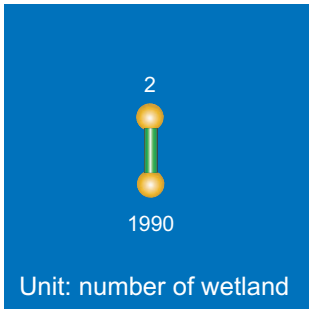
Turkmenistan



Uzbekistan



Kazakhstan



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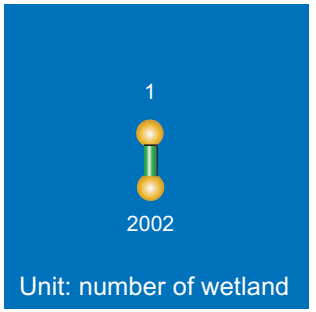

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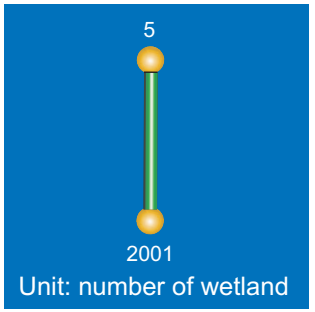

Note: Available data is not sufficient to make proper assessment. Emphasis needs to be put on data generation and reporting. From the available data it is seen that Tajikistan has the highest number of wetlands of international importance, in the region.

Source: http://www.ramsar.org

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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.é

APPENDIX II

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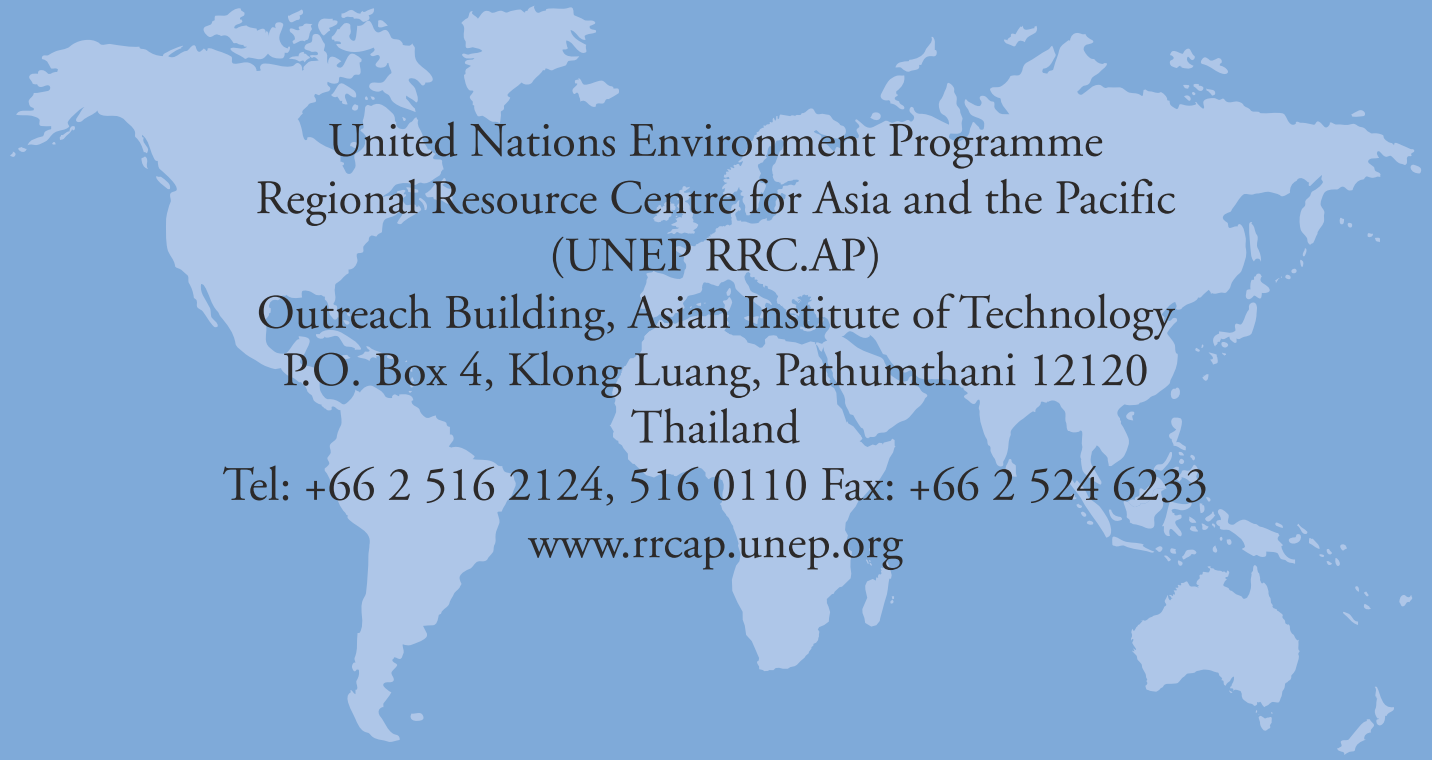

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