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## NOTE

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# *Preface*

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The Environmental Performance Review of Uzbekistan began in May 2000 (first preparatory mission) followed by a second preparatory mission in December 2000, during which the final structure of the report was established. Thereafter, the review team of international experts was constituted. It included experts from Armenia, Croatia, Denmark, Estonia, France, Germany, Poland and the Russian Federation together with experts from the secretariat of the United Nations Economic Commission for Europe (UNECE) and the European Centre for Environment and Health of the World Health Organization (WHO/ECEH).

The review mission took place from 26 March to 6 April 2001. A draft of the conclusions and recommendations as well the draft EPR report were submitted to the country for comments in August 2001. In September 2001, the draft was submitted for consideration to the Ad Hoc Expert Group on Environmental Performance. During this meeting, the Expert Group discussed the report in detail with representatives of the Uzbek Government, focusing in particular on the conclusions and recommendations.

The EPR report, with suggested amendments from the Expert Group, was then submitted for peer review to the UNECE Committee on Environmental Policy at its eighth annual session in Geneva on 25-26 September 2001. A high-level delegation from the Government of Uzbekistan, including the Chairman of the State Committee for Nature Protection, participated in the peer review. The Committee adopted the recommendations as set out in this report. The review of Uzbekistan's environmental performance is evidence of the efforts that the Government of Uzbekistan is making towards overall improvement of environmental management, including the development and implementation of new national legislation adapted to European standards. However, this process is restrained by the difficult economic situation in the country as it attempts to move toward a market economy. Attention was given during the reviews to a number of issues, and especially to those related to agriculture and irrigation, the use and quality of water resources, energy, economic instruments and financing, integration and the policy framework. The report stresses that the environment should become a priority issue and an area of fruitful cooperation among all ministries and other key partners that have competencies and responsibilities in environmental protection and management.

The UNECE Committee on Environmental Policy and the UNECE review team wish the Government of Uzbekistan success in carrying out the tasks before it to meet its environmental objectives and policy, including implementation of the recommendations aiming at the support and promotion of overall environmental protection and improvement of living standards.

UNECE would also like to express its deep appreciation to the Governments of Denmark, the Netherlands, and the United Kingdom for their support to the Environmental Performance Review Programme and to the European Centre for Environment and Health of the World Health Organization (WHO/ECEH) for its participation in the Uzbekistan review mission and the preparation of this report.

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The preparatory mission for the project took place from 5 to 6 May 2000 and from 11 to 12 December 2000. The review mission was organized from 26 March to 6 April 2001.

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**ABBREVIATIONS, SYMBOLS AND MEASURES**

ADB	Asian Development Bank
ASBP	Aral Sea Basin Programme
BAT	Best available technology
BOD	Biochemical oxygen demand
CEEC	Central and Eastern European Countries
CFC	Chlorofluorocarbon
CHP	Combined heat and power plant
CIS	Commonwealth of Independent States
CITES	Convention on the Trade in Endangered Species
CPC	Cleaner Production Centre
CT	Cleaner technology
DDE	Dichlorodiphenyl dichloroethylene
EBRD	European Bank for Reconstruction and Development
EIA	Environmental impact assessment
EIS	Environmental impact statement
EMEP	Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
EPR	Environmental Performance Review
ESCAP	Economic and Social Commission for Asia and the Pacific
EU	European Union
FCCC	United Nations Framework Convention on Climate Change
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse gases
GIS	Geographic information system
GOST	Former USSR standard organization
HCFC(s)	Hydrochlorofluorocarbons
HCH	Hexachloro cyclohexane
IAEA	International Atomic Energy Agency
ICAS	Interstate Council for the Aral Sea Problems
ICRP	International Commission on Radiological Protection
ICWC	Interstate Commission for Water Coordination
IEA	International Energy Agency
IFAS	International Fund for the Aral Sea
IFRC	International Federation of Red Cross and Red Crescent Societies
IMF	International Monetary Fund
IMO	International Maritime Organization
ISO	International Organization for Standardization
IUCN	World Conservation Union
JSC	Joint-stock company
JV	Joint venture
LNP	Law on Nature Protection
LPG	Liquefied petroleum gas
MARPOL	Convention for the Prevention of Pollution from Ships
NBSAP	National Biodiversity Strategy and Action Plan
NEAP	National Environmental Action Plan
NEHAP	National Environmental Health Action Plan
NGO	Non-governmental organization
NMVOCs	Non-methane volatile organic compounds
ODS	Ozone-depleting substance
OECD	Organisation for Economic Co-operation and Development
OSCE	Organization for Security and Cooperation in Europe
PAHs	Polyaromatic hydrocarbons
PCB(s)	Polychlorinated biphenyls

PCDD	Polychlorinated dibenzo-p-dioxins
PCDF(s)	Polychlorinated dibenzofurans
PHARE	Assistance for Economic Restructuring in the countries of Central and Eastern Europe
PM	Particulate matter
POP(s)	Persistent organic pollutant
REC	Regional Environmental Centre for Central Asia
SMEs	Small and medium-sized enterprises
TACIS	Technical Assistance to the Commonwealth of Independent States and Georgia
TSP(s)	Total suspended particulates
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Funds
UNIDO	United Nations Industrial Development Organization
UNV	United Nations Volunteers
US\$	United States dollar
VOC(s)	Volatile organic compound
WHO	World Health Organization
Olij Medlis	Parliament
IFAS	International Fund for the Aral Sea
MAC	Maximum Allowable Concentrations
SEE	State ecological expertise
Uzbekneftegas	State Governmental Oil Company
PIP	Public Investment Programme
WMO	World Meteorological Organization
NATO	North Atlantic Treaty Organization
ECO	Economic Cooperation Organization
SCNP	State Committee for Nature Protection
Goskomgeologiya	State Committee for Geology and Natural Resources
Glavhydromet	State Administration on Hydrometeorology
Gosgorthechnadzor	Supervises Safety of Mining
WB	World Bank
ODS	Ozone-depleting Substances
CFC	Chlorofluorocarbon
WWF	World Wildlife Fund
MAB	Man and the Biosphere Program
EAP	Environmental Action Plan
SPECA	UN Special Programme for the Economics of Central Asia
SES	M of Health; Sanitary and Epidemiological Service
API	Atmospheric Pollution Index
Uzgosstandards	Council of Standardization
Khokimiayty	Municipalities
VODGEO	Tashkent Scientific Research Institute
MSW	Municipal Solid Waste
DDT	Dichlorodiphenyltrichloroethane
PIU	Project Implementation Unit
IUCN	World Conservation Union
BCNSAP	Biodiversity Conservation National Strategy and Action Plan
OSCE	Organization for Security and Cooperation in Europe
GAP	Gross Agricultural Product
SANIGMI	Hydrometeorological Research Institute
CDC	Centre for Disease Control
UNFPA	United Nations Population Fund
EPHIS	Ecology and Public Health Information System

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**SIGNS AND MEASURES**

-	nil or negligible
.	decimal point
..	not available
cap	capita
cm <sup>2</sup>	square centimetre
eq	equivalent
g	gram
Gcal	gigacalorie
GJ	gigajoule
GWh	gigawatt-hour
h	hour
ha	hectare
Hz	hertz
kg	kilogram
km	kilometre
km <sup>2</sup>	square kilometre
kt	kilotonne
kV	kilovolt
kW <sub>el</sub>	kilowatt (electric)
kW <sub>th</sub>	kilowatt (thermal)
l	litre
m	metre
m <sup>3</sup>	cubic metre
mg	milligram
min	minute
ml	millilitre
mm	millimetre
MW	megawatt
MW <sub>el</sub>	megawatt (electric)
MWh	megawatt-hour
MW <sub>th</sub>	megawatt (thermal)
°C	degree Celsius
s	second
t	metric tonne
toe	ton oil equivalent
TWh	terawatt-hour
y	year

## Currency

Monetary unit: Sum

Exchange rates: Annual average

Year	1 US\$
1994	9.96
1995	29.81
1996	40.15
1997	66.43
1998	...
1999	124.64
2000	236.58

*Source:* Economic Survey of Europe 2001, UNECE.

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# INTRODUCTION

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## I.1 Geography

The Republic of Uzbekistan is a landlocked country situated in the middle of Central Asia. It shares borders with Kazakhstan (2,203 km), Kyrgyzstan (1,099 km), Tajikistan (1,161 km), Afghanistan (137 km) and Turkmenistan (1,621 km). The map of Uzbekistan is presented on Figure 0.1.

The territory of Uzbekistan covers 447,000 km<sup>2</sup> of which 22,000 km<sup>2</sup> is water. The Aral Sea (area in 1998, 28,687 km<sup>2</sup>) in the Northwest of the country is divided almost equally between Uzbekistan and Kazakhstan. Uzbekistan is part of the Aral Sea basin. Two rivers, the Amu Darya (length 2,580 km) and the Syr Darya (length 2,212 km), are replenishing the Sea.

Plains cover more than 80% of Uzbekistan's territory. In the south these plains meet the mountains. This mountainous area is known for its seismic activity with strong earthquakes up to 10 on the Richter scale. The lowest point of the country (Sariqarnish Kuli 12 m below sea level) is in the west, and the highest (Adelunga Toghi 4,301 m), in the southeast.

The plains consist of deserts and steppes, with many traversing rivers. The plains area has a continental climate with hot and dry summers and short, cold winters. Temperatures between day and night, as well as between summer and winter, vary between extremes. The coldest winter month is January when the temperature in the north sometimes drops to -8°Celsius, while in the extreme south, the temperature usually stays above zero (2.8°Celsius, on average). The temperature during the winter, however, may drop to as low as -38°Celsius.

The hottest summer month is July, and, in mountainous areas, July and August. The average temperature during this period in the plains and the foothills is 25–30°Celsius, and in the south 32°Celsius. The summer temperature of 42 - 47°Celsius is a common phenomenon on the plains

and in the foothills. In the desert region the air temperature during warmer months may reach more than 50°Celsius.

Average rainfall on the plains is between 100-200 mm, which is lower than the rate of evaporation. Therefore dry, hot air combined with high evaporation lead to rapid mineralization of soils suffering from inadequate drainage. Plains and foothills also have strong, dry hot winds, which contribute to land erosion.

The territory of Uzbekistan is poor in forest resources. The area occupied by forests on sandy soils, mountain forests, planted forests, and forest plantations in the flood plains constitutes 3% of the territory of Uzbekistan.

Forests and meadows with rich flora and fauna cover mountain areas where annual average rainfall is sometimes over 600 mm. The valleys, of which Fergana valley is the largest, are characterized by a mixed plains and mountain biota. Population density in valleys is high; from an environmental perspective this is a factor that requires keen attention since the conditions for waste disposal are unfavourable.

## I.2 Population and social conditions

Uzbekistan's population in 2000 was 24,582,000 and growing at a rate of 2-2.5% a year. It has the largest population of the Central Asian Republics. Over the last three decades population has increased by almost 12 million persons. With over 100 different nationalities living in the country Uzbekistan is an ethnically diverse country, although the majority of the population is Uzbek (75.8%), followed by Russian (6.0%), Tajik (4.8%) and Tatar (1.6%). The official language is Uzbek and main religion Islam; the population is predominantly Sunni Muslims.



**Figure I.1: Map of Uzbekistan**  
 Source: National Environmental Action Plan



Population density varies greatly due to the specific natural features like mountains or arid deserts of the country. The population is mainly concentrated in the oases. On average, population density is 53 persons per km<sup>2</sup>, but density varies from 452 people per km<sup>2</sup> in Andijan *oblast* (province) to 6.5 persons per km<sup>2</sup> in Navoi *oblast*.

Life expectancy at birth (68.7 in 1998) is relatively high, infant mortality is low (20.2 per 1,000 newborn in 1999) and the literacy rate (98%) impressive when compared to countries with a similar GDP level (US\$ 550 in 2000). There are, however, areas where environmental pollution negatively affects the health of the population. Potential problems may arise as well from the high birth rate and when a significant share of the young population enters employment age.

### **I.3 Administrative, institutional and legal structures**

The Republic of Uzbekistan consists of the Republic of Karakalpakstan and 12 *oblasts*. These are subdivided into 163 *rayons* (districts) and 118 towns. The capital of Uzbekistan is Tashkent. According to the Constitution adopted in 1992 the head of state is a President elected by direct universal and secret ballot for a term of five years. The President is the head of the Cabinet of Ministers and wields executive power. The unicameral Parliament (Oliy Majlis) with 250 deputies has the legislative power. The key executive power in environmental protection is vested in the State Committee for Nature Protection.

### **I.4 Economic development**

Uzbekistan is engaged in a transformation process of a centralised planned economy to a market orientated system. Transformation has not been easy, but key economic figures have stabilised and began to improve after 1995 (see Table 0.1).

Immediately following independence, the country suffered a number of economic difficulties similar to those affecting other newly independent States, including the loss of markets and subsidies from the former Soviet Union, disruptions in trade and

payments, inflation and declining output. It was heavily dependent on cotton monoculture and imports of essential food and energy products.

At this time, the Government established economic policies that favoured efforts to support state enterprises and shield consumers from inflation through a combination of state subsidies, price controls and wage increases. These measures managed to hold the GDP decline between 1991-1994 to 17%, a substantially lower decrease than the average among newly independent States of 40%. In 1994, the Government's approach became untenable, however, when Uzbekistan left the Russian rouble zone.

In 1994 the inflation rate of the transitional currency "sum coupon" soared to an annual rate of 1,550%, and mounting economic problems forced the government to begin new economic reforms. Policies included strict fiscal measures that ended the price controls on most commodities, cooperation with international financial institutions, modest steps towards privatisation, overtures to foreign investors and instituting a permanent currency, the sum. These economic policies began to have an effect almost immediately after their adoption, and impressive gains were made against inflation. In 1995 the annual rate of inflation decreased to 76.5%, and in 1999 it stood at 29.1%.

Similar progress was made with Uzbekistan's GDP, which had been declining since 1989. GDP went from a drop of 4.2% in 1995 to a robust growth of 5.2% in 1997. From 1996 to 1999, reforms proceeded at a slower pace. In 1996 lower production of the key commodities and lower world commodity prices for cotton and precious metals created a balance-of-payments crisis. The Government strengthened its control over the prices of a number of commodities, increased import tariffs and excise taxes on imports and established a legal exchange-rate system. The Government reduced State ownership in commercial banks and prepared to sell its shareholdings in the major State-owned banks. In 1998 the global financial crisis impacted on the economy: foreign trade declined, exports and imports decreased, and foreign debt and external public debt increased. External debt alone was US\$ 2.8 billion in 1998.

**Table I.1: Selected economic indicators, 1995-2000**

	1995	1996	1997	1998	1999	2000
<b>Real GDP/Net material product (NMP) (Indices, 1989=100)</b>	80.5	81.9	86.1	89.9	93.9	97.6
<b>GDP/Capita (US\$)</b>	441	592	622	621	700	553 *
<b>Total employment (Indices, 1989=100)</b>	110.8	112.3	113.8	115.4	116.5	117.8
<b>Registered unemployment (% of labour force, end-of-period)</b>	0.3	0.3	0.3	0.4	0.5	0.6
<b>Consumer Price Index CPI (% change over the preceding year)</b>	76.5	56.3	73.2	17.7	29	...
<b>Producer Price Index PPI (% change over the preceding year)</b>	834	133	54	41	38	60.9
<b>Merchandise exports (Billion US dollars)</b>	2.821	4.211	4.026	3.218	2.928	3.265
<b>Merchandise imports (Billion US dollars)</b>	2.748	4.712	4.186	3.125	2.841	2.947
<b>Current account balances (Million US dollars)</b>	-21	-980	-584	-102	-176	50 *
<b>Net Foreign Direct Investment (FDI) inflows (Million US dollars)</b>	-24	90	167	140	121	100 *

Source: UNECE macroeconomic database, 2001.

Note:

\* Provisional data.

From 1996 to 2000, there was real growth in GDP (1.7 to 4.4% a year). Some of this was the result of early investments in the energy sector. A comprehensive programme of economic liberalization aimed at increasing exports and attracting foreign investment was developed in 2000. Since then, the Government has devalued the official exchange rate and curtailed foreign borrowing under government guarantees.

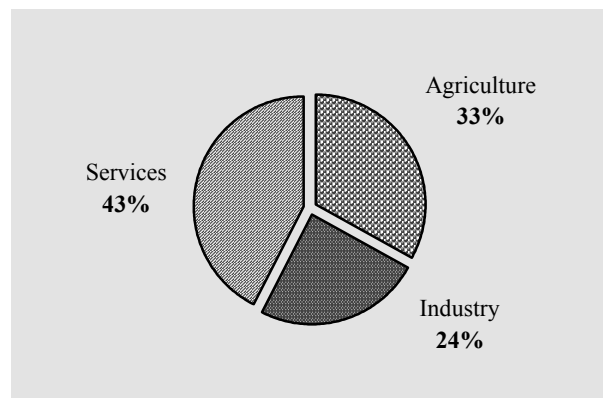
Uzbekistan held observer status in the General Agreement on Tariffs and Trade (GATT) beginning in 1994. It currently holds observer status in the World Trade Organization and has applied for membership. In September 1998, Uzbekistan submitted a Memorandum on the Foreign Trade Regime of the Republic of Uzbekistan to the WTO Secretariat.

## I.5 Natural resources

### *Oil, Gas, Mining*

Uzbekistan has substantial hydrocarbon resources. The country rests on top of the major oil and gas fields of Central Asia. The value of its overall mineral and raw material potential is estimated to exceed US\$ 3.3 trillion. The development of huge confirmed reserves of oil (350 million tons) and gas (2 trillion m<sup>3</sup>) has made Uzbekistan a focus of international finance and investment. In gas production Uzbekistan is among the world's ten largest producers.

Uzbekistan also has ample resources of copper, silver, lead, zinc and wolfram. It is also the second biggest gold producer among the New Independent States (NIS) (after the Russian Federation) and first

**Figure I.2: Contribution to GDP, 1999**

Source: UNECE macroeconomic database, 2000.

by quantity per capita. Globally, Uzbekistan is ranked seventh in production and fourth in gold deposits.

### *Agriculture*

Agriculture and agriculture related industries account for approximately 30% of GDP (25-35% depending on the source; see also Fig. 0.2), and 55% of the hard currency revenues of the country is related to agriculture. Approximately 60% of the population resides in rural areas, and 44% of the work force is engaged agricultural production.

The most important crop is cotton, which dominates the agricultural sector. Uzbekistan is the world's fifth largest cotton producer and the second largest exporter. Cotton has been central to the economy because it accounts for about 50% of the country's export earnings. At the same time, however, cotton production has depended on vast amounts of irrigation, and this has had a significant and possibly irreversible negative impact on the Aral Sea. Water depletion from the rivers feeding the Aral Sea has reduced the volume of the Sea by 50% and caused serious soil salinity.

Since independence, the government has pursued an agricultural policy of wheat self-sufficiency by using state orders, subsidies and directed credits as main instruments in order to reduce Uzbekistan's dependence on food imports.

### **I.6 Selected environmental problems**

The majority of the country's waterways are either moderately or heavily polluted. The problem is particularly severe in areas such as the Republic of Karakalpakstan and Fergana valley. The natural quality of groundwater, which is used as a main source of water for cities and towns, has significantly declined. As a result 40% of known fresh groundwater is unsuitable for drinking. More than one third of the population uses drinking water that does not meet national standards, with serious impacts on health.

Cotton monoculture, poor irrigation practises, deficiencies in water resource management and lack of incentives for water conservation have lead to a scarcity of water resources. One of the greatest concerns is drainage from irrigated fields that is causing increased salinity of surface and groundwater. Lack of sanitation, uncontrolled industrial charges and losses in municipal water distribution networks aggravate the situation.

Land is being degraded by salinity from large-scale irrigation, soil erosion, and over use of pesticides and fertilizers that has contaminated the crops. Since 1991 the use of pesticides and fertilizers has declined sharply, but most food products still do not meet national food quality standards.

Emissions from industry, energy and transport have been declining, but economic recovery could reverse this trend rapidly. Ambient level of air pollution in most cities demonstrates high concentration of particulates, and toxic pollutants near the industrial zones may significantly exceed standards.

### **I.7 International cooperation and environment**

Uzbekistan joined the United Nations in 1992 and cooperates with a number of its programmes and specialized agencies of the United Nations System. It is also a member of the United Nations Commission on Sustainable Development. Since 1991, Uzbekistan has been a member of the Commonwealth of Independent States (CIS) and, in 1999, it signed the Agreement on Partnership and Cooperation with the European Communities and their Member States.

International cooperation plays an important role in providing access to international investments, international experience and clean technologies. Uzbekistan has bilateral agreements with a number of countries, and it cooperates with several international financial institutions, including the World Bank, the European Bank for Reconstruction and Development (EBRD), the Asian Development Bank (ADB), the International Monetary Fund (IMF) and the Global Environment Facility (GEF).

In 1994, Uzbekistan signed an agreement with Kazakhstan, Kyrgyzstan, Tajikistan, and Turkmenistan on a common economic area. These countries have also signed various bilateral and multilateral economic agreements with environmental elements, and several agreements on specific environmental issues, like water management. The efforts towards Central Asian cooperation stem from these countries' geographical position, their transport links, and their need to exploit jointly the region's water and energy resources and to tackle the consequences of the Aral Sea catastrophe.

***PART I: THE FRAMEWORK FOR ENVIRONMENTAL  
POLICY AND MANAGEMENT***

## Chapter 1

# LEGAL INSTRUMENTS AND INSTITUTIONAL ARRANGEMENTS FOR ENVIRONMENTAL PROTECTION

### 1.1 The legal framework for environmental protection

#### *General legal system*

Since its independence in 1991, Uzbekistan's new Government has been taking steps to establish a legislative system that corresponds to the changed political conditions. In many instances the new laws followed the structure and substance of the old laws. However, in other cases the emerging challenges encouraged the enactment of entirely new laws, especially on economic activities and privatization, and also on environmental protection. Some 80 legal acts, including laws and governmental regulations, have been adopted on the environment and natural resources.

Administratively, Uzbekistan's territory is divided into two unequal parts:

- The Republic of Karakalpakstan and
- 12 *oblasts* (regions)

The *oblasts* are entirely dependent on the central Government, and are not empowered to legislate or to set up their own executive bodies. The Republic of Karakalpakstan has the status of a republic within Uzbekistan. It has its own constitution, adopted on 9 April 1993, its own legislature (*Jogargy Kenes*) and its own executive. Moreover, it has the right to acquire full independence following a referendum. The *oblasts* and the Republic of Karakalpakstan are further divided into 163 *rayons* (districts) and urban and rural settlements.

Legislation in Uzbekistan is adopted both on the national level and on the level of the Republic of Karakalpakstan. National legislation is equally valid in Uzbekistan and in the Republic of Karakalpakstan. The legislative acts of Karakalpakstan are valid only in the territory of the Republic, but they have to conform to the legislation of Uzbekistan. In practical terms, the

legislative acts of Karakalpakstan follow the contents, legal mechanisms and even structure of the equivalent Uzbek laws. The Constitutional Court of Uzbekistan may repeal any laws, including those of Karakalpakstan that do not conform to the Constitution of Uzbekistan.

The Constitution of the Republic of Uzbekistan, adopted on 8 December 1992, places the system of national legal acts in the following hierarchy:

- Constitution;
- Laws;
- Governmental regulations and presidential decrees;
- Ministerial norms, instructions, and other regulatory acts.

#### *Environmental legislation*

The Constitution of Uzbekistan establishes basic rules on environmental protection and natural resource use. Its article 55 stipulates that land, water, minerals, flora, fauna and other natural resources are a national asset that should be rationally used and protected by the State. Article 50 makes citizens responsible for treating nature with care. The Constitution does not grant individuals any environmental rights, although the Law on Nature Protection does contain such rights.

The Law on Nature Protection establishes the general legal framework for comprehensive environmental protection and for the use of natural resources. It was enacted in 1992 and amended three times, in 1995, 1997 and 1999. It covers a wide range of issues, including division of responsibilities among the parliament, Cabinet of Ministers and local administrations, standard-setting, environmental monitoring, economic incentives for environmental protection, procedures for dealing with emergencies, and liability for environmental damage.

The Law proclaims the right of individuals to live in a healthy natural environment, and to protect their health against negative environmental impacts. They are entitled to have access to information about the state of the environment and environmental protection measures. Natural resources should be used in a sustainable manner. Pollutants in air, soil and water should not exceed their respective maximum allowable concentrations. Enterprises are obliged to limit their impact on the environment. Although it is largely declarative, the Law does contain a long and intricate article on environmental charges, which regulates the collection and distribution of pollution charges in detail. Its concluding article makes provision for the precedence of international agreements over national laws.

General requirements for the use and protection of forests are spelled out in the Law on Forests of 14 April 1999. The Law provides for State ownership of forests, establishes procedural rules governing State permits for the use of forests and obliges users to use forests in a sustainable manner.

The Land Code (1998) establishes basic and comprehensive rules for all land-related transactions. All of Uzbekistan's land forms the "land fund". There are eight categories of land with different land-use regimes. Land rights figure prominently in the Land Code. The Code specifies such rights, establishes procedures for acquiring them and determines legal grounds for terminating them. Land is State property; it cannot be owned privately. Land parcels are allocated only for use, which can be permanent, lifelong with the right to pass it on to heirs, or short-term. Land can also be rented. The rights of individuals to land parcels are laid down in State acts issued to tenants or users and registered by the *oblast* administrations (*khokimiat*). (See also Chapter 10)

Agricultural land enjoys special protection. Provision is made for the responsible government body for water and agriculture to supply sufficient water to land users, in accordance with the established regulations. Irrigated land can be used only for agricultural purposes. The Code also establishes in detail the regime for use and protection of land granted to farmers, collective farms and individuals for agricultural purposes. Provisions include obligations to rehabilitate destroyed soil, to take measures against erosion, to remove and relay soil in cases of minerals use and to increase soil fertility.

The Law on Rational Use of Energy adopted in 1997 requires fuels and other energy resources to be certified and energy-producing or consuming equipment to be examined to ensure that they meet standards and environmental requirements. Certified fuels are allowed for sale and use. A special examination of new equipment is mandatory. Energy consumption is subject to limitation. (See also Chapter 11)

Hunting, fishing and other uses of wildlife are regulated by the Law on the Protection and Use of Wildlife adopted on 26 December 1997. The Law stipulates that wildlife can belong only to the State. It has a short but important article on the rights and obligations of citizens and organizations, which requires them to take measures to protect animals and their habitats and to promote implementation of State programmes on the protection of wildlife. However, the Law does not specify how this should be done, who bears the cost or how these rules will be enforced. (See also Chapter 8)

The Law on the Protection of Ambient Air, of 27 December 1996, establishes a legal framework for standard-setting, State control over emissions of pollutants, and determining the quality of fuels. In particular, the Law restricts the use of cars that do not conform to established limits of emissions. In line with Uzbekistan's international obligations, the Law requires organizations and enterprises to register and replace ozone-depleting substances. (See also Chapter 6)

The Law on Water and Water Use, adopted in 1993 and amended several times since, addresses one of the most urgent problems of the country – that of ensuring the rational use and protection of scarce water resources. To this end, companies may abstract water for meeting economic, social and other needs of people in conformity with specified limits and State permits. The permit stipulates the exact purpose and quantity. Water may be abstracted for irrigation, municipal water supply and industrial needs. A permit holder may not use a water body for any other purpose than that stipulated in the permit. An extensive article deals specifically with irrigation, and, in particular, using effluent water for irrigation. Finally, the Law also foresees that the use of transboundary water bodies, including the Amu Darya, the Syr Darya, and Aral Sea, shall be regulated by international agreements.

Conservation of valuable natural zones is regulated by the Law on Specially Protected Areas adopted on 7 May 1993. The Law provides for the

establishment of a variety of specially protected natural areas with different legal regimes. The most stringent regime is established for natural reserves (*zapovednik*), which are designated for scientific research, and the conservation of habitats of rare animals and plants. Protected areas are State-owned and are set up by decision of the Cabinet of Ministers. (See also Chapter 8)

The Law on the Protection of Plant Life of 26 December 1997 establishes a permit procedure for collecting plants, grazing and other purposes.

Several new environmental laws were adopted in 2000, including the Law on State Cadastre for keeping special registers of natural objects, the Law on Radioactive Safety, and the Law on the Protection of Agricultural Plants against Pests and Diseases.

The Law on Ecological Expertise was also enacted in 2000. It establishes the administrative decision-making process for projects that may have an impact on the environment. According to the Law project initiators are required to submit project documentation together with the results of an environmental impact assessment (EIA) to the State Committee for Nature Protection for State ecological expertise (examination). The State Committee for Nature Protection created a system of state ecological expertise to examine the documents and prepare a decision on the project's admissibility. As soon as the decision of the experts is approved by the Chairman of the State Committee, it becomes mandatory. EIA is conducted by the proponent himself and at his own discretion and expense.

### Box 1.1: Selected environmental legislation

Law on Nature Protection (1992, amended in 1995, 1997 and 1999)  
 Law on Specially Protected Areas (1993)  
 Law on Water and Water Use (1993)  
 Entrails Law (1994)  
 Law on Ambient Air Protection (1996)  
 Law on Forests (1997)  
 Law on the Protection and Use of Wildlife (1997)  
 Law on the Rational Use of Energy (1997)  
 Land Code (1998)  
 Law on Ecological Expertise (2000)  
 Law on the Protection of Agricultural Plants against Pests and Diseases (2000)  
 Law on Radioactive Safety (2000)  
 Law on State Cadastre (2000)

To implement laws, the Cabinet of Ministers, ministries and State committees are empowered to adopt regulatory acts. This is particularly important in the context of implementing framework laws. For example, there is a Decree of the Cabinet of Ministers that sets the rates of payment for environmental emissions, discharges and disposal of wastes to help implement the Law on Nature Protection; another Decree of the Cabinet of Ministers lays down procedures for limiting water consumption to help implement the Law on Water and Water Use; and a ministerial regulation adopted by the State Committee for Nature Protection provides measures for the protection of habitat and breeding conditions of protected deer.

#### *Privatization and environmental protection*

Privatization is predominantly governed by civil and administrative legislation. Some of these laws include environmental protection provisions. The

basics are formulated in the Civil Code, and certain aspects are addressed in other laws. Environmental provisions are formulated in a general manner, but they are to be further developed in individual privatization and rental contracts. Under the civil law, an owner (the State), in sales or in rental contracts, imposes certain environmental obligations on the person who buys or rents a property in conformity with the general provisions of the law.

The overall socio-economic objectives and the governmental programme to speed up reforms were set out in the President's address to the 14<sup>th</sup> session of Parliament and complemented by the Cabinet of Minister's Resolution of 10 June 1999.

The Presidential Decree of 21 January 1994 on Measures for Further Development of Economic Reforms provides the opportunity for individuals and companies to own land used for commerce,



public and social service buildings or new constructions (e.g. shops, hotels). Land for individual housing or allotments may be transferred to citizens only on the basis of lifelong inheritable possession – a type of land-use right. It cannot be privatized, nor can other natural resources.

The Law on Property of 31 October 1990 lays down general requirements concerning the regime of property, both real and movable. It establishes the right of exclusive State ownership of land (except for certain cases provided for by law), subsoil, internal waters, plant life and wildlife. It explicitly provides that property may be used only on condition that the environment is not damaged and the rights and legally protected interests of other persons not violated.

According to the Law on Denationalization and Privatization of 1991, State-owned objects may be privatized in accordance with State programmes either for free or for a charge. Decisions on privatization are taken by the Cabinet of Ministers. The Law did not establish specific environmental obligations, nor did it address the issue of who is liable for past pollution. This question, therefore, remains unregulated and unresolved. Any claims would therefore be referred to the courts, although there have not been any so far.

The Law on Enterprises of 15 February 1991 imposes certain general environmental obligations on enterprises. In particular, it stipulates that enterprises should take timely measures to reduce the negative impact of production on the natural environment at their own expense.

The 1991 Renting Law comprehensively regulates property rentals. Only agricultural land can be rented. Other natural objects and categories of land may nevertheless be used permanently or temporarily (see above). The lease specifies the

requirements connected with the use of the property.

Foreign citizens and companies may be engaged in economic activities, including the use of land parcels and mineral deposits on the basis of special permits – concessions issued by State bodies. These concessions are governed by the 1995 Law on Concessions. According to its framework provisions, concessions may be issued only where there is assurance that environmental legislation will be observed, and guarantees of ecological, health and occupational safety are given. The Law does not spell out which guarantees are required.

Foreign investment is specifically regulated by two principal legal acts: the Law on Investments and the Law on Guarantees and Measures for Protecting the Rights of Foreign Investors, both adopted in 1998. The Laws establish a level playing field for foreign investors and also lay down health and ecological requirements. Discrimination against foreign investors is forbidden. Foreign investors do not have to comply with new laws, if these worsen investment conditions. So a foreign investor can potentially exempt himself from any new environmental legislation, since new laws tend to imply expenses or additional obligations. Such a provision undermines environmental legislation. In practice, it is applied predominantly with respect to environmental charges: foreign investors are entitled to pay according to the rates in force at the moment of an investment.

The 1998 Law on Investment also requires investors to observe health, radioactive, ecological and other requirements. The 2000 Law on Guarantees of Freedom of Economic Activities contains the same requirement for all those engaged in economic activities.

### **Box 1.2: Selected legislation on privatization**

<p>Law on Property (1990)          Renting Law (1991)          Law on Denationalization and Privatization (1991)          Law on Enterprises (1991)          Law on Concessions (1995)          Law on Guarantees and Measures for Protecting the Rights of Foreign Investors (1998)          Law on Investment (1998)</p>
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### *Enforcement and compliance mechanisms*

Environmental damage is subject to punishments in accordance with criminal, civil and administrative law. Liability is generally governed by the Code on Administrative Liability (1994), the Criminal Code (1994) and the Civil Code.

The Criminal Code addresses environmental crimes in a separate chapter that provides for punishments for twelve types of violations. For example, individuals and officials are criminally liable for concealing information about accidents that have dangerous ecological consequences; impacts on public health, including outbreaks of diseases; serious pollution; illegal fishing or hunting. The courts decide on the punishments (fines or community service). However, criminal cases are first investigated by the enforcement officers (*militsia*) of the Ministry of Internal Affairs and the Procurator's Office. The Criminal Code seems adequate, except that it does not provide any methodology or criteria for determining guilt in, for example, cases of pollution or health impact, making it almost impossible to pursue such cases. In practice, only the provisions on illegal hunting, fishing and tree-cutting are applied.

The Code on Administrative Liability was adopted in 1994. Fines are imposed by either nature protection inspectors directly or upon decision by quasi-judicial administrative commissions. There are about 40 types of environmental violations, including violation of State ecological expertise procedures, use of natural resources without State permit, excessive pollutant emissions, illegal hunting and fishing, and violation of the regime of specially protected areas.

The Civil Code obliges those proven guilty in court to compensate victims in full for environmental damage. Owners or operators of dangerous sources, such as cars and certain enterprises – chemical plants, hydroelectrical facilities -- are also liable for compensation. "Guilt" implies that the violation was committed either through negligence or deliberately and that such a violation caused environmental damage. Victims include the owners or users of the natural objects that have been damaged: the State or individual persons, whether physical or legal (businesses, institutions). If damage is inflicted to State property, the State bodies that use or administer the damaged property may claim compensation. Any compensation paid goes to the State budget or to environmental funds and has to be used to rehabilitate the damaged

property. Damage caused by natural disasters is the responsibility of the State.

Compensation is also due for damage to human health. Compensation is based on the loss and the medical cost. It is paid voluntarily or on the basis of a court ruling. Claims for compensation are filed with Uzbekistan's economic courts, which are subordinate to a higher economic court.

The State Committee for Nature Protection is vested with the principal responsibility for finding environmental violations and filing claims with the courts. Both the central Committee and its regional offices have a large number of inspectors whose primary obligation is to ensure proper implementation of environmental law. If they suspect criminal violations, inspectors are entitled to submit materials to procurators, who can take further action against perpetrators.

Criminal punishments are rare. In 2000, 17 criminal violations were prosecuted and criminal fines imposed on perpetrators. Annually there are around 10,000 administrative cases for non-payment of pollution charges, violation of State ecological expertise procedures, use of water without permit, violation of the regime of specially protected areas, and land pollution. In addition to administrative fines, in most cases of air, water or soil pollution, compensation is also required.

Most of the administrative cases deal with non-payment of pollution charges. For example, the Bukhara regional department of the State Committee for Nature Protection, in 2000, filed 98 claims for violation of article 34 of the Law on Nature Protection, which obliges polluters to pay pollution charges. It won all the cases it filed. There were no other claims, although individual citizens are entitled to file claims, e.g. if their health suffers.

## **1.2 Policy objectives and implementing institutions**

### *Objectives*

Uzbekistan faces many interrelated problems, where environmental protection is viewed as having a critical impact on social and economic problems. These range from demographic processes (growth of the population) and economic decline to concerns about security and increasing poverty.

Water supply and land degradation are viewed as the most urgent and serious ones. Inefficient

irrigation and water management have been a major cause of environmental degradation with a massive impact on water quality and availability. Pollution by agro-chemicals and salinization of soils are also a problem. Only 27% of the country meets national water, ambient air and soil quality standards. In certain *oblasts* the growing population causes increased pressure on the environment and natural resources.

The State Programme for Environmental Protection and the Rational Use of Natural Resources for 1999-2005 approved by a Cabinet of Ministers decree on 20 October 1999 includes the following priority legislative and institutional measures:

- Adoption of a law on waste;
- Amendments to the Law on Specially Protected Areas and the Code on Administrative Liability so as to ensure the conservation of biodiversity under the National Strategy and Action Plan on Biodiversity Conservation;
- Development of a regulatory act on compensation for environmental damage that would establish the methodologies for determining such damage;
- Development of a new set of environmental standards and limits on impacts;
- Improvement of the economic incentive mechanisms, including environmental charges and environmental insurance;
- Creation of a centre for cleaner production; and
- Development of projects for sustainable and cleaner production in the oil, chemical, machine-building, food production and other industries.

There are no readily available data or official statements on the programme's progress, but it is too early to expect full implementation. The law on waste is before the legislative body and is likely to be adopted soon. The legislative body is also working on amendments to the Law on Specially Protected Areas. However, work on new environmental standards has stalled because of a lack of financial resources. There is no requirement or rule to review implementation of State programmes. In practice, programmes reflect the official position of the State, but are implemented to the extent that financial means allow.

The National Action Plan for Environmental Protection (1998) comprehensively describes the State's policies and priorities. Adequate legislation and institutional arrangements for the purpose of

ensuring environmental protection and sustainable development, especially the legal regulation of issues related to compensation for past damage, are a priority. It has not yet been decided who should be responsible and who should pay the clean-up cost. Yet, in view of the economic reforms, including privatization, which are now under way this issue is particularly important.

Reviewing standards and limiting environmental impact are also priorities. The standards and limitations now in force are not well harmonized with international practices, and this prevents Uzbek products from competing on the international market. Some standards are too lax; others do not exist. Uzbekistan's environmental standards were adopted in the 1960 and 1970s and have not been revised since. Adopting new standards would require large financial resources.

Another important issue is improving methodologies for determining environmental charges. There are no criteria for establishing pollution charges, which have been set at a level that reflects the financial capacities of polluting industries to pay and the approximate cost of cleaning up the pollution. In fact, the charges are low and do not cover the cost of environmental protection.

The charges collected are to be spent on environmental protection, although some money can be used for other purposes, such as administrative costs. Unfortunately, there is a lack of transparency about how the money is used, and this has led to mistrust and accusations of mismanagement.

The National Environmental Health Action Plan, approved by the Deputy Prime Minister in 1999, does not explicitly establish legislative priorities. Nevertheless, its priorities, such as the prevention and reduction of negative health impacts from pollution, access to environmental information, cooperation of environmental agencies and public health units with NGOs and the population, often require adequate legislative and institutional decisions.

The National Strategy and Action Plan for Biodiversity Conservation was approved by presidential decree in 1998. In addition to measures for the development of a network of specially protected areas, it also regulates the sustainable management of wildlife, and stresses the need to develop ecological education.

There are no specific links between all these plans. They have been adopted as separate documents in response to particular problems. Most have no legal character; they set out policies, but do not specify rights and obligations. Laws and regulations need to be adopted to ensure policy implementation, but this process is not prescribed in the programmes. The legislative body has its own procedures, and it is allowed to enact the laws that it deems necessary.

The priorities relating to environmental safety were identified in the presidential speech “Uzbekistan on the Threshold of the 21<sup>st</sup> Century: threats to safety, conditions and guarantees of progress”. Legislative support is needed for the conservation of biological resources, the introduction of environmentally friendly technologies, and the improvement of urban conditions.

Priorities with respect to energy are outlined in the Law on the Rational Use of Energy. They include stabilizing the production and consumption of energy, monitoring and controlling its consumption, encouraging the production of energy-saving equipment and environmentally cleaner production and technology.

#### *Environmental institutions and their mandates*

Uzbekistan’s Parliament (*Olij Medjlis*) has legislative powers and its laws are enforceable throughout the country. It is a one-chamber body with 250 deputies elected for a five-year term. It

also approves presidential decrees and elects the members of the Constitutional, Supreme and Higher Economic Courts. It ratifies and denounces international agreements. The Constitution (art. 78) specifies that Parliament appoints and dismisses the Chairman of the State Committee for Nature Protection, on the President’s recommendation. *Olij Medjlis* has twelve committees, including the Committees on Environmental Protection, and on Agrarian, Water-related and Food Issues. These committees draft laws on environmental protection, land use, natural resources and agriculture, and submit them for adoption.

Executive power is vested with the President and the Cabinet of Ministers. The President chairs the Cabinet of Ministers. The President can set up and dissolve ministries and agencies. He appoints senior officials, the General Procurator, and the heads of *oblast* governments. The Cabinet of Ministers determines State environmental protection policies, approves State environmental programmes, monitors their implementation, oversees the use of natural resources, and adopts environmental regulations.

*Oblast* power in the field of environmental protection lies with the Councils of People’s Deputies headed by *Hakims*, or chief administrators. The Councils have their own committees for nature protection that are also subordinate to the State Committee for Nature Protection.

### **Box 1.3: Environmental institutional system in Bukhara oblast**

Bukhara *oblast* covers 4 million hectares in the south of the country. Its population of 1.3 million works predominantly in agriculture (cotton production), oil and other industries. The environment suffers from high levels of air and water pollution and the salinization of soils. The Bukhara Committee for Nature Protection has 107 staff members, of whom 45 work in the *oblast*’s 12 administrative rayons. There are four inspectorates, for air, water, and soil and for the protection of animals and plant life, and two departments, one for nature use and one for ecological expertise. Other State agencies also have offices in Bukhara. The Regional Department of the Ministry of Agriculture and Water Management controls land use and leases land for various purposes. The Health and Epidemiological Station is the principal body responsible for protecting public health against environmental impact. The Ministry of Emergencies also has a regional department in Bukhara. Three monitoring posts of the Hydrometeorological Service and several monitoring stations of the Bukhara Committee for Nature Protection systematically monitor pollution.

Practical, local measures for environmental protection (municipal waste, tree-planting in cities) are taken by the local self-governing authorities (*makhallia*).

The key executive power in environmental protection is vested in the State Committee for Nature Protection. According to the Constitution,

the Committee occupies a unique position in that it reports directly to *Olij Medjlis*. Such status allows the Committee to be genuinely independent from the pressure and influences of other competing interests, and in fact ensures that environmental protection has high priority in State policy.

The Committee was set up in 1989. It consists of a central office located in the capital Tashkent and 12 regional offices, the State Committee for Nature Protection of the Republic of Karakalpakstan and Tashkent City Committee for Nature Protection. Combined, the offices have a total staff of 1,864 (of whom 44 work in the central office and 1,820 in the regional ones). Environmental inspectors comprise 67.1% of the regional staff.

The Committee is responsible for State control over nature protection and the use of natural resources. It issues permits for the emission of pollutants, collects pollution charges, carries out control and monitoring functions, manages the Environmental Fund, and initiates liability actions.

Its Chairperson takes decisions on the advice of the Governing Board, which is made up of the heads of the Committee's subdivisions. The main subdivisions are:

- Main Directorate on Protection and Rational Use of Land and Water Resources
- Main Directorate on Air Protection
- Main Directorate on State Ecological Expertise
- Department on Environmental Law
- Main Directorate on Economics and Use of Natural Resources
- Main Directorate on Protection and Use of Plants and Animals,
- Main Directorate on International Co-operation and Programmes

The Committee also operates several scientific and technical support units and reserves, including the scientific centre "Ecology of Water Management"; the Scientific Research Centre "Ecolog"; Tashkent Scientific Research Institute for industrial waste, "Vodgeo"; the scientific research institute for air pollution, "Atmosphere"; Chatcal Biosphere Reserve and Gissar State Reserve.

Certain environmental functions are fulfilled by

- The Ministry of Health
- The Ministry of Internal Affairs
- The Ministry of Agriculture and Water Management
- The State Administration on Hydro-meteorology
- The State Committee for Geology and Mineral Resources
- The State Committee for Safety in the Manufacturing and Mining Industries

- The State Cadastre Agency

The Ministry of Macroeconomics and Statistics issues short- and long-term forecasts and data on the state of the environment, including natural resources.

Uzbekistan co-funds the International Fund for the Aral Sea (IFAS) and the Interstate Commission on Water Coordination.

The Directorate on Forests, which is a part of the Ministry of Agriculture and Water Management, is responsible for regulating forestry with a view to protecting forests and increasing their productivity.

The State Cadastre Agency is responsible for keeping inventories of natural resources. This information is used for levying taxes and other environmental charges.

#### *Coordination framework*

The State Committee for Nature Protection is the main coordinator for environment protection activities among the State entities. It coordinates standard-setting and activities relating to pollution and other harmful impact.

Some environmental coordination functions are fulfilled by intersectoral commissions. They include:

- The National Council for the Coordination of Enforcement and Control;
- The Emergency Anti-Flood Commission;
- The National Commission for the International Hydrological Programme of the United Nations Educational, Scientific and Cultural Organization (UNESCO).

#### *Participation of NGOs in environmental decision-making*

The environmental movement is represented by about 30 non-governmental organizations (NGOs). Most are small with 8-20 members. They concentrate on raising public awareness. However, there are also professional groups, such as the Public Advocacy Group "Armon" set up in 2000, which specializes in representing individuals in environmental decision-making and in defending their environmental rights in courts. The Association of Explorers "Rabat Malik" is a fast-developing non-governmental organization

with a large membership of about 100, which concentrates on promoting basic ecological and cultural education of children by organizing tours and field trips, expeditions and festivals. The International Fund for Ecology and Health "Ecosan" is one of the largest environmental NGOs in the country with over 300 members and 35 permanent staff members.

Environmental legislation provides good opportunities for the public and non-governmental organizations to participate in governmental decision-making. Ecological expertise procedures provide another opportunity for NGOs to influence governmental decision-making. According to the Law on Ecological Expertise, citizens may conduct their own ecological expertise, and it is forbidden to obstruct such activities. Any registered environmental NGO may also initiate an expertise at its own expense. Ecological expertise is expensive, as it involves various experts (scientists, lawyers and others). The conclusions of a non-governmental expertise are advisory.

There are no specific provisions for industry to be involved in governmental decision-making. By law, a project developer may not be represented on the expert commission. Nevertheless, it must be pointed out that Uzbekistan's private sector is still in its infancy. Most enterprises are still State-owned and subordinate to certain ministries. So they participate in governmental decision-making albeit indirectly.

#### *Access to environmental information*

Access to environmental information is an important means of influencing governmental decisions. The right of individuals and organizations to get information about the state of the environment is enshrined in the Law on Nature Protection. The 1997 Law on Guarantees and Freedom of Access to Information is a concise legal instrument that obliges State bodies, local administrations, non-governmental organizations, enterprises, organizations and officials to provide access to documents that concern citizens' rights and legal interests. The right to live in a healthy environment laid down in the Law on Nature Protection is one of those rights. Access is provided by publishing and disseminating information and by forwarding requests to institutions that have such information.

Access to information requires the development of procedures, adequate funding and staffing of

governmental bodies. These procedures do not yet exist. Some information, such as weather forecasts, is disseminated through publication in newspapers. The State Committee for Nature Protection also has a directorate on scientific and technical progress and information that works with non-governmental organizations. However, the Committee's action is limited because of a lack of funds.

### **1.3 Environmental education**

According to the Law on Fundamentals of the Public Youth Policy and the State Programme for Environmental Education up to 2005, it is necessary to promote environmental awareness especially among the younger generation. Environment schools and environment departments at universities have been set up to develop knowledge about the environment. Many conferences and competitions on issues of environmental education take place each year. These highlight national traditions and the country's natural heritage.

Within the past decade 58 higher-education establishments, of which 16 universities, have been set up. These include a number of new private schools and former institutes that have been reorganized, renamed and registered as universities. The fundamentals of ecology are taught at universities and secondary schools. Environmental law is mandatory at law schools. The education system is experiencing hard times. Because of underfunding, educational institutions are poorly equipped, and lack experienced and competent teachers and lecturers. Only 10 per cent of secondary-school graduates enter universities. Many graduates are unemployed.

Plans are under way to train environmental experts in technical education institutions, such as Tashkent Auto Road Institute, Tashkent State Technological University and Tashkent Chemical-Technological Institute. An "Ecology and Nature Use" specialty has been established at some higher-education institutions.

### **1.4 Scientific research in environmental protection**

To organize efficient scientific research, State programmes are developed for priority issues. According to the 1993-96 Action Plan of the State Committee for Science and Technology, 35 scientific institutions carried out environmental research on:

- The link between drinking-water quality and the health of the Aral population;
- The creation and certification, in the United States, of a water-treatment system to rid water of radionuclides, heavy metals, pesticides, phenols;
- The preparation of a unified Asian water management concept;
- Other water problems, including those of the Aral Sea;
- The ozone layer above the mountains of Central Asia.

No new action plans for the State Committee for Science and Technology have been adopted since 1996.

At present, the scientific community is concentrating on creating a database of industrial waste and technical standards for waste collection, storage and disposal.

Uzbekistan is making every effort to ensure that governmental decisions are based on sound science with the help of governmental scientific institutes, such as the Tashkent Scientific Research Institute “Vodgeo” (industrial waste), and the scientific research institutes “Atmosphere” (air pollution) and “Ecology of the Water Economy” (desertification, purification of drinking water, irrigation of the Aral region). The results of scientific research are incorporated into economic development projects.

### 1.5 Conclusions and recommendations

Olij Medjlis is making every effort to establish a sufficient legal framework for environmental protection. Its Committee on Environmental Protection is professional and committed, and has a strong legislative programme. Environmental protection concerns also have an important place in the country’s policy. The legal mechanisms for environmental protection follow generally accepted approaches and practices.

However, the framework approach to law-making requires adequate and timely enactment of governmental regulations. Quite often, these activities lag behind. Legislative provisions are consequently not sufficiently developed, making them inoperable. In addition, legislation is often formulated in declarative terms, giving rise to their free interpretation. For instance, there is no procedure for Environmental Impact Assessment (EIA), although EIA materials are required for the

ecological expertise. Also, the Law on Nature Protection requires nature users to take measures protect the environment from the impact of their activities. Yet, the measures are not spelled out. As a result, implementing agencies may take action at their discretion against those engaged in such activities; however, it is questionable whether such actions are fair. It is also forbidden to use materials without an ecological certificate, but no procedure for issuing such certificates has been established.

#### Recommendation 1.1:

*Olij Medjlis should:*

- *improve law-making procedures and harmonize the law-making activities of legislative and executive bodies;*
- *consider adopting a law on administrative procedures to guarantee that implementing regulations are developed in an appropriate and timely manner.*

*Environmental laws should contain provisions that clarify how nature users should implement them. The legal provisions should refer to governmental regulations.*

#### Recommendation 1.2:

*Policy documents, such as the National Action Plan for Environmental Protection and the National Environmental Action Plan, should be backed up with implementation programmes, including legislative and institutional measures and defined financing.*

Access to environmental information has become one of the principal instruments of many countries’ environmental protection policies. Public awareness of environmental hazards helps prevent serious health consequences. It is also a necessary element of democratic decision-making that ensures transparency, and promotes an atmosphere of trust and cooperation in society.

Uzbekistan’s environmental legislation clearly provides for access to environmental information. Certain laws, including the Law on Nature Protection, contain some provisions in this respect, but none has been developed sufficiently to ensure implementation. The Law on Nature Protection was adopted almost 10 years ago, but the right of citizens to have access to information remains unregulated. Declarations alone are not enough to make the right to have access to information an effective tool in environmental protection. One of the things that needs to be done is to distinguish between information that can be made available

and information that is proprietary or related to security. The Cabinet of Ministers and the respective executive bodies have to develop administrative procedures to ensure access to environmental information. This task has become particularly important in view of Uzbekistan's decision to ratify the Aarhus Convention. The Cabinet of Ministers has to issue regulations to oblige industries to provide information to both the Government and the public.

Recommendation 1.3:

*Oliy Medjlis and the Cabinet of Ministers need to pass relevant act on access to environmental information, determining the scope, type and form of information and procedures for dissemination and access*

*The Cabinet of Ministers should review the structure, mandates and obligations of executive agencies to ensure that they are able to provide environmental information. The relevant executive bodies will need sufficient staff and resources to collect information, analyse it and publicize it.*

Economic reforms have led to laws on privatization and activities by private entities and foreign investors. The reform itself is developing cautiously. Foreign investment is limited mainly to the mining industry. Privatization has particularly affected the trading and service sectors of the economy and also the agricultural sector. Industrial enterprises have been partially privatized, with the State still owning majority stakes.

Economic changes lead to changes in environmental obligations. Privatization puts the financial and legal burden of environmental protection on shareholders. This requires the creation of an efficient legal mechanism to defend the public's environmental interests following privatization. It raises the issue of commercial interests and balancing them with the public's environmental interests, government and public access to commercial information, and access by enterprises to governmental information.

The privatization and economic legislation addresses these problems to some extent. However, environmental provisions in economic laws sound declarative, and are not adequately developed in governmental regulations. One of the hot topics now is the issue of liability for past pollution, which is not regulated at all. Another is company liability for industrial accidents.

Recommendation 1.4:

*The Cabinet of Ministers should adopt regulations with clear provisions referring to assessment of environmental damages caused before privatisation and determine the liability for past pollution.*

Non-governmental organizations are an important link between the population and the government. Their role in environmental protection becomes even more important when environmental problems touch upon a whole range of interests – social, cultural, and economic. With the burden on the government growing, NGOs can assume certain functions to ease probable conflicts and create an atmosphere of support and cooperation in society. Uzbekistan has adopted laws that establish the fundamental rights of NGOs in environmental protection. There are no legal barriers to creating public environmental groups. NGOs are not formally excluded from the law-making procedure—they are entitled to comment on draft legislation and may be invited to participate in parliamentary debates. They are allowed to file claims and to conduct independent ecological expertise of projects.

At the same time, applying these rules is complicated. Some non-governmental organizations claim that they lack information on government activities, and therefore cannot influence decision-making. They are hardly ever invited to participate in working groups for the preparation of draft laws. Non-governmental ecological expertise, introduced only in 2000, seems to be hardly possible, because of financial barriers. Legal defence is complicated because of the lack of professional skills of some of the members of the NGOs. The rules for compensating environmental damage are inefficient. However, results are tangible in public awareness and environmental education. To address some of the remaining problems, civil society, and especially environmental non-governmental organizations, need to be strengthened.

Recommendation 1.5:

*The State Committee for Nature Protection should initiate cooperation with non-governmental organizations to implement common projects. It also should initiate a process whereby NGOs with science expertise may advise the Committee on scientific aspects of environmental decisions. Advocacy groups should publish guidebooks for the courts and citizens on the procedures involved in environmental disputes and defending the environmental rights of citizens.*



To ensure implementation and enforcement of the law, Uzbekistan has created a system of executive agencies charged with various environmental protection functions. The State Committee for Nature Protection plays the principal role. Its independent place in the system of executive ministries and State committees is very valuable. Some other sector-oriented functions are distributed among other ministries.

The State Committee for Nature Protection emphasizes control and inspection activities. It also collects pollution charges, and is thus an important fiscal entity. All other agencies that deal with the regulation of natural resource use also have control tasks. For instance, the Ministry of Agriculture and Water Management controls the use of agricultural land, while the State Committee for Nature Protection controls all other aspects of land use. Responsibility for monitoring is shared between the State Committee for Nature Protection and the Hydrometeorological Service. Both the

State Committee for Nature Protection and the Ministry of Agriculture are empowered to inspect forest use. With such duplication, the cost of environmental protection rises. Duplication also weakens the responsibility of each governmental body to do a good job. Besides, inspection and fiscal functions alone, however necessary, may create a negative attitude in society even to environmental protection generally.

*Recommendation 1.6:*

*The Cabinet of Ministers should issue an Act to strengthen and make more precise the coordination power of the State Committee for Nature Protection. Coordination functions should include assessment of implementation of environmental legislation and adoption of plans for the development of regulations required to implement laws. The State Committee for Nature Protection should have the right to develop cross-sectoral policies in environmental protection in consultation with other ministries and agencies. Decisions should be taken on the basis of consensus.*

## Chapter 2

# INSTRUMENTS FOR ENVIRONMENTAL PROTECTION

### 2.1 Macroeconomic background

Uzbekistan's post-independence development stands in marked contrast to that of most other countries in transition. Economic policy has been characterized by a cautious approach to structural reforms and reliance on administrative measures, government control and intervention in economic activity. These policies have aimed at maintaining social stability by containing inflation for basic consumer goods and limiting the negative impact of structural reforms on employment and economic growth. Uzbekistan has made some significant progress in moving towards macroeconomic stabilization, but the process remains partial and vulnerable. Economic growth creates more favourable conditions for environmental activities, even though the financial resources allocated for environmental expenditures are still limited. As part of the transition process, the Government of Uzbekistan has introduced market-based regulatory and financial mechanisms step-by-step to make polluters pay for pollution abatement and to raise revenue for environmental activities. The use of these mechanisms has resulted in the stabilization of the environmental situation in some regions in Uzbekistan. However, the effectiveness of the whole system appears to be limited and has not yet provided any real incentives to further reduce pollution.

### 2.2 Regulatory instruments for environmental protection

#### *Licensing*

The Law on Nature Protection (9 December 1992) defines the major legal principles for the rational use of natural resources and environmental protection. The exact procedures for the use of resources are laid down in several other laws and regulations, including the Law on Forests (14 April 1999), the Law on the Protection and Use of Wildlife (26 December 1997), the Subsoil Code (22 September 1994) and the Law on Water and Water Use (6 May 1993). In addition, there are a number

of relevant governmental resolutions, such as the Resolution on Limited Water Use, the Resolution on Greater Protection of Valuable and Vanishing Plants and Animals and Regulating their Use, the Ordinance on Hunting, and the Rules on hunting and fishing. The exploration and exploitation of mineral resources, fishing and hunting are licensed in Uzbekistan. (see also Chapter 1)

There is a uniform licensing system for hunting and fishing. Licences for individuals are issued by the Society of Hunters and Fishermen. State and commercial organizations, as well as foreign citizens, must apply for licences from the State Biological Control Department (*Gosbiocontrol*) and the State Committee for Nature Protection. The State Biological Control Department is also responsible for regulating biological resource use in accordance with laws and resolutions, and for setting quotas on the advice of the Academy of Science. There is no detailed information available about the effectiveness of current regulation, but due to financial and staff limitations regulation is not highly effective. Fines, penalties or non-compliance fees are imposed when environmental legislation is violated and damage is caused to natural resources.

The State Committee for Geology and Mineral Resources issues licences and permits for the exploration and exploitation of mineral resources, after consultation with other bodies. Special licences and permits for the exploration of hydrocarbons and the production of oil and gas are issued by the national oil and gas company, *Uzbekneftegaz*.

#### *Permits and related procedures*

The system for issuing permits is not unified. Permits are issued separately for:

- water abstraction and water use;
- waste-water discharges;
- air emissions;
- waste generation and disposal.

Permits are issued by the State Committee for Nature Protection. Generally a permit is valid for one to four years, and registered in a database at the State Committee. All the conditions related to emissions – location, emission limits and duration – are specified in each permit. Permits for smaller emissions or discharges and permits for waste disposal are issued by the oblast (regional) offices of the State Committee. When the permit expires, the enterprise has to apply for a new one. The permit conditions must be in compliance with the existing norms and regulations for emissions and discharges, and cannot exceed previous emissions and discharges.

Water is owned by the State. Permits allowing special water use are needed for enterprises and industries, organizations providing communal services, hydropower stations, and agricultural enterprises. Permits are issued by the State Committee for Nature Protection in agreement with the Ministry of Agriculture and Water Management, the State Committee for Geology and Mineral Resources, and the Agency for Safety in the Manufacturing and Mining Industries. Water use is limited by administrative and territorial regulations in accordance with the Resolution on Limited Water Use of the Cabinet of Ministers (3 August 1993).

Inspectors from the State Inspectorate for Analytical Control monitor pollution emissions from the enterprises and enforce permit conditions. Regional inspectors regularly visit the enterprises (public and private). Inspection frequency varies from every month to once or twice a year, depending on the category of industrial enterprises. The inspection schedule is determined every year by the Coordination Board of the Cabinet of Ministers, following a proposal by the State Committee for Nature Protection.

The Inspectorates cannot impose fines directly when an enterprise exceeds permitted pollution limits. Permission to charge the enterprise is first needed from the State Taxation Committee. This means that at least two inspections must precede penalization of an enterprise. The environmental Inspectorates cooperate with other agencies of the Ministry of Health, the Ministry of Agriculture and Water Management, Ministry of Internal Affairs, and the State Committee for Geology and Mineral Resources.

### *Environmental standards*

Uzbekistan inherited its numerous air and water quality standards from the former Soviet Union. Many of these standards are outdated and inconsistent with WHO guidelines, and are not backed by realistic implementation plans and targets. Consequently, it is impossible to enforce them. The National Environmental Action Plan (NEAP) acknowledges these deficiencies and the difficulty of using the current standards to set environmental quality objectives.

Since 1994, Uzbekistan has been revising its system of air and water quality standards. New adopted air and water quality standards are based on maximum allowable concentrations (MACs), which are defined as the maximum permitted concentrations of toxic substances in air, water and soil that are not harmful to human health. These MACs are set by the Ministry of Health according to their measurement frequency and toxicity. There are 479 air quality standards, 1,138 safety standards and 1,050 MACs for water. Discharge or emission limits for enterprises are listed in their operating permits and are derived from MACs. The standards applicable in Uzbekistan are the following:

- Water quality standards, specified as MACs for every pollutant. Different standards apply to drinking water, surface water, groundwater, effluent discharges, and fisheries.
- Air quality standards, specified as MACs, and including both maximum permissible average daily, monthly and annual concentrations and maximum permissible occasional concentrations.
- Standards for car emissions. Uzbekistan's standards (based on GOST standards) for car emissions were established in the former Soviet Union and have not been revised. These standards are less strict than the equivalent standards in the European Union or in the United States.
- Soil standards; standards for toxic substances in soil were introduced in 1980 and list 109 different harmful substances and concentration standards for 69 of these.
- Safety standards; these standards oblige all industrial enterprises to incorporate environmental and safety features in their design plans.

### *Ecological expertise and environmental impact assessment*

The system of State ecological expertise in Uzbekistan includes environmental impact assessment (EIA). State ecological expertise is intended to verify whether a project complies with legal requirements, whereas EIA aims to assess the project's impact on the environment. An environmental impact assessment is required for the completion of State ecological expertise and can be regarded as one stage of the expertise.

The State ecological expertise is carried out before a decision is made to allow an economic activity or project to go ahead and is an independent, mandatory tool aimed at preventing adverse impacts from economic activities. The process of assessing the environmental impacts of proposed activities was already introduced in the mid-1970s, and subsequently further developed in several regulations and instructions.

The new Law on Ecological Expertise, which was adopted on 25 May 2000, governs State ecological expertise. Regulations for this Law are still under consideration by the Cabinet of Ministers. In the absence of regulations, the State Ecological Expertise (SEE) Department as well as subordinate SEE departments at *oblast* level operate in accordance with the "Guiding Document on Procedures for Arranging and Conducting the Ecological Expertise", approved by the State Committee for Nature Protection on 20 February 1997.

A State ecological expertise is required for all projects, new enterprises and enterprises that are privatized or alter their production process. The Guiding Document lists the projects subject to SEE. They are subdivided into categories I, II and III. The State is responsible for ecological expertise for large-scale projects of categories I and II, and the *oblast* for smaller projects (category III).

The expertise consists of the following stages: (i) a preliminary review of documents submitted by the project developer; (ii) a project and environmental impact assessment review by a group of experts; (iii) a review by the Expert Council of the State Committee for Nature Protection; and (iv) approval or rejection of the proposed activity. Only the Chairperson of the State Committee (who is also Head of the State Ecological Expertise Department) has the authority to sign the final SEE decision.

The environmental impact assessment (EIA) is one of the main documents required for the preparation of an ecological expertise. It reviews the different impacts of economic activities on health and the environment, and is conducted by the project developer. The EIA Instruction of 1993 provides methodological guidance and defines: (i) the objectives of EIA within the process of preparing and taking economic decisions; (ii) the principles of EIA; (iii) the responsibilities for conducting EIA; (iv) the procedures for conducting public hearings; (v) EIA procedures for the preparation of project documentation; and (vi) the procedures for recording the EIA results. The activities or projects that are subject to EIA are listed in the Instruction. This Instruction defines the procedural steps for conducting feasibility studies and designing projects, but it does not clarify how EIA is related to the various stages of the State ecological expertise. The new Law on Ecological Expertise incorporates the different impact assessment principles and procedures.

### **2.3 Economic instruments for environmental protection**

#### *Background*

Uzbekistan has relied mainly on command-and-control methods for environmental protection and management. In 1988, a resolution of the former Soviet Union specified the need to introduce payments for the use of natural resources and pollution charges. It also urged the creation of earmarked environmental funds to allocate the revenue from these payments to environmental protection activities. The Law on Nature Protection (1992) established the legal basis for economic instruments and payments for environmental pollution, which were introduced in June 1992 by a resolution of the Cabinet of Ministers.

The use of economic instruments for environmental protection in Uzbekistan is in many ways different from that in OECD countries. While in Uzbekistan charges are levied on a large number of pollutants, emission charges in OECD countries are used only for a limited number of pollutants, mostly air pollutants. Product charges, except for transport-related charges, are not commonly used in Uzbekistan, while the OECD countries have focused much more on product charges levied on environmentally harmful products. From the revenue-raising perspective, economic instruments in Uzbekistan can be divided into the following categories:

- Pollution charges or fees: direct payments for emissions or discharges of pollutants into water, air or soil;
- User charges or fees: payments for public services, i.e. water supply, waste-water treatment and municipal waste collection;
- Product charges: charges applied to products that create pollution when they are manufactured, consumed or disposed of;
- Nature use payments: payments for the use of natural resources, such as for the extraction of mineral resources and fossil fuels, for the abstraction of water, and for the use of bio-resources. These instruments were originally introduced to promote more efficient natural resource management, but they mainly serve to generate revenue;
- Deposit-refund systems: payments made when purchasing a product. The payment (deposit) is reimbursed when the used product or its container is returned;
- Non-compliance fees: payments imposed on polluters who fail to comply with certain regulations. Non-compliance fees are also referred to as fines or penalties;
- Subsidies: all forms of financial assistance to polluters or users of natural resources, e.g. grants, soft loans, tax breaks;
- Environmental tax: tax introduced in 1998 that applies to every enterprise and amounts to 1% of the enterprise's production costs.

#### *Environmental pollution payments*

Uzbekistan has introduced a system of payments for the disposal of waste and for emissions and discharges of pollutants whether below or above the permitted levels (charged against profits). The rates are proposed by the State Committee of Nature Protection, and approved by the Cabinet of Ministers. The fees are set at a low level and are levied on a large number of air and water pollutants. The payments for the emissions and discharges are calculated by multiplying their volume by the specified basic pollution charge (see table 2.1).

Waste disposal fees are intended to control and reduce wastes. The fees include both fines for the disposal of non-recyclable waste and charges for the disposal of recyclable material. The fees are too low to have any substantial impact on the quantity of waste generated.

Waste-water payments are due when enterprises discharge their waste water directly into a watercourse. The payments depend on the amount and the toxicity of the discharge and on the watercourse receiving the waste water. If the enterprises discharge their waste water into a municipal sewage system, the pollution payments take the form of user charges for public services.

Table 2.1 shows the charges for pollutant emissions and discharges and for waste disposal, which were established under Resolution No. 554 of 31 December 1999. These charges came into effect on 1 January 2000 and can be revised by the Cabinet of Ministers. The rates are calculated per ton of pollutant and depend on the pollutant's toxicity.

#### *User charges*

User charges are due for municipal services, i.e. water supply and waste-water treatment and municipal waste collection. The main aim of user charges is to recover the operating and maintenance costs as well as the capital costs of these services. But social considerations keep the user charges below the full cost-recovery level. The tariffs are controlled by the municipalities, and can vary from one municipality to another.

The tariffs for water use depend on the user type and the type of water source. For enterprises and organizations using municipal services, and for industrial water users and power stations, payment is proportional to the amount of water used. Households pay less than commercial users. Household water consumption is estimated and not based on the quantities of water used; only 2% to 5% of water use is metered. Prices are in principle calculated to cover operating costs, but in practice they fall far short. At present, social constraints and the general economic situation do not allow these prices to be liberalized. The income of the water companies is further depressed by the population's low ability or willingness to pay. As a result, subsidies from municipal budgets are used to cover the most urgent costs (salaries and urgent repairs).

Households and enterprises that are connected to a sewage system pay waste-water treatment charges to the municipal water companies (*vodokanal*). Currently, only about half the population is connected to sewage systems (see chapter 5, on waste water treatment).

**Table 2.1: Pollution charges**

Air Emissions		Waste Water discharges		Waste disposal	
<i>Pollutants</i>	<i>sum/ton</i>	<i>Pollutants</i>	<i>sum/ton</i>	<i>Pollutants</i>	<i>sum/ton</i>
<b>Stationary sources</b>					
Nitrogen dioxide	210	Ammonium nitrogen	43,807	Ash	-
Nitrogen oxide	140	Nitrite nitrogen	1,289,550	Oil products	-
Ammonium	210	Nitrate nitrogen	2,578	Polymers	-
Acetone	24	Acetone	258,000	Paper	-
Benzopyrene	84,000,000	Benzene	38,760	Tyres	-
Petrol	5.6	Cadmium	1,009,545	Non-recyclable: class 1	1,500
Benzene	84	Cobalt	727,500	Non-recyclable: class 2	750
Hydrogen chloride	42	Arsenic	335,400	Non-recyclable: class 3	450
Hydrogen cyanide	840	Oil products	3,616,000	Non-recyclable: class 4	150
Ash	420	Nickel	1,009,995	<b>Non-toxic wastes:</b>	
Arsenic compounds	2,800	Sulphate	155	Mining industry	1.5
Nickel	42,000	Lead	977,250	Processing industry	8
Vanadium pentoxide	4,200	Phenols	5,441,490	Other toxic waste	40
Mercury	28,000	Fluoride	129,200		
Sulphur dioxide	168	Chloride	52		
Hydrogen sulphide	1,050	Cyanide	291,000		
Phenols	2,800	Chlorine	9,690		
Chlorine	280	Zinc	1,009,990		
Copper compounds	4,200				
Cobalt compounds	8,400				
<b>Mobile sources</b>					
Nitrogen oxides	-				
Hydrocarbons	-				
Carbon black	-				
Sulphur dioxide	-				

Source: Resolution No. 554, 31 December 1999.

Municipal waste collection and disposal are the responsibility of the municipalities. The charges depend on the type of user. For domestic users in apartment buildings, a monthly rate is paid by the building's manager, who in turn charges the occupants according to the number of persons in the household. The charges are often included in the rent of the apartments. For commercial users, charges are levied per cubic metre of waste produced (see chapter 8, on municipal waste).

#### *Product charges*

Product taxes and charges on environmentally harmful products are used to a very limited extent in Uzbekistan, except for a number of transport-related product charges on vehicles and transport fuel. However, they were not introduced for environmental purposes: product charges in transport (excise taxes, taxes on fuel, taxes on the purchase, import and ownership of cars) were originally designed to raise revenue for the State.

Excise taxes on transport fuel are differentiated. The excise tax on leaded petrol is 60.4% of the retail price, on unleaded petrol 65.8%, on diesel 39.6%, and on natural gas 48%. Most vehicles run on leaded petrol; few run on unleaded petrol. There are no plans to increase excise taxes on leaded fuel in the short term in order to make the use of unleaded petrol more attractive.

Vehicle tax is paid by vehicle owners. The tax is based on the vehicle's total engine capacity. Road tax is calculated according to the car's weight.

#### *Nature use payments*

Payments are charged for water abstraction and water use, the extraction and use of mineral resources, the use of land and forests, and hunting and fishing.

Hunting, fishing and other uses of wildlife are governed by the Law on the Protection and Use of Wildlife. Half the licence fee for hunting and

fishing is paid into the State budget and the other half is paid into environmental funds.

Payments for the extraction and use of mineral resources are based on various legal documents concerning State taxes, underground resource use and environmental protection, especially the 1994 Subsoil Code. Both legal entities and individuals are subject to the natural resource extraction tax. The tax is based on the volume extracted. Tax rates vary from 1% to 24% of the estimated sales prices of the processed mineral, depending on the mineral. Payments for the use of surface and groundwater are mainly based on the Law on Water and Water Use and the Resolution on Limited Water Use. The rates differ according to the source (groundwater, surface water) and the user. The tax rates for the use of mineral resources and water prices are established annually in the Resolution on Macroeconomic indexes and State budget forecasts of the Cabinet of Ministers. The Ministry of Finance and the Taxation Committee define the payment procedures. The tax rates for extracting mineral resources and water resources for the year 2001 can be found in tables 2.2 and 2.3. Payments for mineral resources and water resources are not used for environmental protection purposes, but go to the State Budget.

**Table 2.2: Fees for the use of mineral sources, 2001**

Type of resource	in % of sales' price
Natural gas	18.5
Gas condensate	6.7
Oil	12.3
Coal	3.8
Ferrous metals	from 1 to 24
Non-ferrous metals	3.0

Source: State Committee for Nature Protection, 2001.

#### *Environmental tax*

An environmental tax, introduced in 1998, is applicable to every enterprise in Uzbekistan and amounts to 1% of the enterprise's production costs. There is a proposal to increase it. Revenues from this environmental tax are allocated to the State budget and not to environmental expenditures. These revenues are more than double the combined

revenues from pollution payments, fines and penalties. Figures are not available for public.

**Table 2.3: Water prices, 2001**

Water source / User type	Price of water in sum/m <sup>3</sup>
<b>Surface water</b>	
Industrial users	227
Power stations	65
Municipal services	125
Agricultural users	11
<b>Groundwater</b>	
Industrial users	227
Power stations	292
Municipal services	162
Agricultural users	14

Source: State Committee for Nature Protection, 2001.

#### *Enforcement incentives*

Fines and penalties can be imposed if evidence is found of violation of environmental regulations and standards. The amount of the fines is defined by the Code on Administrative Liability that was adopted in 1994.

Fines and penalties do not nullify liability for violating nature protection legislation. The violator is responsible for compensating for the damage caused. Liability for violating environmental legislation is envisaged by the Criminal Code, the Code on Administrative Liability, the Civil Code and the Labour Code. In addition to this, the Law on Nature Protection contains special rules on ecological and legal liability.

Fines for the violation of environmental legislation, penalty payments and compensation payments are allocated to the regional environmental funds.

#### *Policy objectives*

In 1996 the State Committee for Nature Protection, together with the Ministry of Macroeconomics and Statistics and other ministries involved, introduced a framework for the introduction of scientifically substantiated economic and regulatory mechanisms for environmental protection and the use of natural resources, which was approved by the Cabinet of Ministers. The economic and legal mechanisms will be implemented in three stages, and have to be

in place by the year 2010. During the first stage, the legal framework was developed and payments were introduced for pollution above the established limits and standards. This stage was completed in June 1992 with Resolution No. 303 on the introduction of payments for exceeding standards of emissions or discharges of pollutants into the environment and waste disposal. The second stage, which called for the introduction of payments for pollution below and above established limits and standards, was completed in 2000 with Resolution No. 554 of 31 December 1999 on the distribution of revenues from payments for pollution. According to this Resolution, 80% of the revenues are allocated to the State budget and 20% to environmental funds. During the last stage, payments for the non-rational use of natural resources will be introduced by 2010, and the payment system will be further developed.

One of the aims of the NEAP is the efficient and sustainable use of natural resources and the implementation of the “polluter pays” and the “user pays” principles. The application and further development of economic instruments as a tool to ensure the efficient use of natural resources is mentioned vaguely in the NEAP.

The system of pollution fees and fines in Uzbekistan serves mainly to raise revenue, and has become an increasingly important source of financial resources for the State Committee for Nature Protection at national and *oblast* level. However, collection rates remain low, and the effectiveness of the payment system is limited. Therefore, the economic instruments are not effective in reducing pollution at the expense of the polluters. The underlying reasons for this are:

- The low level of pollution charges. The inflation of the early 1990s eroded the real value of pollution charges. Though the rates of charges are indexed, they do not adequately reflect the risks and damage associated with different pollutants. Consequently, charges are not high enough to significantly influence the polluter’s behaviour.
- The low effectiveness of fines and penalties for environmental pollution and non-compliance. High non-compliance fees (for exceeding pollution limits) should in principle compensate for low base rates of pollution charges and should provide incentives for reducing emissions in excess of allowable limits. However, fines and penalties for exceeding

limits are not severe. It is sometimes more cost-effective for enterprises to pay fines than to invest capital in solving the pollution problem. Upgrading or repairing treatment facilities requires an extensive overhaul of the existing treatment system and is therefore costly.

- The high number of pollutants on which charges are levied and the administrative complexities of the system. The cost of monitoring and administering pollution charges for the high number of pollutants seems excessive.
- The low collection rate. Complex administration and limited monitoring capacity have led to relatively poor enforcement and low collection rates of pollution charges.
- The wide discretionary powers of environmental authorities. These discretionary powers give environmental authorities the right to adjust emission limits, or to accept payment in kind. Many enterprises claim exemptions from pollution fees and fines on financial grounds, because they are operating at reduced capacity.

## 2.4 Financing environmental expenditures

### *National sources of finance*

The main sources of environmental financing are the State budget, the national and local environmental funds (extrabudgetary), foreign grants and loans. In 1999 (no data for 2000), a total of 32,223.4 million sum from the State budget, including capital investment, were used for environmental protection projects and activities. This was 1.66% of GDP. Table 2.4 illustrates that, while investment in environmental protection has grown in recent years, its share of GDP has not increased significantly since 1994. The environmental expenditures financed by environmental funds in 1999 and 2000 were 156.2 million sum and 212.1 million sum, respectively.

### *Budgetary financing*

The Public Investment Programme was set up to reflect government priorities. National and sectoral investments from the State budget have to be channelled through this Programme. The current (second) Public Investment Programme is for the period 2000-2002 and was prepared by the Ministry of Macroeconomics and Statistics. Its priority sectors are education, industry, transport, housing



and social services. In allocating funds to the environment, the Programme follows the investment priorities of the National Environmental Action Plan and the State Programme for Environmental Protection and the Rational Use of Natural Resources for 1999-2005, which provides a time frame and financing for these activities. A specific programme is prepared for each year.

According to the Public Investment Programme, very little financing is available for environmental investments (0.02% of total investment for 2000-2002). Environmental investments, however, are also grouped under other sectors in the Programme, such as agriculture, energy, health, housing and social services.

In 1999, nearly 82% of current expenses were used for water protection. This was mainly investment in water-supply systems and renovation or construction of the water infrastructure (pumps, pipes, waste-water treatment facilities). Other activities included air protection (12.5%) and land protection (5.5%). Most capital investment is spent on water protection, with some investments in air protection and other environmental activities. Current expenses for environmental protection are

funded by the enterprises themselves. Enterprises provide 62 to 84% of their own capital investment in environmental protection; the balance is financed by other sources.

#### *Environmental funds*

Uzbekistan's Law on Nature Protection of 1992 provides the legal basis for the establishment and operation of the country's environmental funds, which include the republic fund as well as local funds at *oblast* level. Section VIII of the Law on "Economic Measures to Ensure Environmental Protection" stipulates that: "A Republic Environmental Protection Fund and local environmental funds shall be established under the State Committee for Nature Protection with the aim of securing earmarked finance for environmental protection measures of national and international significance, eliminating past environmental damage caused by human activities, and supporting other environmental protection activities". The republic and local funds have been operational in their present form since Resolution No. 246 of the Cabinet of Ministers came into effect on 24 May 1993.

**Table 2.4: Total State budgetary expenditures for environmental protection, including capital investment, 1994-1999**

	<i>million sum</i>					
	1994	1995	1996	1997	1998	1999
<b>GDP</b>	<b>648,778</b>	<b>302,787</b>	<b>559,072</b>	<b>976,826</b>	<b>1,358,781</b>	<b>1,942,109</b>
<b>Total expenditures</b>	<b>999.3</b>	<b>3,792.0</b>	<b>7,172.5</b>	<b>18,958.7</b>	<b>24,680.1</b>	<b>32,223.4</b>
Capital investment	228.7	1,326.9	2,441.8	2,985.6	14,085.8 a)	9,840 a)
Maintenance	48.3 b)	155.9 b)	565.7 b)	1,036.6 b)	1,053.8 b)	3,267.8 b)
Current expenses	722.3 b)	2,309.2 b)	4,165.0 b)	14,936.8 b)	9,540.5 b)	19,115.5 b)
<i>Environmental expenditures as % of GDP</i>	<i>1.54</i>	<i>1.25</i>	<i>1.28</i>	<i>1.94</i>	<i>1.82</i>	<i>1.66</i>

Sources: IMF (GDP); ADB, 1999; Ministry of Macroeconomics and Statistics (a); State Committee for Nature Protection, 2001 (b).

**Table 2.5: Total capital investments in environmental protection, 1994-1999**

	1994	1995	1996	1997	1998	1999
<b>Capital investment (million sum)</b>	<b>228.7</b>	<b>1,326.9</b>	<b>2,441.8</b>	<b>2,985.6</b>	<b>14,085.8 a)</b>	<b>9,840.1 a)</b>
Water protection (% of total)	64.8	53.7	63.8	51.4	-	-
Air protection (% of total)	20.7	21.1	14.9	37.1	-	-
Land protection (% of total)	10.7	15.1	17.9	6.1	-	-
Other (% of total)	4.0	10.0	3.5	5.4	-	-

Sources: ADB, 1999; Ministry of Macroeconomics and Statistics (a).

Both the republic fund and the local funds are managed by a council. The Chairpersons of the respective environmental protection committees (at republic and local levels) also chair the funds' councils. The councils decide collectively on major issues relating to the funds' activities, such as the allocation of resources. The councils of local environmental funds submit quarterly reports on the use of their resources to the State Committee for Nature Protection and to the executive authorities of the regional governments. The republic fund also plays a role in monitoring and controlling the spending of the local funds. The State Committee for Nature Protection is obliged to submit an annual report to the Cabinet of Ministers on the allocation of the national fund's resources.

The funds' main revenue sources, as specified in the Regulations on Environmental Funds, are the payments for pollution, compensation for environmental damage, non-compliance fines and penalties, and payments for violation of environmental legislation.

It has been decided that 25% of these revenues are to be transferred to the republic fund, while 75% remain at the local level where they are initially collected.

In 2000, 71% of the funds' revenues were pollution fees; about 7% came from fines and penalties for violation of environmental legislation, 13% from compensation payments (claims) for environmental damage, and another 9% from fees for late payments and other sources. In 2000 revenue totalled 213.7 million sum (see table 2.6).

The republic and local environmental funds allocate their financial resources in accordance with the annual programmes prepared by their boards and approved by the respective local government administrations and, ultimately, the Cabinet of Ministers. According to the funds' regulations, 15% of their resources are earmarked for salary bonuses for individuals or groups of individuals in State, public and other enterprises, institutions and organizations, to reward significant achievements in environmental protection. The activities that can be financed through the republic and local funds include:

- The construction and modernization of environmental facilities;
- Research and development of environmental technologies, including monitoring equipment;

- The creation and maintenance of nature reserves and protected natural areas;
- Environmental education and public information;
- The restoration of environmental resources damaged by pollution, etc.

In 2000 more than 30% of all the money collected was spent on strengthening the State Committee for Nature Protection (construction and reconstruction of offices, monitoring and technical equipment, staff training), 15% on motivating and rewarding its staff, and about 20% on environmental protection activities as defined in the Resolution on Environmental Protection Funds. This 20% share allocated to environmental protection activities is less than 1% of all funds spent on nature protection by ministries, associations and enterprises. The remainder of the collected payments was transferred to the republic fund (about 30%).

The sources of the environmental funds, payments for pollution, non-compliance fines and penalties, and payments for violation of environmental legislation (penalties), have had no significant impact on the efficiency of nature protection activities. For instance, in 2000 the funds held some 214 million sum, of which more than 70% were payments for pollution. Almost 30% of all funds consist of fines and penalties for various types of violations of environmental law. These payments have increased in recent years.

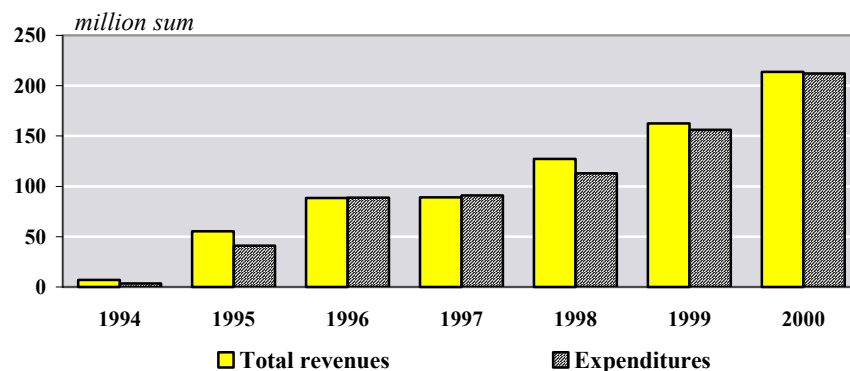
According to several economic assessments, the economic damage to the environment may total one billion sum nationwide. Against this background, the size and effectiveness of fines and penalties seem extremely modest. There is a need to further develop the use of economic mechanisms for environmental management. Currently the State is using very weak environmental management instruments to finance nature protection activities. Shortcomings are mostly due to considerable reductions in State subsidies and the difficult financial situation of enterprises, which result in insufficient funding for environmental management programmes and poor economic incentives for nature protection. The rehabilitation and protection of Uzbekistan's environment requires much more money than is currently available.

Table 2.6 gives an overview of environmental fund revenues and expenditures from 1994 to 2000, with a breakdown into the different sources of total collected payments. This breakdown is not available for the years 1994 to 1996.

**Table 2.6: Revenues and expenditures of the environmental funds, 1994-2000**

	<i>million sum</i>						
	1994	1995	1996	1997	1998	1999	2000
<b>Total revenues</b>	<b>6.9</b>	<b>55.3</b>	<b>88.4</b>	<b>88.9</b>	<b>127.3</b>	<b>162.6</b>	<b>213.7</b>
Fees/payments for pollution	5.9	47.8	65.7	67.3	95.2	124.2	152.6
Fines/penalties	-	-	-	4.2	7.8	11.3	15.6
Suits/Claims	-	-	-	8.9	16.0	12.7	27.4
Arrears	-	-	-	0.9	2.8	4.9	3.7
Other	-	-	-	7.6	5.5	9.5	14.4
<b>Expenditures</b>	<b>3.4</b>	<b>41.0</b>	<b>88.7</b>	<b>90.9</b>	<b>113.0</b>	<b>156.2</b>	<b>212.1</b>

Sources: NEHAP (1994 to 1996); State Committee for Nature Protection (from 1997).

**Figure 2.1: Revenues and expenditures of the environmental funds, 1994-2000**

Sources: NEHAP (1994 to 1996); State Committee for Nature Protection (from 1997).

## 2.5 Conclusions and recommendations

Economic instruments, in theory, trigger action from both producers and consumers that allow environmental objectives to be achieved at the lowest costs. The efficiency of economic instruments is based on the flexibility that they give polluters to devise a cost-effective compliance strategy. Environmental charges and taxes are direct payments from polluters and, hence, an application of the “polluter pays” principle. The application of economic instruments should not be an aim in itself, but should be seen as one of several options to promote improvements in environmental performance and to meet environmental policy goals. The introduction of a pollution charge system in Uzbekistan is one step in the right direction. Still, the present system is not very effective and does not provide real incentives to polluters to reduce their pollution. In many cases, the revenue generated is small. The pollution charge system needs to be reformed to:

- Reduce the number of pollutants on which charges are levied, focusing on the major and priority pollutants that can be monitored at reasonable cost;
- Increase the rates to a level that would provide real incentives to reduce pollution;
- Curb the discretionary powers of the environmental authorities.

Pollution charges could be applied more effectively if they were levied on a limited number of priority pollutants rather than on an extensive number of pollutants. Most of the applicable standards are not measured in any of the environmental monitoring programmes. The cost of monitoring and administering pollution charges is high, and inspection and laboratory facilities are not adequately equipped to measure pollution levels. Criteria for selecting standard pollutants should be based on the feasibility of systematic monitoring and inspection, and focus on major and priority pollutants that can be monitored at reasonable cost.

Increasing pollution charges could provide a strong incentive for technological improvements, but enterprises need financial resources to invest in cleaner production technologies. Most enterprises operate at reduced capacity and are in a difficult financial situation. The insufficiencies of the banking system further complicate the situation by creating credit shortages and limiting access to financial resources. Charges could be increased gradually, with rate increases scheduled in advance, to allow enterprises to introduce technical adjustments step by step. Charges reach their optimal level when pollution abatement is realized at the lowest possible cost, and they simultaneously help to make resource use more efficient, increase productivity and economize scarce resources.

The environmental authorities have in many cases wide discretionary powers to waive charges and to accept non-monetary settlements. Apart from undermining the effectiveness of the charge system, such practices may induce enterprises to lobby for special favours (“rent-seeking behaviour”). The enterprise may direct resources away from pollution abatement and instead attempt to obtain special exemptions from the authorities. Therefore, the level of discretion in enforcing pollution charges should be reduced.

Recommendation 2.1:

*The State Committee for Nature Protection, in cooperation with the Ministry of Finance and the Ministry of Macroeconomics and Statistics should reform the existing pollution charge system to make it more effective and to provide incentives for polluters to invest in pollution abatement. This could be done by: reducing the number of pollutants on which charges are levied and focusing on the major pollutants; gradually increasing charges to levels that would provide incentives to reduce pollution; and reducing the discretionary powers of the environmental authorities.*

The enormous task of expanding and improving municipal water supply and treatment, as well as improving waste collection and disposal, can be accomplished only through cost-recovery and private sector participation. Cost-recovery pricing for public services is a difficult political issue. Households are generally unwilling or unable to pay for such services. Public services were cheap or free in the Soviet period. However, a reluctance to pay can gradually be overcome by the government with proper information and clear pricing signals. Currently, extremely low water prices do not give

any incentive to consumers to reduce consumption and water consumption is, therefore, very high in Uzbekistan. Special financing strategies for communal services need to be developed and financing mechanisms must be designed to tackle the problems in the service sector. Subsidies could be part of those mechanisms, but commercial borrowing components must be substantial. Bank loans can be taken only with well-planned repayment schedules, which need to rely on revenue generated from service charges.

Recommendation 2.2:

*The Ministry of Finance and the Agency of Communal Services need to develop sectoral financing strategies and design financing mechanisms for communal services, in order to improve water and waste management services and to allow the service companies to operate on a cost-recovery basis.*

Product charges on harmful products are used to a very limited extent in Uzbekistan, except for transport-related product charges on vehicles and transport fuel. They are generally applied to products that create pollution when they are manufactured, consumed or discarded. Product charges are intended to modify relative prices and/or to finance collection and treatment systems. One form that product charges may take in practice is that of tax differentiation, making environmentally friendly products relatively cheaper. One example is the tax differentiation between leaded and unleaded fuel, which is not applied in Uzbekistan. The possibilities for introducing product charges should be evaluated. These may include charges on batteries, fertilizers, packaging, tyres, and pesticides.

Recommendation 2.3:

*The State Committee for Nature Protection, in cooperation with the State Taxation Committee, the Ministry of Finance and the Ministry of Macroeconomics and Statistics, should evaluate the increased use of product charges for environmental policy. The introduction of tax differentiation to encourage the use of environmentally friendly products should be considered. The first step is to define criteria and select products; the next step is to analyse the effectiveness and efficiency of the product charges.*

Pollution payments, fines and penalties for violations of environmental legislation, paid by enterprises, are earmarked for the environmental funds, which are supposed to finance

environmental expenditures. But the role of the environmental funds in environmental financing is inconsequential (less than 1% of total expenditures) and their revenues are primarily spent on administration, research, and the construction and modernization of environmental facilities. It appears that the funds do not have the capacity to cope with urgent environmental problems, as there are hardly any transparent financial mechanisms to help them set their investment priorities. There is a need to use the existing environmental funds, both at national and at *oblast* level, more efficiently to ensure that revenue is subjected to strict financial and management control before it is invested in environmental projects.

Recommendation 2.4:

*The State Committee for Nature Protection should improve financial mechanisms for environmental investment by the environmental funds, both at national and at oblast level. These mechanisms will help to set investment priorities and to increase the efficient use of the environmental funds' financial resources.*

An environmental tax was introduced in 1999. It is applicable to every enterprise in Uzbekistan and amounts to 1% of total income. This environmental tax is not earmarked for environmental protection; revenue from this tax is allocated to the State budget. Exact revenue figures are not yet available, but estimates show a total that is more than double that of the revenues from pollution payments, fines and penalties. Returning collected revenue to the sector through earmarking and financing well-defined environmental activities may make the charges more acceptable to enterprises.

Recommendation 2.5:

*The 1% environmental tax that was introduced in 1998 should be earmarked for environmental expenditures, in order to make the charges more acceptable to enterprises and to increase sources of finance for environmental activities. To redirect the revenue from this tax, the Cabinet of Ministers needs to amend the law. Such an amendment could be proposed by the State Committee for Nature Protection, the Ministry of Macroeconomics and Statistics, the Ministry of Finance and the State Taxation Committee. (See also Recommendation 3.4.)*

## Chapter 3

# ***ECONOMIC DEVELOPMENT AND ENVIRONMENTAL MANAGEMENT TOOLS***

### **3.1 Economic policy and development**

Uzbekistan has done much since independence in 1991 to build a basis for a more sustainable future. Immediately following independence, the country suffered a number of economic difficulties similar to those affecting other newly independent States, including the loss of markets and subsidies from the former Soviet Union, disruptions in trade and payments, inflation and declining output. It was heavily dependent on cotton monoculture and imports of essential food and energy products. At the same time, Uzbekistan has rich energy and other mineral resources, including gold, and an educated population.

From the beginning of its transition process, the Government fixed the objectives for economic restructuring as follows:

- Increase export earnings,
- Develop import substitution industries, including increasing local capacity in
  - Agricultural production of key commodities
  - Energy production
  - Chemical and agricultural machinery
- Improve infrastructure for developing manufacturing

Since 1992 there have been three distinct phases in economic development, with differing degrees of reform and changes in the stability and growth of the macro economy.

The first phase, 1992 and 1993, featured a loose fiscal policy, a large investment programme, and subsidized credit to State-owned enterprises. This approach resulted in large fiscal deficits and a decline in gross domestic product (GDP) of 13% per month.

The Government tightened its financial policies in the second phase, from 1994 to 1996. In response to a declining macroeconomic position and the end of Uzbekistan's involvement in the Russian rouble

zone, the Government changed its policies and initiated a period of broad economic reform, including tax reform. It virtually completed privatization of small-scale industry, established a privatization programme for medium and large enterprises, and initiated limited private landownership. Uzbekistan also established both a stock exchange and a national share depository. The budget deficit declined in relation to GDP, GDP rose, and inflation was significantly reduced.

During the third phase, from 1996 to 1999, reforms proceeded at a slower pace. In 1996 lower production of the key commodities and lower world commodity prices for cotton and precious metals created a balance-of-payments crisis. The Government strengthened its control over the prices of a number of commodities, increased import tariffs and excise taxes on imports and established a legal exchange-rate system. The Government reduced State ownership in commercial banks and prepared to sell its shareholdings in the major State-owned banks. In 1998 the global financial crisis impacted on the economy: foreign trade declined, exports and imports decreased, and foreign debt and external public debt increased. External debt alone was increased to US\$ 2.8 billion in 1998.

From 1996 to 2000, there was real growth in GDP (1.7 to 4.4% a year). Some of this was the result of investments in the energy sector, leading to an increase of almost 300% in crude oil and condensates within four years. However, there is some indication that the figures may not be entirely correct; there appear to be significant differences between official estimates and those produced by independent agencies.

A comprehensive programme of economic liberalization aimed at increasing exports and attracting foreign investment was developed in 2000. Since then, the Government has devalued the official exchange rate and curtailed foreign borrowing under government guarantees. However, policy changes, action plans and reforms

still have a long way to go to achieve the Government's objectives of liberalization, macroeconomic stability and social stability.

### **3.2 Liberalization as a path towards sustainable development**

Uzbekistan has set out its principles and objectives for economic reform and sustainable development, in its Strategy for Sustainable Development, its National Environmental Action Plan, and such laws and decisions as the following:

- The Presidential Decree on Measures for Attracting Foreign Direct Investment into Exploration and Production of Oil and Gas, in 2000
- The Cabinet of Ministers Resolution on Measures to Stimulate the Attraction of Foreign Capital in Privatization of State Property, in 1998
- The Government Decree on Measures for Privatization and Reduction of the State Share of Enterprises and Attraction of Foreign Investors in 2000-2001
- The Cabinet of Ministers Resolution on Further Measures for the Denationalization and Privatization of Enterprises with Involvement of Foreign Investors in 2001-2002, which included the new privatization programme issued in March 2001
- The regulation on the procedure of denationalization and privatization of State-owned entities.

The Strategy for Sustainable Development seeks to provide a healthy and fruitful life for all people by ensuring progressive and stable socio-economic growth and spiritual revival of the nation; to promote a market economy in a legally adjusted and democratic society; to integrate the economy into the world market; to overcome the consequences of the ecological crisis of the Aral Sea and stabilize the ecological situation in other zones of the Republic; and to maintain and improve a favourable environment, ensuring a rational use of land and water resources and an effective use of other natural resources in order to save them for the next generations.

In the National Environmental Action Plan (NEAP), Uzbekistan expects to achieve macroeconomic stability through introducing a sound pricing policy, finalizing privatization, restructuring industry, agriculture and transport,

and ensuring trade liberalization. Within industry, priorities include the machine-building sector, particularly the production of agricultural machines and implements; airplane manufacturing, the automobile industry and radio-electronics. Attention is also given to further developing light industry, which is traditionally a special sector in Uzbekistan. Most sensitive -- environmentally -- is the attention given to the reorganization of the fuel and energy complex, where objectives include energy security and operational efficiency. Strategic documents also emphasize the need to increase the share of natural gas in the total amount of energy resources, the use of non-traditional sources of energy, and the need to modernize the administration of all power production in the country.

The NEAP calls for moving away from a monoculture-approach in agriculture, optimizing cotton planting and achieving self-sufficiency in grain production. To ensure sufficient food supplies and both socio-economic and ecological security in agriculture, there is a need to drastically improve the use of water resources and soil fertility along with introducing good agricultural practice. As currently projected, the agricultural sector contributes about 30% of GDP, and will continue to play a leading role in the national economy in the future. In order to meet these ambitious goals, Uzbekistan is trying to liberalize its political and economic life. By 2010, the country plans to raise its GDP growth rate from its current 4% to a rate of between 6 and 8%. Under further liberalization of its economy and continued far-reaching reforms, Uzbekistan has defined its goals as follows:

- Increase industrial output to achieve full capacities at industrial facilities;
- Promote privatization and improve the level of efficiency in the banking system;
- Further assist the development of small and medium-size enterprises;
- Increase efficiency in the creation of joint ventures with foreign capital;
- Improve the functions of market infrastructure in the sectors of insurance, leasing, engineering, consulting and auditing.

Special attention has been given to creating conditions favourable for attracting direct foreign investments in the oil and gas sector and for improving the efficiency of exploration. The Presidential Decree on Measures for Attracting Foreign Direct Investment into Exploration and

Production of Oil and Gas was passed in 2000. This Decree grants favourable conditions to foreign companies involved in exploration and opens up the entire territory of Uzbekistan to foreign investors. Under the terms of this Decree, land can be leased to foreign companies on concessionary terms for a 25-year period. The national Holding Company *Uzbekneftegas* regulates activities and concession relationships in the oil and gas sector.

### 3.3 Privatization and the environment

The Uzbek privatization programme is being implemented as a three-phase process. The first phase was completed in 1995, when mainly housing units and small State-owned enterprises (but not the land) were transferred to private owners. Now, over 96% of the housing stock is in private hands, as well as most of the small enterprises, particularly in the retail sector. The second phase started in 1996 and is still in progress. It involves privatizing medium-size enterprises through the Privatization Investment Funds Programme, which was especially established for this purpose.

The third phase of privatization is aimed at large companies. It has also begun and is running concurrently with phase two. This third phase is the most complicated one, and it is being implemented on a case-by-case basis, with substantial involvement of foreign investors.

Among both medium-size and large enterprises, the programme has resulted in the selling of a number of medium and large companies. Revenues from these sales are reflected in Table 3.1.

#### *Revenues from privatization*

To activate the privatization process, the Cabinet of Ministers adopted a Resolution on Measures to Stimulate the Attraction of Foreign Capital in Privatization of State Property in 1998. This Resolution introduced a list of 258 medium-size and large companies to be sold to foreign investors during 1999 and 2000. At the same time, in 1998, the Government privatized 451 companies worth 8.9 billion sum, compared with 4.4 billion in 1997. Further actions were initiated following the Government Decree on Measures for Privatization and Reduction of the State Share of Enterprises and Attraction of Foreign Investors in 2000-2001. This Decree listed enterprises available to foreign investors on a competitive basis with a designated share of foreign ownership between 25 and 51%. As a matter of fact, 374 State companies were privatized in 2000, yielding 14.3 billions sum in revenue for the State. However, due to the restrictive multiple exchange rate regime, privatization of the large industrial enterprises did not proceed on as satisfactory a level as the Government considers necessary to moderate its current account deficit.

Therefore, the Cabinet of Ministers passed a second Resolution, in March 2001 on further measures for the denationalization and privatization of enterprises with involvement of foreign investors in 2001-2002. Included in the Resolution is a new privatization programme that aims to privatize 48 large enterprises and sell 535 enterprise and company assets. The Resolution approves four lists of enterprises for privatization and issues a new regulation on the procedure of denationalization and privatization of State-owned entities.

**Table 3.1: Revenues from privatisation, 1999-2000**

	<b>Industrial enterprises and service companies</b> <i>number</i>	<b>Sales revenues</b> <i>million sum</i>
<b>1998</b>	451	8.9
<b>1999</b>	448	9.1
<b>2000</b>	374	14.3

*Source:* The Basic Indicators of Social and Economic Development of the Republic of Uzbekistan, 1998 to 2000.



The World Bank has provided US\$ 28 million as an enterprise institutional building loan to assist this process. The largest State-owned enterprises with serious environmental problems are on the first list for privatization. Among them are seven joint-stock companies of the *Uzbekneftegas* national holding company (energy), and the holding company itself, Almalyk mining and metallurgical complex, *Uzmetkombinat* metallurgical plant, five chemical plants, two cable wire manufacturers, two cement plants and five companies of the country's main railway operators.

There has been progress in both decentralization and privatization, and privatization is being extended to more difficult enterprises from an environmental point of view. At present, however, neither environmental conditions nor related procedures have been incorporated directly into the privatization programmes. Environmental problems in large companies continue to be handled according to regular procedures. Furthermore, the privatization transaction requires no environmental audit or any other environmental investigation to clarify environmental conditions and liability issues before privatization. Environmental audit is still a new instrument, falling under the responsibility of the owners themselves. The purpose of environmental auditing is periodically to assess compliance with the requirements stemming from legislation, measures proposed in environmental policy, environmental management systems and standards. Currently, there is only one provision concerning environmental audit in the Law on Ecological Expertise, and there are no mandatory regulations or guiding documents on auditing or how to conduct environmental impact assessment, especially for those enterprises that are being privatized.

Consequently, privatization of industrial enterprises does not contribute to improving the environment. Special legislation or other provisions that require an environmental audit during the process of privatization might improve this situation.

By law, agreements should be reached on how to improve working conditions, ecological safety and environmental protection. As far as the already privatized enterprises are concerned, there are no specific environmental incentives other than various tax exemptions, such as exceptions from land tax or reduced taxes for technological equipment imported by foreign investors as their share in the charter fund of an enterprise with foreign investments.

### *Cleaner technologies*

Consistent with the NEAP and the State Programme for Environmental Protection for 1999-2005, plans are now under way to establish a cleaner production centre (CPC) in Uzbekistan within the framework of United Nations Industrial Development Organization (UNIDO) activities. Funds are being sought for this purpose.

Together with UNIDO, the Government is looking for donor financing for a CPC. As established in the document "Fulfilment of the programme of the activities on environmental protection, based on the results of the year 2000," the State Committee for Nature Protection and the proposed CPC would be responsible for elaborating 40 clean technology projects for the oil and gas industry, the chemical industry, machinery industry, food production and other industries. The projects would concentrate on six core activities such as awareness raising, in-plant demonstrations, training, clean production technology investment promotion, information dissemination and policy assessment. To carry out these activities, there is a need to build up national capacity to introduce cleaner production techniques and technologies and prepare an implementation strategy to promote cleaner production at the national level.

### *Environmental permits and voluntary agreements*

Different laws such as the Law on the Protection of Ambient Air and the Law on Water and Water Use establish requirements both for controlling industrial emissions into the air and discharges into water and for determining the criteria for issuing permits for the discharge of pollutants or for the use of natural resources. Procedures for calculating and monitoring emissions for each facility have been adopted.

There are limits for treated effluent quality, for effluent discharges to surface water and for discharges to municipal sewers. Effluent limits are set for each industrial sector based on data on the performance of treatment facilities for the control of the contaminants in each sector's effluent. Regardless of the treated effluent criteria, discharges are limited to ensure that the maximum allowable concentration (MAC) is not exceeded in the receiving stream. MAC is the level at which the contamination of air, water and soil is safe for health and is approved by the Ministry of Health.

In order to reach targets fixed in permits, enterprises need to plan carefully the appropriate measures to be taken. One possible option that has worked in many countries is for enterprises to work out voluntary agreements with the Government. So far in Uzbekistan there is no experience with such voluntary agreements. If voluntary agreements were developed, the State Committee for Nature Protection could more practically help enterprises to introduce environmental aspects into their programmes and projects. In addition, these agreements can clarify enterprises' targets and deliver information about their activities.

### 3.4 Public investment programme

Major investments are incorporated into the Public Investment Programme (PIP), which provides a general mechanism for prioritizing investment decisions in line with government strategies and objectives. The Programme also provides a consistent framework for financial obligations and needs. Efforts are made to consolidate various government policies and decrees that have established investment priorities and place these within the macroeconomic framework and sectoral strategies.

In the year 2000, according to the Statistical Survey, the total amount of investment in US\$ was 2,142.36 million. Of this, the largest amounts were earmarked for industry (31%), education (14.8%), human settlements (13.8%), transport (12.7%)

agriculture (5%) and animal husbandry (5%); 11.3% is spread out over forestry, construction, communication, purchasing, material and technical supplies, trade, geology, health, and culture. An amount of US\$ 135.39 million, or 6.3%, is shown as investment for environmental protection, including non-direct investment.

Preliminary estimates for the PIP Sector investment allocation from 2000 to 2002 (see Table 3.2) project a total investment of USD 13,789.3 million – a substantial increase over the amount provided in 2000. Estimates for the percent of the investment earmarked for environment are lower – 0.02 percent - although the overall amount of USD 2.6 million for two years would be approximately the same. However, there is no information with respect to the amounts that are actually available.

The small amount of funds provided for direct investment in the environment is essentially only available for geodetic network construction and urban drainage networks. There are, however, indirect investments in subsectors that are often grouped under “environment”, including:

- Agriculture (afforestation, fish processing, rehabilitation of ponds, new land development, land improvement, protection of soil against erosion); Energy (small hydraulic power stations);
- Health (health-care system improvement, recreational centre in Samarkand);

**Table 3.2: Estimated PIP Investment allocation 2000-2002**

	Amount <i>million US\$</i>	Per cent of total %
<b>Total</b>	<b>13,789.3</b>	<b>100.00</b>
Enterprises and industry	4,042.5	29.31
Education and science	3,421.9	24.81
Housing and social services	3,109.1	22.55
Transport	1,247.3	9.05
Energy	849.3	6.16
Agriculture, food, forestry and fishing	587.7	4.26
Communication and media	280.9	2.04
Health	237.6	1.72
Financial sector	10.5	0.08
Environment	2.6	0.02

Source: Public Investment Programme 2000-2002.

- Housing and social services (urban water supply and drainage, urban heat supply, recycling plants, pumping stations, water-treatment works, construction of water, gas and electricity supply lines, and solid waste).

Most foreign investment projects in environmental protection are connected with modernizing and developing public water-supply systems, waste-water discharge and treatment systems as well as the disposal of waste.

Furthermore, it should be noted that foreign assistance for environmental protection is relatively higher than the share of financial resources provided for this purpose by the Government of Uzbekistan (see Chapter 4, Table 4.1).

The PIP is a three-year rolling investment programme that is refined and updated annually. Usually in the first half of the year, line ministries provisionally prioritize project proposals, complete project information sheets and send them to the Ministry of Macroeconomics and Statistics for further consideration. The Ministry of Macroeconomics and Statistics prioritizes projects in line with government objectives and other selected criteria. The draft PIP is usually produced and presented to the Cabinet of Ministers in August for conditional selection for the next year's budget, with relevant amendments in October. The Cabinet is given the PIP for approval in November.

A further screening process would be helpful. Investment activities are identified primarily by "programme" rather than by "project". Well-formulated programmes may be successful in attracting both internal and external investments, but more detailed project proposals could increase investment interest. In addition, many large, technical complex projects need feasibility studies to determine their viability.

The Ministry of Macroeconomics and Statistics has developed a process to rank the projects before they are submitted, giving it considerable decision-making power over which projects will be funded. Environmental concerns might be more adequately reflected among the projects if the State Committee for Nature Protection were more actively involved at the earliest decision-making stages for allocation of funds within the Public Investment Programme and other funding mechanisms. It could also have responsibility for integrating environmental concerns into sectoral

programmes, overseeing implementation of projects and evaluating performance.

#### Sectoral programmes and their implementation

The Uzbek medium-term (2000-2005) and long-term (2005-2010) development plans cover political, social and economic reform; social and cultural development; economic welfare and social security network; economic restructuring; and territorial stability.

The sector programmes are to be integrated into the overall development plan. The economic welfare and social security network includes several key programmes to assist in generating employment, in particular in rural areas, strengthen targeted social employment, facilitate medical and social rehabilitation of disabled children, and promote environmental protection and natural resources management, including the provision of drinking water and natural gas for rural centres.

The integration of environmental considerations into several of the sectors is also reflected in both the National Environmental Action Plan (1998) and the National Strategy for Sustainable Development (1999). To harmonize tasks among different governmental institutions and ministries and to coordinate implementation of the NEAP, in 1999 the Cabinet of Ministers approved the State Programme for Environmental Protection for 1999-2005. This plan includes priority legislative, institutional and investment measures, as follows:

- Adoption of new laws, improvement of environmental information and public participation in the decision-making process;
- Development of a new set of environmental standards and limitation of environmental impacts;
- Further development of both the monitoring system and a cadastral system;
- Improvement of economic instruments, including environmental charges and environmental insurance;
- Implementation of measures for the protection and conservation of groundwater and surface water, including the project for the Aral Sea, and completion of the work on river protection zones;
- Implementation of measures for the management of industrial and hazardous wastes, minimization of air pollution from

industrial enterprises and road transport, including the phase-out of leaded petrol;

- Creation of a cleaner production centre;
- Implementation of the National Programme to minimize ozone-depleting substances and the National Strategy on greenhouse gases for 12 selected projects.

Uzbekistan has developed several programmes that integrate environment and sectoral concerns. Both the Chemical Industry Development Programme and the Mining Industry Development Programme have clear environmental elements. They address such issues as energy savings, environmentally sound technologies, and efficient waste management. The Government invests heavily in the chemical and mining industries; it is often the major shareholder in these companies. In 1998, these two programmes accounted for 23% of the Public Investment Programme.

Other examples include the following:

- The Programme on environmental protection in oil and gas industry for 2000-2005 (see Chapter 11).
- The Strategy for sustainable development in transport. Investments are significant since transport ranks high among the Government's priorities. In 1998, 25% of the funds of the Public Investment Programme were spent on transport. While the Strategy is a positive development for integration, there is, unfortunately, no concrete information in the PIP on how much is being spent on environmental protection and transport.
- The Programme for the Acceleration of Economic Reform in Agriculture, 1998-2000. This Programme lists among its top priorities such elements as soil improvement and development of water resource management, gradual transition to paid water use and introduction of water storage principles. The scope of governmental activities in the agricultural sector is relatively limited, e.g. in 1998 the funds provided by the PIP were only 6%.
- The National Environmental Health Action Plan developed in 1999. (For details, see Chapter 12). So far the Government's investment activities in the health sector have been relatively limited; in 1998, 4% of the total Public Investment Programme went to health.

The main obstacle to implementation is the lack of financial resources and staff. In addition, there is no organization responsible for coordinating implementation. As noted above, the State Committee for Nature Protection should have the capacity and authority to carry out this function.

Both the Public Investment Programme and the National Environmental Action Plan attempt to provide a list of high-priority projects that are designed to meet the goals and objectives laid down in the Government's strategic documents. The process of programming is complicated, and economic and environmental indicators based on feasibility studies are not always taken into account during the drawing-up of programmes. In addition, the tasks divided among different ministries and government authorities make harmonization lengthy and bureaucratic. In spite of some changes in the budgeting process and compilation of PIP within a relevant framework and with fixed procedures, changes in traditional enterprise decision-making, budgeting and accounting continue to be slow and often exclude environmental considerations or keep them on a very general level.

Government investments for environment in the Public Investment Programme are at the same time relatively small. In 1998, environment accounted for 0.6%, which includes all environmental expenditures of the Public Investment Programme. Most environmental projects are financed from the enterprises' and agencies' own assets. In 1999 around 9,840 million sum were spent on all capital environmental investments. This was only 0.46% of GDP. In 2000, both direct and indirect investment in environmental protection accounted for 6.3% of total investment. This includes, for example, investments in several sectors –such as water supply, canalisation, irrigation, and hydro-energy, with considerable positive effect on the environment. At the same time, the government budget received much more revenue from the 1% environmental tax. To date, there is no clear mechanism to channel that tax back to cover environmental programmes. (See Chapter 2)

### 3.5 Conclusions and recommendations

Uzbekistan has indicated in its basic strategic documents and general objectives that sustainable development is its ultimate goal and an agreed approach to future economic development. Still, it seems that a comprehensive and well functioning management system is missing.

Uzbekistan has declared the liberalization of the economy and the further privatization of medium-size and large enterprises to be one of its priorities. At the same time, there are no legal tools to incorporate environmental concerns into the privatization process. There is so far no intention to include environmental provisions or liabilities in the environmental audits conducted under the annual privatization programmes. Nor are there any special financing schemes or funds to cover environmental investments that may take place during privatization and that are the responsibility of the State. Environmental audits are not included in the legislation on privatization.

Recommendation 3.1:

*During the process of liberalization reform, the Ministry of Macroeconomics and Statistics, in cooperation with the State Committee for Nature Protection, should define priority programmes and activities, both the short- and long-term, focusing on a limited numbers of well-defined goals with clear economic and environmental benefit.*

Recommendation 3.2:

*The State Committee for Nature Protection, in cooperation with the State Committee on Property and Ministry of Finance, should ensure that environmental obligations are fully described in the annual privatisation programmes. Proposed provisions should include a list of pre-privatisation actions in order to describe the environmental situation of a company or site and specify proposals for cleaning up environmental pollution and bringing the environmental situation under control. A portion of the revenues from privatisation (up to 5%) should be used to ameliorate the environmental problems of enterprises that are being privatised. Environmental audits should be compulsory and included in the legislation on privatisation. See also Recommendation 1.4*

Uzbekistan has a traditional environmental permit system, with basic criteria such as the maximum concentration of toxic substances in the air or water. However, many enterprises have not been able to meet the permit requirements and need to

take measures to improve the situation step by step. (See also Recommendation 1.3)

Recommendation 3.3:

*The State Committee for Nature Protection, in cooperation with the Ministry of Health, the Ministry of Agriculture and Water Management, the State Committee for Geology and Mineral Resources and the State Committee for Safety in the Manufacturing and Mining Industries, should further develop the environmental permit system as a cornerstone of environmental regulation. Rules governing permits should be clearly defined and include specific indicators for measuring compliance. Where it would facilitate compliance, the State Committee for Nature Protection and large companies should enter into voluntary agreements for environmental protection. Such agreements could be concluded by different economic sectors at national and oblast levels. See also Recommendation 9.3*

Environmental protection programmes in Uzbekistan have been drawn up and implemented at different levels by many ministries and government authorities, but funding remains seriously limited and coordination across ministries is inadequate.

Recommendation 3.4:

*In order to provide the necessary financial support for investment programmes, the State Committee for Nature Protection, in cooperation with the Ministry of Macroeconomics and Statistics, and the Ministry of Finance, should establish an effective system of charges for the use of natural resources, and improve the system of fines for environmental pollution. This includes redirecting the revenues from the 1% environmental tax. See also Recommendations 2.5*

Recommendation 3.5:

*The State Committee for Nature Protection should strengthen its role of participation in elaboration, implementation, supervision and assessment of effectiveness of sectoral programs and projects, including the Public Investment Programme.*

## Chapter 4

# INTERNATIONAL COOPERATION

### 4.1 General objectives for international cooperation

Since becoming independent in 1991 Uzbekistan's international cooperation in environmental protection has been influenced by its complex geopolitical situation. Uzbekistan became a Member of the United Nations in 1992, shortly after its independence, and it has been cooperating with a number of UN System programmes and specialized agencies, including the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Meteorological Organization (WMO), the World Health Organization (WHO), the United Nations Industrial Development Organization (UNIDO) and two of the UN regional commissions: the United Nations Economic Commission for Europe (UNECE) and the Economic and Social Commission for Asia and the Pacific (ESCAP). Uzbekistan also participates in the United Nations Commission on Sustainable Development. Secondly, Uzbekistan has been demonstrating its commitment to democratic rule and the market economy. In 1999 it signed the Agreement on Partnership and Cooperation between the Republic of Uzbekistan and the European Communities and their Member States. Thirdly, since 1991 Uzbekistan has been a member of the Commonwealth of Independent States (CIS). Fourthly, Uzbekistan, on gaining independence, started to revitalize its traditions and links with other Asian countries, particularly Muslim countries. Fifthly, and lastly, Uzbekistan has a natural tendency toward subregional cooperation with its neighbours in Central Asia (Kyrgyzstan, Kazakhstan, Tajikistan and Turkmenistan), above all due to the common water management problems in the Aral Sea basin.

The shortage of drinking water and other water resources as a whole, the contamination of both surface and underground waters, a high degree of land salinization and soil degradation, air pollution,

waste generation, particularly toxic and radioactive waste, the loss of biological diversity and the Aral Sea catastrophe are among the most significant environmental problems in Uzbekistan. The scale and complexity of these problems need an integrated and multifaceted approach and significant financial resources, which are limited as the economy is in transition. In this context international cooperation plays an important role in providing access to international investments, international experience and clean technologies.

From the very beginning of its independence Uzbekistan began a process of integration into the world community. The United Nations Conference on Environment and Development in Rio de Janeiro, Brazil, in 1992 was a starting point for Uzbekistan's participation in global environmental processes. A number of multilateral environmental agreements also became a strong factor in its drive to pursue sustainable development. In its international environmental cooperation Uzbekistan is committed to the same principles as those behind its foreign policy:

- Supremacy of its national interests, with an overall consideration of mutual interests;
- Equity and mutual benefit, non-interference in the internal affairs of other States;
- Openness to cooperation, irrespective of ideological concepts, commitment to universal values, peace and security;
- Precedence of international law over domestic law;
- Promotion of external relations through both bilateral and multilateral agreements.

Uzbekistan cooperates with a number of international financial institutions, including the World Bank, the European Bank for Reconstruction and Development (EBRD), the Asian Development Bank (ADB), the International Monetary Fund (IMF) and the Global Environment Facility (GEF). As a result some of these institutions have invested in environmental protection projects in Uzbekistan,

and the country hopes that these institutions will intensify their activities on its territory.

Furthermore, Uzbekistan cooperates with the North Atlantic Treaty Organization (NATO) in the "Partnership for Peace" process, particularly regarding environmental protection through the prevention of, preparedness for and response to natural disasters and industrial accidents, as well as cooperation in strengthening the rescue services.

Uzbekistan's environmental policy aims to link up with international activities by:

- improving regional and worldwide cooperation in environmental protection;
- harmonizing its laws with international legislation;
- drawing up national programmes and adopting mechanisms for the implementation of international conventions;
- implementing bilateral and multilateral agreements as well as participating in regional programmes.

Over the past few years the National Environmental Action Plan (NEAP), the National Environmental Health Action Plan (NEHAP), the Biodiversity Conservation National Strategy and Action Plan, the Climate Change Strategy and the National Programme on Phasing out Ozone-depleting Substances have been developed, taking into account international standards.

Uzbekistan is developing environmental cooperation with international organizations and individual countries in Europe, mainly within the framework both of UNECE and of the European Union, as well as bilaterally with the Czech Republic, France, Germany, Israel, Slovakia, Switzerland and Turkey. There is also close cooperation with international organizations in Asia, such as ESCAP, the Economic Cooperation Organization (ECO), and with individual Asian countries, such as China, India, Indonesia, Japan, Malaysia, the Republic of Korea, Thailand and the United Arab Emirates.

Uzbekistan is developing environmental cooperation with other countries in Central Asia. Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan signed an agreement on a common economic area in 1994. These countries have also signed various bilateral and multilateral economic agreements with environmental elements, and several agreements on specific environmental

issues, like water management. The efforts towards Central Asian integration and cooperation stem from these countries' geographical position, their transport links, and their need to exploit jointly the region's water and energy resources and to tackle the consequences of the Aral Sea catastrophe.

Several executive agencies in the country are responsible for international environmental cooperation, with the State Committee for Nature Protection playing the leading practical role. The State Committee is the focal point for the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer, the Convention on Biological Diversity, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the Convention on International Trade in Endangered Species of Wild Fauna and Flora and the Convention on the Conservation of Migratory Species of Wild Animals. All issues connected with bilateral, regional and global cooperation are coordinated by the State Committee's Department of International Relations and Programmes, consisting of three persons (including the Chief).

The Main Administration on Hydrometeorology, *Glavhydromet*, under the Cabinet of Ministers, is the focal point for the United Nations Framework Convention on Climate Change and the Kyoto Protocol, the Convention to Combat Desertification, and the Ministry of Culture for the Convention for the Protection of the World Cultural and Natural Heritage. The Ministry of Foreign Affairs acts as a supervisory body for the implementation of provisions set out in different international agreements. The Government is responsible for verifying the implementation of international obligations. The national procedures on ratification, acceptance, approval and accession to international agreements are regulated by the Law on International Agreements (1995).

All international cooperation on the application of sustainable development principles and relevant investment projects is coordinated by the Ministry of Macroeconomics and Statistics. In particular, this concerns projects financed or supported by the World Bank and UNDP.

In recent years environmental cooperation with international organizations, both at global and regional levels, has focused on developing national programmes and strategies. Today, cooperation concentrates on information exchange, participation

in meetings, workshops and seminars, as well as training courses and other educational activities.

Cooperation with international financial institutions and UNDP, and with some industrialized countries focuses on investment projects, although their number and scope are insufficient to meet the needs. In Uzbekistan's present economic conditions they do not provide sufficient opportunities for sustainable development.

## 4.2 Global cooperation

### *Implementation of Agenda 21*

Uzbekistan's National Environmental Action Plan (NEAP) was finalized in 1998 with the support of the World Bank. It includes four priority areas:

- improving environmental health and living standards (drinking water supply, sanitation and sewage treatment, municipal waste management, industrial pollution prevention and abatement, road traffic emission control, food quality control);
- the sustainable use of natural resources (improving agricultural land use, water conservation, integrated water, land and salinity management, biodiversity conservation and desertification control);
- the protection of its cultural heritage;
- international cooperation (international conventions, regional activities, climate change).

The National Strategy for Sustainable Development was finalized in 1999 with the support of UNDP and adopted on 30 October 1999. It covers a period until the year 2010 and it sets, *inter alia*, some environmental targets:

- a 10% reduction in air pollution emissions by 2010 (assuming annual increase in industrial production of 6-8%);
- a 10-fold increase in environmental pollution fees (in relation to GDP);
- an increase in environmental expenditures from 1.7 to 2.6% of GDP.

A report on the implementation of Agenda 21 was submitted to the United Nations Commission on Sustainable Development in 1997.

### *Climate change*

Uzbekistan acceded to the United Nations Framework Convention on Climate Change in

1993. It also signed the Kyoto Protocol in 1998 and ratified it in 1999. Its National Commission on Climate Change was established to implement both international agreements. In 1999 the Commission prepared the National Initial Communication and submitted it to the Parties at their fifth Conference. The National Communication was prepared within the framework of the "Uzbekistan Country Study on Climate Change" project with financial assistance from GEF and in cooperation with UNDP.

In 1997 Uzbekistan started to inventory anthropogenic impacts on the climate system, to carry out studies and to make climate change prognoses. This work resulted in the above-mentioned Initial Communication and the National Action Plan for the Emission Reduction of Greenhouse Gases. As Uzbekistan was not listed in Annex 1 to the United Nations Framework Convention on Climate Change, it does not need to meet the targets set for Greenhouse gas emissions set for 2008-2012. Nevertheless, Uzbekistan's national environmental policy has set a target for the main economic sectors to reduce their emissions of greenhouse gases. To this end, Uzbekistan will have to ensure a more effective use of energy in all economic sectors and introduce a suitable tariff policy.

The Cabinet of Ministers took a decision on 9 October 2000 concerning the implementation of the national strategy for the reduction of greenhouse-gas emissions. As a result the State Committee for Nature Protection prepared a proposal on the composition of an independent expert group that would prepare draft documentation for the Kyoto Protocol negotiations. They will cover national emission standards of carbon dioxide, harmonization and amendments to national legislation, the establishment of a national project implementation centre and other activities for the implementation of the Convention on Climate Change.

### *Protection of the ozone layer*

Uzbekistan became a Party in 1993 to the Vienna Convention on the Protection of the Ozone Layer and the Montreal Protocol on Ozone Layer Depleting Substances by taking over some of the obligations assumed earlier by the former Soviet Union. In 1998 Uzbekistan ratified the 1990 London Amendments and the 1992 Copenhagen Amendments. The implementation of the Vienna



Convention and the Montreal Protocol is based on the following two national normative acts:

- Resolution of the Cabinet of Ministers No. 20 of 24 January 2000 on measures of compliance and enforcement with obligations deriving from international agreements on the protection of the ozone layer. This document resulted in the adoption of the National Programme on Phasing out Ozone-depleting Substances (ODS), the introduction of a trading ban with non-parties to the Vienna Convention and the Montreal Protocol, as well as a ban on the import of ODS;
- Resolution of the Cabinet of Ministers No. 90 of 14 March 2000 on regulating the import and export of ODS and products containing ODS.

The following four projects for the implementation of the National Programme for Phasing out ODS are being carried out with the support of GEF, UNDP and UNEP:

- A capacity-building project, including the establishment of the Ozone Office within the State Committee, to implement the above-mentioned programme and projects. A sub-project to train customs officers and supply equipment for ODS identification;
- A project to phase out CFC-11 and CFC-12 at the plant producing refrigerators;
- A project on removing CFC-12 from existing cooling devices and recycling it. A grant was used to buy equipment for this purpose and to organise a workshop for staff in Tashkent, Fergana and Samarkand.
- A project to train teachers and technicians in the field of refrigeration devices.

Since 2000 Uzbekistan has held events, including a special press conference, to mark the International Day for the Preservation of the Ozone Layer on 16 September.

Parliament has started the procedure for ratifying the Montreal Amendments (1997) and the Beijing Amendments (1999).

*Transboundary movement of hazardous waste*

Uzbekistan acceded to the Basel Convention in 1996. Several methodical documents were prepared to help fulfil its requirements. Work on a new draft act on waste was undertaken and staff received

short-term training abroad. As required by article 13 of the Basel Convention, a report covering 1999 has been prepared.

In 2000 the State Committee for Nature Protection reviewed the implementation of the Convention and concluded that the activities undertaken were insufficient. An appropriate draft decision by the Cabinet of Ministers was prepared urgently in this matter together with draft guidelines on the control of transboundary transport of waste and its disposal and storage. Ministers recommended that the guidelines be improved, and they have not yet entered into force.

*Biodiversity protection and nature conservation*

Uzbekistan acceded to the Convention on Biological Diversity in 1995 and is expected to accede to the Cartagena Protocol on Biological Safety soon. The necessary documents were prepared, there was an interministerial consultation and a special resolution was submitted to the Ministry of Foreign Affairs.

Several steps have been taken to implement the Convention on Biological Diversity. The State Committee for Nature Protection, with the support of UNEP, began a project to create a funding mechanism for the implementation of the National Strategy and Plan of Action on biological diversity protection. Two further projects financially supported by GEF were undertaken. One concerns the establishment of the "Nuratinski" biosphere reserve (US\$ 1.8 million); the other is devoted to the protection of the wetlands (US\$ 861,000). Apart from the State Committee, UNDP and Uzbekistan's Academy of Science are also involved in both projects. With the support of the World Bank and GEF, Kazakhstan, Kyrgyzstan and Uzbekistan are continuing a transboundary project on biodiversity protection in the high mountain area of West Tien-Shan. The project began in 1998 and will last until 2005. Its overall cost amounts to US\$ 10 million (with over US\$ 2 million from Uzbekistan). Work to develop and establish nature protection areas is under way in Uzbekistan as part of the project.

Uzbekistan acceded to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1997. The Main Administration of the Protection and Use of Plants and Animal Resources (at the State Committee for Nature Protection), together with the customs

services, coordinates the control of exports and imports of animals and plants, in line with the requirements of this Convention.

In 1998 Uzbekistan acceded to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979). In the framework of this Convention action has been taken to protect two bird species migrating over the territory of Uzbekistan: the Siberian crane (*Grus leucogeranus*) and the slender-billed curlew (*Numenius tenuirostris*).

With the support of the World Wide Fund for Nature (WWF) a joint Memorandum of Understanding was signed between Uzbekistan, Kazakhstan, Tajikistan and Turkmenistan on the implementation of the project entitled "The behaviour of Bactrian deer (*Cervus elaphus bactrianus*)". Uzbekistan is expected to accede to the Agreement on the Conservation of African-Eurasian Migratory Waterbirds in the near future.

In 1995 Uzbekistan acceded to the Convention for the Protection of the World Cultural and Natural Heritage (Paris Convention, 1972). Action taken under this Convention is mainly to protect historic monuments. Through its Man and the Biosphere Programme (MAB), UNESCO also takes part in certain projects to protect the world natural heritage in Uzbekistan. A National Committee for the UNESCO Programme "MAB" was established in Uzbekistan. The Ministry of Culture is the focal point for this Convention.

In 2000 WWF offered a small grant to Uzbekistan to prepare the Chatkal biosphere reserve and the Gissar reserve so that they could be put on the UNESCO World Heritage List.

On 30 of August 2001 Uzbekistan acceded to the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention, 1971). In 1998 cooperation with the Convention's Secretariat started with a small project to protect Uzbekistan's wetlands and water birds.

### *Desertification*

Uzbekistan signed the Convention to Combat Desertification in 1994 and ratified it in 1995. During 1998-2000 Uzbekistan, with the support of UNEP, prepared the National Programme to Combat Desertification and submitted it to the Convention's Secretariat as an official document

for the third session of the Conference of the Parties.

In Uzbekistan desertification is due to erosion, salinity, the periodic disappearance of watercourses and water reservoirs as well as the drop in the groundwater level. In practice, the whole territory of Uzbekistan (except for the small high mountain areas) should be classified as areas covered by drought. The water shortage is a priority problem for irrigation.

The Main Administration on Hydrometeorology within the Cabinet of Ministers serves as the national focal point for the Convention to Combat Desertification. Uzbekistan's implementation of the Convention, in the form of a separate task for the State services, is still at an early stage. Most tasks connected with this Convention are carried out within the Aral Sea Cooperation (see below). However, a UNDP project is under way to minimize the effects of water shortage (US\$ 150,000). Within this project around 300 wells are being dug in the north of the Republic of Karakalpakstan and equipped with manual pumps to improve water supply in the less inhabited regions.

At present a subregional action plan to combat desertification in the Aral Sea basin is being prepared with external support.

### **4.3 Regional cooperation in the framework of UNECE**

#### *Conventions*

Uzbekistan has not signed or ratified any of the five UNECE environmental conventions or any of their protocols. However, it participates as an observer in the work of some of their governing bodies.

Uzbekistan recognizes the importance of the UNECE conventions for the sustainable development of Central Asia as a whole, especially with respect to the need for the joint exploitation of water and energy resources. Uzbekistan is located in the middle of Central Asia, in the transit zone of watercourses, and as such is vulnerable to transboundary effects. Furthermore, there are sources of transboundary air pollution affecting Kazakhstan and Uzbekistan, and Tajikistan and Uzbekistan. Most watercourses entering the country are polluted by discharges from industrial and mining enterprises, farms and waste disposal sites. For this reason transboundary problems need to be

tackled by all countries involved, but accession to the UNECE conventions is very slow. The lack of appropriate infrastructure to implement the conventions, the need to develop new legislation or adapt existing laws, insufficient funding and capacity to ensure effective follow-up also explain the lack of progress.

The accession to the UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes will be decided at the subregional level. There is already an Interstate Coordination Commission on Water Coordination on the subregional level, represented by the five Central Asian States, which sets annual water allocations. In addition, there are general subregional water agreements. Uzbekistan is considering acceding to the Water and Health Protocol, but will not take a final decision until it has acceded to the Convention.

Following the example of Kazakhstan and Kyrgyzstan, which ratified the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters in 1998 and 1999 respectively, Uzbekistan is expected to accede to it shortly.

The Law on Ecological Expertise has been in force since 1 July 2000. This is the legislative basis for the implementation of the UNECE Convention on Environmental Impact Assessment in a Transboundary Context. Uzbekistan already takes an active part in meetings of the working groups under the Convention, in particular those on amending the Convention and drafting its protocol on strategic environmental assessment.

It is also expected that Uzbekistan will accede to the Convention on the Transboundary Effects of Industrial Accidents. At national level the Ministry of Emergency Situations is responsible for these matters. A State prevention and rescue system has been developed to deal with extraordinary threats (decision of the Cabinet of Ministers). Since 1996 Uzbekistan has multilateral agreements with Kazakhstan, Kyrgyzstan and Tajikistan on the joint prevention of transboundary effects of accidents at hazardous mining waste landfills. Complying with the convention would help solve national and subregional problems connected with the environmental impacts of industrial accidents, especially in the event of accidental discharges to rivers.

Central Asia has been relatively less interested in cooperating on transboundary air pollution. But the fact that Kyrgyzstan and Kazakhstan have already acceded to the UNECE Convention on Long-range Transboundary Air Pollution (Geneva, 1979) has prompted Uzbekistan to consider acceding to it also.

Uzbekistan's lack of interest in the UNECE environmental conventions is the result of two prosaic factors. Firstly the conventions lack effective financial mechanisms to support poorer countries. Secondly, there are not enough personnel involved in international cooperation in environmental protection (e.g. only three persons in the State Committee for Nature Protection).

#### *“Environment for Europe” process*

The “Environment for Europe” process started in 1991. Uzbekistan has participated in the process since the third Ministerial Conference in Sofia in 1995 and will continue to do so for the upcoming Fifth Ministerial Conference “Environment for Europe” (Kiev, 2003).

Uzbekistan is involved in the EAP Task Force established at the Conference in Lucerne, Switzerland, in the Pan-European Biological and Landscape Diversity Strategy and in the follow-up to the Declaration on Action for Environment and Health in Europe adopted at the Second European Conference on Environment and Health in Helsinki.

#### **4.4 Other regional and subregional cooperation**

##### *Cooperation with member States of ESCAP*

Uzbekistan has been a member of ESCAP since 1992. It cooperates with ESCAP mainly in training, in particular under the Japanese and the Korean International Cooperation Agencies, and the regional training centres in India (geographical information system (GIS)), China (waste), Malaysia and Thailand (environmental management).

In February 2000 ESCAP organized a subregional meeting in Tehran on strategic environmental management for Central Asia. It was followed in March 2000 by a meeting of experts on the development of regional environmental priorities for Central Asia. The meeting identified a

preliminary list of problems requiring regional cooperation for their optimal solution.

These events paved the way for the Conference of Environment Ministers of Asia and the Pacific, also known as ECO Asia 2000, which was held in September 2000 in Kitakyushu, Japan. This Conference discussed a programme for regional cooperation, the preparations for “Rio+10” and the Sixth Conference of the Parties to the United Nations Framework Convention on Climate Change.

Uzbekistan is a member of the Economic Cooperation Organization (ECO), which is an intergovernmental regional organization for social and economic development made up of ten States: Afghanistan, Azerbaijan, Islamic Republic of Iran, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkey, Turkmenistan and Uzbekistan. Environmental protection cooperation in ECO is handled by its Directorate for Energy, Natural Mineral Resources and the Environment. ECO cooperates closely with ESCAP.

In 1998 the countries of the Central Asian region and ESCAP declared their intention to prepare and implement, with international financial support, the United Nations Special Programme for the Economies of Central Asia (SPECA). One of its priorities is the rational and effective use of the region’s energy sources.

#### *Cooperation in CIS*

Uzbekistan cooperates in regional integration matters with some members of CIS on the basis of bilateral agreements (Russian Federation, Ukraine, Georgia) as well as with the Interstate Environmental Council, which is a subsidiary body of the CIS Executive Committee. The Action Programme for the Development of CIS until 2025, which was developed and signed by the Heads of State in 2000, includes several measures regarding environmental protection (e.g., environmental monitoring, environmental safety, a uniform classification and labelling system for industrial waste.).

It should be noted that, for Uzbekistan, cooperation within CIS has more political significance than practical value for solving its environmental problems.

#### *Central Asian cooperation*

In 1995 five Central Asian States signed two declarations on environmental matters. These are

the Issyk-Kul Declaration on Cooperation Among the Central Asian Republics, and the Nukus Declaration of the States of Central Asia and the International Community on the Sustainable Development of the Aral Sea Basin (see below). The Issyk-Kul Declaration recognizes, *inter alia*, a common heritage and similarities among the five republics, the need to make further development in the region sustainable, and the role of regional cooperation in preserving peace. The 1997 Almaty Declaration deals with environmental safety and aims to harmonize NEAPs.

In March 1998 Kazakhstan, Kyrgyzstan and Uzbekistan signed an Agreement on Cooperation in the Field of the Environment and the Rational Use of Natural Resources. A decision was made to cooperate on the protection of biodiversity in the West Tien-Shan region.

In April 1998 the Joint Declaration of the Environmental Protection Ministers of the Central Asian Region was signed. It highlights the need to:

- develop unified approaches to the creation and implementation of national environmental policies;
- continue the process of acceding to international nature protection conventions and UNECE programmes as well as other, global conventions and programmes;
- develop a regional environmental action plan for the States of Central Asia;
- encourage international organizations, donor States and other interested parties to support the efforts of the States of Central Asia to resolve regional and global environmental problems with local experts.

The five Central Asian Heads of State met in Bishkek in June 1999 to discuss the current status and future prospects for multilateral cooperation and the economic revival of Central Asia. Also in 1999 it was decided at a ministerial conference for Central Asia to develop a regional environmental action plan and establish a regional environmental centre in Almaty, Kazakhstan. At present UNEP and UNDP are providing financial and technical assistance to develop the action plan.

Uzbekistan supported the establishment of a regional environmental centre (REC) in Almaty for Central Asia, which would be a basis for the development of the regional environmental action plan. Uzbekistan is also planning to set up a national centre to cooperate with the regional one.

Among the other subregional agreements is the Agreement between Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan on joint action for the rehabilitation of mining waste disposal sites with a transboundary impact. Waste dumps near State border areas cause leaching of lead and radioactive substances into transboundary watercourses, and also pose environmental threats in the event of accidental landslides. The Ministers for Emergency Situations meet regularly to discuss these extraordinary transboundary threats. An implementation programme for the above agreement was signed in 1999.

In 1998 the following agreements were signed: the Agreement on the use of water and energy resources of the Syr Darya River Basin, the Agreement between Uzbekistan, Kazakhstan and Kyrgyzstan on cooperation in environmental protection and the rational use of natural resources, and similar bilateral agreements between Uzbekistan and Kazakhstan and between Uzbekistan and Kyrgyzstan. The Interstate Commission for Sustainable Development carries out subregional cooperation tasks.

#### *Aral Sea cooperation*

The Aral Sea crisis is one of the biggest environmental and human catastrophes in recorded history. It affects about 35 million people living in the Sea's basin. The interstate agreement of February 1992 between the Central Asian countries laid the foundation for regional cooperation with the establishment of the Interstate Commission on Water Coordination (ICWC) to co-ordinate problems of water resources. The meeting of Heads of State of Central Asia held in March 1993 in Kyzyl-Orda, Kazakhstan, where an Agreement on Joint Action to Solve the Aral Sea Crisis was signed, boosted efforts to solve these issues. The Interstate Council on the Aral Sea Basin Problems and its Executive Committee were set up, as well as the International Fund for the Aral Sea Rescue. At the second Meeting of Heads of the Central Asian States, held in Nukus, Uzbekistan, in January 1994, the Programme of specific actions to improve the environmental situation in the Aral Sea basin over the next three to five years considering the social and political development of the region was approved.

At its third meeting in March 1994 the Interstate Council reported on the implementation of this Programme. In September 1995 the Nukus Declaration of the Central Asian States and the

International Community on the Sustainable Development of the Aral Sea Basin was adopted. This Declaration stipulates a strong commitment to sustainable development principles and focuses on solving such important problems as:

- The transition towards a more balanced and scientifically proven system of agriculture and forestry;
- A more efficient irrigated agriculture through economically-driven methods of water use, the use of better technologies in irrigation and environmental protection;
- The improvement of the system of integrated management of natural resources in the region.

The final goal is to develop and implement a long-term strategy and programme to solve the Aral Sea crisis based on sustainable development, and protecting the quality of life for people living in this area for generations to come.

In February 1997 at a meeting in Almaty of the Heads of the five Central Asian States with the participation of representatives of the United Nations, the World Bank and other international organizations, a decision was adopted to improve the organizational structures for solving the Aral Sea problems.

More information on Aral Sea cooperation may be found in the EPR of Kazakhstan and the EPR of Kyrgyzstan.

#### **4.5 Bilateral cooperation**

##### *Cooperation with European Union*

The Agreement on Partnership and Cooperation between the Republic of Uzbekistan and the European Community and its member States was signed in 1999. Article 54 of this Agreement is devoted to the protection of the environment and health and includes 22 objectives and areas of cooperation, *inter alia*:

- water quality
- transboundary water and air pollution
- the application of the UNECE Convention on Environmental Impact Assessment in a Transboundary Context
- waste management and the implementation of the Basel Convention
- biological diversity conservation and global climate change abatement

- the safety of industrial plants, chemical safety and use of clean technologies
- early warning of disasters and catastrophes and other emergency situations
- the harmonization of national environmental legislation with European Union law

The Cabinet of Ministers adopted a special decision on the implementation of this Agreement in 1999-2005, which includes, *inter alia*, 11 framework tasks for the State Committee for Nature Protection. They will serve as a basis for projects and other bilateral projects with EU member States.

#### *Bilateral cooperation with different countries*

Bilateral cooperation with individual countries is based either on intergovernmental agreements or on agreements with certain agencies or organizations operating in these countries. In most cases these agreements concern concrete assistance projects carried out in Uzbekistan. There are also cases of individual cooperation with experts or scientists (e.g. botanists and zoologists from the United States, France, Poland come to Uzbekistan on private terms to perform certain field studies).

Organized bilateral cooperation is under way with the following countries: China (since 1997), Georgia (since 1995), India (since 1996), Israel (since 1997), Japan (since 1994), Kazakhstan (since 1997); Kyrgyzstan (since 1996), Malaysia (since 1996), Republic of Korea (since 1995), Slovakia (since 1998), Switzerland (since 1998), Tajikistan (since 1994), Thailand (since 1998), Turkey (since 1996), Turkmenistan (since 1996), Ukraine (since 1998); United Arab Emirates (since 1998), and the United States of America (since 1994). An agreement with Hungary and Italy is planned.

For more details about the implementation of some of the joint projects, see below.

#### **4.6 Internationally funded projects**

##### *Strategies and action plans, capacity building and education*

In recent years, the following strategies or action plans have been developed with the support of international organizations:

- Biodiversity Conservation: National Strategy and Action Plan (until 1998; GEF and UNDP; US\$ 183,000)

- National Environmental Action Plan (until 1998; World Bank; US\$ 350,000)
- National Strategy on Sustainable Development (until 1999; UNDP; US\$ 95,000)
- National Programme for Phasing out Ozone-depleting Substances (until 1999; GEF and UNEP; US\$ 16,000)
- Country Study on Climate Change (until 1999; GEF and UNDP; US\$ 346,000)
- National Action Plan for Combating Desertification (until 1998; UNEP)
- National Environmental Health Action Plan (until 1999; WHO).

Several projects focusing on detailed regional and local action plans, on capacity building and the training of qualified personnel participating in the implementation of the strategies and action plans are being carried out or are planned in the near future in connection with the above action plans and strategies. The following may be classified as the most important:

- Aral Sea basin project (first phase: 1997; GEF and World Bank; US\$ 15 million for 8 main projects and 19 subprojects; second phase: ongoing; GEF and other sponsors coordinated by the International Fund for the Aral Sea;
- Transboundary project for the preservation of biodiversity of western Tien-Shan (ongoing; World Bank, GEF, United Kingdom and other sponsors; US\$ 2 million for Uzbekistan, over US\$ 8 million for Kazakhstan and Kyrgyzstan);
- Strengthening environmental protection institutions (1999; Asian Development Bank and United States; US\$ 734,000);
- A project to train teachers and technicians in the field of refrigeration devices aimed to improve their knowledge and skills (2001; GEF and UNEP; US\$ 134,000)
- Institutional strengthening - organizing an office for the management of ozone-depleting substances (ongoing; GEF and UNEP; over US\$ 225,000);
- The Project on removing and recycling CFCs (2001; GEF and UNDP; over US\$ 1.3 mln.);
- The Project on stopping use of CFC-11 and CFC-12 in the "SINO" Refrigerator's Plant (2002; GEF and UNDP; over US\$ 1.5 mln)
- Protection of wetlands and water bird species in Uzbekistan (1998; Secretariat of the Ramsar Convention; US\$ 25,000);
- Introduction of cleaner production and development of sustainable cleaner production

programme for Uzbekistan (1999; Japan, UNIDO and Czech Republic; US\$ 177,000);

- Capacity building in the field of cleaner production mechanisms (2001; Switzerland; US\$ 16,000)

Some of the above-mentioned projects include investments, e.g. in the form of purchasing devices, installations or facilities.

#### *Investment projects*

In 1995 the Cabinet of Ministers adopted Resolution No. 219 on Improving the Coordination of Foreign Activity in the Republic of Uzbekistan (amended in 1999). A special body for implementing this Resolution, the Department for the Coordination of External Economic Activity, was established within the structure of the Cabinet of Ministers. The World Bank, EBRD, IMF, ADB and UNDP are partners in Uzbekistan's economic development.

According to the report of the Department for the Coordination of External Economic Activity published on 15 April 2000, international support

for Uzbekistan until 1999 totalled US\$ 1.8 billion, with only US\$ 30 million (1.6%) for environmental protection. However, these statistical data are not complete because some of the investments related to environmental protection have been classified as coming within the following sectors: energy, industry, agriculture, housing and social services, health. Taking into consideration also the above environmental projects, the published list includes 25 investment projects for environmental protection carried out between 1995 and 1999 (some of them have not yet been finalized) for a total value of approximately US\$ 250 million, i.e. 8.9% of total foreign investment in Uzbekistan (completed or started). The following are among the more significant ongoing projects:

- The water supply system for Khorezm District (Germany; US\$ 12 million);
- Uzbekistan: Clean Water, Sanitation and Citizens' Health (World Bank; US\$ 75 million);
- The reconstruction of water supply and wastewater systems in Buchara and Samarkand (World Bank; US\$ 40 million);

**Table 4.1: Environmental investments financed by domestic and foreign sources**

	Number of projects	Cost <i>US\$ million</i>
<b>Total governmental expenditures planned for 2000-2002 (new and ongoing investment projects)</b>		
In the entire economy	...	7,900
"Environment" sector + water supply ("housing" sector)	...	1300
"Environment" sector	...	7.7
<b>Foreign assistance</b>		
<b>♦ Financial resources used in 1999</b>		
In the entire economy	...	1,800
In environmental protection	...	30
Total cost of investment projects started in 1999	...	250
<b>♦ Ongoing projects in environmental protection and water management (deadline: 1999-2005)</b>		
- for the "environment" sector according to the Uzbek classification	6	29.6
- for the "environment" sector according to the international classification	25	250

Sources: Foreign Aid Report of 31 December 1999, Department for the Coordination of External Economic Activity; Public Investment Programme 2000-2002, Ministry of Macroeconomics and Statistics.

- The improvement of water supply in the cities of Nukus and Urgentch (Kuwait Fund for Arab Economic Development; US\$ 20 million);
- The reconstruction of the waste-water system in the city of Nukus (Switzerland; US\$ 5 million);
- The demonstration project on energy efficiency in housing and the chemical industry (EU; US\$ 3 million);
- Building 300 wells with manual pumps in Karakalpakstan (UNDP; US\$ 150,000);
- The water supply in the cities of Samarkand and Mujnak (France; US\$ 6 million);
- Waste storage and disposal systems in Tashkent (World Bank and EBRD; US\$ 40 million).

From the above-mentioned data and examples it may be concluded that most foreign investment projects for environmental protection are concerned with modernizing and developing public water-supply systems, waste-water discharge and treatment systems as well as the disposal of waste.

Furthermore, it should be noted that foreign assistance for environmental protection is higher than the share of financial resources provided for this purpose by Uzbekistan itself (see Table 4.1).

#### 4.7 Conclusions and recommendations

In recent years Uzbekistan has been actively involved in the worldwide process of environmental improvement, particularly on the basis of principles included in global conventions. This can be seen in Uzbekistan's accession to the majority of these conventions (the Vienna Convention on the Protection of the Ozone Layer and the Montreal Protocol on Ozone Layer Depleting Substances, the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Destruction, the United Nations Framework Convention on Climate Change and the Kyoto Protocol, the Convention on International Trade in Endangered Species of Flora and Fauna, the Bonn Convention on the Protection of Migratory Species of Wildlife, the Convention to Combat Desertification, the Convention on Biological Diversity, the Paris Convention for the Protection of the World Cultural and Natural Heritage and the Ramsar Convention on the Protection of International Wetlands Having an International Significance as a Habitat of Waterfowls). Representatives of Uzbekistan have also participated in negotiations on the Stockholm

Convention on Persistent Organic Pollutants (POPs). Of all the major global conventions only the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade remains outside Uzbekistan's field of interests.

##### Recommendation 4.1:

*Uzbekistan should accede to both the Stockholm Convention on Persistent Organic Pollutants (POPs) and the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. These steps would facilitate its full incorporation into the world's environmental community. National responsibility for the implementation of these international agreements should be assigned to the State Committee for Nature Protection..*

Subregional cooperation in environmental protection in Central Asia has expanded on the basis of various bilateral and multilateral economic and environmental agreements and their high-level executive bodies (including prime ministers). The Presidents of the five Central Asian States meet periodically to discuss water management and environmental protection.

Water management problems in the Amu Darya and Syr Darya river basins linked with the Aral Sea are the top priorities in subregional cooperation. Agriculture in this climate area requires irrigation and the present shortage of irrigation water encourages unfavourable conditions and natural phenomena for agriculture: salinity of the soil and erosion. Moreover, the Aral Sea environmental disaster is rapidly getting worse causing serious concern to the international community. Hence, the International Fund for the Aral Sea was established with its appropriate executive structures. A number of bilateral and multilateral agreements on water issues have been signed in an attempt to solve the conflicting problem of water allocation in the Amu Darya and Syr Darya river basins in the context of hydropower development. Some of these agreements also cover the potential environmental threats to transboundary waters due to the landfilling of hazardous mining wastes.

Subregional and bilateral cooperation among the Central Asian countries in environmental protection is the result of serious threats but it is based on temporary political decisions and has no solid foundation in international legislation. One of the reasons for this is the fact that the five States of the



region, despite their membership of UNECE, have acceded to few of its conventions: the Convention on Long-range Transboundary Air Pollution, the Convention on Environmental Impact Assessment in a Transboundary Context, the Convention on the Protection and Use of Transboundary Watercourses and International Lakes and the Convention on the Transboundary Effects of Industrial Accidents. Kazakhstan was the only country to accede to all four, whereas Uzbekistan has not acceded to any of them. Experience gained during the implementation of these conventions in the UNECE region would be very useful for the implementation of bilateral and subregional environmental agreements in Central Asia.

Recommendation 4.2:

*Uzbekistan should consider acceding to the UNECE conventions: the 1979 Convention on Long-range Transboundary Air Pollution, the 1991 Convention on Environmental Impact Assessment in a Transboundary Context, the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes and its protocols as well as the 1992 Convention on the Transboundary Effects of Industrial Accidents, and make every effort to use the standards and procedures included in these conventions as a basis for its own bilateral agreements with neighbouring countries and for sub-regional environmental protection agreements. National responsibility for the implementation of these international agreements should be shared between the State Committee for Nature Protection, the Ministry of Agriculture and Water Management (air, environmental impact assessment and water) and the Ministry of Emergency Situations (industrial accidents).*

Democratic processes are developing intensively in all spheres of economic and social life in Uzbekistan. However, they are not sufficiently advanced in environmental protection. This can be seen in the insufficient coordination between the different public administration bodies dealing with environmental issues in various contexts, insufficient information sharing among these bodies and scarce public participation in decision-making in environmental matters. Uzbekistan is considering acceding to the Aarhus Convention but so far the appropriate decisions have not been taken.

Recommendation 4.3

*Uzbekistan should speed up its internal procedures enabling accession to the Aarhus Convention.*

*Acceding to this Convention would improve environmental management and the development of public democratic processes. National responsibility for the implementation of this international agreement should be assigned to the State Committee for Nature Protection.*

In 1999 the Agreement on Partnership and Cooperation between the Republic of Uzbekistan and the European Communities and their Member States was signed. It covered, *inter alia*, the harmonization of national environmental legislation with European Union law. A similar role in the global harmonization process is or may be played by the worldwide and regional conventions to which Uzbekistan has or is planning to accede in the future. Making use of European Union directives in introducing European issues into Uzbekistan's national environmental regulations would help speed up the harmonization and set concrete procedures for the implementation of legislation. Although the texts of the UNECE environmental conventions are available in Russian, the fact that the European Union directives are not available in either Uzbek or Russian is a significant barrier.

Recommendation 4.4:

*Uzbekistan should take measures to incorporate into the TACIS projects a project to translate into the official Uzbek language (or into Russian) and to publish the basic environmental directives, regulations and decisions of the European Union bodies. The initiative, followed by the implementation of project results, should be undertaken by the State Committee for Nature Protection in the framework of the agreements with EU.*

The implementation of Uzbekistan's obligations deriving from international multilateral agreements (global and regional conventions and protocols) and from subregional and bilateral agreements on environmental protection is within the competence of several ministries and other central institutions. Coordination of activities for 6 multilateral and 14 bilateral agreements, and activities connected with the participation of various international organizations in this process, is assigned to the main central institution, i.e. the State Committee for Nature Protection. The lack of effective coordination of the international activity of different ministries in environmental protection is, *inter alia*, the result of an insufficient number of personnel (three persons working at the State

Committee's Department of International Relations and Programmes).

Recommendation 4.5

*It is necessary to strengthen the capacity of services involved in environmental matters to allow for the effective implementation of international obligations by Uzbekistan and effective use of foreign assistance. Considerations should be given to increasing the number of staff in the Department of International Relations and Programmes of the State Committee for Nature Protection, to designating an international commission (or other body) for information exchange and coordination, and to establishing a research centre or assigning the task of an information centre for environmental conventions and other international legal acts, for international environmental institutions, and for internationally supported projects carried out in Uzbekistan, to an existing body.*

Uzbekistan has completed or is continuing over 50 international projects funded by grants or credits from the international financial institutions. Around half of them are investment projects, and the rest are non-investment projects aiming at capacity

building, developing national or regional strategies and programmes, nature protection and environmental education. Whereas investment projects are coordinated within an inter-sectoral framework by the specially designated Department for the Coordination of External Economic Activity within the Cabinet of Ministers, the non-investment projects are not coordinated inter-sectorally and their effectiveness is not assessed (except for projects under the Aral Sea protection programme).

Recommendation 4.6

*There is a need to strengthen internal (inter-ministerial) coordination in Uzbekistan for internationally funded environmental protection projects, especially non-investment projects. To do so it would be advisable to designate a small section within the Department of International Relations and Programmes at the State Committee for Nature Protection. This body would participate in the preparation of projects, supervise projects assigned to the State Committee as an executive agency, review the effects of the implementation of projects supervised by other ministries, and provide information for the public on projects carried out in Uzbekistan.*

***PART II: MANAGEMENT OF POLLUTION AND OF  
NATURAL RESOURCES***

## Chapter 5

# WATER RESOURCES MANAGEMENT

### 5.1 Introduction

Water management may be the single most important issue for Uzbekistan. Forty years of poor management now threaten agriculture, soil quality and availability of water for all purposes. The Government faces difficult political choices. Cotton, a significant foreign-exchange earner, consumes more water in irrigation than can be sustained. (See Chapter 10.) Salinity of soil, surface water and groundwater is increasing to unacceptable levels. Run-off from irrigation is negatively affecting the quality of drinking water

from the main water streams. Water is becoming scarce for all purposes.

### 5.2 Water resources

Uzbekistan's surface water resources are mostly located within the Aral Sea basin. This basin includes the largest rivers of Central Asia, the Amu-Darya and the Syr-Darya. Beside these large rivers there are other important rivers like the Zarafshan, the Surkhandarya and the Kashkadarya. Water abstraction allocations for Uzbekistan are presented in Table 5.1.

**Table 5.1: Water abstraction allocations from the basins of Amu-Darya and Syr-Darya for Uzbekistan Hydrological year 2000 – 2001 (million m<sup>3</sup>)**

	Total water allocation	From Amu-Darya and Syr-Darya Rivers	Internal small rivers	Groundwater	Collector-drainage water
<b>Total for Uzbekistan</b>	49,381	30,554	16,497	600	2,829
Total for Amu-Darya basin	25,636	19,514	5,667	225	1,330
Karakalpakstan	7,520	7,406	0	0	114
Kashkadarya	5,257	4,048	1,947	90	272
Bukara	3,909	3,341	255	60	253
Navoi	1,440	533	791	39	77
Samarkant	3,027	0	2,674	36	317
Korezm	4,483	4,186	0	0	297
Total for Syr-Darya basin	19,795	9,936	8,334	325	1,199
Andijan	3,060	775	1,954	92	239
Namangan	2,755	2,337	230	27	161
Fergana	4,262	1,802	2,068	162	230
Djizak	2,250	1,935	260	2	52
Syrdarya	2,588	2,385	0	28	175
Tashkent	4,880	702	3,822	14	342
Additional inflow					
Surhandarya	3,950	1,104	2,496	50	300

Source: Ministry of Agriculture and Water Management, 2001.

The availability of the groundwater and its use in the Republic of Karakalpakstan and in the different *oblasts* is presented in Table 5.2:

In 2000 groundwater resources that were used totalled 17,075 thous.m<sup>3</sup>/day 26,756 wells.

### 5.3 Water quality and water-quality monitoring

#### *Sources of pollution*

The principal sources of water pollution in Uzbekistan are industry, agriculture and human settlements. Facilities for the treatment and disposal of municipal and industrial wastes also seriously pollute groundwater with heavy metals and hazardous organic substances. Untreated medical waste is a special threat to groundwater.

In addition to discharges of collector-drainage water containing salt, fertilizer and pesticide residues into virtually all surface waters, the Syr-Darya basin is also contaminated by industrial waste-water from mining and metallurgical industries, steam power plants, and agriculture. (See Chapters 9 and 10.) The main pollutants in the waste-water are iron, oil, chlorine-organic pesticides and other organic substances, heavy

metals and dry sediment. The concentrations of these pollutants exceed their MAC several times.

There are water-quality problems in almost all *oblasts*, but especially in the Republic of Karakalpakstan, and in Khoresm, Fergana and Navoi *oblasts*.

#### *Groundwater quality*

Pollution of groundwater is *regional, diffusive or local*.

*Regional* groundwater pollution is the result of the intensive use of chemicals in agriculture and the percolation of polluted surface water. In the Amu-Darya river basin intensive agriculture has contributed to the contamination of groundwater, increasing salinity, hardness, nitrate and pesticide content. Contamination is particularly widespread around lower river stretches and in areas with well-developed irrigation.

*Diffuse* pollution of ground water occurs on irrigated land because of the application and further percolation of mineral fertilizers and chemicals, especially pesticides. Even at a depth of 100 to 150 m groundwater is often polluted.

**Table 5.2: Use of available groundwater resources in 2000 (thous.m<sup>3</sup>/day)**

Regions	Resources available	Total used in 2000	For drinking water in cities	For drinking water in rural areas	In industry	For irrigation	For other purposes	Number of wells
<b>Total for Uzbekistan</b>	66,412	17,073	3,043	3,872	1,772	3,722	4,608	26,756
<b>Republic of Karakalpakstan</b>	6,627	110	10	23	7	3	60	839
<b>Total for Oblasts</b>	59,785	16,963	3,033	3,849	1,765	3,719	4,548	25,917
Andijan	5,394	1,696	28	656	123	273	616	2,283
Namangan	7,973	1,474	52	391	49	519	462	1,882
Fergana	8,976	4,922	413	848	796	1,290	1,575	5,429
Tashkent	7,828	3,133	1,116	721	557	173	517	3,368
Syrdarya	4,223	800	90	109	9	126	467	1,210
Djizak	2,986	315	112	144	15	8	35	790
Samarkand	6,253	1,342	717	300	53	219	53	2,714
Navoi	2,474	600	21	40	33	244	262	1,170
Bukhara	2,641	742	58	27	70	290	297	1,966
Kashkadarya	1,786	870	286	66	16	304	198	2,799
Surkandarya	4,166	985	125	540	39	273	8	1,994
Khorezm	5,085	84	15	7	5	-	58	312

Source: State Committee for Geology and Natural Resources, 2001.

Local groundwater pollution occurs close to large industrial enterprises. There are some 500 pollution sources of this kind in the country, reducing the supply of fresh drinking water by 35-40%. This trend is continuing.

#### Monitoring

The water-quality monitoring system has considerably declined within the basin of Amu-Darya and SyrDarya rivers. Many monitoring stations fail to provide systematic data; others simply are not operated. The equipment and methods used to sample and analyse water are not adequate. There are no automatic monitoring devices to check water quality 24 hours a day. Consequently, there is a lack of detailed and reliable monitoring information on surface water, groundwater and drinking water. The data are simply arithmetic averages; they do not include information on the quantity of water taken from the natural watercourses or on pollutants discharged into natural watercourses and reservoirs during different seasons of the year. There is a need for more information on the quantity of water used, polluting substances, quantities discharged into water, their concentration in water and their environmental impact.

The national monitoring system provides information on water-quality and water-quality trends in the Amu-Darya and Syr-Darya rivers and their tributaries. But differences in monitoring methodologies and equipment in the riparian countries (Kazakhstan, Kyrgyzstan, Tajikistan, and Turkmenistan) cast doubt on the reliability of the data and their comparisons.

The Ministry of Health's Sanitary and Epidemiological Service (SES) monitors the quality

of drinking water from the moment it is released to water pipes or used for human consumption. Water is also monitored by Vodocanal services. Not all SES stations and Vodocanal laboratories are sufficiently equipped by modern analytical devices, and there is a lack of chemical reagents used for analytical control. This limits the ability to carry out analyses of pesticides and microbiological components in drinking water.

## 5.4 Water use

#### Abstraction and major users

A total of 60 km<sup>3</sup> of water is distributed annually in Uzbekistan. The major source of water supply is surface water; groundwater accounts for only 5%. Most surface water is taken from rivers. Some collector and drainage water from irrigation systems is also used for water supply.

The main water users are presented in table 5.3.

As can be seen, 93% of all water used in 1988 was for irrigation and drainage. In 1998, this fell slightly to 91%. The total volume of water used for all purposes decreased by 18% during this period; the amount used for irrigation, by approximately the same amount.

This decrease resulted from three factors: technological improvements, reduced water supply for irrigation and replacement of part of the cotton crop with grains. Some measures were taken to reduce water losses, for example by modernizing part of the irrigation system, introducing simple water meters, and putting limits on water use per hectare of irrigated land. This resulted in a 10% cut

**Table 5.3: Trends in water use in different sectors of the national economy, 1988-1998**

	Total <i>million m<sup>3</sup></i>	Drinking-water supply		Agricultural water supply*		Industrial water supply		Fishery		Irrigation and drainage	
		<i>million m<sup>3</sup></i>	<i>as % of total</i>	<i>million m<sup>3</sup></i>	<i>as % of total</i>	<i>million m<sup>3</sup></i>	<i>as % of total</i>	<i>million m<sup>3</sup></i>	<i>as % of total</i>	<i>million m<sup>3</sup></i>	<i>as % of total</i>
<b>1988</b>	69,068	1,609	2.3	1,022	1.5	1,990	2.9	475	0.7	63,972	92.6
<b>1990</b>	63,610	2,353	3.7	723	1.1	1,298	2.0	1,080	1.7	58,156	91.4
<b>1992</b>	63,271	2,051	3.2	839	1.3	1,260	2.0	783	1.2	58,338	92.2
<b>1994</b>	58,564	2,580	4.4	950	1.6	1,100	1.9	534	0.9	53,400	91.2
<b>1996</b>	54,974	2,354	4.3	712	1.3	844	1.5	503	0.9	50,561	92.0
<b>1998</b>	57,920	2,205	3.8	1,120	1.9	902	1.6	821	1.4	52,872	91.3

Source: National Environmental Action Plan, State Committee for Nature Protection, 2000.

Note:

\* Excluding irrigation

in water consumption. At the same time, the allocation of water from the main transboundary basins, the Amu-Darya and the Syr-Darya, was affected. The Interstate Commission on Water Coordination (ICWC) establishes yearly water quotas for countries in the region, but these quotas are not consistently honoured and enforced.

### *Irrigation*

Cotton and other agricultural crops have been consuming more than 90% of all available water just for irrigation. This is having increasingly serious, potentially irreversible, effects on water availability and quality, land, health and other social concerns. At present, 4.3 million hectares are irrigated. Already in 1997, the supply of water for irrigation under the current system fell short by 17% of the quantity needed; in 1998, it was 22%; and, in 2000, when it was compounded by severe drought, the shortfall was 40%.

The irrigation system is also inefficient. Equipment, control devices and technologies are obsolete and need either repair or replacement. Due to the transition to a market economy there is a lack of economic incentives and financial resources to improve the irrigation system, and neither land-use nor water-use practices encourage efficiency in water use.

### *Drinking water*

Seventy-four per cent of the urban population and 65% of the rural population have access to piped water. By 2010 all urban areas and 85% of rural areas should be covered

There are difficulties in supplying high-quality drinking water in the west of the country, where the Amu-Darya, the Syr-Darya and many groundwater sources are polluted. To satisfy drinking water demand in these areas, pipelines from distant locations supply water.

About 65% of groundwater is used as drinking water in urban and rural areas. A small quantity is used in industry and agriculture. The volume of groundwater under the Aral Sea basin is about 44.0 km<sup>3</sup>, of which 6.4 km<sup>3</sup> is used by Uzbekistan, including for irrigation. The total capacity of drinking water supply is 6.8 million m<sup>3</sup>/day, of which 4.4 million m<sup>3</sup> is from groundwater and 2.4 million m<sup>3</sup> is water from surface sources.

The drinking-water consumption figures include treated water supplied to industrial users (it accounts for about 25% of all drinking water). Water leakage due to outdated equipment is estimated at 11-40%, depending on the oblast.

Drinking-water consumption in Uzbekistan is high. However, water consumption is rarely metered, so the statistics may not be reliable. Only large enterprises have water meters. It is estimated that the consumption of drinking water could be reduced by 15-20% if water meters were installed and users were charged for the quantities they actually use. This has happened to a limited extent in Tashkent. Families with water meters have been able to monitor and adjust their consumption. The result is that these families pay an average of about 200 sum a month, against 800 sum without a meter. The effective use of existing water meters, however, is hampered by the high mineralisation of the water, which damages the meters over time.

There is a real shortage of drinking water in Karakalpakstan, Khorezm and Bukhara *oblasts* and in the west of Samarkand, Kashkadariya, Djizak and Surkhandariya *oblasts*. The deficit is caused by the irregular distribution of groundwater in the west of Uzbekistan. At present more than 30% of the population drinks and otherwise uses water that does not meet national and international quality standards.

## **5.5 Waste-water treatment**

### *Collector-drainage water from irrigation*

At present collector-drainage water is not treated at all. The annual discharge of collector and drainage water into surface water amounts to 20-25 km<sup>3</sup>: about 10 km<sup>3</sup> into the Syr-Darya, 5 km<sup>3</sup> into the Amu-Darya and the rest into small rivers and natural salt lakes. The most mineralized of these waters is found in the lower reaches of small rivers and the Amu-Darya. The solution is to build compartment collectors or treatment installations for collector-drainage water. These measures could make a considerable contribution to saving water in Uzbekistan and in the region as a whole.

### *Industrial waste-water*

Uzbekistan's main industries are energy, mining, metallurgy and chemicals. There are 502 industrial users of water. They discharge into surface water 2.2 km<sup>3</sup> of waste-water, of which 131 million m<sup>3</sup> is untreated polluted water.

Industrial waste-water containing specific substances is treated separately but not with the same efficiency. Concrete measures should be taken to improve the efficiency of industrial waste-water treatment installations or to construct new facilities with modern equipment and technologies.

The water quality of the Syr-Darya basin is affected by industry around Fergana and Tashkent. In the Fergana Valley, 564,70 tons of pollutants are discharged into Syr-Darya. In the Amu-Darya basin, the disposal of industrial waste-water mainly affects the Zarafshan basin. The oblasts of Samarkand, Navoi and Bukhara cities are the most affected; 415,40 tons of industrial pollutants are discharged into the rivers with waste-water.

Other Central Asian riparian countries also contribute to the contamination of both the Syr-Darya and the Amu-Darya. The problem is exacerbated by the lack of treatment facilities for industrial waste-water situated along the Syr-Darya and Amu-Darya rivers.

#### *Municipal sewage*

Many cities have installations that only partially treat domestic sewage, but, due to obsolete equipment and technologies in many of them, their efficiency for municipal and industrial waste-water is about 50%. Sewage water and industrial water are usually treated together by mechanical and biological methods. Treated and partly treated sewage is discharged into surface water. This increases biological oxygen demand (BOD), nutrients and pathogens in the surface water.

#### *Water conservation*

Water conservation is an important factor in the rational use of water resources in the region. In addition to the 40%-60% of water lost due to inefficient irrigation systems, about 5-10% of drinking water is lost because of corroding and aging water pipes, and another 15-20% of drinking water is lost due to outdated and inefficient equipment used for drinking-water supply.

There is no integrated water and land management, and irrigation planning fails to involve agro-business sufficiently in the management and distribution of irrigation water.

## **5.6 Water policies and objectives**

### *Policy objectives*

Water management and its interrelation with agriculture and energy are considered the highest priority in Uzbekistan. This is particularly reflected in the National Environmental Action Plan, the Framework on Water Supply Development for the period up to 2010, the Framework on Groundwater Protection and Use, for the period up to 2010, and the Programme on Maintaining Population by Drinking Water and Gas up to 2010.

The National Programme on Maintaining Drinking Water calls for providing clean drinking water to rural areas and upgrading the water supply systems, the distribution network, and sewage as well as building the waste-water treatment facilities in urban areas. The NEAP requires pretreatment or primary treatment of toxic waste-water discharges. Water saving and conservation are addressed through stricter control over water use, supported by water prices, introduction of water metering for agricultural and municipal use and the modernization, upgrading, and better maintenance of irrigation and drainage networks. Emphasis is also placed on integrated management, including integrated land, water and salinity management and watershed management.

The Framework on Water Supply Development to 2010 is based on new water norms and standards. It describes the existing water-supply conditions in every oblast and includes both measures to prevent pollution of the water supply and a plan for improving water supply based on regional water-supply systems and local sources. However, financial resources necessary for the full implementation of the Framework are only partially available.

The Framework on Groundwater Protection and Use to 2010 includes a reassessment of the reserves of fresh groundwater, specific data on the use of water and land resources and an evaluation of changes in groundwater stocks and quality. The Framework foresees possible changes in groundwater stocks, describes the interaction between all the big groundwater deposits and surface waters, and maps sources of pollution and industrial facilities. The Framework also contains proposals for the rational use of existing wells, including for irrigation, and for measuring groundwater capacity.



### Legislation

Uzbekistan's Constitution stipulates that water, as well as land and its subsoil, flora, fauna and other natural resources, are national assets that should be rationally used and protected.

The main legislation is the Law on Water and Water Use (1993), which stipulates the classification of water, responsibilities for water management and the procedure for issuing permits for water use. The Law calls for the protection of water from pollution by chemicals, oil and other substances through the enforcement of quality standards for sewage disposal, industrial waste-water treatment and its disposal.

Other legal documents that address water management issues include:

- The Resolution of the Cabinet of Ministers (No. 179, 1992) on arrangements for the use of groundwater, and its protection from contamination and depletion;
- The Resolution of the Cabinet of Ministers on Limited Water Use (No. 385, 1993);
- The Resolution of the Cabinet of Ministers (1998) approving the procedure for developing and maintaining the State water cadastre.

### Institutional arrangements

The Ministry of Agriculture and Water Management is involved in water research, planning, development and distribution. The Ministry is responsible for the construction, operation and maintenance of the irrigation and drainage systems, and maintenance of the surface water cadastre.

The Agency of Municipal Services and local authorities (*Khokimiyaty*) are responsible for the infrastructure of municipal water supply and waste-water treatment.

The State Committee for Nature Protection (*Goskompriroda*) is responsible for monitoring compliance with standards for waste-water. It is assisted by the State Special Inspectorate of Analytical Control (*GosSIAC*). The Main Administration on Protection and Wise Use of Land-Water Resources within the State Committee monitors and regulates industrial waste discharges. Other responsibilities of the State Committee for Nature Protection include the protection of water resources from municipal pollution, monitoring the

quality of water at major waterworks, analysing the impact of pollution on water quality, issuing permits for water use and sewage-water discharge, and supervising measures to decrease the quantity of harmful substances in the environment from sewage. It also is responsible for ensuring that water discharges meet water quality standards (MACs).

The Main Administration on Hydrometeorology within the Cabinet of Ministers monitors surface water, collects and analyses information and forecasts the state of surface water. It provides systematic information on the level of water pollution to the relevant State and community bodies, enterprises, departments, and organizations.

The State Committee for Geology monitors changes in the condition of groundwater in the underground hydrosphere, including its level, quality and volume. It also maintains the groundwater cadastre.

The Sanitary and Epidemiological Service of the Ministry of Health (SES) monitors drinking-water quality in cities and large settlements, particularly piped water. (See Chapter 12)

### Instruments

Water-quality standards are represented by maximum allowable concentrations (MAC), which were developed by the Ministry of Health. There are water-quality standards for drinking water, surface water, and fishing waters.

Some national drinking-water standards are less strict than those recommended by WHO, for example Uzbekistan's MAC for nitrates is 4.5 times the WHO standard. Special national standards exist also for water quality in reservoirs and fish-breeding ponds. There are no specific quality standards for collector water and drainage water from irrigated land. This type of water accounts for 78% of all discharged waste-water. Industry generates 18% of all waste-water, and sewage 4%.

Standards do not correspond to the current situation in the country, nor are they in line with EU and WHO standards. Almost all water-quality standards should be revised and new ones should be introduced for some hazardous substances and for collector water and drainage water from irrigation systems.

The water pollution index (WPI) is used to categorize water according to its quality, which can range from very clean to extremely dirty. The index is based on MACs of dissolved oxygen, biological

oxygen demand (BOD) and four widespread pollutants. There are six categories of surface water (see Table 5.4).

**Table 5.4: Treatment guidelines by different water sources for negligible virus risk**

Type of source <sup>1</sup>	Recommended treatment
<b>Ground water</b>	
Protected, deep wells; essentially free of faecal contamination	Disinfection <sup>2</sup>
Unprotected shallow wells; faecally contaminated	Filtration <sup>3</sup> and disinfection
<b>Surface water</b>	
Protected, impounded upland water, essentially free from faecal contamination	Disinfection
Unprotected impounded water or upland river; faecal contamination	Disinfection and filtration
Unprotected lowland rivers; faecal contamination	Pre-disinfection or storage, disinfection and filtration
Unprotected watershed; heavy faecal contamination	Pre-disinfection or storage, filtration, additional treatment and disinfection
Unprotected watershed; gross faecal contamination	Not recommended for water supply

Source: WHO, 1995.

<sup>1</sup> For all sources the median value of turbidity before terminal disinfection must not exceed 1 Normal Turbidity Unit (NTU) and must not exceed 5 NTU in simple samples.

<sup>2</sup> Terminal disinfection must produce a residual concentration of free chlorine of >0.5 mg/l after at least 30 minutes of contact in water at pH<8, or must be shown to be an equivalent disinfection process in terms of the degree of enterovirus inact

<sup>3</sup> Filtration must be either slow sand filtration or rapid sand filtration preceded by adequate coagulation-flocculation (with sedimentation or floatation). Diatomaceous earth filtration or a filtration process demonstrated to be effective with virus could also be used. The degree of virus reduction must be >90%. Additional treatment may result in slow sand filtration, ozonation with granular carbon absorption, or any other process demonstrated to achieve 99% of enterovirus reduction.

Mountain rivers are virtually free from pollution. Their water quality is very high. The more downstream the lower is the water quality. The middle and lower reaches of most rivers are heavily mineralized. In the middle reaches the salt content is 1 to 1.5 g/l and in the lower reaches up to 2 g/l.

The water of the Amu-Darya and the Syr-Darya in the middle and lower reaches is polluted and breaches MACs for mineralization, hardness, sulphates, chlorides, phenol and silicon.

#### *Drinking water quality and health*

Drinking-water quality is the main indicator of the impact of drinking water on health. To prevent the public drinking contaminated water, the following WHO treatment methods are recommended (see Table 5.5).

The quality of drinking water in Uzbekistan is a very complex problem that has a broad range of health effects, including water-borne infectious diseases, effects on the urinary system, hypertension and long-term effects related to the consumption of water contaminated by pesticides. Microbiological and chemical pollution arise mainly from insufficient waste-water treatment, insufficient water disinfection, the difficulty and high cost of removing pesticides from contaminated water, the scarcity of good-quality water in the Aral Sea basin, and the lack of public information and education on the appropriate use of water resources. Simple, cost-effective measures are not always available. For example, the high level of mineralization of water damages pumps and filters, and many banned or restricted pesticides persist as water contaminant. Furthermore, expensive treatment plants would be necessary to rid the water, in particular, from pesticide contamination.

**Table 5.5: Surface water quality**

Category	Comment	Examples
I.	Pollution does not exceed MAC levels	Pskem, Akbulak, Kyzlsay, Tashkesken, Terekly, Aksu and Geledarya
II.	Natural background mineral concentration does exceed MPC levels	Aktash-Sai, Ugam, Ahangaran (above Angren City), Gavasai, Kashkadarya at Varganza Village, Amankutan, Sazagan, Charvak and Gissarsky Reservoirs
III.	Background concentrations of some organic or mineral substances are 2-3 times the MAC-	Chirchik River, Akhangaran (medium stream), the upper reaches of the Salar and chanel Karasu, Kokandsay, Naryn, Karadarya, Isfayramsai, Margilansai, Zarafshan above Samarkand City, Tusunsay, Chimbulak, Tuyabuguz, Yujno-Sukhandary, Kayraum, Tuyamuyun, the lower stream of Surkhandarya, Chimkurgansk, Kuyumazar, Tupalang Reservoir, Syr-Darya in the Fergana area and Amu-Darya near Termez and Nukus Cities
IV.	Background concentrations for specific substances are 3-5 times the MAC	Chirchik River below the Chrichik industrial complex, Kokandsai below Kokand City and the Ciab and Sever-Bagdad collectors.
V.	Specific substances up to 3-5 times the MAC	Right bank of the Karasu in Tashkent, Akhangran and Chirchik cities.
VI.	Concentration of specific pollutants can reach 40- 50 times the MAC	Kalgan-Chirchik River, the Salar River below Tashkent and Yangiul cities.

Source: National Report on State of Environment, 1998; State Committee for Nature Protection.

## 5.7 Aral Sea

Irrigation for agriculture has been used in the Central Asian countries for more 5,000 years, but during the last 40 years, this has become unsustainable. It has resulted in an ecological crisis in the Aral Sea and significant environmental problems throughout Uzbekistan as well as in the region as a whole. The main problems faced in the Aral Sea basin could be summarized as follows:

- The level of water has dropped by 15 metres and only 5 km<sup>3</sup> of water reaches the Sea, compared with 50 to 60 km<sup>3</sup> before 1960;
- The Sea has shrunk to less than half its size;
- The amount of drinking and irrigation water in the region is insufficient and its quality, poor;
- Both water and more than 50% of irrigated land have high salinity, and salinization continues to increase. The annual loss caused by salinity is estimated at US\$ 2 billion that is 5% of GDP in the whole of Central Asia. Along the former shoreline, salt and dust have formed a thin white crust, and, when the strong northeastern winds blow, salt and small dispersed dusts are transported and deposited over vast tracts of cultivated land.

- Sea water is contaminated from fertilizers and pesticides that are transported with collector-drainage water and by the wind;
- Biodiversity has been drastically reduced as a result of desiccation and shrinking of the Sea. This includes the loss of river habitat in the deltas;
- Desertification of the Amu-Darya and Syr-Darya deltas is changing the climate in the region;
- All of these factors have had an adverse socio-economic impact on the population in the region through health risks, poor nutrition and unemployment. For example before the crisis there were more than 24 commercial species of fish; these are gone, and 60,000 people are unemployed in the region.

### *Resource sharing in the Aral Sea Basin*

One of the most difficult problems in the region is water resource sharing from the Amu-Darya and Syr-Darya Rivers between upstream (Kyrgyzstan and Tajikistan) and downstream countries (Kazakhstan, Uzbekistan and Turkmenistan). Upstream countries use the water from these two rivers for hydroelectricity generation from the dams during wintertime. As a result, downstream countries receive a lot of water during the winter

but not during the summer when the need is highest for irrigation.

The countries in the Aral Sea basin need to integrate their planning of energy and agriculture, and, equally important, they need to improve cooperation among themselves. There is agreement on water resource sharing and energy production in the region, but it is not consistently implemented, nor does it address the social, economic and environmental impacts of the situation.

*Institutional arrangements, policy objectives and programmes*

An Interstate Council on Aral Sea Problems (ICAS) and its Executive Committee (EC-ICAS) and an International Fund for Aral Sea Rescue (IFAS) were established to solve the above-mentioned problems. Until 1997, IFAS operated in parallel with the Interstate Council on the Aral Sea Problems (ICAS); in 1997, ICAS was taken over by IFAS.

The Interstate Commission on Water Coordination (ICWC) is a joint commission of the ministers of water resources in the region. It is intended to develop and implement water policy management in the Aral Sea basin. ICCWM includes a secretariat, a scientific international centre and two basin water organizations (BWO Amu-Darya and BWO Syr-Darya). The policies of the ICCWM for the Syr-Darya and the Amu-Darya are implemented by the basin water organizations (BWO). The Commission, which is largely dominated by people representing irrigation, could be more effective if it were to provide for stronger representation from other sectors, and particularly from energy and industry.

There are several interstate institutions and bodies involved in water resource management in the Aral Sea basin. In many cases there is no clear definition of their respective responsibilities, and this results in duplication of decisions and activities. At the minimum, further coordination among them is needed; a new look at an overall reorganization of the water management structure at the regional level may be more effective. In particular, a structure that provides for good multisectoral representation and with a mandate to carry out both cooperation and negotiation is needed.

In cooperation with donor organizations and countries, the five member States of IFAS adopted the Aral Sea Basin Programme, which contains

practical projects to be implemented at the regional level. In 1998, the member States of IFAS started seven Regional Programmes. The following regional environmental problems were established as priorities for the Aral Sea basin:

- stabilisation and improvement of the management methods for Aral Sea environment
- rehabilitation works within the Aral Sea zones
- improvement of the water management methods under the conditions of water lack in the region
- capacity building of local and national authorities aimed to implement the regional programmes in efficient way

*Activities carried out by Uzbekistan*

Uzbekistan is well aware of the problems associated with the Aral Sea crisis, and it has formulated a number of important objectives in its NEAP toward improving the situation. These include the following:

- Development and implementation of a regional strategy for water resources;
- Mitigation and restoration activities in the Amu-Darya and Syr-Darya deltas
- Broader use of a basin (watershed) approach to water management, including the creation of basin agencies and water authorities, to ensure a more efficient and sustainable use of water resources;
- Improvement in environmental health and sanitary living conditions of the local population;
- Restoration of the delta ecosystems with a focus on restoring fisheries, and bird and animal species;
- Reuse of mineralized waste-water for crop irrigation when applicable; and
- Integration of international obligations into national programmes and action plans on environmental and water resources management.

## 5.8 Conclusions and recommendations

Uzbekistan needs to develop a strategy for water management that recognizes the need for long-term shifts in the structure of all water uses, with a particular emphasis on the use of water for cotton irrigation. In addition, it is essential that the Central Asian countries, including Uzbekistan, will follow the recent agreements and decisions on

allocation of water from the Amu-Darya and Syr-Darya rivers' basin.

The unsustainable use of water resources in the Aral Sea basin has resulted in a major ecological crisis, with widespread social, economic and environmental impacts in the region. Both the rational use of water resources and a negotiated agreement for sharing these resources at the regional level are urgent tasks for the Governments of the Central Asian countries. Further, this regional cooperation and planning must look at energy and agriculture as interdependent sectors.

There are a number of interstate institutions and bodies involved in water resource management in the Aral Sea basin. However, their respective responsibilities are not well-defined and frequently overlap. There is also inadequate representation of stakeholders in these institutions. Attention needs to be given to a reorganization of the overall water management structure at the regional level.

The Interstate Commission for Water Coordination (ICWC) establishes water quotas, and every year the Governments of the riparian countries decide and jointly agree on the quantity of water that should be allocated to each country. Distribution of quotas is carried out by two interstate water basin management organizations: one for the Amu-Darya basin and the other for the Syr-Darya basin. However, questions have been raised regarding the extent to which the quotas are monitored.

There is also no enforceable intersectoral agreement that addresses the environmental, social and economic problems and that takes into account sharing of water resources, sustainable development of agriculture and energy production in the region.

*At the Aral Sea basin level:*

Recommendation 5.1:

*The Ministry of Agriculture and Water Management and other responsible bodies in cooperation with the ministries and bodies involved in water management in the riparian countries in the region should:*

- *Ensure that all stakeholders are represented in the Interstate Commission for Water Coordination;*
- *Develop and implement an inter-sectoral agreement that addresses the environmental, social and economic impacts of the Aral Sea crisis and takes into account sharing of water*

*resources, sustainable development of agriculture and energy production in the region; and*

- *Create an inspection or other control mechanism for the implementation of the agreement.*

Significant industrial surface-water pollution is generated in Uzbekistan, but other riparian countries also contribute to the contamination of both the Syr-Darya and the Amu-Darya rivers. Special measures are needed to prevent water pollution of these main rivers. Improving existing or building new treatment facilities for industrial waste-water at the enterprises situated along the Syr-Darya and Amu-Darya rivers are urgent tasks for riparian countries.

Recommendation 5.2:

*The Ministry of Agriculture and Water Management and the Agency of Municipal Services and industrial enterprises, in cooperation with their counterparts in the other riparian countries, should improve existing or install new treatment facilities for industrial waste-water for the enterprises situated along the Syr-Darya and Amu-Darya rivers in order to prevent further contamination of main surface water sources in the region.*

A monitoring system provides information on water quality and water quality trends in the Amu-Darya and Syr-Darya rivers and their tributaries. However, due to differences in methodology and equipment among the riparian countries (Kazakhstan, Kyrgyzstan, Tajikistan, and Turkmenistan), it is not possible to compare data.

In addition, monitoring equipment and methods used for analysis of water pollution are obsolete. There are no automatic devices to control water quality 24 hours a day. There is a lack of detailed and reliable information on the quantity of pollutants discharged into natural watercourses and reservoirs and a need for more information concerning the range of polluting substances, quantities discharged into the water, their concentration in the water and their environmental impact.

Recommendation 5.3:

*The State Administration on Hydrometeorology, the State Committee on Nature Protection the Ministry of Agriculture and Water Management in cooperation with other riparian countries should harmonize the monitoring systems used for transboundary water, in particular the Amu-Darya*

and Syr-Darya rivers. This includes the use of the same analytical methods and equipment for measuring water pollutants and the same software for processing and comparing data.

*At the national level:*

At present the economy suffers from the depletion of surface and groundwater resources; the poor management and condition of the irrigation system; the lack of training and knowledge about rational use of water in agriculture; the absence of economic mechanisms to save and protect water resources and improve their quality; and the lack of modern drinking-water supply equipment. Solving these problems requires the development and implementation of integrated basin management approaches and the development of a strategy for the sustainable development of agriculture.

Water conservation is a critical component of the rational use of water resources in the region. Measures should be taken to develop and introduce integrated management of water and land, to involve the agricultural sector more actively in the management and conservation of water for irrigation, to restructure and improve the water supply and distribution system, to improve the planning of irrigated lands, to introduce water meters, to develop an information system for water abstraction, supply and distribution and to use economic instruments.

Recommendation 5.4:

*The Ministry of Agriculture and Water Management should:*

- *Develop and implement a strategy for the sustainable development of agriculture that recognizes that water is scarce and that use of water for irrigation must be decreased;*
- *On the basis of this strategy, develop a plan for the use of irrigated lands, taking into account the quantity and quality of the water resources available in the region and the salinity of the soil;*
- *Improve the irrigation system and introduce water metering in agriculture;*
- *Involve the agricultural sector more actively in the management and distribution of water for irrigation.*
- *Set up an association of water users and develop the economic and legal rules for use of water;*

- *Develop regulations and norms on improving water management through restructuring state agricultural units into private ones;*
- *Develop a system of water management on the basin river principles taking into account the experience gained in the countries of the European Union, in particular those with intensive agricultural activities.*

The quality of drinking water in Uzbekistan is a very complex and serious problem with a broad range of health effects. Microbiological and chemical pollution arise mainly from insufficient waste-water treatment, insufficient water disinfection, and the difficulty of removing pesticides from contaminated water. Compounding these problems is the scarcity of good-quality water in the Aral Sea basin and the lack of sufficient public information and education on the appropriate use of water resources. Major efforts need to be made to bring water management practice in line with health priorities and economic realities.

Recommendation 5.5:

*The Ministry of Agriculture and Water Management and the Ministry of Health, in cooperation with Agency of Municipal Services, should:*

- *Revise the drinking water quality standards in line with WHO guidelines;*
- *Revise the operational procedures for drinking water plant management aimed at overall quality assurance rather than end-of-station chlorination;*
- *Conduct an evaluation of economic instruments for water (including systematic use of water meters to calculate user charges) and if needed, extension programmes to educate households on rational uses of water.*
- *Build facilities for the demineralisation and recycling of collector-drainage water in order to save and protect surface water resources.*

Many cities have installations that only partially treat domestic sewage. The efficiency of existing installations is about 50% for both municipal and industrial waste-water treatment because of obsolete equipment and technology. Concrete measures should be taken to improve the efficiency of existing industrial waste-water treatment installations or to construct new facilities with modern equipment and technologies. At present collector-drainage water is not treated at all.

Recommendation 5.6:

- (a) *The State Committee for Nature Protection should establish Maximum Allowable Concentration (MAC) for highly toxic substances such as mercury, cyanides and chromium- and strengthen the existing MAC in line with WHO and EU standards. The Ministry of Agriculture and Water Management (MAWM) should enforce these standards and implement the requirements of the NEAP for treatment of toxic wastewater discharged by industry.*
- (b) *The MAWM and the Agency of Municipal Services should create the necessary financial resources for the implementation*

*of the Plan on Water Supply Development, in particular by introducing of metering and appropriate pricing for water consumption.*

Recommendation 5.7:

*In implementing the Plan on Fresh Ground Water Use and Saving the Ministry of Agriculture and Water Management should urgently take measures to reduce the use of clean ground water for industrial and irrigation purposes with the long-term aim to restrict the use of ground water to the supply of drinking water for the population*

## Chapter 6

### AIR POLLUTION

#### 6.1 Recent developments and trends in air emissions

Air pollution in large cities and industrial centres is one of the major environmental problems in Uzbekistan. Despite the decline in industrial output, the content of air pollutants in these areas exceeds

the maximum allowable concentration (MAC). Since 1994 the total emissions of air pollution from industry, energy and even from transport have decreased. Emission data on the main air pollutants from stationary and mobile sources are presented in Tables 6.1, 6.2 and 6.3 and Figure 6.1.

**Table 6.1: Air emissions, 1995-2000**

	<i>1 000 tons</i>					
	1995	1996	1997	1998	1999	2000*
<b>Total</b>	<b>2,557.7</b>	<b>2,173.5</b>	<b>2,344.0</b>	<b>2,194.7</b>	<b>2,220.9</b>	<b>2,267.5</b>
Stationary sources	904.7	857.5	837.0	775.5	776.9	755.5
Mobile sources	1,653.0	1,316.0	1,507.0	1,419.2	1,444.0	1,512.0

Source: The State Committee for Nature Protection, 2001.

Note:

\* Preliminary data.

**Table 6.2: Air emissions from stationary sources, by pollutant, 1995-2000**

	<i>1 000 tons</i>					
	1995	1996	1997	1998	1999	2000*
<b>Total from stationary sources</b>	<b>904.6</b>	<b>857.5</b>	<b>836.8</b>	<b>775.6</b>	<b>777.0</b>	<b>755.5</b>
Dust	127.0	122.8	112.9	103.5	102.6	114.8
SO <sub>2</sub>	400.0	395.1	406.1	359.3	371.3	338.5
NO <sub>x</sub>	78.3	72.2	75.3	76.3	72.4	76.5
CO	147.7	108.0	86.7	81.0	69.3	77.3
HC + VOC(s)	141.8	147.5	143.3	148.5	155.8	143.5
Others	9.8	11.9	12.5	7.0	5.6	4.9

Source: The State Committee for Nature Protection, 2001.

Note:

\* Preliminary data.



**Table 6.3: Air emissions from stationary sources in the main industrial regions, 1995-2000**

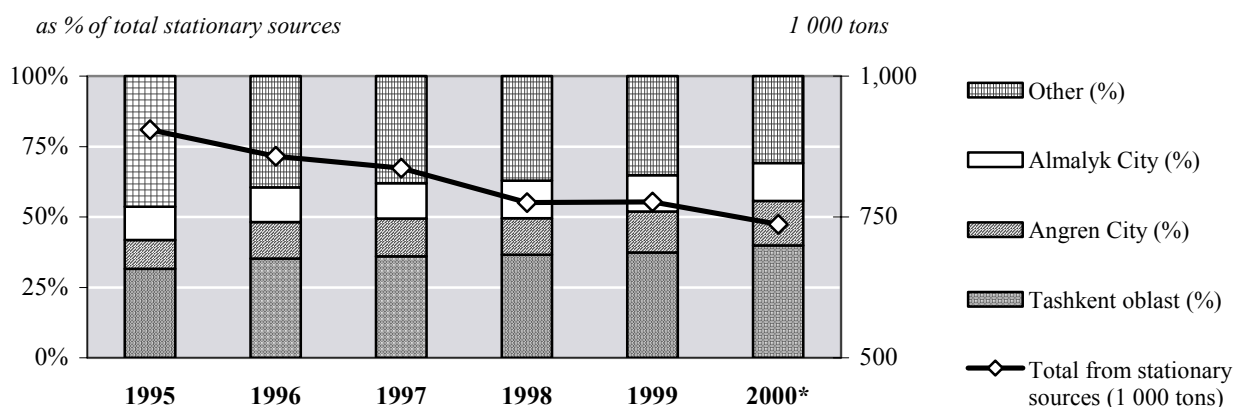
		1995	1996	1997	1998	1999	2000*
<b>Total from stationary sources</b>		<b>904.7</b>	<b>857.5</b>	<b>837.0</b>	<b>775.5</b>	<b>776.9</b>	<b>737.1</b>
<b>Tashkent oblast</b>	<i>1 000 tons</i>	286.6	302.4	301.6	283.6	290.8	294.2
	<i>as % of stationary emissions</i>	31.7	35.3	36.0	36.6	37.4	39.9
<b>Angren City</b>	<i>1 000 tons</i>	91.6	111.2	111.8	101.0	112.6	115.9
	<i>as % of stationary emissions</i>	10.1	13.0	13.4	13.0	14.5	15.7
<b>Almalyk City</b>	<i>1 000 tons</i>	106.6	105.5	105.9	103.6	100.0	99.4
	<i>as % of stationary emissions</i>	11.8	12.3	12.7	13.4	12.9	13.5

Source: The State Committee for Nature Protection, 2001.

Note:

\* Preliminary data.

**Figure 6.1: Air emissions from stationary sources in the main industrial regions, 1995-2000**



Source: The State Committee for Nature Protection, 2001.

Note:

\* Preliminary data.

Tables 6.1, 6.2 and 6.3 show that in 1995 total air emissions amounted to 2,557,700 tons, of which 904,700 tons or about 35% from stationary sources. From 1995 to 1999 total air emissions decreased by 17% to 2,220,900 tons. It should be noted that in 1999 the share of air pollution from stationary sources (35%) was the same as in 1995. But in 1999 the total amount of air pollution from stationary sources was 14% lower than in 1995. This was mainly due to the decline in the industrial and energy sectors, although some of the reduction may also be a result of implementation of environmental protection measures to reduce air pollution. Throughout this period sulphur dioxide was the main air pollutant (44-48% of total).

The concentration of particulates in air remains high in Navoi, Nucus and Tashkent. The

concentration of particulates in these cities is higher than both the WHO standards and national standards (NEAP). Fine particulates from the energy and transport sectors are difficult to measure. They may contribute significantly to respiratory illnesses, chronic bronchitis and heart diseases (see also Chapter 12). Soil erosion, desertification and poor road conditions are also reported to be sources of particulate pollution.

## 6.2 Air quality

### Monitoring network

Ambient air quality is monitored in Uzbekistan. There are 69 stations to measure air quality in 39 settlements. The Main Administration on Hydrometeorology within the Cabinet of Ministries

(*Glavhydromet*) measures the following pollutants: phenol, sulphur dioxide, ozone, dust, nitrogen oxide and dioxide, ammonia, carbon monoxide, hydrogen fluoride and solid fluorides, 3,4 benzo (a) pyrene, and lead. In total, it monitors 22 air pollutants, including 6 heavy metals and benzo (a) pyrene.

The State Committee for Nature Protection (SCNP) is responsible for controlling emissions from industries and mobile sources. Eighteen specialized analytical monitoring inspections take air samples of smoke and waste gasses and analyse them. These inspections measure air pollutant concentrations from plants located in 136 settlements of Uzbekistan. From 4 to 39 different air pollutants are measured, depending on the nearby industrial facilities. Unfortunately, toxic substances such as dioxins are not monitored in big cities because of a lack of modern equipment. PM10 is not monitored in urban areas either.

Air emission and air quality monitoring are based on emission standards and maximum allowable concentrations (MAC) (see above). MACs were developed more than 6 years ago. They consist of short-term (20-30 minutes), daily, monthly and yearly concentrations of 457 harmful substances. In many cases these standards do not correspond to WHO standards (see Table 6.4).

For some very toxic pollutants, for example cadmium, WHO standards are much stricter (see Table 6.4). The same is true for dust. Car emission standards were developed as GOST standards (GOST was the main organization involved in the development and approval of standards in the former Soviet Union). They have not been revised since Soviet times. They are less strict than EU and United States standards. At present there are not enough monitoring stations and their measuring equipment and methods are outdated.

**Table 6.4: National air quality standards and WHO Guidelines**

Pollutant	Uzbekistan*			WHO, 1997**		
	30-min	24-hour	1-year	1-hour	24-hour	1-year
Nitrogen dioxide	85	60	40	400	150	
Sulphur dioxide	500	40	50	350	125	50
Ozone	200	160	30	200	-	-
Lead	1.5	1.0	0.3	-	-	0.5-1
Solid suspended particulates	500	350	150	-	150-230	60-90
PM-10 (particulates <10 µm)						40-60
Phenol	10	7	3	No guidelines		
Cadmium	1.5	1	0.3	-	-	0.02
Mercury	1.5	1	0.3	-	-	1
Carbon monoxide	5,000	4,000	3,000	30,000		

Source: National Environmental Action Plan, 1998; State Committee for Nature Protection.

Notes:

\* **Uzbekistan**

- Test concentration means the maximum concentration found in a 20-30 minute test.
- Daily concentration means the average of test concentrations found as a result of a test taken during a day or obtained as a result of 24 hours of continued testing.
- Average monthly concentration means the average of daily concentrations found in a month.
- Average annual concentration means the average of the average monthly concentrations found in a year through testing.

\*\* **In 1997, WHO:**

- Waived threshold limits for particulates because adverse health effects are observed even at very low levels (as low as 20 µg /m<sup>3</sup> of PM10);
- Revised guidelines for NO<sub>2</sub> as follows: 1 hours - 200 µg /m<sup>3</sup>, 1 year – 40 µg /m<sup>3</sup>;
- Reduced the guidelines for ambient lead to 0.5 µg /m<sup>3</sup>

**Table 6.5: Air pollution in Tashkent City, 1991-1998**

	<i>MAC scale</i>							
	1991	1992	1993	1994	1995	1996	1997	1998
Formaldehyde	1.7	5.0	10.5	10.3	8.3	7.3	6.0	8.7
Ozone	0.8	2.0	2.0	2.0	1.3	2.3	1.3	1.3
Dust	1.3	1.0	1.0	1.3	1.3	1.3	1.3	1.3
Nitrogen dioxide	2.0	1.5	1.3	1.5	1.2	1.2	1.5	2.0
Ammonia	1.2	1.0	1.0	0.8	1.0	1.0	0.7	1.0
Carbon monoxide	1.0	1.1	0.7	1.0	1.0	1.0	1.0	0.7
Hydrogen fluoride	0.4	0.4	0.4	0.4	0.8	0.8	0.6	1.0
Phenol	1.3	1.0	1.0	0.9	0.7	0.7	0.7	0.7
Nitrogen oxide	1.2	0.5	0.5	0.5	0.3	0.5	0.5	0.8
3,4 benzo(a)pyrene	0.7	0.4	0.3	0.3	0.3	0.2	0.2	-
Sulphur dioxide	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2
Lead	0.6	0.5	0.6	0.1	0.02	0.02	0.02	0.01
Mercury	0.7	0.3	0.3	...	0.0	0.0	0.0	0.0
Hydrogen chloride	...	0.4	0.5	...	...	...	-	-
Hydrogen sulphide	0.3	...	...	...	...	...	-	-
Carbon sulphide	1.2	0.8	0.7	0.5	0.6	...	-	-

Source: National Environmental Health Action Plan, 1999.

**Table 6.6: Air pollution in Fergana, 1991-1998**

	<i>MAC scale</i>							
	1991	1992	1993	1994	1995	1996	1997	1998
Formaldehyde	4.3	2.7	2.3	3.7	4.3	5.0	5.0	3.0
Ozone	2.1	2.8	3.3	3.7	4.0	0.7	1.0	1.1
Dust	1.3	1.6	1.6	1.0	0.7	1.3	1.3	1.0
Nitrogen dioxide	1.8	1.4	1.5	1.1	1.0	1.2	1.5	1.2
Ammonia	0.8	1.0	0.8	0.9	1.5	1.5	1.5	0.7
Carbon monoxide	0.7	0.6	0.7	0.8	0.7	0.7	0.7	0.3
Phenol	1.3	1.0	1.0	0.8	1.0	1.0	1.0	1.3
Nitrogen oxide	0.5	0.4	0.5	0.3	0.5	0.5	0.8	0.5
3,4 benzo(a)pyrene	0.6	0.3	2.0	0.4	0.4	0.3	0.1	-
Sulphur dioxide	0.4	0.4	0.2	0.2	0.4	0.2	0.3	0.2
Furfural	0.2	0.2	0.1	0.3	0.10	0.2	0.20	0.10
Lead	0.1	0.1	0.3	0.1	0.04	0.1	0.02	-
Hydrogen chloride	...	0.6	0.2	...	...	...	-	-
Hydrogen sulphide	0.5	0.1	...	3.9	0.6	...	-	-
Chlorine	0.3	...	...	0.2	...	...	-	-

Source: National Environmental Health Action Plan, 1999.

These tables show that the concentration of formaldehyde in 1998 exceeded the MAC by a factor of three to nine in both cities. Ozone, dust and nitrogen dioxide also exceeded their MACs. The concentration of other air pollutants listed in the tables was below the MACs during the 1991-1998 period. However, these data may be unreliable, because measuring equipment is so obsolete that it needs to be either modernized or replaced. Replacing the equipment would also result in the use of new and modern analytical methods for such measurements. Air quality in big

cities and industrial areas, such as Tashkent, Almalyk, Navoi, Samarkand and Chirchik, is a serious problem.

The atmospheric pollution index (API) is used to characterize air quality in big cities. The index is based on a combination of the average pollution concentration during a year, the MAC, the degree of toxicity, and the quantity of toxic substances.

Table 6.7 gives the API for 16 cities during 1991-1998.

**Table 6.7: Air pollution (API) in urban areas, 1991-1998**

	1991	1992	1993	1994	1995	1996	1997	1998
Namangan	7.61	6.69	10.61	9.64	7.82	8.15	2.70	2.64
Kokand	8.29	7.53	6.22	5.58	7.53	7.45	5.55	4.78
Almalyk	11.61	8.64	5.45	4.65	4.79	5.74	6.98	6.44
Angren	1.43	13.04	6.20	7.61	6.86	5.68	3.33	3.96
Navoi	8.44	12.04	5.34	5.79	5.99	5.62	7.84	8.65
Saryasya	4.58	4.41	1.81	1.77	5.05	5.31	2.74	1.59
Bekabad	13.07	8.81	3.35	4.19	5.07	5.18	3.27	2.61
Tashkent City	4.92	5.42	4.85	5.70	4.88	4.74	5.65	6.38
Gulistan	8.03	9.03	5.77	5.17	4.64	4.54	2.45	3.37
Akhangaran	9.96	10.15	6.04	5.98	4.51	4.33	3.72	-
Andijan	4.23	3.42	3.39	3.28	3.39	3.40	5.66	4.51
Samarkand	2.74	2.71	2.31	2.89	3.12	3.37	4.39	4.41
Fergana	4.50	6.01	3.64	3.04	3.99	3.25	6.21	5.11
Chirchik	2.16	-	-	2.29	3.20	3.17	4.24	4.40
Bukhara	7.05	6.68	5.94	4.61	3.76	3.16	5.48	6.08
Nukus	4.17	3.03	2.39	3.22	3.47	2.56	4.01	3.82

Source: National Environmental Health Action Plan, 1999.

Note:

API > 14 : air pollution is very high

7 < API < 14 : air pollution is high

5 ≤ API ≤ 6 : air pollution is relatively high

API < 5 : air pollution is low

During the period from 1991 to 1998 the index either went down or remained stable in several cities, except in Tashkent, Bukhara and Navoi, where it was higher in 1998 than in 1991. As the Tables show, the level of air pollution in most cities is relatively high.

### 6.3 Sectoral pressure on air quality

The main economic sectors that contribute to air pollution are energy, transport and industry. The data on industrial and energy facilities, which emit sulphur and nitrogen oxides and dust, are presented in Table 6.8.

#### *Energy sector*

The effects of the energy sector on the environment are: urban air pollution, acid deposition and the greenhouse effect. To reduce these adverse environmental effects they should be considered together with overall economic and social development.

The main air pollutants from the energy sector are sulphur dioxide, methane and dust. The emissions of carbon dioxide from combustion account for 95.2% of total CO<sub>2</sub> emissions or for 40% of total air emissions. Emissions of methane from gas use and distribution account for 73.3% of total CH<sub>4</sub> emissions.

At present, about 6.4% of energy is produced by coal-fuelled power generation plants. In 1996 air emissions from the energy sector amounted to 256,100 tons or 30% of total emissions from stationary sources.

There are plans to apply energy conservation measures at industrial facilities (see Chapter 11). Modern technologies at new installations would help reduce particulate emissions and keep SO<sub>2</sub> and NO<sub>x</sub> concentrations in flue gas down.

**Table 6.8: Industrial enterprises with the largest volume of emissions\***

Enterprise	City	Particulates	Sulphur and nitrogen oxides
		Thousand tons	
Akhangarancement	Akhangaran	21	2.5
Angren Hydropower Station	Angren	26	28
Cement factory	Angren	6	...
Chemical factory	Chirchik	...	6
Concern "Metallurgy"	Bekabad	8	35
Factory of building materials	Kuvasay	17	...
Factory of building materials	Navoi	20	...
Mining and Metallurgical Works	Almalyk	37	142
Oil refinery	Fergana	...	5
Power station	Fergana	11	31
Power station	Kuvasay	...	3
Power station	Navoi	21	...
Power station	Nurabad	7	61
Power station	Shirin	...	94

Source: National Environmental Action Plan, 1998.

Note:

\* At full capacity.

### Transport

The main pollutants from the transport sector are nitrogen oxides, carbon monoxide, hydrocarbons, benzo (a) pyrene and volatile organic compounds (VOCs), which contribute to forming ground-level ozone during photochemical reaction. Dust or soot from old vehicles is an additional problem. The concentration of particulates or dust near roads breaches standards. For example, the concentration of benzo (a) pyrene exceeds the MAC 30-40 times at road junctions. The low quality of fuel and the number of older vehicles are the main factors that determine air emissions from transport. The use of leaded petrol results in high levels of lead in the air, which can harm human health, especially that of children (see Chapter 12). About 90% of lead emitted in the atmosphere is from vehicles. The State Action Programme for Environmental Protection 1999-2005 includes plans to phase-out leaded petrol, but only by 2008.

In 1997, the State sector accounted for 287,500 vehicles: 34,500 buses, 200,000 trucks, and 53,000 cars. The private sector accounted for 679,147 vehicles: 4,902 buses, 17,042 trucks and 657,203 cars. So the private sector owned more than 70% of Uzbekistan's total transport fleet.

Transport emission data are not reliable because they are only based on the quantities of fuel sold at service stations. There is neither strict control nor

consistent technical inspection of vehicles. Nor are exhaust fumes regularly measured. Air pollution abatement measures should be the main component of any overall strategy for the sustainable development of the transport sector.

### Industry

Industrial facilities are concentrated in four big cities (86%): Tashkent (40%), Fergana (27%), Samarkand and Navoi (19%). In addition there is a new refinery in Bukhara. The industrial sector includes ferrous and non-ferrous metallurgy, the chemical industry (mainly fertilizer production), the petrochemical industry, the gas industry, oil refineries, cement and other building material industries. (see Table 6.8).

Since 1980 air emissions from industry have been inventoried. The inventory gives information on where and how much air pollution is emitted. According to the Ministry of Macroeconomics and Statistics, 1,826 enterprises with 81,000 sources of air pollution were registered in 1999. These enterprises are equipped with 12,754 gas-purification units with an overall capacity of 204,273 m<sup>3</sup> of gas per hour. The degree of purification is about 68%.

The chemical, petrochemical, mining and smelting, cement and construction material plants in Tashkent, Angren, Almalyk, Navoi, Chirchik,

**Table 6.9: Efficiency of removing pollutants, by sector**

	Average	Solid	Sulphur dioxide	Carbonic oxide	Nitric oxide	Hydrocarbons	Volatile organic compounds	Other	%
Total Republic of Uzbekistan	67.5	91.7	39.6	41.0	22.0	8.8	26.7	79.9	
Oil and gas industry	9.0	0.5	2.4	0.7	0.3	10.0	0.0	71.3	
Electric power	63.0	90.8	0.0	0.0	0.0	0.0	0.0	0.0	
Metallurgy	77.0	92.8	71.0	3.2	46.0	0.0	0.0	59.0	
Construction	91.4	94.1	0.0	4.0	0.0	0.0	8.0	0.0	
Public utilities	3.9	49.3	0.0	0.0	0.0	0.0	0.3	-	
Chemical industry	88.0	89.0	70.0	91.0	84.5	10.9	78.9	88.0	

Source: National Environmental Action Plan, 1998.

Samarkand and Fergana all contribute to air pollution. In these cities stationary sources account for 70% of particulates and 55% of gaseous pollutants. For example, the Almalyk mining and smelting complex emits about 100,000 tons of toxic substances (sulphur dioxide, carbons, nitrogen oxides, sulphuric acid, heavy metals, arsenic, etc.) per year, which is responsible for 13% of all of Uzbekistan's air emissions from stationary sources.

The petroleum and gas industries account for 35% of total air pollutants. Each year they emit more than 250,000 tons of air pollutants, of which 110,000 tons of sulphur dioxide and 114,000 tons of untreated hydrocarbons. Only 9% of these pollutants are recovered (see Table 6.9). A huge problem of the oil industry is the waste gas generated during petroleum production. Annually about 100 million m<sup>3</sup> of waste gas is flared and about 12 million m<sup>3</sup> of natural gas is lost or leaked during transport and use.

Flared natural gas is a potential source of energy, if proper technology is used. The Holding Company "UZBEKNEFTEGAS" could benefit from identifying technical, financial and administrative arrangements to implement such technology.

The metallurgical industry emits about 15% of all air pollution from stationary sources. The share of the chemical industry, which is situated in Almalyk, Andijan, Kokand, Navoi and Samarkand, is only 3% of total air pollution. The main pollutants are ammonium nitrate, ammonia, hydrogen fluoride gas (HF), nitrogen dioxide and phenol.

Air quality in the vicinity of the industrial areas is poor. The volume of air pollutants per capita

exceeds the MAC fivefold in 20 major industrial areas.

The building and cement industries are the main sources of dust in Akhangaran, Navoi, Becabad and Angren (5% of total air emissions). Light industries and food-processing industries cause little air pollution.

The main reason for the high level of air pollution from industrial facilities is that their air pollution abatement technologies are either obsolete and inefficient or not used at all. In addition, the production technology itself is not up-to-date and requires modernization or replacement.

The situation is further exacerbated by the fact that environmental audits are not being carried out in industrial enterprises to define the exact sources and quantities of air pollution, and emission standards for harmful air pollutants are not sufficiently rigorous.

#### **6.4 Policy objectives and institutional arrangements**

##### *Policies and priorities*

Uzbekistan's overall strategy for air management and air quality control is part of its National Plan for Environmental Protection, which was the basis for the State Action Programme for Environmental Protection for 1999-2005. Other important policy documents containing objectives for air management and air quality are the National Environmental Action Plan (NEAP), the National Environmental Health Action Plan (NEHAP) and

the Strategy for Sustainable Development in the Sector of Urban Transport.

These policy documents set the following main objectives:

- Reducing air pollution from transport and other mobile sources;
- Improving the quality of motor fuels;
- Modernizing and replacing old vehicles, including trucks;
- Improving the road network in big cities and elsewhere;
- Replacing leaded by unleaded petrol and introducing more widely the use of natural gas as motor fuel, as well as improving fuel specification standards;
- Strengthening the technical inspection and control of norms and standards for exhaust fumes and improving car-repair services for State and private vehicles;
- Reducing air pollution from industrial facilities by introducing air pollution abatement technologies;
- Implementing a national programme to phase out ozone-depleting substances (ODS);
- Implementing a national strategy for reducing the emissions of greenhouse gases (carbon dioxide, methane, nitrous oxide).

#### *Programmes and projects*

A programme to develop and modernize air pollution monitoring and to define air pollution was drafted in 1998. This Programme includes the following measures:

- Further developing and improving the air monitoring system;
- Improving the system of analytical control; replacing equipment and methods and introducing completely automated control systems for the measurement of air pollutants;
- Setting up a unified, efficient system for gathering and processing information on air quality (database) to be used by all interested ministries and institutions.

SCNP and Glavhydromet are cooperating to implement this programme. Donor countries are seriously considering sponsorship.

Other programmes, for the development of scientific solutions for the main problems of environmental protection and rational use of natural

resources, consist of 38 tasks, some related to air quality:

- Developing and implementing new methodological approaches to environmental and health norms for hazardous substances;
- Developing methods for reducing air pollution;
- Developing methods for reducing the emission of carcinogenic substances from industry;
- Improving the overall State system for environmental monitoring.

In the framework of the implementation of the State Action Programme for Environmental Protection for 1999-2005 the following measures are planned in an attempt to reduce air pollution from mobile sources:

- Producing 50,000 pieces of equipment to switch car fuel from petrol to gas by the year 2002;
- Improving the car fleet, favouring cars that run on diesel fuel, and strengthening emission controls by establishing 36 ecological points "Ecotrannazorat";
- Phasing out the use of leaded petrol by 2008.

Implementing these programmes requires money. For instance, according to the Asian Development Bank, implementing the projects for reducing air pollution from industrial installations in Tashkent and Fergana alone would cost more than US\$ 65 million.

#### *Legislation and regulations*

The main legal instrument on air quality is the Law on the Protection of Ambient Air of 27 December 1996 (see also Chapter 1). Its main purpose is to prevent adverse air pollution effects on the environment and human beings.

The Law includes the following main provisions and tasks:

- The aims of air pollution legislation;
- The right of citizens for clean ambient air;
- The State air management mechanism;
- Standards and norms for vehicles, for fuel, and for transport-related enterprises; - Standards and norms for industrial enterprises;
- Norms for the use of air; regulations for the discharge of hazardous gases into the atmosphere;
- Network of national roads;

- Payments for air emissions and damage caused;
- The State inventory of air emission sources;
- Air quality monitoring and enforcement of air legislation.

The Law requires an environmental impact assessment (EIA) and a health assessment to be carried out in industrial areas and areas with dense traffic. It obliges industrial enterprises to report on air emissions, and waste-water and solid waste discharges. The Law gave the State Committee on Nature Protection responsibility for air management, air quality and air monitoring.

The following legal documents also contain provisions on air management and air quality:

- The Law on State Health Inspections, 3 July 1992
- The Law on Nature Protection, 9 December 1992
- The Law on Self-Governing Authorities, 2 September 1993
- The Code on Administrative Liabilities, 22 September 1994
- The Law on the Protection of Citizens' Health, 29 August 1996
- The Law on Ecological Expertise, 1 July 2000;
- The Law on Radioactive Safety, 31 August 2000
- In addition, there are 100 normative and regulatory documents (soft law) on air management and air quality control.

The Ministry of Health has developed and adopted health-based air quality norms. They include:

- The list of maximum allowable concentrations (MACs) No. 0015-94;
- The list of MAC of hazardous substances in the workplace No. 0046-95;
- The list of MAC of acoustic, electro-magnetic and ion negative physical factors that influence atmospheric air;
- The list of standards (GOSTs) for mobile sources of atmospheric air pollution produced and used in Uzbekistan: for cars and agricultural vehicles, for rail transport and for air transport.

The GOST standards apply throughout Central Asia in accordance with the Agreement of the Interstate Council on Standardization (1997) and

UZGOSSTANDARDS decision No. 12-16/183, 10 May 1999.

The Law on the Protection of Ambient Air was adopted in 1996, but many standards and norms date from Soviet times. They do not meet the present requirements of industry, transport and the energy sector. The Law fails to address the energy sector adequately, although this sector is a major air polluter.

This Law and all regulations, standards and norms for air quality and air management lack consistency should be made consistent to strengthen the inspection and control system.

#### *Institutional arrangements*

According to the Law on the Protection of Ambient Air, the Cabinet of Ministers, The State Committee for Nature Protection and the local state authorities (*Khokimiyaty*) are bodies with air management and protection responsibility

Developing legislation and policy on the adverse impact of physical air pollution on human health is the responsibility of the Ministry of Health. The Ministry of Internal Affairs is responsible for managing air pollution from mobile sources, including the development and implementation of emission standards and norms.

The State Administration on Hydrometeorology (*Glavhydromet*), in cooperation with SCNP, is the main air quality monitoring institution. *Gosgorthekhnadzor* supervises safety in mining and industry. The Agency for Safe Work in Industry and Mining is responsible for control of safety in these fields.

The specialized monitoring sites carry out analytical analysis of air quantity and measure concentrations of pollutants in ambient air.

The State Committee for Nature Protection is the overall coordinating body for air management. It is also involved in monitoring air pollution from all economic sectors and for protecting and regenerating natural resources. The air management and air monitoring and inspection system includes the State Committee for Nature Protection of the Republic Uzbekistan, Karakalpakstan, all *oblast* committees and Tashkent City Committee, cities and regional inspectorates, and the committees' subordinate organizations and enterprises.



## 6.5 Implementation of international conventions

Uzbekistan is a party to the United Nations Framework Convention on Climate Change. It set up a Commission on Climate Change to implement the Convention at national level. Total emissions of greenhouse gases fell from 163,204,000 tons in 1990 to 15,711,000 tons in 1997, primarily as a result of the cessation of most industrial activities. The State Action Programme for Environmental Protection (1999-2005) contains the following measures for the implementation of the Convention:

- Setting up a system to monitor greenhouse-gas emissions;
- Improving the technologies and processes at the municipal service installations;
- Developing processes for energy production at steam and gas turbine facilities;
- Using alternative sources of energy;
- Encouraging the use of natural gas and thermal energy;
- Strengthening the application of charges and payments for energy use and heating.

Uzbekistan is a party to the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol. The Government has developed and is implementing a national programme to phase out ozone-depleting substances (ODS). The following measures have been taken to implement the Convention:

- Since 1 January 2000, trade in ODS with countries that are not parties to the Vienna Convention and the Montreal Protocol has been prohibited, as has import of ODS from countries belonging to Group 2 of Annex A and Group 1 of Annex B
- Since 1 July 2000 the import of any air condition equipment and refrigerators containing ODS belonging to Group 1 of Annex A has been prohibited;
- A special permit system was introduced for the export and import of ODS.

Uzbekistan is not a Party to the ECE Convention on Long-range Transboundary Air Pollution, and it does not submit official air pollution statistics to ECE.

## 6.6 Conclusions and recommendations

- Uzbekistan has 69 stations to measure air quality in big cities. However, their equipment is obsolete and needs to be either modernized or replaced. The same could be said for methods of analysis. Mobile monitoring units should be introduced to measure air pollutants in areas that have no monitoring stations and in emergencies cases to improve the quality of measurements. PM10 and ozone are not monitored in urban areas.

### Recommendation 6.1:

*The State Committee for Nature Protection and Glavhydromet should reorganize and strengthen the monitoring network; technical capacities for air quality monitoring should also be improved, including the introduction of automatic methods as well as alternate methods such as diffusion sampling for measuring air pollutants and processing air emissions data. Glavhydromet should also monitor PM10. Measures should be taken to improve the technical capacities for evaluating and monitoring air pollution. In this connection training activities should also be undertaken.*

The main pollutants from the transport sector are nitrogen oxides, carbon monoxide, hydrocarbons, benzo (a) pyrene and volatile organic compounds (VOCs). The concentration of particulates near roads breaches standards. The low quality of fuel and the average age of vehicles are the main factors that determine air emissions from transport. The use of leaded petrol pollutes the air with lead. Leaded petrol is to be phased out, but only by 2008. There is no strict control or mandatory technical inspection of vehicles, nor are exhaust fumes regularly measured.

### Recommendation 6.2:

*The State Committee for Nature Protection and the Uzbekavtoprom Association -in cooperation with enterprises involved- should take the following measures to reduce the adverse environmental effects of the transport sector:*

- *Revise existing air emission standards and develop and implement new, realistic and scientifically justified emission standards, including strict standards for the lead content of petrol that meet EU requirements;*
- *Speed up the phase-out of leaded petrol.*

Recommendation 6.3:

*The Municipalities, organisations and bodies involved in the exploitation of transport, should take urgent steps to:*

- *Replace old cars, buses and trucks;*
- *Increase the use of natural gas as motor fuel, in particular in public transport;*
- *Improve car-repair services and make the technical inspection of all vehicles mandatory;*
- *Improve road quality and road infrastructure in large cities and in the country as a whole.*

Each year the petroleum and gas industry emits about 300,000 tons of air pollutants, of which 130,000 tons of sulphur dioxide and 114,000 tons of untreated hydrocarbons. Only 9% of these pollutants are recovered. A huge problem of the oil industry is the natural gas generated during petroleum production. Annually about 100 million m<sup>3</sup> of this waste gas is flared and about 12 million m<sup>3</sup> is lost through leakage during transport and use. Flared natural gas is a potential source of energy, if proper technology is used.

Recommendation 6.4:

*The concerned sectors of Ministries and the industrial enterprises should make all possible efforts, including providing the financial resources, to install or modernize abatement technologies to reduce gas emissions and dust from industrial installations. The following measures should be taken urgently:*

- *Environmental audits should be carried out at industrial enterprises;*
- *Modern abatement technologies should be installed to reduce air pollution.*

Stationary sources in large cities currently account for 70% of particulate pollution and 55% of gaseous pollutants. The main reason for the high level of air pollution from industrial facilities is that their air pollution abatement technologies are either obsolete or inefficient. In addition, their production technology is not modern and needs repairing or replacing.

Recommendation 6.5:

*The State Committee for Nature Protection should:*

- *Revise and introduce emission standards for harmful air pollutants that are consistent with EU standards;*

- *Use economic incentives to encourage the introduction of cleaner production technologies (reduced taxes for environmental equipment, low charges for improving environmental protection at enterprises)*
- *Harmonize the air quality standards with WHO guidelines on ambient air.*

See also Chapter 12

The Law on the Protection of Ambient Air was adopted in 1996. Its main purpose is to prevent adverse air pollution effects on the environment and human beings. The regulations for its implementation were developed in Soviet times. They do not meet the present requirements of industry, the transport and energy sectors. The energy sector, though a major air polluter, is not properly addressed in the Law.

This Law and all regulations for air quality and air management should be made consistent to strengthen the inspection and control system for air pollution.

Recommendation 6.6:

*The State Committee for Nature Protection and the Ministry of Justice should further develop the Law on the Protection of Ambient Air, and revise existing regulations and develop new regulatory documents for its implementation.*

Uzbekistan is a Party to the United Nations Framework Convention on Climate Change and to the Vienna Convention and the Montreal Protocol. Two special programmes were developed for the implementation of these conventions. A Commission on Climate Change was set up to develop and implement measures to reduce greenhouse gases at national level. Uzbekistan is not a Party to the ECE Convention on Long-range Transboundary Air Pollution.

Recommendation 6.7

*The State Committee for Nature Protection should speed up the process of accession to the UNECE Convention on Long-range Transboundary Air Pollution so that Uzbekistan can participate actively in the cooperation on air management in the UNECE region. (See also Recommendation 4.2)*

## Chapter 7

# WASTE MANAGEMENT

### 7.1 Current waste management

#### *General overview*

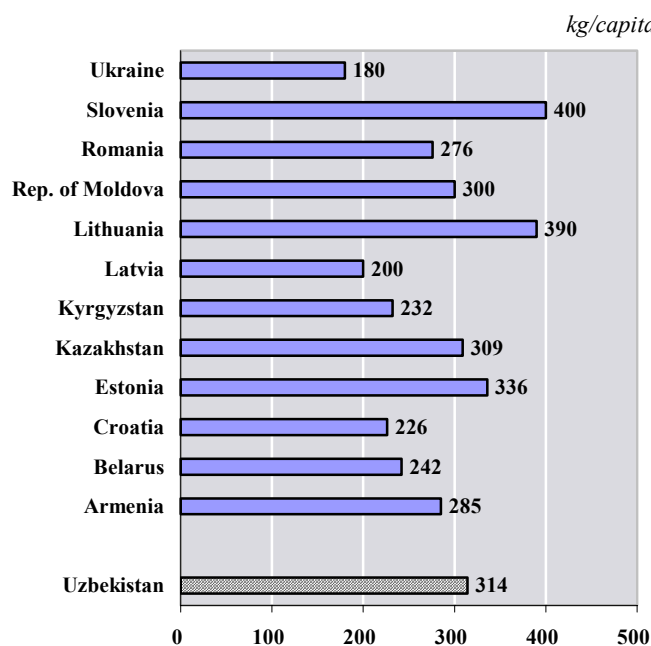
In Uzbekistan, the availability of data on waste is generally limited and data are fragmentary. Existing data are compiled on the basis of reports from waste producers. Only three landfills for municipal solid waste are equipped with a weighbridge. Still, compared to data on other waste types, data on municipal solid waste are the most reliable. The Tashkent Scientific Research Institute, VODGEO, sent out a questionnaire on dumpsites to oblast committees for nature protection. As a result 160 sites for municipal solid waste disposal have been identified and there is

some indication about their conditions. At many sites personnel are present and record the incoming refuse-collection vehicles.

All in all, the available data cannot be regarded as very reliable. The waste cadastre (database) run by VODGEO includes only an estimated 5% of total industrial waste.

The most reliable data are available for the city of Tashkent, where, in preparation of a World Bank-funded waste management rehabilitation project, investigations into municipal solid waste have been carried out. All data however should be considered as no more than an indication of the real amounts involved.

**Figure 7.1: Generation of municipal wastes, 1993-1997**



Source: UNECE; EPR (various issues).

*Generation of municipal solid waste*

**Table 7.1: Production of MSW 1997-1999**

Geographical Area	Total			Per inhabitant
	1 000 t/year			kg/capita/year
	1997	1998	1999	1998
<b>Total for Uzbekistan</b>	<b>8,980.0</b>	<b>7,516.7</b>	<b>5,730.8</b>	<b>314</b>
<b>Republic of Karakalpakstan</b>	<b>257.7</b>	<b>200.8</b>	<b>201.2</b>	<b>137</b>
<b>Total for Oblasts</b>	<b>8,722.3</b>	<b>7,315.9</b>	<b>5,529.6</b>	
Andijan	593.0	412.5	318.7	193
Bukhara	116.0	125.0	151.8	90
Djizak	365.0	395.0	265.0	425
Kashkadarya	222.2	231.6	228.3	110
Navoi	37.7	58.7	445.6	76
Namagan	596.4	534.6	38.8	285
Samarkand	627.4	814.5	308.6	312
Surkhandarya	414.7	191.5	163.1	114
Syrdarya	285.0	90.6	78.6	139
Tashkent Region	584.1	457.3	443.6	198
Fergana	1,042.8	838.2	564.3	322
Khorezm	147.0	141.0	65.0	110
Tashkent City	3,691.0	3,025.4	2,458.2	1,418

Sources: VODGEO; NEHAP, 1999.

Information on municipal solid waste can be obtained from several sources and documents. According to the NEHAP, waste generated per capita stand at 400 to 450 kg/year in cities and 40% less in rural areas. Other sources speak of an average of some 300 kg/capita, although with wide variations between different regions.

Table 7.1 shows that total municipal solid waste generation as well as per capita generation have declined over the years. The reported per capita waste dropped from 375 kg in 1997 to 314 in 1998 and 240 in 1999. However, during the same period, the number of operational waste-collection vehicles declined as well and so did the number of trips to disposal sites. The decline in registered waste does therefore not necessarily reflect a real decline in waste and not even a decline in waste disposal. The lower figures may be caused by a more efficient use of operational equipment, since owing to the method of data collection, carrying the same amount of waste with fewer trucks results in a lower amount of waste being registered.

On the basis of the available data, the only conclusions that can be drawn are that during recent years municipal solid waste per capita has been in the order of 300 kg/year and that it is higher in urban areas and lower in rural areas. The figure mentioned is comparable with those in other countries in transition in both Central Asia and central and eastern Europe.

The composition of municipal solid waste is illustrated in Table 7.2. It too is comparable with that in other countries in transition.

*Generation of industrial waste*

Industrial waste is registered and dealt with together with waste from mining operations, including the so-called tailings. These tailings are discussed in Chapter 10 "Mineral Resources". Due to the common approach to industrial and mining waste, industrial waste is overshadowed by mining waste, which, especially in terms of both amount and impact, is more significant than industrial waste.

**Table 7.2: Composition of MSW produced in Tashkent**

	Summer	Autumn	Winter	Spring	<i>percentage by wet weight</i>	
					Average over the year	Average over the year *
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100</b>
Paper	20.5	18.3	18.8	18.1	18.9	20
Food waste	35.3	36.8	39.2	42.2	38.4	30
Wood	4.7	4.2	3.7	6.8	4.9	5
Metals	3.0	3.9	2.2	3.3	3.1	3
Textile	3.7	3.3	3.9	4.3	3.8	3
Leather and rubber	2.0	0.7	0.4	0.4	0.9	not listed
Glass	4.7	4.5	0.3	1.9	2.9	not listed
Stones	6.4	10.5	13.8	8.0	9.7	not listed
Plastic		not listed			not listed	15
Other	19.7	17.8	17.7	15.0	17.6	24

Sources: WB project PIU (Project Implementation Unit) of Hokimyat of Tashkent City  
\* NEHAP, 1999.

Average moisture content 43%; ash content 22%; caloric content 1 280 kcal/kg.

The registration of industrial waste is based on reports from industries, but only waste classified as toxic waste has to be reported. Non-toxic industrial waste is not registered and no data are available.

Although reporting of toxic industrial waste is mandatory in accordance with Governmental Regulation No. 22 of 18 November 1997 of the Ministry of Macroeconomics and Statistics, only a small percentage of industrial enterprises do indeed report their hazardous waste and, as a result, only a fraction of the real amount is registered. The trend in registered industrial waste is presented in Table 7.3.

**Table 7.3: Reported industrial hazardous waste production, 1998-1999**

	<i>1000 tons</i>	
	1998	1999
<b>Total</b>	<b>26,438.9</b>	<b>26,985.1</b>
Class 1	0.3	0.2
Class 2	6.0	5.2
Class 3	667.8	706.8
Class 4	25,764.7	26,272.9

Source: VODGEO, 2000.

As Table 7.4 shows, most industrial toxic waste is toxicity class 4 waste. Of the reported amounts of industrial waste more than 97% is in this class. It includes sludge from the galvanic industry and used

catalysts from the chemical industry. The waste contains a high percentage of inert substances, but these are contaminated by toxic compounds.

In 1999, 293 of some 12,000 industrial enterprises and construction sites producing industrial waste reported the hazardous waste amounts they produced (or the reports of only 293 companies reached VODGEO). The limited reporting rate results in large discrepancies. For instance, according to the NEHAP, the oblasts with the largest industrial waste generation (in decreasing order) are: the Tashkent oblast, Fergana Valley and the Central Oblast, including the Bukhara, Samarkand and Navoi oblasts. These oblasts generate an estimated 72% of all industrial waste. According to Table 7.4, the Tashkent and Fergana oblasts are only marginal waste producers, while the Navoi oblast (part of the Central Oblast in the NEHAP) accounts for almost 97% of all waste.

VODGEO claims that its database includes only 5% of the real amount of industrial waste generated. On this basis the following figures would be more realistic:

1 <sup>st</sup> toxicity class:	3000 t/y
2 <sup>nd</sup> toxicity class:	100,000 t/y
3 <sup>rd</sup> toxicity class:	1,500,000 t/y
4 <sup>th</sup> toxicity class:	500,000,000 t/y

**Table 7.4: Reported industrial waste production in thousand tons**

Region	Total	Toxicity class				Reporting enterprises	Out of total waste
		1.0	2.0	3.0	4.0		
		tons					
<b>Uzbekistan</b>	<b>26,985,063.5</b>	<b>155.1</b>	<b>5,245.1</b>	<b>706,747.5</b>	<b>26,272,915.8</b>	<b>293</b>	<b>100.0</b>
Karakalpakstan	...	...	...	...	...	0	-
Andijan	7,133.2	0.1	617.0	324.1	6,192.0	4	0.03
Bukhara	1,079.1	0.4	339.2	739.5	...	34	0.004
Djizak	211.7	...	156.6	55.1	...	7	0.001
Kashkadarya	217.3	2.0	215.3	...	...	4	0.001
Navoi	26,087,433.6	31.5	2,349.6	701,171.1	25,383,881.4	14	96.67
Namagan	113.3	113.3	...	...	...	5	0.0004
Samarkand	81,708.0	...	31.6	24.3	81,652.1	23	0.30
Surkhandarya	...	...	...	...	...	0	-
Syrdarya	555.1	...	554.9	0.2	...	62	0.002
Tashkent region	799,774.2	1.8	85.3	1,041.6	798,645.5	8	2.96
Fergana	3,964.4	...	555.1	2,901.1	508.2	38	0.01
Khorezm	...	...	...	...	...	0	-
Tashkent City	2,873.6	6.0	340.5	490.5	2,036.6	94	0.01

Source: VODGEO, 2000.

In addition to waste in these four toxicity classes, non-toxic industrial waste is also generated, but in the absence of any data the amounts cannot even be estimated.

Although the above data can be considered as more realistic than those presented in Tables 7.3 and 7.4, it has to be concluded that the real amount of industrial waste is not known and estimates can only provide an indication of the order of magnitude.

#### *Agricultural waste*

Agricultural waste is dominated by cotton production, which generates more waste than the metallurgical, energy, engineering and chemical industries combined. For each kilogram of raw cotton more than a ton of cotton branch waste and cotton hulls is produced. However, in spite of the high amounts, it is not the biodegradable waste that should give cause for concern but the obsolete pesticides that have been generated by the agricultural sector over the years. Owners of the obsolete pesticides regard them as an urgent problem and have appealed to the State Committee for Nature Protection to solve it.

Based on a preliminary evaluation carried out in 1996, the State Committee for Nature Protection estimates that currently some 12,000 tons of obsolete pesticides are stored in various places in

the country, including on farms and especially at former airstrips for pesticide-spraying airplanes. The stocks include pesticides that have been prohibited for use, including DDT and hexachlorine. The conditions under which these pesticides are stored are unsatisfactory. In areas neighbouring such airfields and other pesticide storage sites high levels of soil contamination have been found with DDT concentrations twice or three times above the quality standard.

Some of the pesticide stocks have now been emptied and the pesticides have been disposed of in concrete lined pits. In Navoi oblast for instance, two such pits have been constructed and filled. The construction of a third is planned but cannot be carried out due to a lack of funds.

#### *Medical waste*

Medical waste is generated in hospitals and clinics, but also by doctors, dentists and veterinarians. According to the Project Implementation Unit (PIU) for the World Bank-funded waste management project in Tashkent, the capital generates 104,228 tons of medical waste a year (1999). Extrapolated to the entire republic, yearly medical waste generation should be in the order of one million tons. Experience shows that 80% or more of medical waste is comparable to municipal solid waste, while the remaining part should be considered as hazardous waste.

Only a few hospitals have special facilities to deal with their hazardous waste. The tuberculosis hospital in Tashkent is equipped with an incinerator, while other hospitals disinfect waste with chlorine. These are the only special measures taken. In general medical waste is managed together with municipal solid waste and used medical supplies such as syringes and infusion sets can therefore be found at municipal landfill sites.

#### *Other waste*

A variety of other waste is produced, including construction and demolition waste, car wrecks, waste tyres, waste oils, PCB-containing waste, etc. Most is recycled or reused although all types of waste are disposed of as well. Car wrecks are for the most part used as secondary raw material in the steel industry and waste oils are recovered in accordance with the regulations of the State Committee for Oil Products. Used PCB-containing oil, so-called 'transformer oil', is recovered as well and sometimes used as engine oil in vehicles.

#### *Radioactive waste*

Since Uzbekistan does not generate electricity in nuclear power plants, radioactive waste is limited to waste from research, medical and industrial facilities. On a yearly basis approximately ten such sources of radioactive waste are replaced. In addition, some 400 litres of liquid radioactive waste are produced by the Institute for Atomic Science.

The State radioactive waste management organization is responsible for the collection, transport and disposal of radioactive waste. It collects radioactive waste on request with a special vehicle, licensed for the transport of radioactive waste. The waste is disposed of in a dedicated site in the mountains outside Tashkent. The underground disposal facility consists of a concrete bunker divided into several sections. For liquid radioactive waste a concrete tank with a volume of some 500 m<sup>3</sup> is available.

Radioactive sources as well as the management of radioactive waste are supervised by the organization for atomic inspections, Atom Nazor. In addition, the International Atomic Energy Agency (IAEA) carries out inspections.

#### *Management of municipal solid waste*

The collection and disposal of municipal solid waste are the responsibility of the State. In most

cities these services are carried out by local branches of the Agency for Communal Services or *Uzkommunalhizmat*. In Tashkent, they are the responsibility of the municipal enterprise "*Spetstrans*". Local and oblast authorities have a supervisory role. Waste producers in principle pay for the service but the amount is symbolic. The waste fee of 100 sums per person per month is, like the cost of cold and hot water, heating and supply of natural gas, included in the rent for apartments. The total rent depends on the size of the apartment and the number of occupants and is some 2,000 sum per month, the above-mentioned supplies and services included.

Waste discarded by waste producers is simply collected and disposed of at city dumps. Recovery, reuse and recycling are in the main organized as a parallel system. This State-operated system is based on the buying of reusable or recyclable materials from waste producers. A beer bottle, for instance, is worth 35 sum, as is a kilogram of waste paper or cardboard. In addition to the State system, scavengers recover recyclables from discarded waste both at the collection point and at the dumpsites. At one of the Tashkent dumpsites, scavengers stated that they made some 3,000 to 6,000 sum per day. This is a considerable amount compared to the monthly salary of an average State Committee employee, which is some 10,000 sum. Recyclable materials recovered from waste are eventually sold to industries, which use the waste fractions as secondary raw materials.

In spite of the relative success of the recovery system, there are also less positive signs. The cost of collecting glass for recycling, for instance, is said to outweigh the financial benefits and glass production from virgin material is said to be cheaper.

Although the recovery system is not market-driven and the State influences or even determines prices, the scavengers prove that there is a market for recyclable materials in Uzbekistan. Due to the lack of virgin materials, secondary raw materials are highly appreciated by industry. Metal, glass, paper and plastic factories all work below capacity and are able to absorb large amounts of secondary raw materials recovered from waste.

In Tashkent attempts are being made to introduce separate waste collection. For this purpose containers for different waste fractions have been placed at some 350 supervised container stations in the city. However, all types of waste are mixed up

in the containers. This might be due partly to the fact that all containers are the same size and colour and partly to a lack of awareness among inhabitants and supervisors of the container stations.

In some instances municipal solid waste is managed by large industrial enterprises or *kombinats* for historical reasons. *Kombinats* used to be established in areas far from existing cities, so employees lived and worked within the “*kombinats*” territory. The “*kombinats*” were responsible for their operations but also for the living conditions of their employees. In the cities that grew out of these enterprises, the *kombinats* are still providing public services including waste collection and disposal. In Navoi oblast, 3 out of 10 dumpsites for municipal solid waste are managed and operated by such *kombinats*.

In general the waste collection system is satisfactory, although several years ago there were reports of acute problems with municipal solid waste in many large cities. The NEAP of 1998 states:

*“The poorly managed collection and removal of municipal solid waste is worsening due to depleted city budgets. The accumulation of wastes in residential buildings and public areas such as schools, hospitals, parks and streets, causes an uncontrolled increase in the population of rodents and insects in cities, and outbreaks of infectious diseases.”*

This is no longer the case, at least not in Tashkent, Bukhara and Navoi. Of course, waste can be seen in the streets, in storm water drainage ditches and in streams, but in general the level of littering is low and the above-mentioned cities appear to be at least as clean as many west European cities.

Within the waste management systems, waste producers play a significant role, especially in smaller cities, villages and other rural areas. Here only materials without any use or value are disposed of. Glass bottles are returned to shops or glass-trading points for reuse, PET bottles are collected by individuals (scavengers or waste traders) for resale and recycling, kitchen waste is used as animal swill and only the remaining waste is brought to waste collection points, where it is frequently burned to prevent these temporary storage places from overflowing. Only a small fraction is eventually collected and landfilled.

### *Management of industrial waste*

Industrial waste management is the responsibility of and mostly done by the waste producers, i.e. the industries. The larger industrial waste producers transport their own waste and operate their own disposal facilities. If at the disposal sites waste types and amounts are registered, this is done by the industries themselves. Most of the disposal sites are reported to be lined with concrete or with a double lining system of concrete on top of a bentonite lining.

In some instances, especially for small amounts of waste of toxicity classes 3 and 4 and non-toxic waste, the industrial waste is collected and disposed of by the Agency for Communal Services ” against the payment of a service fee of several thousand sum per ton and hardly covers the operating costs of the service. There is consequently no competition in this market.

Since independence, Uzbekistan has tried to become more self-sufficient and to limit imports. In the industrial sector this has not only led to a larger variety of products but also to an increase in the recycling of waste. Due to the larger product offer, more by-products can now be used as raw material. In addition to this more or less spontaneous reduction in waste, concerted activities to reduce waste by industry are being taken. The United Nations Industrial Development Organization (UNIDO) has already carried out demonstration projects and is about to establish a centre for clean technology in the country.

### *Waste disposal facilities*

City dumps, which total more than 160 (NEHAP mentions 261) and are not lined, occupy according to NEAP and NEHAP over 5,000 hectares, but this seems very high. On the basis of responses to a questionnaire sent out by VODGEO, 160 dumpsites have been identified with a total surface area of just above 1,000 ha. Over 90% of the dumps do not meet the landfill construction standards drawn up before the collapse of the Soviet Union. Few have any equipment like bulldozers or waste compactors. Most sites are staffed. About half the sites are licensed; the other half should be regarded as illegal. Eighty per cent of the sites is said to be full and should be closed. Most dumps have been established without a proper site selection process.



### Box 7.1: Environmental impacts from dumps and landfills in Uzbek conditions

In the meteorological conditions of Uzbekistan, where evapo-transpiration outweighs precipitation by far, the formation of leachate is of less importance than in climates with a precipitation surplus. In fact, in many instances, if not all, there might be no leachate at all. The electro-chemical plant Navoi Azot reported that, at its landfill for industrial waste of toxicity classes 3 and 4, there is no leachate.

At dumps and landfills for municipal solid waste, leachate not only depends on the precipitation and evaporation but also on the moisture content of the landfilled waste. At the point of generation the moist content of municipal solid waste can be as high as 60% in autumn, the season of the watermelon harvest. The yearly average is around 40-45%. Although part of the moisture evaporates prior to landfilling or is pressed out of the waste during transport, a significant percentage of water is still present when the waste is disposed of. This water will partly evaporate from the landfill surface.

Because of active waste compaction or as a result of the disposal of subsequent waste layers, waste layers at the bottom of the landfill are compressed and the amount of moisture in the waste may exceed the water-carrying capacity or so-called field capacity. In such cases leachate is formed. However, calculations show that if the moisture content is reduced to some 25% or less, leachate formation is very unlikely. If leachate is formed, both the amount and the period during which it is generated will be limited. Given also the low groundwater table (reportedly 50 to 100 m under the soil surface at the main Tashkent city dump), it would seem that in Uzbekistan groundwater pollution from landfills is unlikely.

Currently, the establishment of a new landfill should follow a five-step procedure. In the first step a commission in the *Hokimyat* takes a decision on the location of a new landfill. Different departments of the *Hokimyat* are represented on this commission. The second step involves the allocation of a certain area of land for the purpose of waste disposal. In the third step a landfill design should be drafted and on basis of the previous steps the ecological expertise is carried out as a fourth step. The fifth step is the final decision by the State Committee for Nature Protection.

The dumps vary significantly in size and volume. The ten municipal solid waste dumps in Navoi oblast vary in size from 0.5 ha to 14.2 ha. Three of the dumps are larger than 10 ha, while the remaining seven are smaller than 4 ha. The ten dumps together occupy almost 50 ha. Four of the sites have not been designed but came into existence spontaneously. The other six were built on the basis of a decision of the *Hokimyat*. Four of the sites are not included in the responses to the VODGEO questionnaire.

City dumps are said to be a source of soil and groundwater contamination, but, if so, the environmental damage will be limited (see consideration in Box 7.1).

Due to the lack of water, landfill gas production is most likely also affected. Under optimal conditions, some 200 to 250 m<sup>3</sup> of landfill gas can be produced out of each ton of municipal solid waste as a result of biodegradation of organic matter. However, the process depends on the availability of water. If less

than the optimum amount of water is available, the amount of landfill gas produced will be much lower and if there is little or no water no gas will be produced at all. It is expected that landfill gas production in Uzbekistan is significantly lower than the theoretical production. With a yearly municipal solid waste production of some 6 million tons, the theoretical production for Uzbekistan as a whole could be some 1.5 billion m<sup>3</sup>, which is equivalent to some 400,000 to 500,000 tons of CH<sub>4</sub>. This is similar to the 300,000 tons of CH<sub>4</sub> emitted per year during natural gas exploitation.

In addition to the disposal sites for municipal solid waste, most of the larger industries or *kombinats* operate one or more dumpsites for industrial waste. The enterprises in the chemical and petrochemical sector, for instance, operate some 30 disposal sites with a total surface area of more than 1,300 hectares and a disposed waste amount of more than 60 million tons.

At disposal sites for industrial waste, mainly waste of toxicity classes 3 and 4 and non-toxic waste is disposed of. In some instances industrial sites are also used for the disposal of municipal solid waste and vice versa.

There is no landfill for waste of toxicity classes 1 and 2, although preparations have been made for such a site near Tashkent. A feasibility study for a hazardous waste landfill is planned for 2003. Incineration facilities for toxic wastes are not available either. In the absence of adequate disposal facilities some of the toxic waste ends up in ordinary dumps but large quantities of waste of

toxicity classes 1 and 2 are stored on company premises. In the Navoi electro-chemical plant for instance, used mercury lamps (tubes) are stored awaiting the construction of an in-house destruction facility (in Tashkent such a facility is already operational). An estimated 50,000 tons of waste of toxicity classes 1 and 2 is stored in industries all over the country. In Tashkent the estimated amount of stored toxic waste is 7,200 tons.

There are separate dumps for construction and demolition waste. One of these is located in the centre of Tashkent. It must be old, as it is partly overgrown. However, recently dumped waste can be found there as well. Navoi oblast has three dedicated dumps for construction and demolition waste. Part of the construction and demolition waste, e.g. reinforcement steel from concrete, is recovered for reuse and recycling.

Disposal facilities other than dumps and landfills are rare in Uzbekistan. As reported above, the tuberculosis hospital in Tashkent is equipped with an incinerator, and in Navoi some industrial waste is incinerated by the *kombinats* Navoiazot. Alternatives to dedicated incinerators are not used. Cement kilns, which many countries use for the destruction of hazardous wastes and used car tyres, play no role in waste disposal in Uzbekistan. Some decades ago a composting plant operated for a while but as its end products were contaminated, the plant was closed soon after construction.

## 7.2 Policy objectives, organization and waste management instruments

### *Legal provisions*

Uzbekistan does not have a law on waste although a draft law has been drawn up and a second version of this draft is under preparation. However, some legal provisions do exist and more general laws also address waste management issues. The Law on Nature Protection provides the current legal basis for the control and regulation of waste management activities.

In addition to general laws, specific regulations have been adopted and have been in force since 1997 dealing respectively with: (1) waste inventory (2) definition of limits for waste disposal per enterprise and (3) definition of the limits for waste disposal. The implementation of these regulations is however limited due to a lack of funds.

Some norms and standards drawn up during the Soviet period also continue to be applied. The regulation on the classification of toxic waste, dividing toxic waste into four toxicity classes, and regulations on landfill construction are cases in point. Many of the regulations are not enforced however.

Disposal of waste is regulated by resolutions from the Cabinet of Ministers. The fiscal fee<sup>1</sup> for industrial waste disposal is set by resolution. No 554 of 31 December 1999 as follows:

1 <sup>st</sup> toxicity class:	1500 sum/ton
2 <sup>nd</sup> toxicity class:	750 sum/ton
3 <sup>rd</sup> toxicity class:	450 sum/ton
4 <sup>th</sup> toxicity class:	150 sum/ton
non-toxic:	40 sum/ton

### *Objectives, action programme and institutions*

No special policy document on waste management has been drawn up in Uzbekistan, but waste management is included in some more general policy documents. Waste management issues are addressed in the National Environmental Action Plan of 1998 (NEAP) drawn up by the State Committee for Nature Protection with the support of the World Bank, and the National Environmental Health Action Plan of 1999 (NEHAP) drawn up by the Ministry of Health.

In the NEAP, the accumulation of waste in residential areas and the disposal of mining waste are mentioned as key environmental problems. The Plan includes actions to prevent environmental pollution and transboundary pollution by waste disposed of by mining and mining-related industries (under the heading "Development of international cooperation") as well as actions to improve municipal and industrial waste collection, storage, processing and transport and the building of new landfills (under the heading "Improvement of sanitary conditions in urban and rural areas"). Cost recovery is mentioned as an objective.

The NEHAP includes goals and tasks for waste management in much more detail than the NEAP as may be concluded from Box 7.2.

<sup>1</sup> Formally the payment to be made to the State for waste disposal is not a tax but a "mandatory payment". Mandatory payments are less strictly enforced than tax payments.

### Box 7.2 Solid waste management goals and tasks as listed in the 1999 NEHAP

By the year 2005 the risk factors associated with solid and dangerous waste and soil pollution in Uzbekistan should be eliminated by means of appropriate waste disposal and the prevention of soil contamination.

#### Tasks:

- Safe disposal of household waste
- Waste minimization in manufacturing, waste reuse and recycling
- Disposal of plastic waste
- Construction and operation of pilot waste disposal sites that are ecologically safe
- Sorting of waste before disposal
- Professional training of the staff engaged in waste treatment and disposal and operators working on waste disposal sites, at waste incinerators and at waste disposal plants
- Control over hazardous waste disposal
- Disposal of waste in the country of origin (ecological safety considerations should in any case prevail over cost considerations).

The institution responsible for policy development for waste management is the State Committee for Nature Protection or *Goskompriroda*. The State Committee develops legal and methodical documents and is responsible for the control and gathering of data on the generation and disposal of waste, for the inventory of waste disposal sites and for the collection of the fiscal fee for waste disposal.

The collection and analysis of data on waste generation and disposal are a priority, but the current statistical system of regional and national data collection needs to be improved. The control and inspection of waste utilization are the responsibility of the Department for Water and Soil Resources. However, this Department does not employ a waste management specialist. Utilization of medical waste is the responsibility of the Ministry of Health. Coordination between VODGEO and the Ministry of Health is non-existent or weak.

The State Committee itself has not appointed any staff to work on or deal with waste issues although its analytical control inspectors also deal with obsolete pesticides. At oblast level, the Committees for Nature Protection have officials responsible for waste issues (use, treatment and disposal of waste) but these responsibilities have merely been added to the normal duties of existing staff (in Navoi to the official for natural resources).

NGOs are also involved in waste management although their expertise is limited. Their activities include clean-up campaigns to draw attention to the subject, especially in cases where waste has

accumulated in public areas, such as the ruins of Afrosiab, the original city of Samarkand. The ruins are currently used as a dumpsite by Samarkand citizens.

### 7.3 Conclusions and recommendations

Although the Government of Uzbekistan regards waste issues as a priority and several politicians have even called the lack of proper waste handling the number two problem of the country, in practise waste management does not get the attention it deserves. Only recently have the first steps been taken to improve this situation by initiating the drafting of a waste law. Significant improvements are, however, required in all aspects of waste management. At the central level, policies need to be defined, a complete legal framework needs to be developed and the institutional set-up requires strengthening. On the ground, technical improvements need to be made and proper waste-handling practices need to be implemented, especially with regard to special waste like hazardous industrial and medical waste and obsolete pesticides.

At the central level, the drawing-up of waste law is ongoing but waste policy is fragmentary and incorporated in different and general documents drafted by different stakeholders.

#### Recommendation 7.1:

*An integrated national waste management strategy on ways and means should be drawn up as a joint effort of all stakeholders. The State Committee for Nature Protection should in the short term bring together other stakeholders, including the Ministry*

of Health, the Ministry of Agriculture and Water Management, the Agency on Communal Services and non-governmental organizations, and start the process of developing such a national strategy. Assistance from donor countries might be sought.

The waste policy and the legal framework should be developed by an institution able to negotiate with other stakeholders on an equal footing. In the current situation, the issues of waste management are addressed by the Tashkent Scientific Research Institute, VODGEO, which is a subsidiary of and serves as an advisory body to the State Committee for Nature Protection.

Recommendation 7.2:

*Within the Goskompriroda, a department for waste management should be established with at least four waste management specialists with different expertise (hazardous waste, medical waste, non-hazardous industrial waste and municipal solid waste) and with the necessary support staff.*

Data on waste generation and disposal are fragmentary and conflicting. To be able to address waste management issues effectively and to plan for future waste management practices, more complete, consistent and reliable data are required. Such data should not only include the amounts and types of toxic industrial waste produced but also information on non-toxic industrial waste, municipal solid waste, waste producers, waste management organization and disposal sites.

Recommendation 7.3:

*An effective, mandatory and enforced reporting and data collection system should be developed and implemented as soon as possible. The system should include data processing, presentation and dissemination. The system should be run and operated by the future department for waste management. Cooperation with the Ministry of Macroeconomics and Statistics is required.*

The management of health care risk waste is not satisfactory and incorporates severe health risks for the general public but especially for waste workers and scavengers. For the management of health care risk waste a separate system should be in place covering the handling of waste from the point of origin till the final disposal. The system should include but not be limited to source separation, transport in dedicated marked bags and containers, adequate disinfection and destruction or incineration and final disposal.

Recommendation 7.4:

*A special, separate management scheme for hazardous medical waste that ensures its adequate disposal and includes mechanisms to render it harmless should be set up, at first on a pilot scale. The pilot project should be implemented as a joint effort by the Ministry of Health and the State Committee for Nature Protection with the support of oblast authorities, local authorities, hospitals and other stakeholders.*

The disposal of pesticides in concrete underground pits cannot be regarded as an adequate solution. The locations of such pits tend to be forgotten over the years and the concrete will deteriorate due to the pesticides. Uncontrolled spreading of hazardous substances into the environment could result. The climate conditions in Uzbekistan limit the risks and concrete pits can provide a safe solution for a number of years but not forever. Seismic activities, on the other hand, increase the likelihood that the pits will not provide the safety required for final disposal of obsolete pesticides.

Recommendation 7.5:

*As soon as possible, the Ministry of Agriculture and Water Management and the State Committee for Nature Protection, should take initiatives to collect, process, utilize or destroy obsolete pesticides. One of the actions to be taken should be the construction of a central temporary storage site. In this case, processing and destruction of the obsolete pesticides could be postponed to the medium term.*

In the management of municipal solid waste, improvements are possible but in general the system functions well. Most waste is removed from residential areas and disposed of at dumps that do not cause any significant impact on the environment. This is mostly due to the climatic conditions in Uzbekistan rather than to the management of the sites, but from an environmental viewpoint the need for improvement is limited.

In residential areas waste that is not regularly removed is burned in the streets by the inhabitants. Waste is burned in containers and temporary storage locations to prevent overflowing. The burning results in both nuisance and air pollution on a local scale.

Recommendation 7.6:

*Burning of waste in city streets, temporary storage points and containers should be prevented as much*

*as possible both by enforcing bans as well as by providing an adequate service. Solutions should be found and implemented at local level by local authorities and organizations such as the Uzkommunalhizmat.*

The final disposal of waste is almost solely based on landfilling. Only rarely is waste incinerated. In these cases, dedicated facilities are involved, e.g. the medical waste incinerator in Tashkent's tuberculosis hospital.

*Recommendation 7.7:*

*Suitable infrastructure available in Uzbekistan should, to the extent possible, be used for waste disposal. In the short term, cement kilns could be adapted for the incineration of waste tyres and hazardous waste with a high caloric value (organic compounds, including pesticides). The result would not only be the proper destruction of the waste but also a reduction in the fuel requirements of the cement factory involved. Waste incineration in cement kilns should be achieved through*

*negotiations between the State Committee for Nature Protection and the operators of the cement plants. The cost of adapting a cement kiln for waste incineration depends largely on the actual cement production process and on the types of waste (liquid, pasty, granulated or solid) to be incinerated.*

More recommendations could be made, as especially in the long run more improvements should be made. For instance, in this chapter, cost recovery has not been addressed but for sustainable waste management it should be introduced at some point. Other issues not addressed include waste separation at source, composting and waste prevention and minimization programmes. However, these aspects are not urgent and can be postponed. Other subjects, such as the poor working conditions of scavengers, can only be addressed by a complex set of (social) measures going beyond the scope of environmental performance.

## Chapter 8

# BIODIVERSITY MANAGEMENT

### 8.1 Ecosystems and species diversity

#### *Current state*

Uzbekistan's ecosystems vary from hot deserts and fertile steppes, which occupy most of its territory, to mountain forests, meadows, steppes and alpine zones. Different types of wetland are spread along rivers and water bodies. This variety has resulted in a high diversity of plant and animal species, many of which are endemic.

The current state of nature is affected by the water shortage, which has been increasing constantly due to a number of factors: the catastrophe of the Aral Sea, the serious degradation of ecosystems and the reduction of biodiversity. The main causes are human activities, especially the inappropriate use of river waters, mainly for irrigation, and the significant decline in forest areas due to overgrazing and encroaching arable land.

Agriculture and water management are the major threats to nature. Inter-sectoral cooperation, especially with the sectors that use natural resources, is a prerequisite for achieving the objectives of biodiversity protection and sustainable use.

The neighbouring countries share these problems with Uzbekistan, and success in solving them greatly depends on regional cooperation.

#### *Lowlands*

Lowlands comprise the major part of the territory of Uzbekistan; the remainder is hills and mountains. The ecosystems are classified as desert, semi-desert and steppe, riverine, wetland, and mountain ecosystems.

Lowland desert ecosystems occupy most of the territory. Different desert types are formed

according to the parent rock or soil types: sandy, stony, clay and saline deserts.

Sandy deserts occupy about 27% of the lowlands. The Kyzylkum desert is the largest sandy area of Uzbekistan. Other areas include the Sundoukli Sands and Kattakoum sandy desert. They provide habitat to 320 flowering plant species, of which 170 are psammophytes. About half of them are endemic species. Rare vegetation cover consists of trees (*Haloxylon* sp., *Ammodendron* sp., *Salsola* sp., *Eremosparton* sp.) and shrubs (*Calligonum* sp., *Ephedra* sp., *Astragalus* sp.). Perennial and seasonal grasses can be found, too. Vertebrate fauna is represented by 16 reptile, 150 bird and 22 mammal species. The most characteristic species are big-eared and sandy-toed agamas, mesh lizard and several species of jerboa, midday "peschanka", and thin-toed gopher.

Stony deserts consist of grey-brown soils covered with eroded materials (Usturt plateau and a part of the Kyzylkum desert). Thick gypsum horizon is also typical. There are about 400 plant and 130 vertebrate species (11 reptile, about 100 bird and 18 mammal species). About 30 species of birds nest in these areas; the most frequent are skylarks, sandgrouses and horned house owl. These deserts provide habitat also for the saiga and the goitred gazelle.

Saline deserts are formed on humid soils, where temporary reservoirs occur. These deserts can be found on the Usturt plateau and its slopes, on terraces of sand dunes (Aydar-Arnasay complex), in closed depressions (Ayakagitma, Karakata, and others), and in the Amu Darya delta.

Clay deserts are formed on clay and loess sediments (Kashkadarya basin, Dalverzin and Golodnaya steppes). The main soil type is sierozem. Flora and fauna are similar to those of stony desert. This ecosystem is very endangered by encroaching agricultural land (Golodnaya steppe).

### *Mountain steppes*

Mountain steppes spread up to 2,600 m above sea level. The main soil type is dark sierozem, but pale-grey and brown soils can be found in upper zones. Flora is represented by 634 plant species, of which about 300 are endemic to Central Asia. Fauna is rich and represented by reptiles (e.g., Turkestan agama, Asian gologaz, Tadzhih lizard, Central Asian cobra), birds (gall yellowhammer, steppe kestrel, skylarks) and mammals (polecat, grey hamster, common vole, badger, porcupine).

### *River and river-related ecosystems*

River and river-related ecosystems occupy the regions of the Amu Darya and the Syr Darya rivers, as well as the downstream parts of the rivers Zerafshan and Surkhandarya. These are tugai (gallery) forests, reed and rivers and shoals.

Tugai forests have been significantly reduced and can currently be found only as narrow strips or spots. Due to their high moisture content, these habitats support amphibians and reptiles (patterned and water-grass snakes). Pheasant, black crow, magpie and passerines can be found, as well as herons, ibises and cormorants, which live in colonies. There are nesting bird species too (kites, "tuviks"). Of the mammal species, there are predators (reed cat, jackal, fox and badger), rodents (e.g., "peschanka", rat, common vole and ungulates (wild boar and Bukharan deer).

Reeds are very important nesting sites for many bird species (water hen, "bald bird", Turkestanian redbird, marsh harrier, black crow and others).

Rivers and shoals serve as habitat for big and small shovel-noses, Aral barbell and other fish species. Riverbanks provide shelter for many different

animal species. These habitats are the most endangered by human activities and special attention should be given to their conservation.

### *Internal marsh ecosystems*

One of the most important wetlands is the Amu Darya delta (about 7,000 km<sup>2</sup>). Today, this area is faced with the shrinking of the Aral Sea, as well as of the Amu Darya river. Both the tugai forests and the reed areas have declined significantly. Considerable efforts have been made to save these habitats, of which about 99,000 ha have been restored. These wetlands are very important habitats for many species, and particularly as nesting sites for migratory and non-migratory birds.

Wetlands created by human activities appear in the zones surrounding artificial reservoirs. Their importance is increasing as natural wetland is being degraded. They seem to be an efficient substitute habitat for the conservation of some fish and wetland bird species.

### *Mountain ecosystems*

Piedmont semi-deserts occur in the zone from 800 to 1,200 m above sea level, occupying two thirds of the mountainous territory. The vegetation is xerophilous, consisting of 400 plant species, of which 44 are Mediterranean *suffrutex* species.

Mountain deciduous forests occupy small areas (altogether about 218,200 km<sup>2</sup>), ranging between 800 and 2,800 m above sea level. These forests can be found in the Western Tien-Shan region. The flora consists of 47 tree and 96 shrub species. Relic forests consist of walnut, plate and common persimmon formations.

#### **Box 8.1: The Aral Sea crisis**

The surface of the Aral Sea was about 66,000 km<sup>2</sup> until 1960. Between the 1960s and 1980s widespread development of irrigation systems reduced the flow of water in the rivers Amu Darya and Syr Darya, which were feeding the Aral Sea. Currently, the Aral Sea is about half its original size. It has split into two parts, one fed by the Amu Darya and the other by the Syr Darya. The salinity of the Sea has increased from 10% to 30%. A highly saline desert has been created on the former seabed, extending over some 20,000 km<sup>2</sup>. These direct impacts, combined with water pollution and land-use changes, have caused significant degradation and loss of ecosystems. Natural vegetation, particularly Tugai forest, has either been cleared for agricultural purposes or degraded due to changed water regimes. The reduction in river and wetland ecosystems (in size and quality) threatens the animal species that they support (see item on Ecosystems and Habitats)

*Source:* Biodiversity-Conservation National Strategy and Action Plan, 1998

**Table 8.1: Species by taxonomic group**

Groups	Number of species
Bacteria	1,942
Viruses	200
Protozoa	870
Planarian helminths	300
Round helminths	930
Molluscs	140
Arthropods	11,300
Vertebrates	664
Fungi	2,008
Higher plants	4,500
Algae	4,146

Source: Biodiversity Conservation National Strategy and Action Plan, 1998.

Juniper (Archa) forests appear in higher zones, ranging from 1,400 to 3,000 m above sea level. They occupy 86,000 ha (total area of forest cover amounts to 105,000 ha). Among their numerous fauna species, bear, wild boar and dormouse can also be found.

Sub-alpine and alpine meadows cover the zone between 2,800 and 3,700 m above sea level. Vegetation is mostly represented by *Polygoneta* sp., *Prangoseta* sp., and *Feruleta* sp. These meadows serve as habitats for insects (nowadays endangered bumblebees), reptiles and birds (bearded vulture, kloushitsa, alpine jackdaw, horned lark, and others). The mammals typical to these zones are marmots, field voles and red "pishouha", snow leopard, ermine, weasel, Siberian mountain goat, and mountain urial.

The high mountain zone spreads above 3,500 m above sea level, on an area of about 9,600,000 km<sup>2</sup>. Its vegetation consists of 110 grass species (*Lagotis korolkovii*, *Geranium regelii*, *Ranunculus* sp., *Frula alaiica*, *Oxytropis microsphaera*, *Puccinella subspicata*, *Astragalus* sp.).

#### Flora and fauna

Uzbekistan has about 15,000 animal and 11,000 plant species (Table 8.2).

Vertebrates are represented by five classes, comprising 664 species (Table 8.3).

**Table 8.2: Estimates of vertebrate species diversity**

Class	World	CIS	Uzbekistan
	Number of species		
Fishes	22,000	500	83
Amphibians	2,300	34	3
Reptiles	6,750	147	59
Birds	9,673	764	424
Mammals	4,327	332	97

Source: Biodiversity Conservation National Strategy and Action Plan, 1998.

**Table 8.3: Rare and endangered species**

Class	Uzbekistan registry	CITES registry	IUCN Red Data Book (1996)
	Number of species		
Mammals	27	11	23
Birds	62	59	23
Reptiles	14	4	4
Fishes	10	4	4
Invertebrates	48	1	36

Source: Biodiversity Conservation National Strategy and Action Plan, 1998.

The highest share of endemic species is found among the reptiles (52%). About 15% of mammal and 1.8% of bird species are endemic.

The total number of plant species included in the first edition of the Red Book is 163. The draft version of the second edition so far includes 301 species. Among the predators, the Turanian tiger and the cheetah have become extinct. The striped hyena, the lynx and the Asian leopard are critically endangered. There are 161 species of rare and endangered animals. Many of them are listed in the registry of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Red Book of the World Conservation Union (IUCN).

#### Forests and forestry

Forests occupy 3.6 % of the territory. There are about 8,285,300 ha of forest land, of which 4,492,071 ha are either covered by forests or assessed as "suitable for forests". According to their main types of sites, forests are categorized as follows:



- Sandy areas - 6,971,250 ha
- Mountains - 1,185,058 ha
- River wetlands - 57,846 ha
- Other lowlands - 71,147 ha

According to the type of use, forests are classified as:

- protective forests - water protection (along the banks of water bodies), erosion protection (steep mountain slopes, and forests along railroads and highways), health protection (around cities, and water-supply sources);
- protective and economic forests in densely populated regions with a developed transport network, they have protective and limited commercial significance;
- economic forests have commercial value (timber and other forest products).

The greatest forest losses occurred from 1930 to 1980, due to extensive agricultural development. In order to mitigate this problem, the Government passed a resolution in 1993 repealing acts on the long-term use of forest land. The resolution also established commercial plantations of forest trees (poplars, pines, walnut trees) and quotas on the collection of medicinal plants and edible forest fruits.

## 8.2 The main pressures on ecosystems

The agricultural use of land – (overgrazing by livestock, irrigation followed by salinization), the

construction of hydroelectric power plants, forest cutting, sand and gravel extraction, pollution with pesticides and heavy metals, have caused serious degradation of most ecosystems in Uzbekistan. According to national data, 95% of river and wetland ecosystems, 80% of clay deserts, 40% of mountain areas, and 20% of sandy deserts are affected by human activities.

About 70% of the total land of Uzbekistan is used by agriculture. (See Chapter 10) Most of this area (82%) is used for pasture. In recent decades, the increasing number of cattle per unit area has led to overgrazing of pastures and also forest areas. The remaining 18% of the agricultural area consists of irrigated arable land, where crops are dominated by cotton, although in recent years other crops, such as grain, fodder, potatoes, vegetables and melons, have been added. The area of arable land has increased in recent decades (from 25,850 km<sup>2</sup> in 1955 to 42,218 km<sup>2</sup> in 1990) but at the cost of biodiversity, as some natural ecosystem areas have been given over to agriculture. Poor irrigation techniques (furrows make up more than 95% of the irrigation system) cause water losses and soil salinization. Increased and inappropriate water use has drastically reduced the flow into the Aral Sea. The dried sea bottom is exposed to erosion. Huge amounts of salt and other particles are carried by winds, causing regional pollution.

The mining and quarrying of sand, gravel and construction stones also cause damage to the

### Box 8.2: Rare and endangered animal species and sub-species

Mausohr (*Muotis froter*) - current state of population unknown  
 Tailed bat (*Tadarida teniotis*) - poorly studied  
 Brown bear (*Ursus arctos isabellinus*) - assessed total number: about 600  
 Honey badger (*Mellivora capensis*) – rare  
 Central Asian otter (*Lutra lutra seistfnica*) - assessed total number: about 150  
 Striped hyena (*Hyaena hyaena* L.) - close to extinction  
 Leopard panther (*Panthera pardus tullianus*) - close to extinction or extinct  
 Caracal (*Felis caracal michaelis*) - rare, current state not known  
 Turkestan lynx (*Felis lynx isabelina*) - assessed total number: about 100-150  
 Snow leopard (*Uncia uncia*) - rare, assessed total number: 30-50  
 Bukhara deer (*Cervus elaphus bactrianus*) - very endangered, assessed total number: about 300  
 Goitred gazelle (*Gazella subguttarosa*) - total number has decreased from 8,000 - 10,000 to 3,000  
 Markhor (*Capra falconeri*) - rare, assessed total number: about 300-400  
 Ustyurt mouflon (*Ovis orientalis arcal*) - rare, current state unknown  
 Severtsov's ural (*Ovis orientalis severtzovi*) – main population numbers 2,500  
 Bukhara Arkhar (*Ovis orientalis bocharensis*) - decreasing in number (200-300)  
 Menzbier's marmot (*Marmota menzbieri*) - total number decreased from 36,000 to about 22,000

*Source: Biodiversity-Conservation National Strategy and Action Plan, 1998*

habitat. Many tailings are abandoned without being re-cultivated, thus causing further soil erosion. The loss of forest and other vegetation cover in hilly and mountainous areas has led to soil erosion by water where mudflows and landslides occur.

### 8.3 Nature protection policy and management

After gaining independence in the early nineties, the Republic of Uzbekistan took over most of the Soviet legislation by succession. The same was done with nature protection regulations. Ratifying the Convention on Biological Diversity in 1995 was the baseline for setting a new framework for nature protection policy. The Biodiversity Conservation National Strategy and Action Plan provided the basis for implementing this policy. The State Committee for Nature Protection (*Goskompriroda*) and other government bodies are responsible for biodiversity management and report to Parliament.

#### *Objectives of the biodiversity conservation national strategy and action plan*

The objectives of nature protection policy are defined in the Biodiversity Conservation National Strategy and Action Plan (BCNSAP). The document was developed in line with the implementation of the Convention on Biological Diversity (1995), and was supported by the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF). Its development was supervised by the Project Steering Committee, which consisted of representatives from the State Committee for Nature Protection, the Academy of Science, the Ministry of Macroeconomics and Statistics, the Ministry of Agriculture and Water Management, "Uzryba", the Union of Hunters and Fishermen (NGO), and UNDP. It was completed in 1998. The main BCNSAP objectives are the improvement of the protected area network, and the development of a sustainable system of biodiversity protection and use.

The reorganization and expansion of the protected area system include:

- rationalizing legal and institutional aspects;
- reorganizing protected area management (to incorporate an integrated approach to conservation and sustainable use);
- establishing new protected areas and expanding some existing ones (to ensure maximum

representation and a viable sample of ecosystem and habitats); and

- getting more support from local authorities.

The efficient conservation and sustainable use of biodiversity include:

- developing public awareness programmes aimed at all levels of society, and with particular emphasis on decision makers, local authorities, local population in priority areas and younger generations;
- developing an education plan for schools and universities;
- promoting participation and attracting the support of local populations living on or by protected areas;
- developing sustainable use mechanisms;
- creating sustainable models of protected areas, which can be replicated elsewhere; and
- protecting agro-biodiversity and using it in a sustainable manner.

The Action Plan was based on an analysis of the general economic and political context, protected area system, sustainable use of biodiversity, as well as education and public participation. The National Commission for Biodiversity and Action Plan Coordination Group coordinated the BCNSAP implementation, which has been slow due to insufficient funding. The programme, Economic and Financial Aspects of the Implementation of the National Biodiversity Strategy, was developed with the assistance of the UNEP/IUCN Consultancy - Biodiversity Service. A round table on BCNSAP implementation and financing was organized in April 2001. Representatives of other ministries, State agencies, UNDP, the World Bank, the Organisation for Economic Co-operation and Development (OECD), and the Organization for Security and Cooperation in Europe (OSCE), as well as representatives of other Governments were invited to help identify financing solutions.

#### *Biodiversity legislation*

The *Law on Nature Protection* (1992) provides the framework for nature protection policy, but it is general and lacks specific obligations for the institutions involved in nature protection, as well as procedures for implementation. According to the Law, Parliament adopts nature protection policy, accepts ecological programmes, adopts nature protection legislation, establishes protected areas of

special ecological importance, coordinates and supervises the implementation of nature protection laws, and introduces economic instruments for the use of natural resources. The Cabinet of Ministers is responsible for implementing the Law and has extensive authority over natural resources, including their use. The State Committee for Nature Protection monitors and enforces regulations on the activities of government bodies, enterprises, organizations and individuals that have an impact on the environment and natural resources.

*The Law on the Protection and Use of Wildlife*, (1997) and *the Law on the Protection of Plant Life* (1997) contain general provisions on biodiversity monitoring, use, statistics and registers, as well as provisions on illegal use and penalties.

*The Law on Specially Protected Natural Areas* (1993) has also more of a framework character and does not specify the competencies of the ministries or committees. Article 6 defines the administration of the protected areas, which is vested with the Cabinet of Ministers, local agencies and special agencies. The State Committee for Nature Protection is charged with exercising State control over the use and protection of protected areas.

*The Law on Forests* (1999) has general provisions on forest functions, ownership and funds. It regulates the use and restoration of forest resources. According to this Law, the Cabinet of Ministers is competent to regulate State forestry policy, forest inventory, and the control of forest protection and use. Local authorities are responsible for implementing these regulations.

*The Land Code* (1998) contains provisions on special regimes for protected land categories, respectively zones along lakes, watercourses, pipelines, power supply lines, roads, railways. On these areas, the use of fertilizers, mineral storage and farming are forbidden.

#### *International agreements*

Uzbekistan has ratified or signed:

- The Convention on Biological Diversity (ratified in 1995)
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, acceded to in 1997)
- The Convention on the Conservation of Migratory Species of Wild Animals (signed in 1998).

- The Convention to Combat Desertification (ratified in 1995)
- The Convention on Wetlands sites (Ramsar; ratified in August 2001)

It is currently preparing to sign or ratify the Cartagena Protocol on Biosafety. In the framework of the Convention on Biological Diversity, the proposal for signing the Protocol on Biosafety was completed and submitted to the Ministry of Foreign Affairs.

Uzbekistan has signed other regional acts that should help in conserving particular species:

1. Eight countries in the region signed the Memorandum of Understanding Concerning Conservation Measures for the Siberian Crane in 1996. After signing the Memorandum, the Government prepared an Action Plan on Monitoring and Conservation of Crane Species, to be implemented by the Tashkent State University and Children Ecological Club "Eremurus," supported by the International Crane Foundation. Russian satellite transmitters carried out the last flyway monitoring in 1998. It demonstrated that cranes crossed north-eastern Uzbekistan near Karakalpakstan (Navoi oblast).
2. Ten countries signed the Memorandum of Understanding Concerning Conservation Measures for the Slender-billed Curlew in 1994. The Slender-billed Curlew was found in the lower parts of the Amu Darya and the Syr Darya rivers, and on the western coast of the Aral Sea. No scientific research has been done since the Memorandum was signed.

Uzbekistan has also signed a number of bilateral agreements on species conservation.

#### *Institutions*

The Cabinet of Ministers administers Forest use and protection, local authorities, the Forestry Department of the Ministry of Agriculture and Water Management and the State Committee for Nature Protection.

The State Committee for Nature Protection is the main coordinating body for nature protection. It is responsible for:

- enforcing environmental law,
- developing environmental action plans and regulatory programmes,

- assessing environmental investment projects,
- issuing permits for emissions, discharges, waste disposal, and hunting licences, etc., and
- international cooperation on environmental issues.

The Chairman of the State Committee is appointed by Parliament. The State Committee coordinates the environmental and nature protection activities of other ministries and agencies. It may monitor the activities of local nature protection authorities and intervene if necessary.

A County State Committee for Nature Protection is established within each of the 12 county authorities (*oblasts*) and the Republic of Karakalpakstan. There are also local authorities responsible for nature protection. Other institutions responsible for monitoring, inspecting and managing nature protection are the Agency on Control of Safety in the Manufacturing and Mining Industries, the Ministry of Health, the Ministry of Internal Affairs, the Ministry of Agriculture and Water Management, the State Committee on Geology and Mineral Resources and some departments within the Cabinet of Ministers (Hydrometeorology, Geology, Cartography, and State Cadastre).

#### *Permits and licenses*

The Main State Administration on Plants and Animals Protection issues hunting and fishing permits and licences. Permits are issued to organizations (e.g., Fishing Corporation, Hunting Associations). Licences are issued to hunters and fishermen, for a certain number of animals of specific species. The Academy of Sciences determines annual quotas for hunting (table 4) and fishing. Amateur or sports fishing is allowed albeit with some limitations (for example, fish catches are limited to 5-10 kg and there is also a period when fishing is prohibited, usually during spawning).

#### *Inspection*

The Laws on the Protection and Use of Wildlife and of Plant Life define biodiversity inspection, which is entrusted to the Main State Administration on Plants and Animals protection (Gosbiocontrol) within the State Committee on Nature Protection (use of flora and fauna), and the Ministry of Agriculture and Water Management's Forestry

Department (forest use). The oblast Committees for Nature Protection (6-20 inspectors per *oblast*, depending on the number of *rayons* and their characteristics) also carry out biodiversity inspection.

The Forestry Department of the Ministry of Agriculture and Water Management is responsible for forest inspection. It issues 'forestry tickets' for forest use that is regulated by the Forest Code.

The Cabinet of Ministers must approve any use of species listed in the Red Data Book.

Uzbekistan acceded to the CITES Convention in 1997 and the customs service is helping to implement it. However, its temporary inspection personnel and facilities are insufficient to control all checkpoints properly. Some boundaries can easily be crossed without control, especially in the deserts.

Penalties for violating the Laws on the Protection and Use of Plant Life and of Wildlife are determined according to the minimum wage and depend on the level of damage. Poaching does not pose a serious problem due to low demand and high gun and ammunition prices.

The main problems of inspection are lack of staff, outdated or insufficient equipment, and inadequate training.

#### *Economic instruments*

There are taxes on the use of land, water and minerals. Taxes and fees for nature use are reported to be low. Facilities intended for nature protection enjoy tax-free status according to the Land Code. Protected areas also enjoy tax-free status according to the Law on Property.

The fines for violating hunting laws are reported to be too low. The Cabinet of Ministers determines the level of fees on the use of natural resources. According to UNDP, resource management agencies have little say in decisions about fee rates, although the Laws on the Protection of Plant Life and of Wildlife provide for consultation with the Academy of Sciences on establishing quotas for the taking of animals.

**Table 8.4: Quotas of 1996-1997 for hunting wild animals**

Animal species	Quota of 1996	Actually bagged in 1996	Quota of 1997
Bear	-	-	6
Wild boar	100	100	150
Mountain goat	50	20	100
Wild goat	10	5	10
Saiga	10	-	scientific purpose
Badger	500	20	300
Porcupine	500	40	100
Hare	5,000	2,000	3,000
Fox	2,000	1,000	2,000
Red marmot	-	-	...
Waterfowl	100,000	45,000	80,000
'Keklik'	5,000	2,000	3,000
Pheasant	500	400	500
'Ular'	-	-	50
Pigeon sp.	200,000	100,000	200,000
'Gourza' (Vipera lebetina)	1,000	150	scientific purpose
'Efa' (Echis)	150	100	ditto
Tortoise	10,000	10,000	ditto
Poisonous nonvertebrates	300,000	-	ditto

Source: Biodiversity Strategy and Action Plan, 1998.

In general, there is no system to value the non-economic functions of biodiversity. Such a system should be based on an integrated approach to evaluating the benefits from nature conservation, including, for example, the importance of protected areas for watershed protection, erosion control, and water quality, which, in turn, has significant implications for public health. UNDP has suggested to the State Committee for Nature Protection that it should add economic expertise to its biodiversity management.

#### Protected areas

The total protected area is 20,449.3 km<sup>2</sup> or 4.6% of the State's territory. The protected area system consists of five categories: (1) State reserves or *zapovedniks* (10.4% of the total protected area); (2) national parks (29.3%); (3) breeding centres (.3%); (4) special State reserves or *zakazniks* (59.8%); and (5) State natural reserves, including natural monuments, a geological reserve and an ornithological reserve (.2%).

**Table 8.5: Protected area system**

Protected area category	Number	Area km <sup>2</sup>	Responsible institution*
State reserves	9	2,136.9	SCNP, MAWM
National parks	2	5,987.0	MAWM
Breeding centres	1	51.4	SCNP
Special State reserves	9	12,239.2	SCNP, Uzryba
State natural reserves	2	34.8	SCNP, MAWM

Source: Biodiversity Conservation – National Strategy and Action Plan, 1998.

\* Notes:

SCNP: State Committee for Nature Protection

MAWM: Ministry of Agriculture and Water Management

### Box 8.3: The Dzhevran Ecocenter

The Dzhevran Ecocenter occupies 5,145 ha of the desert in the Bukhara region. It was established in 1976 as a breeding centre for rare and endangered species. Currently, there are about 1000 gazelles, 20 Przewalskiy horses and 18 donkeys.

The Ecocenter has eight staff members. Its principal objective is to breed wild deer (*djeiran*). In addition, staff carry out scientific research, regulate the population of species in the area, maintain scientific collections of local fauna and flora, and arrange excursions. Hunting, fishing, mining, and any activities that change the hydrological regime are all banned. Visitors need a permit from the State Committee for Nature Protection. The Centre may carry out work to restore natural conditions and construct the buildings it needs to reach its objectives. It is entitled to sell animals to zoos, hunting organizations, or individuals, to organize the culling of animals in conformity with licences, to grow agricultural plants, and to allocate parts of its territory for scientific work to other organizations.

State reserves are the strictest form of protection. Except for scientific research, no use of natural resources is allowed. States reserves include Zaamin, Chatkal, Surkhan, Kyzyl-Kum, Badai-Tugai, Zarafshan, Nuratau, Kitab and Gissar. In the context of ecosystem conservation, they represent the most important protection category.

There are two national parks, Ugam Chatkall and Zamin. Use of their natural resources is allowed, but limited and controlled (agriculture, forestry, hunting, and other economic uses).

Special State reserves are not permanently protected. They are established for a certain period of time, five or ten years, or even seasonally. Most are parts of collective farms or forest management areas, and are managed by the local authorities. They are Karakul, Karnabchul, Saigak, Sudochie, Koshabad, Karakir, Sarmysh, Arnasai and Dengizkul.

State natural reserves comprise a very small part of the protected area system and are established for the targeted protection of certain species or parts of nature

Responsibility for protected area management is divided among the State Committee for Nature Protection (Gosbiocontrol), the Ministry of Agriculture and Water Management (Forestry Department and Uzryba), and the State Committee on Geology and Mineral Resources.

#### *Biodiversity information*

Information about the status of flora and fauna is provided by the Academy of Sciences, the Institute of Botany, the Institute of Zoology, the Forestry Institute, the Hunting Union, Uzryba, the *Oblast* State Committees, the managers of protected areas, and NGOs. Due to scarce financing, no biodiversity

monitoring network has been established, and therefore the registers are not updated.

#### *Transboundary projects*

The Transboundary Project for the Preservation of the Biodiversity of the Western Tyan Shan (supported by UNDP and GEF) involves Kazakhstan, Uzbekistan and Kyrgyzstan. Its main aims are to develop a biodiversity strategy, strengthen policies, legislation and institutions, support the sustainable use of natural resources by local communities, develop financing mechanisms, and encourage regional cooperation.

The Aral Sea Programme has been developed to address the long-term water and land-use management problems of the region, as well as medium-term goals to provide support to local communities in affected areas. The Programme consists of several components that address the conservation and improvement of particularly endangered areas. The Lake Sudochoye Wetland Restoration Project (the area of the Amu Darya delta) is included.

The Nuratau Kyzilkum Biosphere Protected Area, in cooperation with GEF, UNDP and the German Federation for Nature Conservation (NABU), is under preparation.

### 8.4 Conclusions and recommendations

The division of responsibilities for the management of protected areas between the Forestry Department of the Ministry of Agriculture and Water Management, the State Committee for Nature Protection and others prevents the establishment of one of the key requirements for the effective implementation of nature protection policy - namely a unified protected areas management system. This undermines efforts to implement the actions of the Biodiversity Conservation National

Strategy and Action Plan (BCNSAP) to develop a protected area system capable of meeting Uzbekistan's national needs and its obligations under the Convention on Biological Diversity. Logically, the State Committee for Nature Protection, as the national institution with the most appropriate mandate and capacity, should take full responsibility for the management and development of the national protected area system, in accordance with BCNSAP and other policies and actions.

Recommendation 8.1:

*The State Committee for Nature Protection should, as soon as possible, be recognized as the only government body responsible for the development and management of a unified protected area system. Appropriate legal, institutional and budgetary provisions should be made for this purpose.*

All ecosystems should be adequately represented in the protected area network. According to the World Conservation Monitoring Centre criteria for national protected area systems (1996), they should include ecosystems unique to the country, ecosystems of which the country holds a significant part of the world total, and species-rich ecosystems. The selection should be done according to their surface area and different kinds and intensities of pressures. The total protected area should be at least 10% of the State territory (Convention on Biological Diversity).

Currently, about 2.6% of the territory is protected. Wetland ecosystems occupy the smaller part of the territory and are exposed to severe degradation. Desert, semi-desert and steppe ecosystems are not rare (they comprise most of the territory), but they are endangered by constant and inappropriate use (agriculture, water management). They are also recognized in the World Wide Fund for Nature's Global 2000 reports as globally important ecosystems.

The State Committee for Nature Protection should, as soon as possible, prepare medium to long-term proposals for extending the protected area network. The Ministry of Agriculture and Water Management, the Agency for Safety in Manufacturing and Mining Industries, the State Committee for Geology and Mineral Resources, the State Administration on Hydrometeorology and other stakeholders should participate in this process.

Recommendation 8.2:

*In accordance with the Biodiversity Conservation National Strategy and Action Plan, the State Committee for Nature Protection should, as soon as possible, develop a medium to long-term plan for the development of a protected area network covering a representative sample of natural ecosystems, comprising at least 10% of the State's territory. The process of extending the protected areas should focus on maximizing national and global nature protection and biodiversity benefits, minimizing socio-economic impact and integrating international best practices. Implementation of the plan must ensure the participation and cooperation of all relevant stakeholders, including national and local government bodies and local communities.*

Nature conservation measures that are carried out in protected areas vary from forbidding any use of natural resources to proposing preferable uses. Restrictions on the rights of local stakeholders and users of natural resources should be compensated by involving them in the decision-making process of protected area management, and enabling them to share the benefits. Tours, rural tourism and trade in traditional crafts encourage local communities to cooperate and provide them with new possibilities to earn a living. Cooperation with international and local NGOs helps in developing such projects, especially for capacity building and the institutional strengthening of protected area management. The added value of the process itself raises public awareness of biodiversity. The State Committee for Nature Protection should establish cooperation with international organizations dealing with protected areas, in developing a protected area management plan, as part of a broader rural development.

Recommendation 8.3:

*To achieve the objectives of a sound and sustainable management system for protected areas and to meet the international requirements for public participation, the State Committee for Nature Protection should develop and test the legal, institutional and managerial mechanisms needed to increase public participation in protected area management, taking into account the requirements of the Aarhus Convention.*

The implementation of the Biodiversity Conservation National Strategy and Action Plan (BCNSAP) will require substantial and sustained financing if it is effectively to reach its objectives. In the current national economic circumstances this presents a significant challenge. International donor support should be used for initiating key aspects of

the BCNSAP and for providing targeted assistance for strategically important aspects (capacity development, pilot projects, etc.), but the major recurrent and development inputs must come from national sources, both from the State and other sources. Therefore, it is necessary to assess interrelations among socio-economic factors affecting biodiversity, biological data, benefits, costs and net monetary values of biodiversity (both from direct use and from indirect services such as catchment protection), and current capacity for biodiversity conservation and sustainable use. On this basis concrete economic and financial policies and mechanisms should be developed to meet the defined conservation goals and priorities. The Cabinet of Ministers, the Ministry of Finance, the Ministry of Macroeconomics and Statistics, the State Committee for Nature Protection, and the Ministry of Agriculture and Water Management should reconsider macroeconomic and sectoral policies in the context of the 'polluter pays' and the 'user pays' principles, thus providing permanent sources for nature protection financing (see Chapters 2 and 3).

Recommendation 8.4:

*The State Committee for Nature Protection with facilitation of Ministry of Finance, the Ministry of Macroeconomics and Statistics, and the Ministry of Agriculture and Water Management, should develop economic instruments and mechanisms for ensuring adequate financing for the implementation of the Biodiversity Conservation National Strategy and Action Plan.*

Currently, scientific institutions, government agencies and NGOs put much effort into obtaining data on the status of biodiversity. This work is mostly done on some permanent sampling plots that were established to fulfil specific (targeted) scientific requirements. Legal obligations (i.e. quotas accounting) and decision-making in biodiversity management should be based on up-to-date information. A comprehensive monitoring system is absent and should be established as soon as possible. Data requirements on the status of biodiversity should be selected and prioritized according to national strategic goals. As a first step, sources of existing data should be identified, and research should then be undertaken to fill gaps in information.

Recommendation 8.5:

*Under the leadership of the State Committee for Nature Protection, the Academy of Science and other scientific institutions, an efficient and cost-effective biodiversity monitoring system should*

*be established to provide the necessary information for effective biodiversity management and decision-making.*

Wetlands in Uzbekistan are internationally recognized as globally and regionally important habitats for rare and endangered species (especially migratory birds). The surface area of marshes and other riverine ecosystems is decreasing significantly due to the disrupted water regime. They are also exposed to other types of degradation (salinization, water-logging and agrochemical pollution). Uzbekistan's recent accession to the Ramsar Convention should help it bring its wetland conservation goals to an international level, and thus meet its national strategic objectives in compliance with international protection standards.

Recommendation 8.6:

*To protect and improve its extremely vulnerable and degraded wetlands, and meet international obligations concerning the maintenance of habitats for migratory species, Uzbekistan should, develop an integrated national wetland conservation plan.*

Forests in Uzbekistan play a major ecological role. Besides serving as habitats for many species, they are indispensable in regulating the groundwater regime and protecting soil from erosion. Since the 1960s, the forest area has decreased dramatically, and this has contributed to the water losses of the main rivers. Loss of forest cover has affected the quality of agricultural land (higher soil erosion by wind, decreased buffering soil capacity), and crops are directly exposed to higher wind speeds. The annual reforestation rate defined by regulations should be 40,000 ha, but reforestation has not been undertaken on a regular basis, due to scarce financing.

The main role of Uzbek forestry is to restore the forest cover and conserve the remaining "natural" forests. Wood demand should be met by establishing forest plantations. "Green belts" and smaller forest shelter belts should also be established. Due to the high ecological importance of forests for other sectors (particularly agriculture and water management) at national level, the Forestry Department should be institutionally strengthened. Its current status within the Ministry of Agriculture and Water Management is rather weak, especially when compared with the agricultural and water departments. Other government bodies or sectors that benefit from forests (agriculture, water management, tourism,



timber industry) should financially support the forestry sector accordingly.

Recommendation 8.7:

*Due to the high biological and ecological importance of forests, the Forestry Department, currently established within the Ministry of Agriculture and Water Management, should be institutionally strengthened.*

Recommendation 8.8:

*All sectors that benefit from forests, particularly water management and agriculture, should contribute to the financing of forest protection and reforestation. In this connection, the Forestry Department should prepare a proposal on financing forest management for the Cabinet of Ministers.*

## Chapter 9

# MINERAL RESOURCES

### 9.1 Mineral resources: endowment and use

#### *Reserves and production*

Uzbekistan has large reserves of about 100 different types of known minerals concentrated in 2,900 deposits and occurrences. Over 1,000 deposits have already been prospected (Figure 9.1), including 40 deposits of precious metals, 40 deposits of non-ferrous and rare metals, 174 deposits of hydrocarbons, 482 deposits of construction raw materials, 28 deposits of facing stones and 249 deposits of groundwater. More than 40% of prospected deposits are under exploitation. The country produces large quantities of gold, silver, copper, lead, zinc, tungsten, uranium, phosphorus, salts, china clay, sulphur, construction materials and natural gas. The State Committee for Geology and Mineral Resources estimates the value of Uzbekistan's overall mineral reserves at US\$ 3.5 trillion.

Uzbekistan is rich in precious and non-ferrous metal deposits, particularly gold deposits, which make a large contribution to its export earnings. About one third of the total gold output of the former Soviet Union was produced in Uzbekistan. With an output of approximately 50-55 tons of gold per year, Uzbekistan is today the ninth largest producer in the world. It also ranks fourth in reserves, with more than 3,000 tons of gold. Its gold-mining centre is Muruntau, in the city of Zarafshan, which developed in 1972 because of its large reserves. Eighty per cent of Uzbekistan's gold is extracted from this deposit. There are also gold deposits in Tashkent, Jizak and Namangan provinces. Gold is mined at the Kochbulack, Kizilalm, Pirmirab, Guzaksay, Kauldin, Mardjanbulack, Chadak, Zarmitan and Karakutan mines.

Uzbekistan was the third largest producer of copper in the former Soviet Union and now has the world's tenth largest reserves. According to the State Committee for Geology and Mineral Resources, each year the country mines 26 million tons of ore,

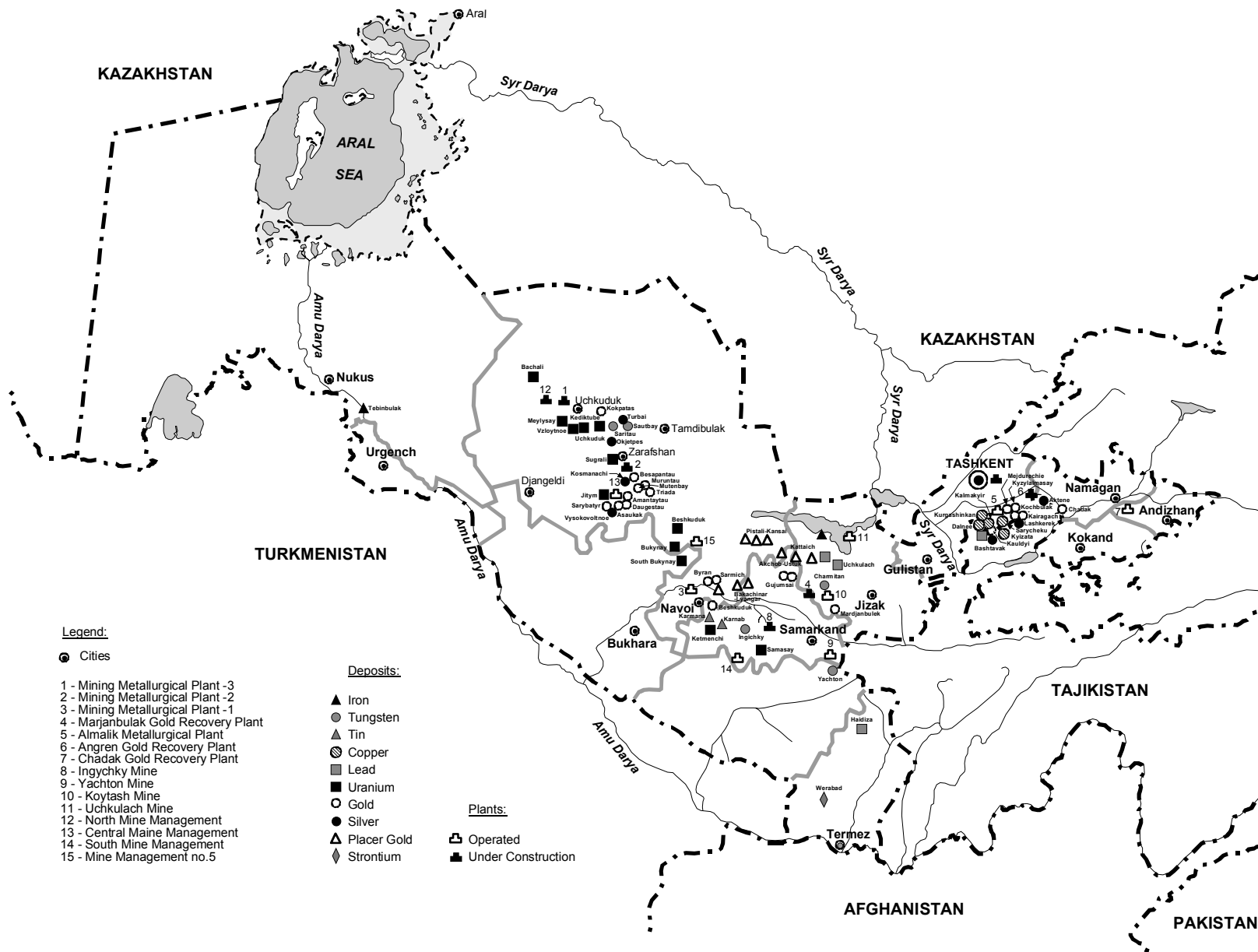
from which it extracts copper, lead, zinc, molybdenum, selenium, tellurium, sulphuric acid and metallic cadmium. More than 115,000 tons of refined copper is produced annually. There are many copper deposits in Uzbekistan, but only three (in the Almalyk region and Tashkent province) are currently in exploitation. The city of Almalyk, the country's centre of non-ferrous metallurgy, was founded in 1951 due to the Kalmakir, Dalnee and Saricheku deposits. Several other promising deposits of copper have been discovered in the Kyzylkum desert, southern Uzbekistan and Karakalpakstan. In addition, deposits of tungsten are being exploited in Samarkand (Ingichka) and Jizak (Koitash) provinces.

Of the ferrous metals, Uzbekistan produces cast iron, manganese and chromium, but it does not have any industrially significant iron deposits. The Uzmetkombinat (Bekabad metallurgical plant) is the only one that processes primarily scrap metal. The most promising manganese deposits are located in Dautash, Kizilbairak and Takhtakarachin, in Kashkadarya province.

Uranium production in Uzbekistan has remained fairly stable since 1990. According to the International Atomic Energy Agency (IAEA), Uzbekistan is the world's sixth largest uranium producer, with an output of 3,000 tons per year. Its uranium reserves rank fourth worldwide. The Navoi Mining and Metallurgical Combine started to exploit the uranium deposits in the Kyzylkum desert in 1958 using opencast and underground mining methods. At present, uranium extraction uses the "in situ leaching" technique. Facilities in operation are located in Uchkuduk, Zafarabad and Nurabad. In Zarafshan, the Sugraly mine is currently inactive.

Uzbekistan also produces large quantities of industrial minerals, including feldspar and fluorspar, as well as a wide range of mineral raw materials (e.g. kaolin, marble and granite). Kaolin is mined with coal in the Angren coal deposit near Tashkent.

**Figure 9.1. Principal mineral deposits of Uzbekistan**  
 Source: State Committee of Geology and Mineral Resources



### *Mining industry*

The mining industry seems to be moving towards increased private ownership. The Government is making efforts to privatize parts of the mining sector; however, privatization is still far from complete. Uzbekistan's mining and metallurgical sectors remain State-controlled. There are three major State mining companies: the Navoi Mining and Metallurgical Combine, the Almalyk Mining and Metallurgical Combine and the Uzbek Association of Gold Mining and Diamond Processing (Uzolmosoltin).

The Navoi Mining and Metallurgical Combine is the country's largest mining and processing enterprise. It explores for, exploits and processes uranium, gold, fluorite and marble. It has six regional mining departments: Uchkuduk, with uranium, gold and marble mining and gold processing; Zarafshan, with an opencast gold mine and a hydro-metallurgical processing plant; Zafarobod, with an underground uranium-leaching operation; Nurabad, with an underground uranium-leaching operation and an opencast marble mine and stone-cutting facility; Krasnogorsk, with two underground fluorite mines and a fluorspar-processing facility; and Navoi, with the company's headquarters and a hydro-metallurgical plant producing uranium monoxide and oxide, as well as gold. The company has overseas trading houses in Kiev (Ukraine) and in Saratov, Voronezh, and Oryol (Russian Federation).

The Almalyk Mining and Metallurgical Combine is the second largest mining company in Uzbekistan. It includes four mining facilities, two mineral processing plants, two metallurgical plants, three sulphuric acid enterprises, a maintenance shop, and a transport (road and railway) unit. Its two main activities are a copper-gold-molybdenum operation, with open pits, an enrichment processing plant and a copper smelter with a sulphuric acid processing unit; and a lead and zinc operation, with lead and zinc processing plants and a sulphuric acid-processing complex. The Almalyk Mining and Metallurgical Combine sells its products both in Uzbekistan and abroad, generating approximately US\$ 300 million from copper and US\$ 10 million from zinc exports per year. However, the attempt to privatize 46.5% of the company in 1999 aroused little interest and was generally considered a failure.

The Uzbek Association of Gold Mining and Diamond Processing was established in 1994. It oversees the Almaz plant, the country's only diamond-cutting facility; the Angren gold mine and gold-extracting factory; the Kochbulack gold mine; the Kyzylalma gold mine; the Kauldin gold mine; the Mardjanbulak open gold mine; the Zarmitan gold mine and the Chadak gold mine.

### *Mining and energy: natural gas, oil and coal*

Uzbekistan possesses the largest hydrocarbon reserves in Central Asia, with total reserves estimated at more than 7 billion tons of oil equivalent. Gas reserves are estimated at more than 1 trillion m<sup>3</sup>, with the richest gas district in the Uzbek section of the Ustyurt region. Gas production started in the Republic more than 50 years ago in the Andijan region. Large-scale production was initiated in 1959 with the discovery of a large gas deposit in the Bukhara region. Today gas production is mostly concentrated in 12 deposits, particularly in the Shurtan and Kokdumalak fields. To offset declining production at some older fields (e.g. Uchkir and Yangikazen), Uzbekistan is speeding up development at existing fields, such as the Kandym and Garbi fields, as well as planning to prospect for new reserves. Prospecting is already under way in the Ustyurt, Bukhara-Khiva and Ghissar regions, and also in Surkhandarya and Fergana oil-contained regions, where the depth of deposits may vary from 800 metres (Bukhara-Khiva oil-contained region) to 6,000 m (in the central part of the Fergana valley).

Much of Uzbekistan's natural gas requires processing due to its high sulphur content. Sulphur compounds are extracted and converted into sulphur at the Mubarek and Shurtan gas-processing plants. Uzbekistan exports natural gas to Kazakhstan, Kyrgyzstan, the Russian Federation and Tajikistan via the Central Asia-Central Russia pipeline. Kyrgyzstan pays 50% in cash and 50% in Kyrgyz-made goods for its Uzbek gas imports, in addition to supplying Uzbekistan with water for the cotton-growing season. Non-payment by these republics has been a frequent problem.

Potential oil resources in Uzbekistan, including condensate, are estimated at more than 5 billion tons. The Bukhara-Khiva region contains over 60% of Uzbekistan's known oilfields, including the Kokdumalak field, which accounts for about 70% of the country's oil production. In addition, the Fergana region contains another 20% of the country's oilfields, and the Ustyurt plateau and Aral

Sea have been targeted for further exploration. Oil and gas deposits in Kokdumalak, Shurtan, Olan, Urgin and south Tandirchi (all in southwest Uzbekistan) are being developed rapidly, and oil tanks are being constructed in Angren (Tashkent region) and in Pap (eastern Namangan region). Extracted oil and gas condensate are refined at oil refineries in Fergana, Alty-Arik and Bukhara. Oil and gas activities are regulated by Uzbekneftgas, the National holding company.

Uzbekistan's coal mining and production are centred in the Angren Valley, Tashkent region. The Angren opencast mine is the country's largest coal deposit, with about 2 billion tons of mostly brown coal. Angren also has underground coal gasification technology in place to produce gas. The Shargun and Baisun bituminous coal mines in the Surkhandarya region are much smaller than the one at Angren. They are exploited by underground mining to supply the southern regions of Uzbekistan, Tajikistan and Turkmenistan.

Currently producing 2.5 million tons of coal per year, Uzbekistan's coal industry has been in decline since independence, in large part due to shrinking State subsidies. Uzbekistan's joint-stock association for the mining and marketing of coal (Auctioneer Society "Ugol") is the country's only coal-mining enterprise. (More detail on coal, gas and oil is provided in Chapter 11 on "Environment and Energy.")

## 9.2 Environmental issues in the mineral sector

### *General*

Mining activities have a wide range of environmental impacts at every stage of operations. Mining operations generally progress through five stages: (i) exploration, (ii) development, (iii) exploitation (extraction of valuable minerals and disposal of overburden and waste rocks), (iv) ore processing (separation of ore concentrates from tailings in milling and flotation plants), and (v) mine closure. Potential environmental impacts include destruction of natural habitat at the mine and waste disposal sites, destruction of adjacent habitats as a result of emissions and discharges, changes in river ecology due to sedimentation and flow modification, alteration of water tables, land instability, land degradation due to inadequate rehabilitation after mine closure and danger of dam failure. In addition, mining activities have occupational health impacts, such as those caused by dust inhalation, exposure to cyanide or other toxic substances, and exposure to radiation.

Today Uzbekistan has to handle huge environmental problems associated with past and present mining operations. Due to unsustainable management policies and practices, the country's mining industry represents a potential source of (i) chronic pollution, with fairly constant toxic emissions of relatively low concentration during long periods, and of (ii) acute pollution, which may release large amounts of radioactive or toxic substances in a short time (e.g. accidental spills).

### **Box 9.1. Foreign investment in the mineral sector**

Foreign interest in developing gold deposits in Uzbekistan has led some foreign companies to enter into a joint venture with the State Committee for Geology and Mineral Resources. The first joint venture in the Uzbek mining industry, Zarafshan-Newmont, began operations in 1995. The partners are Newmont Mining Corporation (United States), the Navoi Mining and Metallurgical Combine and the State Committee for Geology and Mineral Resources. The company processes gold tailings accumulated over many years from the Murantau mine with a modern heap-leach technology. The project is expected to have a 17-year lifespan, during which 156 tons of gold will be extracted. The current output is around 15 tons of gold per year. In 1999, OXUS Resources Corporation (United Kingdom) acquired Lonmin's 43% interest in the Amantay goldfields near Zarafshan, which contain gold-arsenic ores. The company has completed a pre-feasibility study and intends to mine in two phases: first an opencast heap leach (10.4 million tons of ore at 3.4 g/ton of gold), followed by underground mining (5.1 million tons of ore at 13 g/ton of gold).

Although there is a great potential for further development of the mineral sector, Uzbekistan's difficult business climate, notably currency restrictions, has hindered foreign investment. Accumulated foreign investment in Uzbekistan is limited compared to that in other mineral resource-rich former Soviet republics such as Kazakhstan and Azerbaijan.

**Figure 9.2. Sites of radioactive pollution related to uranium mining and milling, Uzbekistan, Kyrgyzstan and Tajikistan**

Source: State Committee of Geology and Mineral Resources



*Tailing management: a key environmental issue in Uzbekistan*

Management of tailings and waste rock dumps is one of the most significant environmental aspects of mining operations. Tailings are mostly mud and slurries containing a very high proportion of extremely finely ground material that remain after ore processing. The separation processes for most metals do not extract all of the minerals. Tailings therefore contain quantities of metals and other minerals, as well as residues of the chemicals used to extract them. The finely ground material from processing makes contaminants formerly bound up in solid rock (e.g. arsenic, cadmium, copper, lead, zinc) accessible to water. Acid drainage, which exacerbates contamination by heavy metals, is often a problem when tailings are exposed to the atmosphere. According to the State Committee for Nature Protection, about 42 million tons of concentration tailings and 300,000 tons of metallurgical slag are generated annually in Uzbekistan. Tailings are stored or disposed of in a variety of ways: dumped at the mine or mill site, released into ponds or retained by tailing dams. In some cases, tailings are released directly into rivers, introducing large amounts of suspended solids and contaminants into aquatic habitats. In addition, due to the large storage volumes, dam structures may easily become unstable, and tailing dam accidents can happen (see short-term impacts below).

Uzbekistan has several opencast (surface) and underground mines of different types of mineral resources, which generate 25 million m<sup>3</sup> of mining waste annually. Opencast mining operations produce far more waste per ton of ore than underground operations, where there is no overburden and where some of the removed material can be used to backfill excavations as work progresses. Waste rocks are usually dumped into heaps, which disfigure the landscape and are also sources of dust, hazardous emissions and water pollution. Inert material carried away in run-off water can clog rivers and streams. If the waste contains sulphides, acid drainage can occur after reaction with rainwater.

According to the State Special Inspectorate for Analytical Control (GosSIK), the total volume of uranium tailings from past mining operations amounts to 3.7 million m<sup>3</sup> in the Navoi, Namangan and Tashkent regions (Figure 9.2). In Navoi, there are two tailing sites with volumes of 1.4 million m<sup>3</sup> and 100,000 m<sup>3</sup> occupying an area of 250,000 and 80,000 m<sup>2</sup>, respectively. In Namangan,

1.2 million m<sup>3</sup> of uranium tailings are accumulated over 455,000 m<sup>2</sup>. In the Tashkent region, the total volume of tailings located in the mountains is about 1 million m<sup>3</sup>. Uranium milling is also a major generator of radioactive waste. About 60 million tons of these tailings are accumulated on a surface of 620 hectares near Navoi city. Moreover, 3,500 hectares of land are occupied by 90.55 million tons of gold mining and processing tailings in the Navoi mining region, where the gold industry is concentrated. The marble industry, also located in Navoi, produces around 2 million m<sup>3</sup> of waste annually. As tailing management in Uzbekistan is not common, most of these sites are in a precarious condition and need urgent restoration.

Rehabilitation of land damaged by mining operations has been financed by mining companies and by institutions involved in the management of mineral resources. For example, since 1994 the Navoi Mining and Metallurgical Combine has rehabilitated about 100 hectares of its uranium tailings at its own expense. The tailings have been covered with a one-metre-thick layer of waste rock from gold mining, which consists mainly of schist and quartz. This cover reduced tailing radioactivity ten times, but a layer more than two metres thick will be necessary to decrease radioactive emissions to acceptable doses. Radioactive dust pollution has been also prevented using this low-cost method. According to the company's programme, the entire tailings will be completely covered within 10-12 years.

*Long-term environmental impacts*

Surface and groundwater pollution

Potential sources of water pollution from mining include drainage from surface and underground mines, waste water from beneficiation, and surface run-off. Mineral separation processes that use dangerous and toxic chemicals such as sulphuric acid or cyanide (e.g. leaching) or organic reagents (e.g. flotation) are also important sources of contamination if appropriate control systems are not in place. Such mining effluents contain large amounts of suspended solids (ranging from colloidal to settleable materials) or radionuclides originating from the ore itself, from waste material or from surface installations. These solids and radionuclides can affect aquatic flora and fauna and physically choke local waterways and lakes.

Almost all waste from uranium mining and processing is radioactive and constitutes a potential

**Table 9.1: Changes in the groundwater composition using strong and weak acid uranium ISL at Aitym ore bodies, Uchkuduk deposit**

Groundwater components	Initial concentration	Final concentration		MPC for drinking water in Uzbekistan
		Strong sulphuric acid leaching	Weak sulphuric acid leaching	
dry residue	2,750	19,500	3,300	1,000
Na <sup>+</sup> , K <sup>+</sup>	526	1,030	620	200
Ca <sup>2+</sup>	132	550	220	...
Mg <sup>2+</sup>	60	608	108	...
Fe total	0.5	1,560	0.8	0.3
SO <sub>4</sub> <sup>2-</sup>	1,400	14,200	1,630	400
HCO <sub>3</sub> <sup>-</sup>	190	880	350	...
Cl <sup>-</sup>	360	880	420	250
pH	7.6	1.1	7	6 to 9

Source: Navoi Mining and Metallurgical Kombinate, 2000.

source of environmental damage. Only 15% of total ore radiation is extracted with final uranium products. Old uranium mining and processing tailings, which do not have protection measures such as a base lining to prevent seepage, are thus potential sources of ground and surface water contamination. Radium-226 and other hazardous substances (e.g. arsenic) can contaminate the local drinking water supply and aquatic flora and fauna in the vicinity of tailing sites. Uzbekistan produces uranium as U<sub>3</sub>O<sub>8</sub> using the “in situ leaching” technique, with all deposits under development located in the Kyzylkum desert (Figure 9.2). The total area occupied by uranium in situ leaching facilities is 1,300 hectares. The technique was first introduced in 1962 by the Navoi Mining and Metallurgical Combine, and since 1994, it has been the sole method used for uranium recovery in the country. With this technique, the uranium-bearing ore is not extracted from its deposit by mining. Instead, a leaching liquid (acid) is injected through wells into the ore deposit, and the uranium-bearing liquid is pumped from wells. Although this mining method has its advantages, like lower cost and less solid waste, the injection of significant volumes of acid leaching solutions crossing aquifers may result in serious groundwater contamination. The contamination can spread downstream from the extraction site and reach populated areas in the future. In addition, leaching solution spills can contaminate soils around the wells. The solution used by the Navoi Mining and Metallurgical Combine contains sulphuric acid in a concentration of 10-20 g/l, which increases 5-10 times the background salinity of the groundwater. This strong

acid leaching method increases the Fe and SO<sub>4</sub> concentration in the underground, exceeding maximum permissible concentrations 5,200 and 35.5 times, respectively (Table 9.1). However, because uranium mines (polygons) are located in arid regions, where the background salinization of groundwater is too high for drinking purposes, the negative impacts of uranium in situ leaching have been ignored for years. Recently, the Navoi Mining and Metallurgical Combine has developed a less harmful method called weak acid leaching, where the sulphuric acid concentration is decreased to 0.1-0.2 g/l with the same efficiency. According to the company, 50% of mining operations in Uzbekistan are now using this method.

Gold processing in many areas of Uzbekistan uses the highly toxic cyanide leach technique. In the Navoi region, sub-economic gold (1.5 g/ton of gold) accumulated in stockpiles from the Muruntau open-cast mine is recovered by heap-leach technology. The process consists in the introduction of a cyanide solution with an initial concentration of 150 mg/l of sodium cyanide into the heaps, which will recover 65% of the gold contained in the ore. The cyanide concentration in the plant effluent is around 30-50 mg/l, with a final concentration in the tailing pond of 1-2 mg/l of sodium cyanide. In the vicinity of the tailing pond, the mining company’s monitoring wells indicate 0.2 mg/l of sodium cyanide, which exceeds the maximum permissible concentration (0.1 mg/l). In the Chadaksky gold mine, almost 2 million m<sup>3</sup> of tailings containing cyanide cover an area of 35 hectares. Diffuse groundwater contamination by



cyanide and other accompanying toxic substances (e.g. arsenic, cadmium) is a serious environmental problem in Uzbekistan as it largely contributes to the degradation of groundwater resources.

The discharge of acid mine waters from mining and processing operations is an additional source of water pollution, notably in the Almalyk copper-mining region. In Almalyk, the ore occurs in the form of copper, lead and zinc sulphides. The natural oxidation of sulphides through exposure to air and water produces acidic and metal-bearing solutions. The combination of acids and metals can have severe effects on the ecology of local watercourses, and metals can enter the food chain. The Almalyk Mining and Metallurgical Combine is a major source of surface and groundwater pollution by heavy metals and phenols in the valley of the Ahangaran River. It generates about 23,000 m<sup>3</sup> of copper-processing tailings a year.

In the Angren region, discharges from coal-mining operations containing hazardous substances have also polluted the Ahangara River. At the Angren coal mine, nearly 5 million m<sup>3</sup> of toxic tailings have accumulated in a hydro-settlement pond, occupying an area of 74.5 hectares. In addition, these tailings may contain radionuclides due to the high uranium content of the coal. Despite the large volume of hazardous tailings, the mining plants do not monitor them.

Since 1994, the State Committee for Geology and Mineral Resources has carried out environmental monitoring in the Angren and Almalyk mining areas. The results showed that surface and

groundwaters, soil and vegetation are highly contaminated with heavy metals, such as lead, copper, zinc, selenium, wolfram, cobalt, cadmium and arsenic.

Outdated technology used for oil exploitation is currently an issue due to the large amounts of field waters handled and oil-contaminated waters discharged. Ineffective management of drilling mud and bottom tank sludge also severely damages the environment. Negative impacts from refining operations are mainly related to the large amounts of waste water produced. Most of the waste-water treatment facilities are inefficient and working over capacity. According to Uzbekneftegaz, the total volume of effluents from its operations in 1999 amounted to 62 million m<sup>3</sup>, of which nearly 60% (37 million m<sup>3</sup>) was untreated (Table 9.2). Untreated effluents are directly discharged into evaporation ponds (21.6%), watercourses (12.7%), wells (7.8%), special tanks (3.2%) and sewage systems (54.5%). Effluents containing phenols, oil products and other toxic substances from the Fergana oil processing plant are major sources of chronic environmental pollution in the Tashlak district. According to the State Committee for Geology and Mineral Resources, which monitors the groundwater, oil leaks have resulted in serious groundwater contamination in this area. Modern and efficient waste-water treatment facilities in oil and gas refining are operating only in the Bukhara oil processing plant and in the Shurtanneftegas oil and gas-processing complex. Oil leaks from old pipelines are also sources of soil and groundwater pollution.

**Table 9.2: Discharges from oil and gas operations, 1995-1999**

Waste water, total	28.02	32.42	33.82	34.02	35.72
evaporation ponds	5.60	6.50	6.90	7.00	8.00
watercourses	3.80	4.50	4.60	4.70	4.70
wells	1.70	1.90	2.20	2.20	2.90
special tanks	0.12	0.12	0.12	0.12	0.12
sewage system	16.80	19.40	20.00	20.00	20.00
Water treated in accordance with the standards	18.00	22.70	23.30	24.50	25.00

Source: Uzbekneftegas, 2000.

### Air pollution

Almost all stages in the mining and processing of mineral resources contribute to air pollution. Dust is produced by open pits and by crushing and grinding operations. Dust can also be given off by tailing dams. High dust emissions have been observed in the cities of Angren, Navoi, Bekabad and Akhangaran, where the mining and construction material industry is located.

Uranium tailings are also subject to many kinds of erosion, which may disperse radioactive material (e.g. radioactive dust) over nearby villages. Occasionally, because of their fine sandy texture, dried tailings have been used for building construction or for landfills. High levels of gamma radiation were found in buildings built on or from such material. In addition, uranium mining and milling release radioactive radon gas and radon daughters, which are potential occupational hazards. Brown coal mining (Angren mine) is also of special environmental concern due to its high uranium content.

Mining and mineral-processing operations are also sources of emissions of gases with a direct (carbon dioxide and methane) and an indirect (mainly sulphur dioxide) greenhouse effect. Oil and gas extraction and processing, and the coal industry account for a large share of methane emissions in Uzbekistan. In oil and gas processing plants, there is a general lack of efficient monitoring equipment for gaseous emissions and flue gases in operating refineries. Coal-fired thermal plants lack new filters, gas detectors and monitoring equipment. Carbon dioxide is produced by energy use and by metallurgical and mineral industries. Smelting (the processes in which ore is heated to separate it from the gangue) produces very large amounts of air pollutants, such as sulphur dioxide, arsenic, lead, cadmium and other heavy metals. Due to the lack of efficient air-treatment facilities for copper smelting, the Almalyk Mining and Metallurgical Combine is a major source of air pollution, releasing significant amounts of sulphur dioxide, nitric oxide, hydrogen fluoride and particulate matter into the atmosphere.

### *Short-term environmental impacts*

Short-term impacts from mining operations are mainly caused by dam embankment failures or operating errors. In general, these failures occur due to unexpected natural events or deficiencies in the system, such as internal erosion, flooding, overtopping, weak foundations of dams, and earthquakes. In Uzbekistan, the risk of tailing-dam failure is significant due to the location of some dams and dumps in active seismic zones, e.g. the uranium and polymetallic ore tailings in the mountains near Tashkent. However, the most environmentally hazardous tailings are located in Mailii-Suu, Kyrgyzstan, at the northeast end of the Fergana Valley (Figure 9.2). They are uranium tailings accumulated in mountain valleys close to the Uzbek border (Andjian and Fergana *oblasts*). Most of the tailing dams are unstable due to insufficient storage capacity, and are not equipped with a base lining to prevent seepage of hazardous substances into surface and groundwaters. The potential risk of accidents due to geological hazards, like landslides, mudflows or earthquakes, is high. Since 1958, when a breach in a tailing dam released 6,000 m<sup>3</sup> of radioactive material along 25 km in the Mailii-Suu River, these processes have been documented in the region. From 1992 to 1996, several landslides triggered by tectonic events led to the erosion and partial destruction of some tailings, releasing toxic materials into the environment. Other mining tailings located in Kyrgyzstan and Tajikistan, which are potential sources of transboundary pollution, are Aktyuz, Sumsar, Shekaftar, Kadamjai, Haidarkan and Degmai.

The consequences of such an accident could be enormous, not only due to the large amounts of toxic substances released (e.g. cyanide, heavy metals), but also to the high concentration of radionuclides (e.g. uranium tailings). After the breaching of a dam, large spills of slurry and contaminated water flood the region downstream of the dam. Due to the surface gradient, the spill reaches surface water or infiltrates groundwater, thus contaminating the aquatic environment. This has an impact on the biodiversity in creeks and watercourses, the downstream land use and the downstream surface and groundwater use. It may also have serious health and social impacts on the local population.

### Box 9.2. The Mailii-Suu uranium tailings: a transboundary pollution risk spot

During Soviet times, uranium mining was very active in the Fergana Valley. To provide logistic support to mining operations, the town of Mailii-Suu was created in the Djalal-Abad *oblast*, in Kyrgyzstan. The town is located in the valley of the Mailii-Suu River, a tributary of the Syr Darya, the second largest river in Central Asia and the main water source for 14 million people in the Fergana Valley. Two uranium-extraction factories were constructed in Mailii-Suu. They ceased their activities in 1968, when mining stopped. There are 23 tailings and 13 dumps spread around the Mailii-Suu valley, with a total volume of 2.7 million m<sup>3</sup> and total radioactivity of 1.1x10<sup>15</sup> Bq. Tailings 3, 5 and 7 are considered potential hot spots due to the danger of landslides, and could easily release a large amount of waste material into the Mailii-Suu River, which would flow to the Syr Darya, and the Fergana Valley in Uzbekistan. Significant amounts of radioactive waste accumulated in Mailii-Suu have come from other countries, such as Tajikistan, the former German Democratic Republic and the former Czechoslovakia.

In 1996, Uzbekistan, Kyrgyzstan, and Kazakhstan signed a declaration recognizing that hazardous mining and processing tailings constituted a serious regional environmental threat and set up the "Interstate Coordination Task Group for the Rehabilitation of Mining Tailings with a Transboundary Impact". In 1998, the Group had identified eight hot spots, all outside Uzbekistan, of which Mailii-Suu is the most critical. They emphasized the need to develop projects to monitor landslides, to rehabilitate tailings and move some radioactive waste. Since then, Uzbekistan has spent US\$ 22,000 on feasibility studies and on monitoring tailing sites. However, work has progressed at a very slow pace. The lack of cooperation between the parties and the lack of funds seem to be the main obstacles to implementation.

### 9.3 Instruments for the management of mineral resources

#### *Policy objectives*

Uzbekistan's mineral policy aims at promoting the sustainable management of underground resources through: (i) the efficient use and protection of resources, (ii) the modernization of the mining, oil and gas industries, (iii) foreign investment, and (iv) integrating the mineral industry into the world market. The country's economic reforms, such as sound pricing policies, privatization and restructuring of industry, as well as the liberalization of trade, are expected to boost foreign investment. The modernization or development of mining and processing plants by foreign investors could make a substantial and positive environmental impact by introducing better and cleaner technology. In order to attract substantial foreign investment into the mineral sector, particularly into the oil and gas industry, the Uzbek Government grants foreign investors a number of incentives and privileges. In particular, foreign companies are exempt from all kinds of taxes and fees during prospecting work.

The main directions of the country's mineral policy include:

- increasing geological prospecting, exploration and development of oil, gas, gold and base metals deposits;
- further exploitation of opencast mining of brown coal;

- boosting high-tech, export-oriented production;
- increasing mineral processing, specially hydrocarbons, to compete effectively on international markets;
- improving product-quality to international standards level;
- modernizing and introducing cleaner technologies in mining and processing enterprises;
- improving plant management, including increased efficiency, loss control and waste minimization.

Some of these concepts were incorporated into the National Environmental Action Plan (NEAP). However, only few of its project proposals are directly related to the management of mineral resources. The proposals are:

- implementing the regional cooperation agreement between Uzbekistan, Kazakhstan and Kyrgyzstan to prevent transboundary pollution from hazardous mining tailings;
- reducing greenhouse-gas emissions from the oil and gas industry;
- developing a programme to protect the population from radionuclides and airborne toxic substances;
- evaluating landslides and related risks near populated areas and setting up an early-warning system.

The NEAP also emphasizes the need for mining industry projects that combine financial return and environmental progress ("win-win" measures). In

1998, the United Nations Industrial Development Organization (UNIDO) completed a cleaner production project that introduced the concept of cleaner production in Uzbekistan and will establish a national cleaner production centre. The partners are the State Committee for Nature Protection and the United National Industrial Development Organisation (UNIDO). The main goal of the cleaner production centre is to strengthen the country's capacity in this field. Policy

implementation and enforcement are still weak, though. Moreover, industrial enterprises consider environmental protection measures to be too costly, taking away resources needed to increase industrial productivity.

Environmental expenditures in 1999 by selected State enterprises and institutions involved in the management of mineral resources are given in Table 9.3.

**Table 9.3: Expenditures on environmental protection measures, by selected State mining enterprises and institutions, 1999**

	Total	<i>million sum</i>			
		Measures for the rational use and protection of:			
		water	air	land	biodiversity
Uzbekneftegas	1,185.61	515.55	588.78	80.77	0.51
Ugol	44.53	36.22	4.89	3.42	-
Uzolmosoltin	88.22	80.60	4.29	3.33	-
Ministry of Energy	842.18	797.78	32.41	11.78	0.21
State Committee for Geology and Mineral Resources	2.38	1.73	0.05	0.60	-

Source: State Committee for Nature Protection, 2000.

To improve economic and environmental performance in the mineral sector, the Uzbek authorities have developed specific programmes with the assistance of international organizations. Uzbekistan has also drawn up a programme for the development of precious metal exports. It is estimated that, with the implementation of this programme, precious metal production and export will grow, increasing export earnings from US\$ 44 million in 1997 to US\$ 123 million by 2005.

#### *Legislation and implementing agencies*

In Uzbekistan, the primary mineral sector regulatory instrument is the Entrails Law (22 September 1994). According to this Code, mineral resources are State property. The Subsoil Code regulates the use and protection of the subsoil, mining-related issues, mining safety and property rights. It addresses some environmental requirements, such as State ecological expertise, the monitoring of groundwater regimes, protected land and mine reclamation. However, these are stated in very broad terms. Mine closure and post-closure maintenance, surface-mine reclamation, mineral waste recycling and recovery, public and community involvement in EIA are not addressed in the Entrails Law.

The main regulatory act for the environment is the Law on Nature Protection (9 December 1992). It governs ecological expertise, defines principles for environmental standards and monitoring, and establishes rules for applying economic instruments to nature use and environmental protection. It is general in nature and does not provide effective mechanisms for implementation.

The State Committee for Geology and Mineral Resources regulates mining activities and coordinates geological prospecting and exploration, compiles geological data and licenses mining operations. The Committee employs 6,900 staff, and is essentially the mining industry's regulatory body. Its structure is quite complex, comprising 31 enterprises grouped in five major organizations. It also supervises two institutions that provide scientific support for geological exploration: the Mineral Resources Research Institute and the Institute of Hydrogeology and Engineering Geology. The Committee is authorized to establish joint ventures for mining and exploration and to represent Uzbekistan's interests abroad. It has organized international tenders and participated in international conferences designed to attract foreign investors.

The Agency for Safety in the Manufacturing Industries and Mining Control verifies occupational safety requirements in mining companies. The State Committee for Nature Protection oversees compliance with environmental requirements in mining. The Uzbekenergo, the Ministries of Macroeconomics and Statistics and of Emergencies are also involved in the management of mineral resources.

#### *Regulatory and economic instruments*

The creation of efficient economic mechanisms to regulate the use of natural resources is one of the major goals of Uzbekistan's environmental policy. At present, the main economic tools for the use and protection of mineral resources are payments for the use of mineral resources and for environmental pollution and fines for the violation of environmental legislation. Charges for the use of mineral resources depend on the mineral resource type, but do not take into account important factors such as the deposit's geological particularities, the scarcity of the mineral resource or exploitation conditions. Fines for the violation of environmental legislation and payments for environmental pollution are low and are not inflation-indexed, which has considerably eroded their real value. In addition, no financial guarantee is required from mining companies to cover environmental protection.

The recently adopted Law on Ecological Expertise (2001) provides for environment impact assessment (EIA) and audits in industrial enterprises. As in many other countries, the approval of EIA is required before mining rights are granted and the EIA baseline studies should be completed before construction starts. However, the country's legal framework lacks instruments for EIA and audit implementation, particularly in mining. Moreover, the Law does not address public participation in environmental impact assessment, leaving an important gap in Uzbekistan's environmental legislation.

The State Committee for Geology and Mineral Resources issues permits or licences for activities related to the exploration and exploitation of mineral resources, including groundwater. Uzbekneftegas issues special licences and permits for the exploration for hydrocarbons and the production of oil and gas. The State Committee for Nature Protection is responsible for issuing environmental permits and developing standards for mining operations. The environmental permit is

not integrated. Two Administrations and one institute within the Committee are responsible for air emission, water discharge and waste disposal authorizations.

#### *Monitoring and information systems*

The State Committee for Geology and Mineral Resources monitors groundwater, the geological environment and mineral resources. Kiziltepageologiya, the Committee's division, performs geo-environmental and radio-ecological monitoring of air, surface water, soil and flora in mining regions and some tailing sites. The Committee's hydrogeology enterprise is responsible for groundwater monitoring, including the monitoring of radionuclide migrations. The observation network for groundwater comprises about 3,000 observation points throughout the country, with laboratories analysing the chemical composition and mineralization level of groundwater. In addition, the State Committee for Geology and Mineral Resources monitors exogenous and endogenous geological processes, such as landslides, karstification and erosion.

The State Geological Fund, under the State Committee for Geology and Mineral Resources, registers all activities related to the exploration and exploitation of mineral resources, and provides geological, economic and geo-ecological information about mineral deposits in Uzbekistan.

Within the State Committee for Nature Protection, the State Special Inspectorate for Analytical Control (GosSIK) monitors air emissions, wastewater discharges and radioactive pollution at industrial and mining sites (including uranium tailings). There are special inspectorates in 11 regional centres. The regulation and monitoring of industrial waste are the responsibility of the Main Administration on Protection and Wise Use of land-Water Resources within the State Committee. (See Chapter 5.)

There is a general lack of analytical and financial support to operate monitoring networks efficiently. Laboratory equipment is often outdated and the data processing and transfer system is rarely computerized. Much information is kept in the form of tables, books and journals. Recently, a geographical information system (GIS) was introduced in the Main Administration on Hydrometeorology through a bilateral cooperation project.

#### 9.4 Conclusions and recommendations

Intensive production methods and the almost complete neglect of environmental protection measures during the past decades have led to the accumulation of large amounts of mining waste throughout Uzbekistan. As a result, mining and processing tailings are now major sources of chronic soil, surface and groundwater pollution by hazardous substances, such as cyanide, heavy metals and radionuclides. Most mining companies currently in operation do not have appropriate tailing management. Waste from mining operations represents a serious environmental and safety issue. Moreover, huge volumes of effluents from oil and gas exploration and exploitation containing phenols, heavy metals and oil products exceeding maximum permissible concentrations also have an important role in the diffuse contamination of soil, surface and groundwater. In some areas, groundwater contamination has impacted drinking water sources and exposed local residents to considerable health risks. Detailed information on the composition, surface, volume, negative impacts, rehabilitation, and recycling and recovery of the country's tailing deposits is limited, making it difficult to integrate this information into decision-making.

##### Recommendation 9.1:

*A broad assessment of the present environmental status of tailings from mining operations and other mineral industry hot spots is necessary in order to draw up an efficient plan for environmental impact prevention and mitigation. The State Committee for Nature Protection should develop a medium-term plan for this purpose under the NEAP. Funds for its implementation may be acquired through international donor organizations. They may also be allocated from the State budget.*

Sustaining improvements in a free-market economy requires a strong legal framework and clearly defined environmental liabilities. This is necessary not only to protect the environment, but also to foster economic growth and increase the flow of investments. The legal basis for the management of mineral resources does not cover many important environmental aspects of mining operations, particularly the liability for environmental rehabilitation after mine closure. During the active period of a mine, land reclamation and environmental protection measures are the responsibility of the company, but accountability

for rehabilitation measures after mine closure is not specified. As a result, Uzbekistan has many tailings and waste rock heaps from mining operations that were simply abandoned. With the current privatization of parts of the mineral sector, clarifying environmental liability within a transparent legal system is extremely important to attract foreign investment.

At the same time, Uzbekistan's legal system does not oblige the legal holder of an active mining right to take out insurance for environmental protection. This requirement is nevertheless an important economic mechanism which generates funds to (a) restore the environment, land and ecology during mining, (b) cover costs associated with mine closure and associated land reclamation, and (c) pay for remedial action arising from contingent accidents during or after mine closure. In general, a rehabilitation fund is based on annual contributions in accordance with a predefined schedule or is stipulated as a percentage of the operation's environmental protection budget. It may be maintained by a governmental agency or set up through a private financial institution. The precise use of the fund must be tied to the results of a required EIA.

##### Recommendation 9.2:

*The State Committee for Geology and Mineral Resources, in cooperation with the State Committee for Nature Protection, should initiate a revision of the current mineral legislation in order to (a) address environmental matters in mineral exploration, exploitation, processing, mine closure, post-closure (maintenance) and mineral waste recycling and recovery, (b) introduce mechanisms to define past, ongoing and future environmental liability, particularly for land rehabilitation after mine closure, and (c) introduce a financial guarantee requirement in mining that would generate funds to be used either during extractive operations to address potential ongoing environmental damage or for reclamation. See Recommendation 1.4*

Regulatory requirements related to environmental impact assessment (EIA) should be better developed, implemented and enforced. The rules are too general and need to be harmonized with international ones to become effective, in particular for mining activities, due to the importance of this sector to the country's economy. Specific guidelines for EIA in mining, such as mine design, environmental protection and management plans, permitted levels of emissions and effluents, and

mining reclamation measures, should also be included in the study. In the absence of specific requirements, mining companies determine themselves what such a study should include beyond what is specified in the general EIA regulatory description. At present, companies performing EIA are not submitted to any kind of accreditation. Furthermore, mining companies are not systematically required to apply the concept of environmental management. An environmental management system should detail the methods and procedures that the company will use to achieve environmental targets and objectives, including responsibilities for fulfilling the different requirements. This concept has been used worldwide to improve environmental performance in mining.

Nor does the law provide for formal public input procedures, such as public hearings or written comments, in the EIA of a mine. Early public and community involvement in a project can pose both short-term risks (project rejection) and long-term rewards (project acceptance by the public) for a mining venture. As mines often operate over long periods of time, the support of local communities can be important.

Recommendation 9.3:

*The State Committee for Nature Protection, in conjunction with the State Committee for Geology and Mineral Resources, should continue to develop the regulatory system for the management of mineral resources. Particular attention should be paid to (a) the development and implementation of EIA and environmental audit guidelines, with specific requirements for EIA in mining, (b) the introduction of an accreditation system for independent firms performing EIA and environmental audits, (c) the enhancement of public participation in the EIA process, and (d) the adoption of formal environmental management as a requisite for the issuing of licences to mining companies. See Recommendation 3.3*

Cleaner production, which is an integrated preventive environmental strategy, is designed to improve industry's environmental performance and gain substantial economic benefits. The results of cleaner production measures implemented at seven selected Uzbek enterprises in the framework of the UNIDO cleaner production project, including the Shurtan and Mubarek gas processing plants and the Uzbek metallurgical plant producing metals, showed significant potential for improving the companies' environmental and economic

performance. It was demonstrated that wide dissemination of industrial cleaner production methods could promote substantial economic and ecological benefits when financial resources are scarce.

Realizing the full benefits of technology nevertheless requires the parallel development of environmental management policies and practices. The establishment of a cleaner production centre in Uzbekistan planned for the end of 2001 will substantially contribute to information dissemination and policy assessment in this field. In addition, the activities of the centre will include the creation of an environmental management system and ISO 14000 assessments.

Recommendation 9.4:

*The industrial cleaner production programme should be developed as part of the NEAP and a national cleaner production centre should become as the main institution for promoting cleaner production methods in Uzbekistan. Specific pilot projects in the mining industry, particularly with respect to waste-water treatment and air pollution abatement technologies, should continue to be promoted and implemented.*

The State Committee for Geology and Mineral Resources is the mineral sector's main regulatory body. The Committee is also involved in mineral prospecting and exploration activities, making the efficient management of mineral resources a very difficult task. The availability, organization and accessibility of reliable geological information are important criteria for private sector appraisal of mining investment conditions. Given the importance of mineral resources for the Uzbek economy, the creation of a national geological survey for the systematic exploration and documentation of geological conditions prevailing in Uzbekistan is of great importance. Additionally, developing, implementing and enforcing the country's mineral policy should become more efficient through institutional restructuring and the separation of regulatory functions from geological survey. Such a geological survey would be a research and information agency with a non-regulatory role and of a scientific nature. Its funds could include, among others: (a) identifying new hydrocarbon basins and promoting these areas as appropriate sites for investment, (b) conducting seismic and ground water monitoring and risk assessments of hazardous geological processes and (d) producing geoscientific databases, maps and reports.

Recommendation 9.5:

*The Government should restructure the State Committee for Geology and Mineral Resources and create a national geological survey as a top priority.*

The lack of modern monitoring equipment as well as discrepancies in the collection, treatment and dissemination of data are hampering a broader use of information on environment and mining. The existing environment and mineral resources databases are poorly interconnected, both in terms of methodology and in terms of software, and the use of Geographic Information Systems is in its infancy. The introduction of a computer system to manage the mineral resources database would facilitate the integration with other databases, such as those on water, land and air. As a result, reliable information would be easily available for decision makers and other users.

The monitoring network of the State Committee for Geology and Mineral Resources requires a new laboratory and field equipment, such as analytical equipment, mobile devices and computers. In addition, the operational transfer of data is not automatic, hindering rapid processing and access.

Recommendation 9.6:

*The State Committee for Geology and Mineral Resources should improve its monitoring system, specifically in terms of data collection, processing and dissemination. Priority should be given to provide computer equipment, and mobile devices, as well as to develop centralized databases for (a) mineral resources, (b) dangerous geological processes, in particular landslides, and (c) groundwater.*

In 1996, Uzbekistan, Kazakhstan and Kyrgyzstan signed an agreement to address the issue of transboundary pollution from hazardous mining tailings, notably uranium tailings from Mailii-Suu. Apart from the initial efforts made to develop a rehabilitation programme in 1998, measures to improve the monitoring system and to develop an efficient emergency preparedness plan have not been implemented. Due to the high risk of accidents with serious environmental, health and social consequences for local communities, the implementation of this programme is a priority.

Recommendation 9.7:

*The regional cooperation programme for the rehabilitation of hazardous mining tailings with a transboundary pollution impact should be implemented immediately. Funds for this purpose should be allocated from the State budget, and raised from international financing institutions.*



***PART III: ECONOMIC AND SECTORAL  
INTEGRATION***

## Chapter 10

# LAND, AGRICULTURE AND THE ENVIRONMENT

### 10.1 Natural conditions and agricultural activities

#### *Climate*

The climate in Uzbekistan depends strongly on geography; in particular, it is significantly different in plains, deserts, steppes, mountains and valleys. In the plains, the climate is continental with hot and dry summers and short and cold winters. The average annual rainfall is 100-200 mm, which is up to 10 times lower than the evaporation rate. This phenomenon leads to rapid soil mineralization. Hot and dry winds are usual in both plain and foothill zones and are a cause of land erosion and significant damage to agriculture. In the mountains, the climate is characterized by significantly more rainfall, sometimes averaging over 600 mm a year. Due to suitable climatic conditions the mountains are rich in flora and fauna and are covered with forests. A mixture of plain and mountain flora and fauna characterizes the valleys.

#### *General information on agriculture*

Agriculture is one of the priority sectors of Uzbekistan's economy. The country is suitable for several agricultural crops, especially "technical" crops, that is, cultivated plants that are the raw material for industry. These include, by category, spinning crops (e.g. cotton, flax), oil crops (e.g. flax, sunflower and soybean), etheric (oil-yielding) crops (e.g. anise, coriander and mint), medicinal plants, rubber plants, tanning and coloured plants.

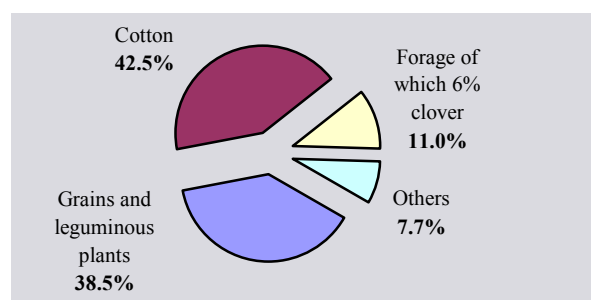
Sixty per cent of Uzbekistan's population lives in rural regions, and 62% of the land was used for agricultural production in 1999. Agriculture accounted for about 33% of GDP and 44% of total employment. The main agricultural areas are located in the basins of the Amu Darya and Syr Darya rivers, which supply about 70% of irrigation water.

#### *Irrigation*

Irrigation is vital for Uzbekistan's agriculture; in 1998 up to 12,000 m<sup>3</sup> of water was used per hectare (in 1993, 13,200 m<sup>3</sup>; in 1988, 15,100 m<sup>3</sup>). To boost profits from agricultural production, and especially from the cultivation of such strategic crops as cotton, Uzbekistan has invested heavily in extending its irrigation system. This has been done with little regard for the rational use of land and water or other environmental concerns. Agricultural land under irrigation constitutes 4.3 million ha. The irrigated land provides 95% of all agricultural production. For various reasons, every year, between 130,000 and 140,000 ha of irrigated arable land are not used for crop cultivation. The potential productivity of irrigated land is higher than current agricultural output would indicate.

The structure of cultivated irrigated lands in 1999 is presented in Figure 10.1:

**Figure 10.1: Cultivated irrigated lands structure, 1999**



*Source:* Statistical report of the Ministry for Macroeconomy and Statistics: V. 2000 year

Only about 0,8 million ha of arable land is not irrigated (*bogara*), mainly in Djizak, Kashkadarya, Navoi, Samarkand, Surkhandarya, and Tashkent oblasts. Were irrigation available, the potential arable land is estimated at 7 million ha. However,

it is not possible to irrigate more land due to the severe water shortage.

About 22 million ha of non-irrigated land are used as pastures and hayfields. Of those, 18 million ha are desert pastures, 3 million ha are foothill pastures (*adyrs*), 0,9 million ha are mountain pastures (*tau*), and 0.6 million ha are high mountain pastures (*yaylau*).

### *Agricultural Production*

Two crops have strategic significance for Uzbekistan: wheat for domestic purposes, and cotton as a source of income from export.

Cotton is the most important crop. Uzbekistan is the world's fifth largest producer of cotton, after the United States, India, China and Pakistan, and the second largest exporter. Seventy-five per cent of Central Asia's cotton fibre is produced in Uzbekistan. More than half the irrigated land – 1,517,000 ha - is under cotton production.

After 1991, during the first six years of independence, the area under cotton was reduced from 2,0 million ha to 1.5 million ha and replaced by grains. Average cotton yield was 2.2 tons/ha in 2000, down from 2.6 tons/ha in 1995. The international average is 3.2 tons/ha.

Between 1993 and 1994, the Government began a new policy of "independence in grains" and "self-sufficiency in wheat." Since that time, efforts have been made to increase grain production through State orders, subsidies and direct credits. The main grains are wheat and barley. The area under wheat production has increased by more than 200%, and irrigated wheat has replaced other crops, including cotton, vegetables, and fodder crops. According to official sources, Uzbekistan is now self-sufficient in grains. The average yield of wheat is 2.5 tons/ha, which is 1.4 times higher than in 1994, but still low compared to normal yields of up to 7.0 tons/ha. The structure of cereals production by crops is presented in Table 10.1.

The costs of cotton and wheat production in Uzbekistan are higher than on the international market. Uzbekistan has been able to compete on the international cotton market and achieve self-sufficiency in grains because it has increased the amount of land under cultivation; it has not yet succeeded in increasing yields per hectare or in introducing more effective agricultural technologies.

**Table 10.1: Structure of cereals production by crops, 1999**

Cereals production by crops	%
<b>Total</b>	<b>100.0</b>
Wheat	83.3
Other cereals	2.7
Corn	3.8
Rice	9.6
Grain legumes	0.6

Source: Republic Uzbekistan: the encyclopaedic guide, 2001.

The main vegetable is the potato, but other vegetables are cultivated as well. Due to the unique natural-climatic conditions more than one harvests of vegetables is usually possible. Nowadays vegetables are grown mainly as an accompanying crop for the internal market.

The area under perennial plants is about 400,000 ha with a relatively low yield. The absence of processing plants and storehouses, compounded by the State system for guaranteed orders for cotton and wheat, provide no incentives for farmers to improve and expand this branch of agricultural production. But producers of fruits and grapes have good prospects in Uzbekistan if provided with the appropriate policy and economic support. Nowadays they account for only about 7% of gross agricultural product (GAP).

Fruits include apple, pear, quince, cherry, plum, apricot, fig, pomegranate, melon and grape. The annual production of fruits and vegetables is more than 5 million tons. Uzbek melons are also well known as a traditional and high-quality crop. Grape production is the basis for more than 30 types of wine, brandy and champagne.

The area under fodder crop cultivation has been halved. The area under lucerne (alfalfa), in particular, has declined by two thirds. This not only negatively affects livestock breeding and livestock productivity, but it also has a negative impact on the quality and productivity of agricultural land. Lucerne is especially important as a rotation crop when producing cotton and grains. In Uzbekistan, crop rotation, in general, and lucerne production, in particular, have been neglected by agricultural producers as the country moves to a market economy. Producers are now mainly focused on producing cotton and grains every year on the same land without crop rotation. In the past

20 years the humus content of the soils has been reduced by 20% on average. The humus content of almost half the country's irrigated land is low.

Even responsible State bodies ignore agrotechnical rules and methodologies. Being leguminous crops, the fodder crops and lucerne, in particular, improve the quality of poor soils, enrich them with nitrogen and other useful elements, and provide a high-quality basis for livestock feeding.

One of the important branches of agricultural production is silk cocoon production as a raw material for natural silk production, which is based on ancient traditions and needs of the local population, as well as on the demand of the international market. Uzbekistan produces 30,000 tons of lackey moth cocoons a year, of which 70% is processed locally as raw silk and 30% is exported.

Livestock breeding has historically focused mainly on sheep (see Table 10.2 and Figure 10.2). According to official information, the sheep and goat stock has stabilized and the cattle stock grown. More than half the livestock breeding farms have been converted from *kolkhozes* (collective farms

from the Soviet era) into small farms. But realistic assessments show the need to further develop livestock breeding and improve its feeding base.

**Table 10.2: Production of livestock and poultry breeding food, 1998-2000**

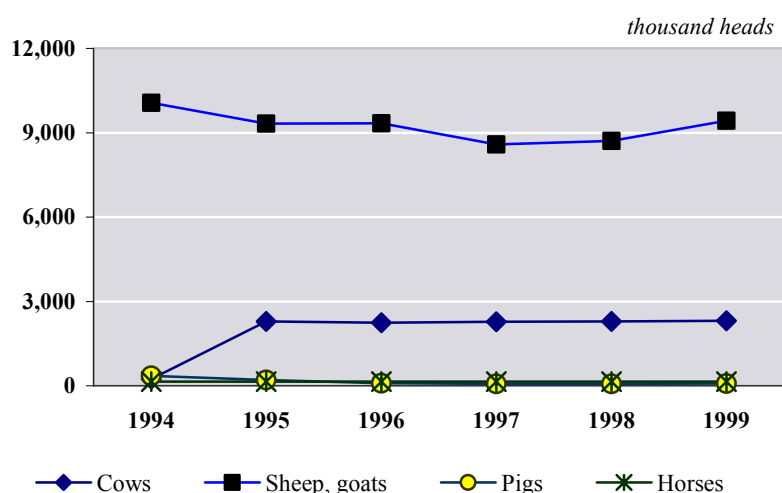
		1998	1999	2000
<b>Meat</b>	<i>thousand tons</i>	808.1	821.4	841.1
<b>Milk</b>	<i>thousand tons</i>	3,494.7	3,544.0	3,636.2
<b>Eggs</b>	<i>million</i>	1,164.9	1,239.2	1,252.9

*Sources:*

Republic Uzbekistan: the encyclopaedic guide, 2001;  
The basic indicators of social and economic development of the Republic of Uzbekistan in 1998 and 2000.

Table 10.3 shows the main agricultural production in the *oblasts* and in Karakalpakstan. The *oblasts* of Bukhara and Andijan are agriculturally the most productive. The least productive are the Republic of Karakalpakstan and the regions of Syr Darya and Djizak.

**Figure 10.2: Livestock numbers, 1994-1999**



*Source:* Republic of Uzbekistan: The encyclopaedic guide, 2001.

**Table 10.3: Agricultural production in regions (oblasts)**

Geographical Area	Crops
<b>Republic of Karakalpakstan</b>	Cotton, rice, sheep breeding, vegetables, melon, watermelon
<b>Andijan</b>	Cotton, cocoons, grains, orchards, grape
<b>Bukhara</b>	Cotton, grains, livestock breeding, silk cocoons, orchards, vegetables
<b>Djizak</b>	Cotton, grains, livestock breeding
<b>Kashkadarya</b>	Grains, cotton, vegetables, silk cocoons
<b>Navoi</b>	Cotton, grains, orchards, silk cocoons, sheep breeding
<b>Namangan</b>	Cotton, orchards, grape, silk cocoons, vegetables, livestock breeding
<b>Samarkand</b>	Cotton, orchards, grape, silk cocoons, tobacco
<b>Surkhandarya</b>	Cotton, melon, watermelon, subtropical crops, cattle breeding, sheep breeding
<b>Syrdarya</b>	Cotton, grains, orchards, cattle breeding, silk cocoons
<b>Tashkent</b>	Cotton, grains, orchards, grape, poultry and livestock breeding, silk production
<b>Fergana</b>	Cotton, grains, vegetables, potato, milk, eggs, honey, cattle breeding, silk cocoons
<b>Khoresm</b>	Rice, wheat, cotton, grape, melon, potato, cattle and sheep breeding

Source: Ministry of Agriculture and Water Management of the Republic of Uzbekistan, 2000.

## 10.2 Land reform and institutions

### *Land reform*

Agricultural reform started in 1998, when Parliament adopted a number of land reform laws:

<b>Land Code of the Republic of Uzbekistan</b>	30.04.1998
<b>Law on agricultural cooperatives (shirkats)</b>	30.04.1998
<b>Law on farms</b>	30.04.1998
<b>Law on State Land Cadastre</b>	01.08.1998

The Land Code (1998) establishes basic and comprehensive rules for all land-related relations. All of the Republic of Uzbekistan's land forms the "land fund". There are eight categories of land with different land-use regimes. Land rights figure prominently in the Code. Land is State property; it cannot be owned privately, but it is given for use. Physical persons may inherit land plots or may be given the right to use or lease land, either permanently or temporarily.

Agricultural land enjoys special protection, and irrigated land can be used only for agricultural purposes. The Code also establishes in detail the regime for use and protection of land that is granted to farmers, collective farms and juridical and physical persons for agricultural purposes. Provisions include obligations to rehabilitate damaged soil, to take measures against erosion, to remove and relay soil in cases of minerals use and to increase soil fertility.

The Code governs the relationships between all levels of administration on the one hand and users and lessees on the other. It lays down their rights and obligations. The principles of land consolidation, land monitoring, the establishment of nature-agricultural districts, categories of land plots, and State control over land use and protection are also included in the Code.

A special part of the Code addresses the basic requirements relating to agricultural land. According to those provisions, there are several legal types of agricultural producers, such as *shirkats* (cooperatives), farms and *dekhkans* (small family farms). Natural persons may inherit *dekhkans*. The size of *dekhkans* is fixed by the Code: up to 0.35 ha of irrigated land per family, or up to 0.5 ha non-irrigated land per family or up to 1 ha per family in desert and steppe areas.

The 1998 Law on Agricultural Cooperative (*shirkats*) defines the legal principles of the establishment, activity, reorganization and liquidation of *shirkats*, their rights and obligations, their relationships with other legal and natural persons. *Shirkats* are legal persons, usually groups of families or shareholders. Within the organizational structure of *shirkats*, farms and *dekhkans* can also be established. Only agricultural land is granted for permanent tenure to *shirkats* to be used obligatorily for agricultural purposes.

The Law on Farms defines the legal principles of the establishment, activity, reorganization and

liquidation of farms, their rights and obligations, their relationships with other legal and natural persons. Farms are legal persons that breed livestock or grow crops on land leased long-term. According to this Law, livestock breeding farms need to have a minimum of 30 animals and at least 0.3 to 0.45 ha of irrigated land 2 ha of non-irrigated land per head of cattle. Cotton and cereal farms need to have a minimum of 10 ha of land. Horticultural farms, vineyards and other crop farms should have no less than 1 ha of land.

The Law on State Land Cadastre establishes the legal basis for the development of the State land cadastre, which is a system of information on the natural, economic and legal regimes of land plots, their categories, qualitative characteristics and value, location, and so forth. Data from the cadastre are used for economic development, establishing rights to land plots, and the rational use, rehabilitation and protection of soils.

The State bodies responsible for the development of State land cadastre are the State Committee for Land Resources of the Republic of Uzbekistan and the Central Administration of Geodesy, Cartography and State Cadastre of the Cabinet of Ministers. The Republic of Uzbekistan's Law on Land Cadastre foresees the preparation of an annual report on the State of land resources.

The Cabinet of Ministers has adopted a number of bylaws in addition to the above-mentioned laws. Among them are:

- The Cabinet of Ministers' Resolution on the development of the land cadastre, 31 December 1998, No. 543;
- The Cabinet of Ministers' Resolution on Approval of Regulations for land monitoring in the Republic of Uzbekistan, 23 December 2000, No. 496.

The Land Code and the Law on State Land Cadastre have not yet been able to solve the country's economic and environmental problems. More than 20 articles of the Land Code contain provisions for improving soil quality and fertility, but new approaches, provisions and norms are necessary in order adequately to address to, soil erosion and land degradation, and to increase the yields of agricultural crops without negative environmental impacts.

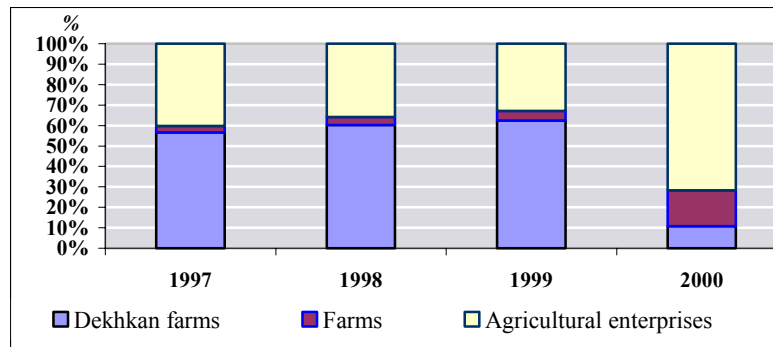
The development of a new law on soil fertility is the subject of wide debate. It is essential that it contain provisions for crop rotation, agrochemical services, soil expertise, State soil monitoring, limiting the negative impact agriculture is allowed to have on soils, recultivation, the protection of water, forests and pastures, "melioration," measures against erosion, desertification and pollution. It should also envisage the development of State support and economic mechanisms to improve soil fertility.

As a result of reform in the agricultural sector 95% of former *sovkhoses* has been reorganized as *kolkhozes*, *shirkats*, private livestock farms, joint-stock companies, rental enterprises, leasehold farms, agrifirms and other forms of agricultural industry (see Figure 10.3). The share of the non-State sector increased to 98.7% of agricultural production in 1999. Moreover, new organizational forms, such as *dekhkans* and farms, have been developed. One of the reform priorities was the development of farms. In January 2000, 42315 farms were registered. (Established during the Soviet period, *sovkhoses* are State-owned farms that are financed directly from the State budget and whose produce must go to the State. In 1991, when reforms were first introduced, Uzbekistan counted 1052 *sovkhoses*. The *kolkhozes* are large, non-governmental enterprises with a complex internal structure and management system. They have had the *de jure* right to market their output, but they have depended on the Government, which continues to control credit resources, inputs and, to some extent, sales. In 1991 Uzbekistan counted 971 *kolkhozes*.)

The restructuring of former *kolkhozes* and *sovkhoses* and the creation of farms started well before the approval of appropriate legislative acts. The year 1999 became the most important year for deepening market relations in Uzbekistan's agriculture. In spite of the restructuring of agriculture, related services, such as banking, agricultural supply and agricultural technology, have not yet been reoriented to the market economy. They have remained under State competency.

Figure 10.3 shows the increasing trend in GAP from small family farms (*dekhkans*) since 1997. Their production has grown much faster than that of cooperatives (*shirkats*).

**Figure 10.3: Distribution of cultivated areas on irrigated lands by categories of farms, 2000**



Source: Republic of Uzbekistan: the encyclopaedic guide, 2001.

In spite of all these achievements, the performance of the agricultural sector has not been satisfactory, with a sharp decline in farm output and productivity, and deterioration in household incomes.

- Although land reform began in 1990, it is still only at an initial stage of implementation.

One of the policy documents adopted by the Cabinet of Ministers of the Republic of Uzbekistan in October 1999 was the National Action Programme for Environmental Protection for 1999-2005. This Programme identifies measures to use natural resources rationally, through the efficient use of agricultural land and the improvement of irrigation and drainage systems. It also sets out specific activities to solve the environmental problems in the agricultural sector, including:

- The development and implementation of an integrated system of plant protection against pests and diseases with the use of pesticides that are safe for humans and animals, the establishment of a network of biofactories and biolaboratories to protect agricultural crops by biological means, and strengthening entomological services. The responsible agencies are the Ministries of Health, and of Agriculture and Water Management, the State Committee for Nature Protection, the oblasts, municipalities and *rayons*. Envisaged financing: 300-million-sum budget from all stakeholders.

- The development and adoption of a national action programme to combat desertification. The responsible agencies are Glavhydromet, the State Committee for Nature Protection, the Ministry of Agriculture and Water Management. Envisaged financing US\$ 30,000 from the Global Environment Facility (GEF).

#### *Institutions*

The Ministry of Agriculture and Water Management is the primary decision-making body for agriculture. It has responsibility for:

- Developing a unified policy for agriculture, based on professional knowledge, effective and rational use of land, water and forest resources;
- Coordinating activities to further reform agriculture and monitoring that reform, restructuring agricultural production, and providing practical assistance to the new *sherkats* and farmers in their relations with purchase and service organizations;
- Developing an effective investment policy;
- Promoting modern agro-technologies and establishing a monitoring system for agricultural production aimed at increasing export profits;
- Considering the structure and volume of agricultural crops according to the requirements of both international and domestic markets;
- Developing livestock breeding, veterinary and other services;

- Protecting water resources and ensuring their rational use, managing the State water cadastre, taking measures to improve irrigated land.

The Uzbek Scientific-Industrial Centre of Agriculture in the Ministry of Agriculture and Water Management is a union of agricultural research institutes, offices and other scientific-industrial units. The Centre is responsible for scientific studies in agriculture, the development of modern agricultural technologies, the implementation of new technologies, the transfer of international know-how to Uzbekistan. There are several scientific institutes within the Centre, including the Institute of Cotton, the Institute of Plant Protection, the Institute of Irrigation and the Institute of Soil Science.

The State Committee for Land Resources (*Goskomzem*) was established in 1998. Its main objectives are implementing State policy for the rational use of land resources, enforcing the Land Code, monitoring, assessing and controlling the state of land, developing a land cadastre, registering land rights, and preparing and implementing the National Programme for the Improvement of Land Fund Use. The Chair of the Committee is the Main State Inspector for land use and protection. The Committee coordinates land cadastre development and land monitoring.

The Institute of Soil Research and Agrochemistry of the State Committee for Land Resources carries out research and studies to protect and improve soil fertility.

Uzgeodezcadastre of the Cabinet of Ministers implements specific projects, and carries out investigations and studies for land monitoring, the development of the State land cadastre, etc.

The State Committee for Nature Protection is responsible for controlling the functions relating to land in specially protected environmental territories, land of the water fund, and radiation and chemical pollution throughout the country.

*Glavhydromet* is responsible for monitoring agricultural land, soil pollution, in particular in agricultural areas and around industrial cities. It produces an annual report with its monitoring results. Most of its tests concern chlororganic and phosphorganic pesticides and herbicides.

### 10.3 Agricultural land and environmental concerns

Land and water resources are of key importance for the economy of Uzbekistan. The land fund is subdivided into seven land categories.

#### *Environmental problems*

Almost all *oblasts* suffer from environmental problems caused by agriculture, but the *oblasts* of Khoresm, Fergana, Navoi and Bukhara are particularly affected. The main environmental concerns include:

- The inefficient use of irrigation water and water pollution due to agricultural activities;
- Land-related problems, including salinization of the soils and desertification;
- The accumulation of agricultural chemicals; and
- Food contamination.

Water shortages are the result not only of the inefficient use of irrigation water, but also of superannuated irrigation equipment and techniques, which cause a total loss of 60% of irrigation water, including 20% in the irrigation process alone.

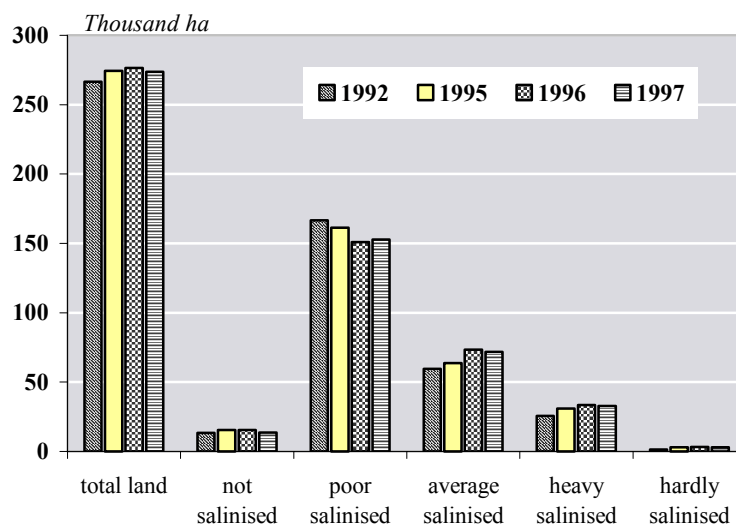
Most surface and groundwater pollution is caused by irrigation. It is very common for irrigation water to be taken from the same surface water sources used to collect drainage. This happens especially in the lowlands. The main *oblasts* where the drained irrigation water is discharged into surface water bodies and streams are Fergana, Tashkent, Andijan, Bukhara and Kashkadarya.

The concentration of nitrates, pesticides and hydrocarbons in groundwater and in open water reservoirs is high, but it is difficult to draw conclusions about the real concentrations of agrochemicals in those waters, because the composition of drained water is not measured. Water pollution by farming can be assessed by systematically measuring pollution in water streams, where most irrigation water ends up.

#### *Land-related environmental problems*

Land-related environmental problems were the subject of priority discussions in the 1998 NEAP. These concerns are: (i) increasing soil salinity; (ii) increasing soil erosion; (iii) soil contamination by fertilizers and pesticides and contamination of food; and (iv) degradation of pastures.



**Figure 10.4: Land salinisation in Bukhara oblast, 1992-1997**

Source: Bukhara oblast Committee of Nature Protection, 1997.

Figure 10.4 gives information on the problem of salinization in Bukhara oblast. Table 10.4 represents the main environmental problems in agriculture, their consequences and possible solutions.

Livestock farming is the largest land user in Uzbekistan. Over 50% of the land used is arid or mountainous pasture. The breeding of cattle is concentrated in the main on irrigated lands. Sheep breeding is concentrated on desert and mountain pastures (non-irrigated lands). Sheep breeding has damaged sensitive arid ecosystems. Indicators of this damage are the reduction in pasture productivity, increased water and wind erosion, and aridity.

Desertification is also accelerated through intensive agriculture, wind, water and pasture erosion and secondary salinity. At present, 46% of irrigated land is saline, an increase from 38.2% in 1982 and 42.8% in 1995.

#### *Accumulation of agricultural chemicals*

The application rate of agrochemicals was very high in Soviet Union times. The phosphor and potassium fertilizers were imported, in particular from other former Soviet Union regions (Kazakhstan and Russia). The fertilizer plants in Navoi and Fergana still produce nitrogen fertilizers.

Although Uzbekistan's need for fertilizers is high, the rural population—both new farmers and

dekhkan farmers - is not in a position to pay for the large quantity it needs. Consequently, the reduction in the use of agrochemicals to 35-40% of its former level has socio-economic reasons. On the other hand, statistics indicate that there is still a significant problem of both overuse and unregulated use of agrochemicals. Data from 1998 show that, during the past decade, annual fertilizer use peaked at 1.4 million tons.

The population is still constantly exposed to the danger of diseases caused by chemical contamination of foodstuffs, which occurs both at industrial enterprises and in agriculture (because of pesticide and mineral fertilizer application). Moreover, due to the specific peculiarities of cotton cultivation and the location of the cotton fields near rural settlements, the rural population is generally warned about the risk.

The quality of food is monitored at different levels. The Ministry of Health, its Sanitary Epidemiological Service (SES), and the Veterinary Service dependent on the Ministry of Agriculture are responsible for food monitoring. Imported food is inspected at random at the border. The State Veterinary Service randomly samples locally bred animals and meat and milk products. However, milk products, for example, are only monitored when they arrive at a milk treatment plant or are sold on the market. Meat is only controlled after slaughtering, when it arrives on markets or is processed.

Table 10.4: Summary of main environmental problems in agriculture

Land problems	Causes, consequences, effects	Suffered oblasts and spreading	Required measures
Soil salinity	<ul style="list-style-type: none"> <li>– 50% of arable irrigated land is saline</li> <li>– of this amount 500,000 ha of land is hardly and average salinized</li> <li>– arid zone climatic conditions, which speed up soil mineralization</li> <li>– large-scale irrigation is a cause of secondary soil salinity</li> </ul>	<ul style="list-style-type: none"> <li>– upper basin of rivers (less than 10%)</li> <li>– lower basin about 95%</li> <li>– total 200 thousand ha of land is high in salinity</li> <li>– Karakalpakstan, Bukhara, Khoresm, Navoi, Syrdarya</li> </ul>	<ul style="list-style-type: none"> <li>– improvement of drainage capacities, in particular vertical drainage</li> </ul>
Soil erosion	<ul style="list-style-type: none"> <li>– strong, dry winds</li> <li>– excessive irrigation</li> <li>– over grazing</li> <li>– cultivating on slopes</li> </ul>	<ul style="list-style-type: none"> <li>– affected areas by erosion account to 65-98 % in Bukhara, Navoi, Fergana, Kashkadarya</li> <li>– affected land by water erosion accounts to 50-60% in Tashkent, Namangon, Andijan</li> </ul>	<ul style="list-style-type: none"> <li>– planting forest belts and multi year grass bands</li> <li>– creation of terraces on the slopes</li> <li>– implementation of appropriate agromeliorative and hydrotechnical methods in specific erosion cases</li> </ul>
Soil contamination	<ul style="list-style-type: none"> <li>– use of fertilizers and pesticides</li> <li>– contamination reduced by 4 times since 1990</li> <li>– while content of chemicals in soils is at acceptable level, the past contamination still remains a problem</li> </ul>	<ul style="list-style-type: none"> <li>– in the past almost 90% of land was contaminated by pesticides and fertilizers</li> <li>– biggest quantity of nitrates, phosphates has been discharged through drainage to watercourses and surface waters.</li> <li>– introduced on the all territory of country</li> </ul>	<ul style="list-style-type: none"> <li>– wise use of agrochemicals</li> <li>– introduction and implementation of integrated methods (complex methods: chemical, biological, agrobiological, etc.) of crops pests and diseases control and fertilization</li> </ul>
Degradation of pastures	<ul style="list-style-type: none"> <li>– feeding capacity has been lost due to over-grazing, livestock-compaction, lack of phytomelioration, lack of forage, loosening control on use of pastures</li> <li>– lack of rules and regulations in a new agricultural reform conditions</li> <li>– pastures degradation resulted in soil degradation, mudflows, landslides, floodings</li> </ul>	<ul style="list-style-type: none"> <li>– 33% of pastures are degraded</li> <li>– 30% of degraded land is highly degraded</li> <li>– landslides are highly introduced in mountains of Fergana valley</li> <li>– mudflows are frequent in mountains of Tashkent and Kashkadarya oblasts</li> </ul>	<ul style="list-style-type: none"> <li>– development of main scheme and new regulations for pastures management</li> <li>– implementation of phytomelioration</li> <li>– improvement of pasture use practice, such as pasture rotation</li> <li>– stimulation of feeding crops cultivation in farms</li> </ul>

Source: Ministry of Agriculture and Water Management of the Republic of Uzbekistan

### Box 10.1: Impact of drought in 2000

In 2000, severe drought and water shortages affected northwest Uzbekistan, in particular the Republic of Karakalpakstan. Much rice, cotton and fodder was lost. Poor water management and maintenance of the irrigation system and unsustainable cropping patterns exacerbate the impact of droughts. Forty-five thousand people faced severe food shortages and required food assistance. Changes in diet had taken place in recent years, coinciding with the decline in agriculture productivity at household level. Land degradation had already affected the production of vegetables and fruit. The poorest households suffered chronic malnutrition. Climate predictions indicate that the number of hot days unfavourable for crops and pasture vegetation would increase during the spring-summer period. If there is a water deficit and the temperature is high, yield losses may amount to 10-50% for vegetable crops; 9-15% for cotton crops; 10-20% for rice crops; and 10-30% for melon crops. As for the desert pastures, green fodder reserves may decrease by 20-40%.

During the period before Uzbekistan's independence, agricultural airfields were used to house crop duster airplanes and pesticides. These airfields were closed in the early 1990s because they presented a hazard for human and animal health. The storage of all hazardous pesticides has been forbidden. The old storage sites have been mapped, but they still pose a danger to people. There are 39 such sites in Fergana and Samarkand oblasts, and 51 in Karakalpakstan and other oblasts. The soil has been analysed and chlorganic pesticides were found in quantities that exceeded maximum allowable concentrations (MAC) by a factor of 2 to more than 100. According to statistics, more than 100 ha of contaminated soils are used to grow wheat in Navoi, Surkhandarya, Djizak, and Syrdarya oblasts, 4 ha to grow corn in Karakalpakstan, 80 ha to grow rice in Khoresm and Tashkent oblasts, and 30 ha to grow fodder crops in Syrdarya and Navoi oblasts. Unfortunately, the warnings of ecologists are very often ignored.

#### 10.4 Conclusions and recommendations

Land reform, which began in Uzbekistan in 1998, is still in its early stages of implementation. The Ministry of Agriculture and Water Management as an empowered governing body should promote gradual reform and the implementation of a concomitant agrarian policy to this end. The time frames should become the subject of intergovernmental discussions and should be realistic.

Further development of agricultural legislation and agrarian policy, based on environmental considerations and the rational use of natural resources in agriculture, will be vital for the success of this reform.

##### Recommendation 10.1:

*The Ministry of Agriculture and Water Management, the State Committee on Land Resources and the State Committee for Nature Protection should improve land and water legislation, with a special focus on the development of mechanisms for its implementation as well as market economic mechanisms, which stimulate land users to conduct anti-erosion and other measures for protection and rational use of land and water resources and which create conditions for profiting from agricultural activities. (See Recommendation 5.4)*

In order to speed up the agricultural reforms, Uzbekistan needs to revise existing and develop new legislation, in particular provisions on land ownership, the establishment of a real open market, price liberalization, the independence of agricultural producers, moving from *shirkats* to farms, *dekhkans* and other forms of agricultural production. This will require, among other things, better coordination among national, *oblast*, *rayon* and local institutions, the definition of responsibilities of all levels of government dealing with land and agriculture; and more consideration to the environment in agricultural practice.

##### Recommendation 10.2:

*The Ministry of Agriculture and Water Management, in cooperation with the State Committee for Nature Protection, should develop a law on soil fertility. This law should incorporate both economic mechanisms and agro-ecological mechanisms in an effort to increase soil fertility and improve the state of the soils overall.*

The negative impact of agriculture on the environment in Uzbekistan is evident, yet agricultural production is heavily dependent on the diversity of natural-climatic conditions. Also, the agricultural sector is not developing effectively. Foreign partners and donor organizations interested

in cooperating with Uzbekistan could help it to assess the best ways of reforming the sector by mobilizing technical and financial assistance.

Recommendation 10.3:

*The Ministry of Agriculture and Water Management, in cooperation with the State Committee for Nature Protection, should identify sites in different ecological or agricultural zones for the implementation of pilot projects that can illustrate the value of agricultural reform and sectoral development and attract external investment*

Environmental media, such as land and water, are severely affected by agriculture. Good management and sufficient investment could improve conditions. Possible measures include improving the security of land tenure, encouraging competition and private sector development, incorporating environmental concerns into the land reform (for example, by introducing appropriate charges, permits, restrictions, and new pricing and taxation systems), applying appropriate agricultural techniques, such as crop rotation, developing integrated measures to use and protect agricultural land and water resources and controlling desertification through agricultural improvements and afforestation.

Recommendation 10.4:

*The Cabinet of Ministers and the State Committee for Nature Protection should facilitate dialogue with all stakeholders and engage their cooperation in repairing damage caused to land and improving agricultural practices in order to reduce the environmental pressure on land.*

Studies and analyses have shown that soil quality is getting worse. The State Committee for Nature Protection has, consequently, made proposals to the Cabinet of Ministers to improve the situation both to the benefit of the economy and in an attempt to reduce land under cultivation. Some of those recommendations focus on measures to decrease land under wheat cultivation, increase yields (efficiency) and increase the area under lucerne cultivation. Measures foreseen by existing legislation should be implemented to decrease dependence on irrigation and conserve arable plots.

There is also a need to refocus on the application of safer pesticides and biological means (widening and strengthening the network of biofactories and biolaboratories), crop rotation with the cultivation of leguminous fodder crops, training and advice to

farmers through the establishment of multi-profile and highly professional extension services, and strengthening food quality control.

Recommendation 10.5:

*The Ministry of Agriculture and Water Management should introduce and implement environmentally friendly methods of agricultural production and integrated plant protection against pests and diseases to prevent increasing food contamination.*

To promote efficient and environmentally sustainable agriculture in the new economic circumstances is one of the most important tasks for the Government. A major obstacle to the development of environmentally sustainable agriculture is the inefficient use of irrigation water. Irrigation itself very often causes a secondary negative impact on land and water resources (i.e. secondary salinization of soils, pollution of surface and groundwaters in closed cycle conditions). Irrigated farming is the main source of surface water pollution.

A huge investment is required to make the agricultural sector sustainable. To protect the environment it is necessary to develop reliable sources of financing for agriculture by combining social funds, micro-credits and external assistance.

Recommendation 10.6:

*The Ministry of Agriculture and Water Management should make all efforts to upgrade and repair existing irrigation and drainage systems, as well as apply modern and efficient irrigation methods and technologies.*

Current agricultural conditions have endangered the pastures, and this, in turn, is likely to threaten food security. The largest payoff in livestock production could come from improved fodder crops, better management of natural pastures and compound-feed production. All this needs to be facilitated by targeted subsidies and private investments, training and awareness-raising.

Recommendation 10.7:

*The Ministry of Agriculture and Water Management and the State Committee for Nature Protection and State Committee on Land Resources should improve both short- and long-term planning for the use and management of agricultural land.*



## Chapter 11

# ENVIRONMENT AND ENERGY

### 11.1 General energy overview

#### *Availability of energy reserves and resources*

Uzbekistan is well endowed with fossil fuels and mineral resources. Energy supply is mainly composed of hydrocarbons. Uzbekistan's oil and gas industry is able to provide more than 90% of the fuel required by the country. Uzbekistan's natural gas potential is comparable to that of the Netherlands and Indonesia, and ranks among the 15 largest in the world. However, the deposits have not yet been entirely explored due to a lack of investment. According to the State oil and gas company, Uzbekneftegas, in January 2000, oil resources, including condensate, were evaluated at roughly 5,060 million tons, but only 770 million tons were explored and even fewer were considered as reserves. Natural gas resources were estimated at 5,430 billion m<sup>3</sup>, of which reserves represented about 2,000 billion m<sup>3</sup>. At present, other energy resources, in particular coal and uranium, are less important, but that might change in the longer term. Coal resources are evaluated at 2,000 million tons, and uranium reserves rank seventh worldwide. In

January 1999, the known uranium resources recoverable at less than US\$ 80/kg amounted to 125,000 tons, as recoverable resources adjusted for depletion.

Uzbekistan's total renewable resources (hydro, geothermal, solar, wind and biomass) are evaluated at 6,750 million tons of oil equivalent (toe), but only 180 million toe are economically viable, of which only 0.33% is currently being used. The hydroelectric potential could provide some 9-10% of total electricity production. However, such a target is unrealistic since water resources are becoming scarce.

#### *Energy supply and demand*

Since 1996, the country has been fully self-sufficient in its energy requirements. Oil, natural gas and coal are the major constituents of the national energy supply mix: natural gas supplies more than 80% of total energy demand; oil between 10 and 13%; and coal approximately 5%. During the 1990-2000 period, oil and natural gas supplies

**Table 11.1: Energy supplies, 1990-2010**

Energy sources	1990	1995	2000	2005	2010
Crude oil <i>million tons</i>	1.5	5.2	4.2	4.2	4.2
Condensate <i>million tons</i>	1.3	2.4	3.4	3.4	3.4
Oil + condensate <i>million tons</i>	2.8	7.6	7.5	7.5	7.5
Natural gas <i>billion m<sup>3</sup></i>	40.8	48.6	56.4	56.4	56.4
Coal <i>million tons</i>	4.7	1.6	2.5	5.4	12.0
Uranium (export only) <i>tons</i>	86,422	86,400	3,000 *	...	...
Electricity <i>TWh</i>	56.3	47.5	46.9	54 - 55	63 - 65
Heat <i>million Gcal</i>	58.7	56.5	53.1	57.8	62.2

*Sources:*

- Initial Communication of Uzbekistan under the United Nations Framework Convention on Climate Change, 1999 (the medium scenario is shown for 2005 and 2010);
- Energy Efficiency and Energy Supply in CIS, UNECE, 2001;
- UzbekEnergO.

*Note:*

\* IAEA, Uranium 1999 Resources.

constantly increased: oil and condensates reached 7.537 million tons in 2000 up from 2.8 million tons in 1990, an increase of 275%; and natural gas increased by 35%, from 41.8 billion m<sup>3</sup> in 1990 to 56.4 billion m<sup>3</sup> in 2000. However, no further growth in gas and oil production is foreseen before 2010, though coal supplies are to be increased by around 430%.

Uzbekistan has been a net exporter of energy since 1996, mainly of natural gas, electricity, petroleum products and uranium. This trend will continue. Exports of natural gas and electricity can be increased to 15-18% of annual production. Uzbekistan has a sufficiently powerful system of gas mains that allow transporting natural gas to local consumers as well as exporting it. The total extent of gas mains is about 13 thousands km. Pipelines with diameter of 1200 mm and 1400 mm are part of gas mains "Central Asia Center" and "Bukhara Ural". The neighbouring countries Kazakhstan, Kyrgyzstan and Tajikistan are supplied with Uzbek gas. In addition Turkmenistan uses this gas transportation system for its own gas exports. At present, exports are rather constrained because the importing countries are failing to pay for deliveries and because of the lack of export alternatives to the Central Asia-Central Russia

pipeline, which connects Uzbekistan to the Russian Federation and the other republics of the former Soviet Union. Uzbekistan has made efforts to develop alternative export routes: one proposal calls for extending the above-mentioned pipeline in order to export gas to Europe; the second alternative is to identify new markets in Asia. In 1995, Uzbekistan signed a memorandum of understanding with Turkmenistan, Afghanistan and Pakistan to participate in the construction of the Central Asian Gas (Centgas) pipeline project, with a view to exporting gas to Pakistan and India. Uzbekistan may also participate in a proposed 5,000-mile pipeline to bring gas from Turkmenistan and Kazakhstan to China.

Uzbekistan's energy system is a component part of the united energy system of Central Asia. Some exports are part of an intergovernmental agreement among Uzbekistan, Kyrgyzstan and Kazakhstan to share the region's water and energy resources. Under this agreement, Kyrgyzstan supplies surplus power generated by its hydroelectric plants to Uzbekistan during the summer, and receives electricity and natural gas from it during the winter.

### **Box 11.1: Development of new oil and gas deposits**

Uzbekistan is seeking foreign investment to increase prospecting for and development of oil and gas deposits. The President of the Republic of Uzbekistan signed on 28 April 2000 the Decree on Measures to Involve Foreign Investments into the Prospecting for and Development of Gas and Oil in order to establish good conditions for foreign investments. The Decree has the status of a law and defines priorities of development of oil and gas and stipulates advantages for foreign investments, such as simplified procedures for investments, custom and duties facilities.

Uzbekneftegas developed a Programme on prospecting to 2005. The Programme is directed towards the poorer regions such as Ustjurtsky, Suhandarinsky, and the Southwestern spurs of Hissar mountains. Uzbekneftegas has elaborated investments projects in 16 blocs of Uzbekistan oil and gas regions. Foreign companies are offered agreements for 25 years for the exploitation of new oil and gas deposits with the right of extension. UzPEK Ltd (operating company is Trinity Energy, UK) has been working on a production share basis since 1 July 2001 in four blocs, three in Ustjurt and one in the Hissar mountains. Partners in other investment blocs include companies like Naftogas, Metalurgiya, Industrial Union of Donbass, GASPEKS (Ukraine), Berlanga Holding (the Netherlands), Kazakhoil (Kazakhstan) and LUKoil and ITERA (Russian Federation). Uzbekneftegas has also teamed up with oil services giant Baker Hughes in a joint venture to increase oil production at the country's North Urtabulak field.

Uzbekistan plans to upgrade mining operations with foreign investment in the coal sector as well. Therefore, tenders were invited for the reconstruction of the Angren opencast coal mine, the major raw material base of the coal industry in Uzbekistan. Germany's Krupp Fordertechnik GmbH won the tender. The refurbishment project, which will be implemented over 10 years in six stages, stipulates a transition from cyclical coal extraction technology to the flow-line method. The cost of the first stage, which may start in late 2001, is approximately \$20 million, which will be funded by a German bank credit under Uzbek Government guarantee.

### Oil sector

Since 1990, Uzbekistan has substantially increased its crude oil production (including natural gas liquids), from 2.8 million tons in 1990 to 7.5 million tons in 2000. It ceased being a net importer of petroleum in 1995. The sector needs huge investments for exploration, exploitation and processing. The prospects of oil sector development depend on speeding up the geology prospecting works and discovering new deposits of oil, involving the experience and technical equipment

of specialized foreign companies. The recent Decree of the Uzbek President, on “Attracting Foreign Investments in Oil and Gas Exploration and Production” (issued on 26 April 2000) lays down the conditions for foreign companies wishing to invest in the oil and gas sectors.

At present, oil supplies fully satisfy domestic demand, and only a limited quantity of refined products is exported by rail and road to neighbouring countries. It is unlikely that this situation will change. One of the major problems is the lack of pipelines and Uzbekistan’s remoteness from world energy markets.

**Table 11.2: Oil production, 1995-2000**

	1995	1996	1997	1998	1999	2000
<b>Oil + condensate</b> million tons	7.6	7.6	7.9	8.1	8.1	7.5

Source: Uzbekneftegas, 2000.

The projection scenarios vary widely since it is not clear how much investment the sector will attract and whether the reserves will be confirmed. According to Uzbekneftegas, the volume of oil and gas condensate production should be kept stable at 7.5-million tons, which would be enough to meet future national requirements. The reason is that oil reserve exploration is limited at its current level. Most of the existing 85 oil deposits are small; the major exception is the Kokdumalak field in the Bukhoro-Khivi region, which accounts for some 70% of liquid hydrocarbon national production. All regions are targeted for exploration, including the Aral Sea and the Ustyurt plateau, but, again, this needs investments and confirmation of oil reserves. Moreover, oil from some deposits has a high sulphur content and needs processing before it can be used. Therefore, the prospects of the oil sector have to be considered throughout its entire chain, from exploration to oil refinery, and modernization throughout the whole chain is crucial to the country’s objective of self-sufficiency in oil.

Uzbekistan has two older refineries at Fergana and Alty-Arik, and a new one at Bukhara, which went on stream in 1997. Crude oil with a higher sulphur content is mostly supplied to the Fergana refinery for processing. Since 1998 Japanese companies, namely Mitsui and Toyo Engineering, have been involved in expanding its desulphurization capacity. The first stage was completed in 1999, by introducing a modern wet-desulphurization unit. The World Bank also financed a project at Fergana

to clean up the hot gases. Modernization has not yet been completed. The Fergana refinery has a capacity of 5.6 million tons a year. It was designed to produce transmission and hydraulic lubricants from local crude oil. The Alty-Arik refinery has a capacity of 3.2 million tons a year and produces mainly fuels. The first phase of the new refinery in Bukhara (2.5 million tons/year) went on stream in 1997. This refinery was designed to process condensates from the Kokdumalak field, and to produce high-quality petrol, diesel fuel and kerosene to world standards.

With the construction of a new refinery at Bukhara, Uzbekistan’s current total refining capacities have been increased to 11.1 million tons a year. Therefore, it is worthwhile considering all opportunities for importing an additional 3 million to 4 million tons a year of crude oil from Turkmenistan, Kazakhstan, and even the Russian Federation, in exchange for the export of oil-refined products or natural gas. This alternative would be realistic if the current modernization of refining capacities could increase the range of products, improve their quality and make refining processes more efficient.

### Gas sector

Natural gas is the most important energy resource for the national economy. Gas provides more than 80% of total energy consumption, and it will continue to be the major energy resource in the



future. Stocks of natural gas have been identified in 134 deposits, of which 53 are developed, 48 are prepared for industrial development, and 63 deposits contain a condensate in their composition. Gas production is concentrated in especially in southeast Uzbekistan, in older fields, such as Shurtan and Kokdumalak. The richest gas district, however, is the Ustyurt region of which, according to geological assessment, 60% is located in Uzbekistan and 40% in Kazakhstan. To offset declining production at some older fields such as Uchkir and Yangikazgaen, Uzbekistan is attempting to speed up the development of some of the other existing fields, such as those at Gadzhak and Kandym. Similar to the situation with oil, further exploration involves substantive foreign investments.

The development of gas production is shown in Table 11.3.

**Table 11.3: Gas production, 1995-2000**

	1995	1996	1997	1998	1999	2000
<b>Gas</b> billion m <sup>3</sup>	47.6	49.0	51.2	54.8	55.6	56.4

Source: Uzbekneftegas, 2000.

Natural gas production will remain at the same level until 2010, while consumption is to be significantly reduced, in accordance with a national energy-conservation programme to be implemented after 2001.

The major consumers of natural gas in 2000 were the following: (a) households, 17.0 billion m<sup>3</sup>; (b) the power-generating sector, 14 billion m<sup>3</sup>; (c) the gas industry itself, 11.25 billion m<sup>3</sup>; and (d) the chemical industry, 2.30 billion m<sup>3</sup>. The gas industry's own consumption looks substantive; it includes gas transport, recycling processes, compressor stations and losses. The total underground storage capacity is 4.60 billion m<sup>3</sup>. The second underground storage facility, Khodjabad (Andizhan region), was opened in 1999. It allows for increased shipments to local industry in the Fergana Valley. In 2000, gas exports were limited to Kazakhstan. Excluding the gas industry's own consumption, domestic consumption can be broken down by sector as follows: households, 45%; industry, 30%; and power generation, 24%. The Government is currently implementing a programme to increase the share of natural gas in the domestic sector and particularly in the rural areas.

Natural gas in Uzbekistan is a multi-component feedstock, which varies widely in its composition depending on its field of origin. Apart from methane, it contains a large number of light and heavy hydrocarbons. In general, most of Uzbekistan's natural gas requires processing because it has high sulphur content (2.5-2.7%). Gas processing aims to: (a) capture the sulphur; (b) extract the most valuable products (fraction C5 H12 and higher), and (c) extract the liquefied petroleum gas (LPG). The gas-processing branch is represented by Mubareksk Gas Processing Plant (GPP) and by technological installations for gas purification from sulphur contents at Shurtanneftegaz (unitary branch plant). Mubareksk also has technological installations for the production of stable condensate and liquefied gas.

The Shurtan Gas-Chemical Complex was built on Shurtan deposits, of which natural gas has a high concentration of hydrocarbons components. It is one of the biggest complexes in the Central Asia region, and it produces polythene, condensed gas and light condensate. The Complex should go on stream by the end of 2001, which means the rise of a new branch for the Uzbekistan oil-chemical branch. The Mubarek Plant went on stream in 1973 (first block). It was designed for desulphurization and sulphur production, low-temperature separation and condensate stabilization. At present, the plant is processing around 24.0 billion m<sup>3</sup> a year. Plant capacity will be maintained at this level. For this reason and to replace old installations, new installations for processing natural gas with a low sulphur content (universal blocks) will be installed.

The Shurtan Petrochemical Plant began operation on 15 May 2001. This is a modern industrial complex for processing natural gas with a low sulphur content, mainly from the Shurtan field. However, in the future it will also be treating feedstock from many comparatively small fields (South Tandyrycha, Adamtash and Gumbulak). The Shurtan condensate contains a high percentage of aromatic hydrocarbons, making it a valuable feedstock for refinery synthesis. The natural gas from Adamtash and Gumbulak is rich in light hydrocarbons (ethane, propane and butane), which require a low-temperature treatment at the initial phase. The Shurtan plant will start by processing some 4.0 billion m<sup>3</sup> of gas using the ethanolamine method, and then, at a later stage, will process natural gas from all the fields in the region, and transfer it to the Shurtan-Syrdaria-Tashkent gas pipeline. Undoubtedly, this will significantly

reduce the noxious emissions from power plants using this gas in the region.

According to Uzbekneftegas, with the introduction of the Shurtan Gas-chemical Complex and the rehabilitation of the Mubarek Plant, processed gas is expected to increase from 30-35 billion m<sup>3</sup> in 2001 to 45 billion m<sup>3</sup> in 2010. In addition, the range of refined products should be increased, and, ultimately, the impact of the gas sector on the environment mitigated.

### *Coal sector*

Uzbekistan's coal reserves are concentrated primarily in the Angren, Baisun and Shargun deposits. The Angren coal deposit is the largest, with production capacity of 1 million tons per year of brown coal used for power generation. The Baisun and Shargun deposits contain hard coal of a better quality, but their production is limited. Exploitation is carried out by the Ugoli (Coal) joint-stock association, with five mining enterprises. Three of them are developing the Angren brown-coal deposit by using open-cut mining, and the other two, hard coal by using underground methods of exploitation. In addition, the Angren mine has underground coal gasification technology in place, designed to produce some 2.3 billion m<sup>3</sup> of gas from brown coal seams.

According to the objectives of the National Energy Strategy, 2000-2010, coal should significantly increase its share in the energy mix over the next decade. Coal production declined from 4.7 million tons in 1990 to 2.5 million tons in 2000, but will increase to 12.0 million tons by 2010. (See Table 11.4).

**Table 11.4: Coal production, 1996-2000**

	1996	1997	1998	1999	2000
<b>Coal</b> million tons	1.4	1.7	2.0	2.1	2.5

*Source:* Coal Joint-Stock Association, 2001.

Almost 96% of the 12 million tons projected for 2010 will be delivered to the power-generating sector, and the remaining 4% to households and the public sector. This ambitious objective should follow the completion of a modernization programme for existing coal mines, giving priority to the Angren opencast exploitation. Recently, Krupp Hoesch Stahl export (Germany) signed an agreement to provide new equipment and upgrade

mining operations in the Angren mine, which should lead to an increase in output of some 0.3 million tons a year.

Mining operations at other deposits are also expected to be modernized and upgraded. The Shargun and Baisun deposits are smaller than that of Angren (their capacity is 460,000 tons a year), but additional investment at the Shargun deposit is expected to double or even triple its current production level. The operation of a second mine at Baisun is under consideration, so together the Shargun and Baisun mines might supply a surplus of coal for export in the future.

### *Electric power generation*

The electric power generation sector has a total installed capacity of 11,264 MW. There are nine thermal power plants with a joint installed capacity of 9,844 MW or 88% of the total, and 28 hydropower plants with a joint installed capacity of 1,420 MW. In addition, 2 hydro stations with a capacity of 290 MW that belong to the Ministry of Agricultural and Water Management are connected to the electric system. The biggest hydropower plant is Charvak, with an installed capacity of 620 MW. The thermal power plants are ranked by order of capacity in Table 11.5. The annual production level can reach 50 – 55 TWh.

The State-owned joint-stock company, UzbekEnergy, is the major electricity generator, producing 98% of electricity and 35% of heat demand. In 2000, the power sector produced 46 TWh, of which 90.8% from the thermal sector and 9.2% from hydropower plants. This is 16% less than the electricity produced in 1990, but that is typical of all countries in transition that are reshaping their macroeconomic infrastructure. The structure of the energy mix (in percentage) used for electricity generation over the past five years and forecasts to 2010 are shown in Table 11.6. and Figure 11.1

Natural gas is set to remain the major energy source for electricity generation. The share of electricity generated from coal will rise significantly by 2010, while that of heavy oil will remain fairly stable. At present, the electric power generation sector fully meets domestic requirements and is able to export surplus electricity to neighbouring countries. The head power block with a capacity of 800 MW is envisaged for the Talimarzhansk power plant (on natural gas of Shurtan deposits). A number of

**Table 11.5: Thermal power plants, 2000**

	Capacity <i>MW</i>	Efficiency <i>%</i>	Consumption <i>g/kWh</i>	Emissions from thermal power plants				
				CO <sub>2</sub> <i>ton/toe</i>	SO <sub>2</sub> <i>kg/toe</i>	NO <sub>x</sub> <i>kg/toe</i>	Solids <i>kg/toe</i>	Total <i>kg/toe</i>
<b>UzbekEnerg</b>	9,844	34.3	358	1.74	8.1	2.8	2.6	13.5
<b>Sir Darya</b>	3,000	34.4	357	1.68	6.2	3.7	0.02	9.9
<b>New Angren</b>	2,100	33.9	363	1.90	13.5	1.2	11.8	26.5
<b>Tashkent</b>	1,860	34.2	359	1.80	9.4	4.4	4.4	18.2
<b>Navoi</b>	1,250	32.6	376	1.60	1.3	2.2	3.6	7.1
<b>Tahiatash</b>	730	32.0	385	1.70	4.4	4.4	0.2	9.0
<b>Fergana</b>	330	63.0	196	2.00	27.3	1.6	0.3	29.2
<b>Angren</b>	484	35.6	345	2.77	57.5	2.7	38.2	98.4
<b>Mubarek</b>	60	79.0	155	1.60	0.1	2.6	0.0	2.7
<b>Tashkent 2</b>	30	81.8	150	1.60	0.1	1.1	0.0	1.2

Source: UzbekEnerg, 2001.

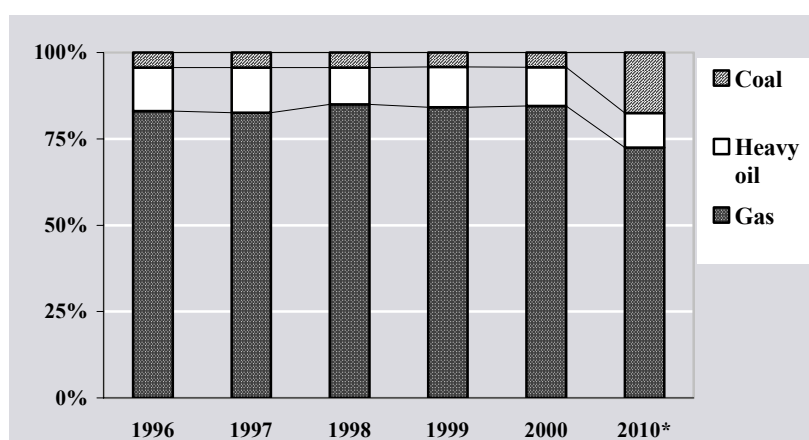
**Table 11.6: Electricity generation by type of fuel, 1996-2010**

	%					
	1996	1997	1998	1999	2000	2010*
<b>Total</b>	100.0	100.0	100.0	100.0	100.0	100.0
<b>Gas</b>	83.0	82.6	85.0	84.1	84.5	72.5
<b>Heavy oil</b>	12.6	13.0	10.6	11.7	11.2	10.0
<b>Coal</b>	4.4	4.4	4.4	4.1	4.3	17.5

Source: UzbekEnerg, 2001.

Note:

\* Forecast.

**Figure 11.1: Electricity generation by type of fuel, 1996-2010**

Source: UzbekEnerg, 2001.

Note:

\* Forecast.

combined steam and gas turbine blocks with 50-55% efficiency are envisaged for the Tashkent and Navoi thermal plants (steam station) and gas turbine blocks with 70-75% efficiency for Tashkent and Mubarek power plants. According to the National Energy Strategy, 2000-2010, electricity demand will grow 3% annually, reaching 34% more in 2010 than in 2000.

## 11.2 Impact of the energy sector on the environment

The exploration, production, transport and use of energy and energy resources are closely associated with harmful emissions, water pollution and land degradation. In Uzbekistan, the level of environmental damage caused by the fuel and energy complex is relatively high as the country is self-sufficient in energy and, in addition, is obliged to run large processing installations due to the low quality of local energy commodities. That is the reason why emissions from the gas and oil sectors are at the same level as those of the power sector, which is not the case in the European countries that are highly dependent on energy imports.

### *Fuel and Energy Complex (FEC) and related emissions*

Air emissions from energy installations are the major polluter of the environment. At present, emissions from the Fuel and Energy Complex (FEC) account for 67% of total emissions in Uzbekistan. According to national statistics (see Table 11.7), they have to be reduced by 18% between 2000 and 2010. Forecasts are based on the National Energy Strategy, 2000-2010, prepared by associated State agencies. Indeed, the FEC has the highest potential for reducing emissions. However,

according to Uzbekistan's initial national communication under the United Nations Framework Convention on Climate Change, further increases, not reductions, of greenhouse gases (GHG) are likely, since the forecasts presume constant GDP growth to 2010, while all energy-saving and technological rehabilitation measures require both more time and investments which have not yet been made. Nor is it likely that the attitude of energy consumers will change radically overnight. The trends in emissions from FEC are shown in Table 11.7.

At present, the oil and gas industry and power generation are the biggest emitters. The specifics of the oil and gas industries are such that their impact on the environment is spread throughout the full chain, from exploration to end use. Leaks from the 13,000-km gas network and the two underground natural gas storage facilities should not be underestimated. Between 1995 and 1999, more than 40 breaks occurred, followed by gas blast releases into the atmosphere, due to the corrosion of gas pipelines. The losses due to leaks and breaks amount to 12 million m<sup>3</sup> a year. In the oil sector, the main sources of emissions are gas processing, refineries and distribution of gas and gasoline.

In 2000, total emissions from the oil and gas sector (Uzbekneftegas) reached 241,000 tons (SO<sub>2</sub>, CO + CO<sub>2</sub>, NO<sub>x</sub> and volatile organic compounds). More than 35% is sulphur dioxide from the flaring of gas products or from flue gases. Losses due to the flaring of natural gas exceed 100 million m<sup>3</sup> a year. The main air polluters within Uzbekneftegas are the Mubarek Gas Processing Plant (70%), Shurtanneftegas (the unitary branch plant) (20%) and the Fergana refinery.

**Table 11.7: Emissions from the energy sector, 1996-2010**

	<i>thousand tons</i>					
	1996	1997	1998	1999	2000	2010*
<b>Total stationary sources</b>	<b>857.5</b>	<b>836.9</b>	<b>775.5</b>	<b>776.9</b>	<b>755.5</b>	<b>650.0</b>
<b>Total FEC</b>	<b>576.4</b>	<b>552.6</b>	<b>512.4</b>	<b>521.2</b>	<b>498.8</b>	<b>440.3</b>
<i>as % of total stationary source:</i>	<i>67.2</i>	<i>66.0</i>	<i>66.1</i>	<i>67.1</i>	<i>66.0</i>	<i>67.7</i>
<b>Oil and gas</b>	318.2	298.0	273.4	259.6	241.0	290.0
<b>Power</b>	256.1	252.2	236.5	259.3	255.5	147.3
<b>Coal</b>	2.1	2.4	2.5	2.3	2.4	3.0

Sources: National Statistical Bulletin, 2000.

Note:

\* State Committee for Nature Protection, 2001 (estimates).

From 1995 to 1999, Uzbekneftegas made a significant effort to reduce sulphur dioxide (SO<sub>2</sub>) and hydrosulphide (H<sub>2</sub>S) from flue gases. For example, more than 80% of H<sub>2</sub>S emitted from oil exploitation is burned on site in small boilers and utilities. New installations have been built on the Mubarek Plant, one to clean up the waste gases by catalytic methods and the second based on Sulfren cleaning methods. Another challenge for Uzbekneftegas is the desulphurisation of diesel fuels. Here the action started with a new installation in the Fergana refinery, where desulphurisation is a priority.

Furthermore, in accordance with point 3.3 of the Protocol of the Meeting of the International Commission on Economic Co-operation between Russian Federation and Uzbekistan, 19 April 2001, joint-stock companies Uzgeoneftegazdobycha and Russian Iskra-Energetika (city of Permi) are working together on the possible utilisation of self-contained Gas-Turbines Power Stations (GTPS) by using burned gases from Kokdumalak deposits. Implementation will require foreign investment since it will require an additional block to process the gas including a system of sulphur purification and compressing.

All of these changes have resulted in a decrease in the index of sulphurous anhydrite emissions from 50% in 1995 to 30% in 2000; the efficiency or extraction and neutralization pollutants from 8% to 20%; and a decrease in the index of over-standard emissions. This has translated into a reduction of sulphur emissions from 155,000 tons to 90,000 tons a year between 1995 and 1999. However, the current introduction of new processing capacities (Shurtan, Gas-Chemical Complex) will lead to further increases in total air emissions of some 5,000 tons after 2001. So the level of emissions will remain stable at 295,000 tons a year by 2005.

As mentioned above, in 1999, the level of total emissions from *power generation* was equal to that of the entire oil and gas industry. Although emissions in 2000 were around 20% lower than in 1990, this is linked to lower production of electricity (down 22%) and not the result of any policy or technical improvements. In 1999, the power-generating sector and the utilities within UzbekEnergo consumed 18,570,000 toe (83.33% gas, 12.02% oil and 4.65% coal), and emitted into the atmosphere 32,220,000 tons of carbon dioxide. Emissions in 2001 from the sector are set to peak at 326,000 tons and will continue to grow thereafter

(if measures are not taken) at the same pace as the rate of electricity demand. At present, almost 40% of carbon dioxide emissions from fuel combustion come from this sector. Thermal power will remain the main source of electricity. Therefore, CO<sub>2</sub> reductions can be achieved through efficiency improvements and energy conservation. According to the initial communication for the United Nations Framework Convention on Climate Change, CO<sub>2</sub> emissions in 2010 will be some 16% higher than in 1990 even if all the planned technical and technological measures are fully implemented.

Although electricity is basically generated by gas and oil, and less by coal, air pollution from the thermal power sector is higher than in other countries with a similar energy mix. There are three main reasons for this: (a) the low quality of the fuels used; (b) the old and inefficient equipment; and (c) the lack of monitoring and emission control technologies.

The heavy oil used by the power plants contains 3.5% sulphur, while the established norm worldwide is 0.7%. Furthermore, none of the power plants in Uzbekistan is equipped with desulphurization units. During the course of the review mission, no clear answer was provided on whether all deliveries of natural gas to thermal power plants meet the norms established for sulphur content. However, SO<sub>2</sub> emissions from Fergana (57.52 kg/toe) show that fuel burned in this power plant has high sulphur content. The quality of the coal that is supplied to the Angren gas power plant is also low; the ash content, on average, reaches 40%; the sulphur content, around 1.5% and, with higher humidity, 38%.

The bulk of installed capacity in the power sector has been in operation for more than 20 to 25 years and requires full rehabilitation and refurbishing. The sector's efficiency is low, on average 33%, and this leads to more noxious emissions. The average specific fuel consumption needed for the generation of electricity is 368 g/kWh. Huge investments are needed to implement clean combustion and gas emission control technologies. Desulphurization of fuels before or during combustion is necessary for all thermal plants and utilities, except, perhaps, for low-sulphur natural gas from the Bukhara gas deposits. The sector's installed precipitators for dust separation have 89% efficiency on average, and this should also be upgraded.

**Table 11.8: Precipitators in the FEC, 1999**

	Number	Capacity <i>1 000 m<sup>3</sup>/h</i>	In use	
			Less than 10 years old	More than 10 years old
			%	
<b>Oil + gas</b>	95	869	79	21
<b>Power</b>	112	36,905	16	84
<b>Coal</b>	10	146	50	50

Source: National Statistical Bulletin, 2000.

The sites for new power plants are not chosen on the basis of an environmental impact assessment; economic criteria are given priority. Most of the power plants are located in or near a district (populated area). In general, these sites are highly polluted by SO<sub>2</sub>, NO<sub>x</sub> and solid particles. Recently, environmental impact assessments have been carried out in a number of thermal power plants (Angren, Navoi, Fergana, Mubarek), but the recommendations did not result in environmental improvements. Furthermore, the large power plants do not respect air pollution norms. Nor are there specific norms that determine the level of emissions by type and by unit of electricity and heat. The Government of Uzbekistan has not yet signed the UNECE Convention on Long-range Transboundary Air Pollution but intends to do so soon. It signed the Kyoto Protocol but without committing to any CO<sub>2</sub> reduction. Therefore, Uzbekistan is not an Annex I country of the UN Framework Convention on Climate Change.

The production, transport and use of energy have a significant impact on land and water. In the first place, energy production involves the exploration of hydrocarbons (well drilling), the water flooding of gas and oil fields, oil and gas processing, waste disposal, gas pipeline maintenance, and the development of opencast mining. Both major companies, Ugbekneftegas and UzbekEnergo, have developed a Plan of Action for Environmental Protection, 2000-2005, containing a long list of technical measures to protect land and water resources in the areas of their activities.

To maintain its oil and gas output over the next decade, Uzbekneftegas intends to proceed with extensive field drilling operations and increased extraction from the old oil fields. This will further harm the environment. The new activities will increase water consumption from 112 million m<sup>3</sup> in 1999 to 125 million m<sup>3</sup> in 2001 and continue at the same level to 2010. For this reason, the Plan of

Action foresees a number of additional measures aimed at mitigating the impact on land and water, such as identifying and preventing the pollution of water reservoirs by oil leakage, recycling waste water, accelerating land rehabilitation, and strengthening the monitoring of potentially dangerous processes in the Bukhara and Fergana refineries. The total cost of the Plan of Action is estimated at 200 billion sum.

It is worthwhile underlining that one of the serious environmental problems in Uzbekistan is groundwater pollution by oil and oil leaks in the Tashlak region of Fergana Oblast and pollution of the Utchkyzil water reservoir (basin) in the Surhandarin region. The Fergana refinery is polluting the first, and the second is polluted as a result of the solution used from 1935 to 1946 to water flood the 16 exhausted oil wells. The technical solutions applied to these two different cases have not been entirely successful. The short-term objective is to stop the oil moving toward the populated areas.

### 11.3 Environmental funds

The State finances the environment programme of the fuel-energy complex. The information provided by Uzbekenergo showed that, in 2000, the total investments related to the environment programme in electricity generation and coal reached 212 million sum. Uzbekneftegas has calculated that its environment programme will require 200 billion sum from 2000 to 2005, or some 40 billion sum a year, but the Government has not firmly confirmed whether or not this amount can be made available. According to the Ministry of Microeconomics and Statistics (Public Investment Programme, 2000-2002), total investments in the fuel-energy complex amounted to US\$ 399 million, of which 85% from the State budget.

The Law on the Rational Use of Energy adopted in 1997 provided for the creation of an intersectoral energy conservation fund to finance projects and initiatives supporting government policies for the implementation of energy-saving technologies and the promotion of renewable sources. It was foreseen that the fund would receive some of the profits gained from energy conservation and from economic incentives and sanctions. However, no such fund has been created.

#### 11.4 National energy programme

In April 1997, the Parliament adopted the Law on the Rational Use of Energy, which unfortunately has not been enforced. At present, the Ministry of Macroeconomics and Statistics is completing a draft national energy programme to 2010. Its main objectives are to:

- Improve efficiency, reduce energy intensity and provide a coherent legal and regulatory framework for a more rational use of energy and energy resources;
- Preserve the self-sufficiency and independence of the national energy supply by giving priority to the exploration for and exploitation of domestic energy resources;
- Increase the share of domestic coal for electricity generation and reduce that of natural gas;
- Proceed with a partial decentralization of electricity generation by giving priority to combined heat and electricity production (CHP);
- Mitigate the adverse environmental impact of energy also by increasing efficiency and the share of renewable sources in the energy mix.

For gas and oil, the programme recommends: (a) maintaining the present level of gas and oil production up to 2010; (b) speeding up exploration for gas and oil; (c) increasing the efficiency in refineries and enlarging the range of oil products; and (d) raising the quality of products to world standards.

For coal, the programme foresees: (a) increasing the share of coal in the energy mix from its current level of 4.5% to 17% by 2010; (b) attracting the foreign investments needed for rehabilitation and increasing productivity in opencast coal mining; and (c) further promoting the gasification of local low-grade coals.

For electric and thermal power, the strategy is to (a) restructure the sector, adapting it to more flexible market conditions and operations; (b) gradually rehabilitate the sector by implementing clean and efficient technologies; (c) adapt the tariffs and prices to market level with a view to attracting investors; (d) promote small-scale capacities, including steam-gas turbines; (e) promote CHP; and (f) rehabilitate the district heating infrastructure and introduce renewables for heating purposes.

The reasons why Uzbekistan's national energy programme has placed such priority and emphasis on energy efficiency, energy saving and the rational use of energy resources are discussed below.

##### *Energy efficiency and rational use of energy*

The current production, transport, storage and use of hydrocarbons, and especially of natural gas, are characterized by substantial losses, waste and inefficient use. The same is true of electricity, heat, water and secondary resources, as demonstrated by the macroeconomic statistics. For example, in 2000, gross domestic product (GDP) was nearly the same as in 1990, while energy consumption rose some 15 to 20%. Current energy consumption is roughly 1.8-2.0 toe/capita; energy intensity is extremely high (0.8-0.9 toe/US\$1,000 of GDP, based on current purchasing power parity); and energy efficiency in both supply and demand is low.

As in other countries in transition, the main reason is the decline of the economy and its macroeconomic reform. Furthermore, the old industrial equipment and technology need replacing or modernizing. The heat losses from district heating infrastructure exceed 30%. But there are also a number of other factors that should not be neglected, such as the lack of regulations and control, as well as the passive attitude of consumers to the environment and energy savings. For example, there are no economic incentives to encourage energy savings either by large industrial consumers or by households. Energy consumption norms, where they exist, are not respected. Few industrial sectors have an energy conservation policy. There are no gas, heat or electricity consumption meters in many enterprises, the public sector and households. For example, only 0.6% of district heating customers have meters.

Aware of this situation, the Government is now preparing (deadline 31 December 2001) a national

energy conservation programme, 2001-2010, intended to make significant savings in energy consumption, perhaps up to 30%, by 2010. The successful implementation of this programme is the only way to reduce CO<sub>2</sub> emissions in Uzbekistan, and, according to the initial national communication under the United Nations Framework Convention on Climate Change, energy savings in the energy sector could reach 10 million tons by 2010, resulting in a reduction of CO<sub>2</sub> emissions of about 17 million tons. If successful, the surplus of gas and electricity production over consumption could be exported, and would provide much-needed additional revenue for new investments and rehabilitation of the energy sector.

This ambitious programme requires a further increase in new and renewable sources in the energy mix and their early promotion for use at remote and less accessible areas as well as those with greater environmental pollution. The country's potential in renewable sources is significant, and the programme recommends the development of solar, small hydropower, geothermal, wind and biomass projects. The most promising and realistic approach in the short term seems to be the promotion of solar energy for hot water and heat in households and the public sector.

### 11.5 Management of the energy sector

The management structure of the Fuel and Energy Complex is presented in Figure 11.2

Two companies, namely Uzbekneftegas and UzbekEnergo, manage Uzbekistan's energy sector. The Uzbekneftegas National Holding Company manages all operations related to the exploration, development, exploitation, infrastructure, processing and trade of gas and oil resources. It was created by presidential Decree in 1998. The Company is governed by the provisions of the Law on Joint-Stock Companies and Rights of the Shareholders. The State holds 51%; the remaining 49% can be held by foreign and domestic investors (see below). The Company includes six principal joint-stock companies and two others with auxiliary functions. It consists of 14 basic units, with more than 266 enterprises and organizations, and employs over 84,000 people. Regulatory functions and control are given to UzNeftGasInspektsii, which reports to the Cabinet of Ministers. UzNeftGasInspektsii was removed from Uzbekneftegas structure in accordance with the

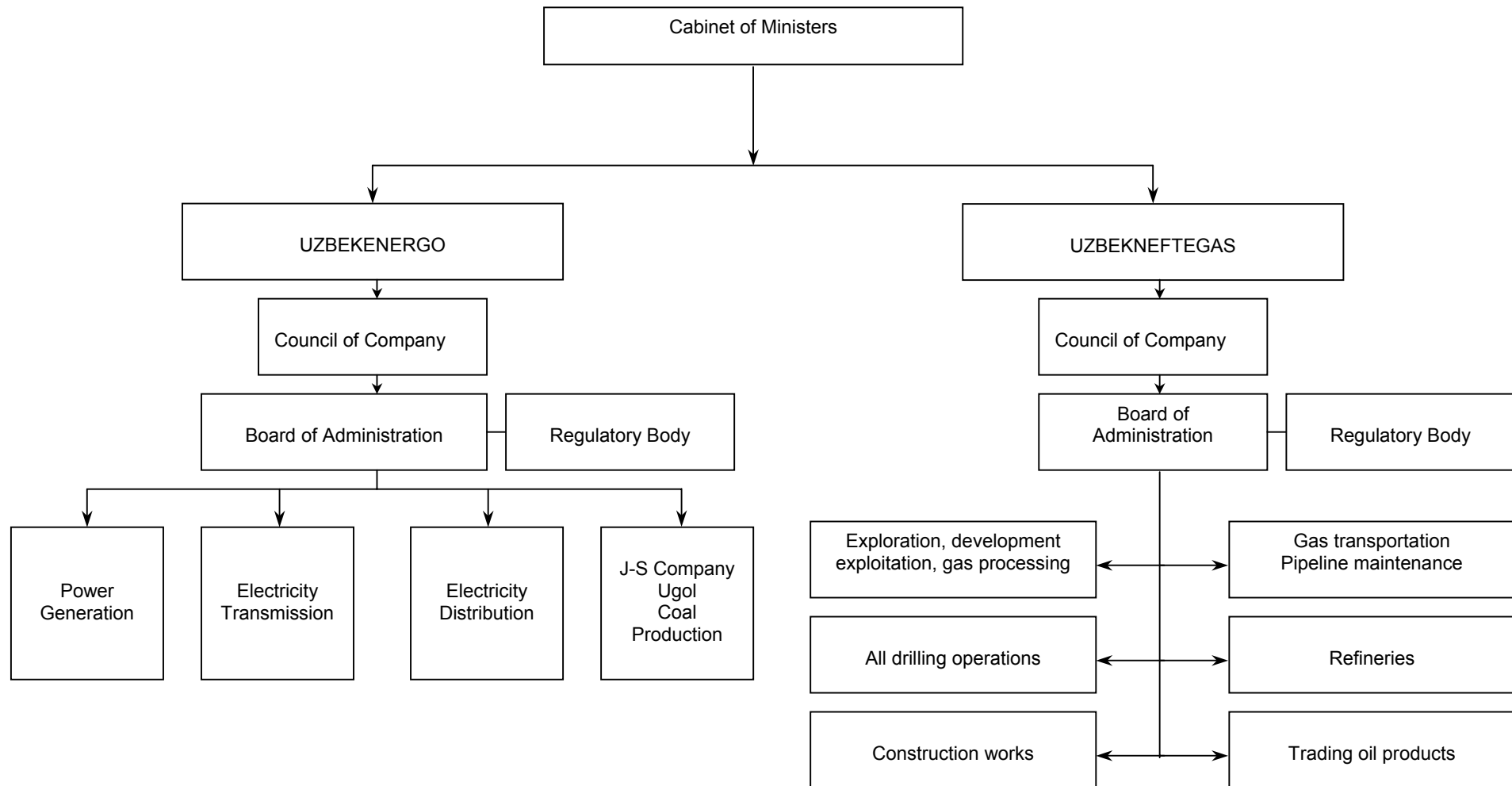
Cabinet of Ministers' Decision of 8 June 2000 to improve the state control and the effective and rational use of oil and gas products. The second company, UzbekEnergo, is a state-owned joint-stock company which runs the electric power and coal sectors. It was created in 2001 by presidential Decree. Its objectives are to promote further decentralization and privatization in this sector, and to attract foreign direct investments. The Company manages all functions related to power generation, transmission, regional distribution of electricity to end-users and several auxiliary activities. In addition, it operates opencast coal mines. Uzgosenergonadzor, a state agency that was also established in 2001, regulates the power sector and issues power production licences at the stationary power plants connected to the single power system. This agency is subordinate to the Cabinet of Ministers of Uzbekistan. These companies are administrated by a Council, a Board, and an Inspection unit. The Cabinet of Ministers approves the members of the Company's Council and Board.

Uzbekistan launched an oil and gas investment programme on 28 April 2000, when the President decreed that foreign companies involved in exploring and extracting oil and gas would receive tax exemptions and options to produce any oil or gas they discovered within a set period of time. Since independence, the Uzbek Government has invested US\$ 1.2 billion in modernizing Uzbekneftegas, but despite estimates that Uzbek oil and gas reserves are greater than those of all other Central Asian republics put together, the flow of money into upstream operations has been far slower than in other Central Asian countries. Economists and energy analysts agree that Uzbekistan's strict currency controls have hindered foreign investment, but the Uzbek Government has said it intends to dismantle those restrictions by mid-2001.

As part of the programme, the Government drew up a privatization strategy for Uzbekneftegas with interested organizations and the World Bank and approved it. In May 2000, Uzbekistan announced that it intended to sell off 49% of the shares in Uzbekneftegas, the State-owned holding company that controls the country's entire oil and gas sector, to foreign investors by 2002. In addition, in 2001, as much as 44% of the stock of Uzbekneftegas's subsidiaries will also be put on the block in a tender.



Figure 11.2: Management Structure of Fuel-Energy Complex in Uzbekistan



Regarding the coal sector, the Uzbek Government is also implementing a programme to modernize production facilities, thereby facilitating an increase in output. The effectiveness of Ugol's branches was assessed and this helped to establish priorities for the restructuring of the coal-mining industry so as to attract foreign investment to the sector. As a result, a rehabilitation project for the Angren pit was developed and is to be implemented by the end of 2001, with the participation of foreign investors. It is hoped that the project will raise coal production from the current 2.5 million tons to 5 million tons and cut production costs at Angren from US\$ 22.9 to US\$ 12 per ton. Additional investment at the Shargun mine is expected to double or triple production of high-quality coal and the completion of a second mine at Baisun could quintuple the mine's production, ensuring a surplus of coal for export in the future.

### 11.6 Conclusions and recommendations

Uzbekistan is richly endowed with energy resources. The proven reserves will be enough to meet its future energy requirements for decades to come. Natural gas and petroleum are the major energy resources that have not yet been fully explored. The country has large coal and uranium reserves, and the potential of new and renewable resources is enormous.

Natural gas and oil will continue to be the major components of the energy mix, followed by coal, the relative share of which will significantly increase. By preserving the present production level of natural gas and oil to 2010, and by implementing energy conservation measures, Uzbekistan could increase its export of natural gas (to 7-10 billion m<sup>3</sup> a year), petroleum products and electricity to its neighbours.

Regulatory functions and control on the energy supply side are weak and are carried out by the energy companies themselves (UzNefteGas-Inspektsii and UzEnergoNadzor) and not by a government institution. These entities exercise internal control, and they are not in a position to impose more efficient energy use, nor do they have the power to do so. An analogous situation exists in the other sectors and in the household sector, where there are no incentives or market tools to reduce energy consumption or encourage energy efficiency. In general, consumption of natural gas, heat and water is not metered.

The regulatory agencies should also be given authority to issue licences for the generation of electricity in stationary power plants, and for the exploitation and processing of natural gas, oil and oil products. This mandate should comply with the Decree of the Cabinet of Ministers of 19 April 1994 on Improving the Order on Issuing Licences for Different Activities.

Programmes for implementing technical measures and making related investments do exist, but the legal provisions, regulations and institutional support are still lacking. Consumers are neither motivated nor encouraged to save energy. The Law on the Rational Use of Energy (1997) has not been enforced; it needs some additional provisions. At the same time, the Ministry of Macroeconomics and Statistics is now drafting a new national energy programme up to the year 2010 and a national energy conservation programme, 2000-2010. Both are likely to contain elements of regulations and enforcement not foreseen in 1997.

#### *Recommendation 11.1:*

*The respective Parliamentary Commission should revise and strengthen the enforcement of the Law on the Rational Use of Energy. In this connection a team of experts should be established to propose amendments to the Law and guidelines for its enforcement.*

Since 1990, energy consumption in Uzbekistan has remained stable even when GDP declined, a phenomenon that appears to be unique among countries in transition. This anomaly indicates that energy consumption during this period has not followed the economic recession. The reasons for this appear to lie both in the behaviour of consumers (whether households, enterprises or the public sector) and in poor energy efficiency. Energy intensity is higher than the CIS average.

#### *Recommendation 11.2:*

*Each sector of the economy should draw up and adopt an energy conservation programme and integrate it into its long-term strategy and policy. These requirements should be introduced in the Law on the Rational Use of Energy and the forthcoming national energy conservation programme. Additional technical energy-saving measures should be adopted and implemented in the most energy-intensive sectors.*

Uzbekistan's energy sector is its biggest polluter, especially in terms of harmful emissions, including CO<sub>2</sub>. It also has the greatest potential for reducing

these emissions by energy-saving measures and policy action. Energy-saving measures should be taken first, as they are cheaper and more effective than any other action. A number of studies carried out by national and international institutions have concluded that the present level of Uzbekistan's GDP could be obtained with around 25-30% less energy. The unmanageable growth of energy demand does not allow for an accurate analysis of the effectiveness of cost-cutting measures in the energy-production sector and the setting of realistic energy prices.

### Recommendation 11.3

*To provide financial support for government policies on the promotion of rational energy use, the Government should create, as soon as possible, an energy conservation fund with contributions from energy-saving initiatives and projects. Such a fund would facilitate the implementation of energy-efficient and environmentally sound technologies, new and renewable resources, and non-waste technologies. The creation of such a fund was foreseen in the Law on the Rational Use of Energy, but no fund was established.*

Energy efficiency in power generation is low, leading to a higher level of emissions. For example, generating 1 kWh of electricity requires 368 grams of oil equivalent and leads to the emission of 622 grams of air pollutants. Both parameters are high, but according to GosKomPriroda, the power plants,

in particular the larger ones, do not respect the pollution norms. Worse, there are no specific norms to regulate the emissions from electricity generation and heat production.

Some norms and standards related to energy production, processing and use need to be updated. For example, the ISO technical standard for heavy fuel permits a sulphur content of 0.5%, the Uzbek standard is up to 3.5%, and the fuel used, in fact, contains more than 4%. The norms of individual gas emissions in the thermal power sector do not take fuel quality into account.

### Recommendations 11.4:

*The State Centre for Standardization (UzGosStandard) with active participation of the State Committee for Nature Protection, Uzbekneftegas and UzbekEnergo should revise the fuel-quality standards, including GOST standard 10 585-75, to limit sulphur content in heavy oil to a maximum of one percent, set specific fuel consumption norms and emission ceilings for each power plant and set up specific energy consumption norms for the different sectors and activities.*

### Recommendations 11.5:

*The Ministry of Macroeconomics and Statistics should set fuel prices according to fuel quality, or allow producers and users to negotiate these prices.*

## Chapter 12

# HUMAN HEALTH AND THE ENVIRONMENT

### 12.1 Overall health status and environmental conditions

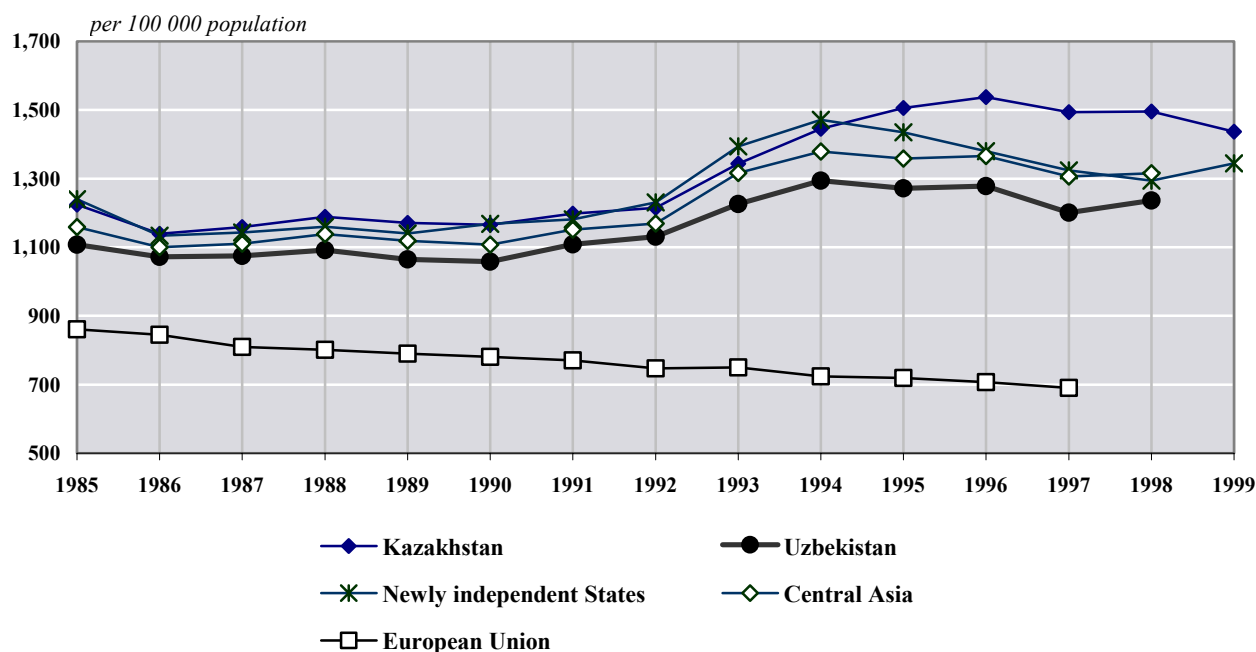
#### *Population development*

The total population of Uzbekistan amounted to 24,582,000 inhabitants in 2000. The rural population accounts for as much as 62% of the total population and 40% of the population is under the age of 14. The country has one of the highest natural rates of population increase in the WHO European region, owing to the combination of a high birth rate and relatively low total mortality. The population increased by 1.4% in 1998 (compared with figures of between 2% and 2.5% in previous years). The birth rate fell from 34.5 per 1,000 population in 1991 and to 23.1 per 1,000 in 1998. This fall is thought to be the result of a family-planning policy, which resulted in increased access to contraceptives (from 12% of women of

child-bearing age in 1990 to 59.5% in 1998). Consequently, abortions also decreased (from 31.0 per 100 live births in 1990 to 11.2 in 1998). Rural areas have a higher population growth than urban areas.

After a slight decline between 1990 and 1994, which affected all of eastern Europe and Eastern Asia, life expectancy at birth started to increase again in 1995. In 1998 it reached an average of 68.7 years, which is higher than the average for the newly independent States and Central Asia (67.3 years), but almost 10 years lower than the EU average (78.1 years). Women's life expectancy is five years longer than men's. Life expectancy is almost two years higher for the urban population than for the rural one.

Figure 12.1: Mortality rates trends, 1985-1999



Source: WHO Health for All database, January 2001.

Since 1992, in parallel with the decrease in birth rate, infant mortality has been falling, from 37.6 to 20.2 per 1,000 live births in 1999, almost twice the European average (11.1) and four times the EU average (5.5). The leading causes of infant mortality are diseases of the respiratory system (ca. 50% of all deaths), followed by perinatal pathologies, infectious and parasitic diseases, and congenital disorders. Although over the past few years inter-regional differences in infant mortality have decreased, there is still almost a two-fold difference between the regions (*oblasts*), with Surkhandaraya *oblast* and Karakalpakstan reporting the highest and Buchara the lowest infant mortality rates.

#### *Development of selected causes of death*

After reaching a peak of 1,294 deaths per 100,000 population in 1993, standardized rates have declined to 1,236 per 100,000 population in 1998. This trend is similar to that observed in other Central Asian republics, although Uzbekistan's rates remained slightly below the averages reported in that part of the region.

Mortality caused by diseases of the circulatory system is one of the highest in the region, and the leading cause of death. Accounting for 9% of all deaths, one of the highest rates in the region, diseases of the respiratory system are the second most important cause of death. Malignant neoplasms rank third, with a standardized death rate below those in Europe and in Central Asia. Cancer mortality has fallen since 1986, while cancer incidence, after decreasing between 1990 and 1996, is again increasing.

Death rates due to diseases of the digestive system are one of the highest in the region and represent the fourth most important cause of death, with a substantial proportion (approximately 70%) attributed to chronic liver diseases and cirrhosis. This can be partly related to the high incidence of hepatitis infections and its long-term negative effects on the liver, in association with other risk factors, such as alcohol consumption, although according to 1996 estimates, this has decreased from 2.2 litres per year in 1990 to 0.8 litres in 1996.

External causes (injuries and poisoning) are the fifth cause of mortality. Mortality due to homicide is half the Central Asian average and a quarter of the average of newly independent States (18 per 100,000 population). The death rate for traffic accidents is also comparatively low, and halved between 1990 and 1998. 2,075 people died and 11,360 were injured as a consequence of the 10,588 traffic accidents recorded in 1997. In spite of these relatively low figures, the number of people who died per 1,000 casualties (severity index) was among the highest in Europe (154), pointing to a possible lack of adequate emergency services for the rescue and treatment of victims. In addition, relatively high speed limits in urban areas (70 km/h) and reckless driving result in more serious accidents.

Uzbekistan's national morbidity and mortality averages mask some marked regional differences. In particular, the city of Tashkent has the highest mortality rates by diseases of the circulatory system, malignant neoplasm and injuries, while Karakalpakstan reports the highest mortality by respiratory and infectious diseases.

**Table 12.1: Standardized mortality rates by selected cause of death (all ages), 1998**

	Uzbekistan		EU (1997)		Central Asia	
	<i>per 100 000 population</i>	%	<i>per 100 000 population</i>	%	<i>per 100 000 population</i>	%
<b>All causes</b>	<b>1,236.2</b>	<b>100</b>	<b>690.5</b>	<b>100</b>	<b>1315.8</b>	<b>100</b>
Diseases of the circulatory system	782.5	63	270.1	39	759.1	58
Diseases of the respiratory system	110.7	9	56.6	8	122.2	9
<i>Bronchitis, emphysema, asthma</i>	39.3		12.3		46.7	
Malignant neoplasms	86.7	7	187.9	27	119.4	9
Diseases of the digestive system	64.4	5	32.1	5	59.7	5
<i>Chronic liver disease and cirrhosis</i>	46.1		13.9		39.7	
External causes	53.5	4	41.3	6	87.7	7

Source: WHO – Health for all Database, January 2001.

**Table 12.2: Mortality rates by selected cause of death and region, 1999**

*per 100 000 population*

	All causes	Diseases of the circulatory system	Diseases of the respiratory system	Malignant neoplasms	Injuries and poisoning	Infectious and parasitic diseases
<b>Uzbekistan</b>	<b>535</b>	<b>271</b>	<b>69</b>	<b>39</b>	<b>43</b>	<b>20</b>
Republic of Karakalpakstan	572	177	125	45	39	44
Andijan	515	285	69	36	33	13
Samarkand	509	270	62	32	46	19
Djizak	432	182	68	31	41	15
Kashkadarya	425	196	87	20	30	12
Navoi	501	237	49	47	50	22
Namangan	485	244	100	26	31	15
Bukhara	450	243	49	32	32	16
Surkhandarya	466	204	83	26	41	19
Syrdarya	525	270	44	39	51	28
Tashkent	631	346	52	47	63	28
Fergana	513	241	60	31	37	23
Khoresm	518	291	89	26	28	16
Tashkent city	819	488	33	101	71	24

Source: WHO, 2000.

### *Trends in morbidity*

Indicators of aggregated morbidity are the highest in Karakalpakstan, where they are approximately three times higher than in Syrdarya (12,271 per 10,000 population and 3,891 per 10,000 population, respectively, in 1997).

A specific problem is the high incidence of bronchial asthma in Karakalpakstan, in the environmental disaster area around the Aral Sea. In this autonomous republic, the incidence of asthma has sharply increased since 1992, and in 1998 it was 178 per 100,000 population, more than three times higher than the national average (51.6 per 100,000 population). Asthma shows bimodal seasonal peaks, with one peak in spring and one starting in September. The latter coincides with the blossoming season of cotton and cotton collection. Hospital discharges for respiratory diseases have decreased in the past four years, and so have those for infectious and parasitic diseases. However, this is more likely to reflect the effects of a health-care reform that resulted in a shift from inpatient to outpatient treatment (more than 46% of all hospital beds were closed between 1991 and 1997), than an improvement in these health conditions. Respiratory diseases remain the most important cause of morbidity among both children and adults, for whom they account for nearly 30% and 20% of total morbidity, respectively.

Although lower than the Central Asian average and the average of the newly independent States, the increasing incidence of tuberculosis, reaching 62 per 100,000 population in 1999, with 15,080 new cases, is a growing public health concern. Karakalpakstan appears to be the region most affected by this disease, with an incidence almost double the national average. Several factors concur in increasing the incidence of this disease, including poor housing conditions, overcrowding, deteriorating socio-economic conditions, and reduced immunological responsiveness.

According to the Ministry of Health, nearly 1.8 million people (including 1.2 million children) suffered from infectious diseases in 1997. The groups most at risk of infection were children under five years of age. Gastrointestinal diseases accounted for 46.6 % of all infections, while viral hepatitis for 29.7 and respiratory disease for 16.9 %, respectively. The most common diseases were viral hepatitis, acute intestinal infections, dysentery and unspecified Salmonella infections. For a number of years, the incidence of viral hepatitis in Uzbekistan was the highest in the WHO European region. After peaking in 1995, the reported incidence of hepatitis A has decreased approximately five-fold, and in 1999 it was 126.3 per 100,000 population, with 30,689 new cases. The highest incidence was reported by the *oblast* of Buchara, where it was 331 per 100,000 population in 2000, with 4727 cases. At national level the

incidence of hepatitis B was 27.9 per 100,000 population. Hepatitis B is transmitted through infected blood and accounted for approximately 60% of all nosocomial infections reported in 2000. If correct, these data indicate an urgent need to cope with the problem, through mass immunization, early case detection and hygienic measures in hospitals, such as the use of sterile syringes and needles. It should be noted that surveillance of hepatitis in Central Asia is based on clinical diagnosis of jaundice patients and does not reflect a serologically confirmed diagnosis. Therefore, it is unclear to which extent the present data reflect an accurate diagnosis. Several hepatitis outbreaks have occurred since 1951, with a major one in 1987.

In 1995, Uzbekistan reported the last case of poliomyelitis, and vaccination coverage has reached 99% of children under 1 year of age.

Contrary to the dramatic scale of the malaria epidemic that is still afflicting neighbouring Tajikistan, the incidence of malaria in Uzbekistan appears to have remained low, at 0.3 per 100,000 population in 1999 (against 220.2 per 100,000 population in Tajikistan). More than 95% of the cases are *vivax* malaria. The highest incidence was reported by the *oblast* of Surhandarskaya (2.9 per 100,000 population), on the border with Tajikistan. There were 85 cases in 1999 and 123 in 2000. This area and the borders with Afghanistan are particularly vulnerable to the risk of local transfers of malaria, and so are the main rivers as well as the rice-growing areas. The environment and climate conditions are in principle favourable to the breeding of mosquitoes that are the vectors of the malaria plasmodium. The presence of large water bodies facilitates the simultaneous occurrence of *An. maculipennis*, *An. pulcherrimus*, and *An. Superpictus*, and ambient temperature creates the conditions for the transmission of the plasmodium over a period of five months.

## 12.2 Environmental conditions associated with health risks

### *Health effects of air pollution*

Compared to the dramatic environmental health problems posed by the scarcity and poor quality of water, air pollution appears to account for a relatively lower burden on mortality and morbidity in Uzbekistan. However, the lack of comprehensive monitoring and exposure data may lead to an underestimation of the overall burden of disease

attributable to air pollution. Concerns related to air pollution include increasing emissions from the transport sector, industrial pollution in the Fergana Valley and Navoi region, indoor pollution and the yet-to-be-clarified effects of exposure to some pollutants, such as wind-blown dust possibly contaminated by pesticides in the Aral Sea basin.

At the national level, it has been reported that the relative importance of morbidity by respiratory diseases decreased between 1992 and 1998. Although these diseases remain the second most important cause of both mortality and morbidity, they might be underreported. Exposure to high levels of dust remains a very important problem in some parts of the country, such as in Karakalpakstan, whose capital city, Nukus (with 160,000 inhabitants), has a daily average concentration of total suspended particles (TSP) in the range of 300  $\mu\text{g}/\text{m}^3$ . This is more than twice the threshold of 120  $\mu\text{g}/\text{m}^3$ , which defines these areas as "black spots" and requires measures to reduce population exposure. Even though a large proportion of this pollution might be due to the wind-blown mineral dust, the concentration of respirable fraction of the particles would be quite elevated. Epidemiological studies, conducted worldwide in the last decade, indicate a wide range of serious health effects associated with this pollution level, including increase of incidence of acute respiratory infections in children and increase of cardio-respiratory morbidity.

The health effects of particulate air pollution depend on particle size, composition and concentration, and can fluctuate with daily fluctuations in PM10 or PM2.5 levels. This is the fraction of particulate of greatest health concern, as it penetrates the respiratory system. Particulate matter may have acute health effects, such as increased daily mortality, increased rates of hospital admissions for exacerbation of respiratory disease, fluctuations in bronchodilator use, cough and peak flow reductions. Also long term effects are related to mortality and respiratory morbidity, but there are few studies on the long-term effect of particulates.

It is very difficult to estimate the health effects of particulate matter in Uzbekistan, because only TSP is measured. A few epidemiological studies carried out in several countries over the past years have shown a relationship between frequent episodes with high concentrations of TSP (above 150  $\mu\text{g}/\text{m}^3$  daily average) over a period of many years and the incidence of chronic obstructive pulmonary

diseases and asthma. On the basis of analogies with other highly polluted European cities, approximately 21% of lower respiratory illness in children, 3.4% of adult mortality, more than a 5% decrease in pulmonary function in ca. 20% of the population, and 3-7% of new cases of obstructive airways diseases can be expected. The number of people living in Uzbek cities with reported average concentrations of TSP in the order of 200-400  $\mu\text{g}/\text{m}^3$  is approximately 4.4 million. These cities include Navoi and Nukus, the cities reporting the highest TSP average concentration, and also Buchara, Tashkent, Samarkand, Namangan, Fergana, Kokand, Chirchik, Karshi, Angren and Alamyk. Pollution from particulate matter comes only in part from stationary and mobile emission sources. A significant part comes from soil particles transported by the winds that blow in the Aral Sea basin.

The fine size of particles of soil allows for long-distance transport by winds, extending the geographic boundaries of the territory affected by this phenomenon. The regions of Buchara and Navoi are also particularly affected by the problem of dust storms, whose frequency and magnitude were reported to be increasing as the Aral Sea recedes. In the period 1989-98 Glavhydromet reported an average of up to 16.4 storms per year in the area of Tamdi-Navoi, one of those most affected by this phenomenon.

In the Aral Sea basin the observed dust deposition rates appear to be among the highest of the world. A particular feature of this dust is that it is contaminated by pesticides, such as organophosphate phosalone, identified in samples taken in Turkmenistan. Similar results were found in the Aral Sea Basin Dust Project, which in addition to phosalone also detected dust contamination by dimethoate. Analysis also indicates that pesticide levels are the highest at the sites closest to the Aral Sea. The population's exposure to contaminated respirable dust requires an urgent assessment of the possible health impact. Recently collected data from Uzbekistan suggest an increased incidence of obstructive lung diseases in the region, particularly in Karakalpakstan.

The Hydrometereological Research Institute (known as SANIGMI) is developing mathematical models to estimate the correlation between children and adult total mortality and air pollution. The model has been able to establish this association at *rayon* (district) level. Other research focuses on the relation between dust contaminated by polycyclic

aromatic hydrocarbons (PAH) and benzo-a-pyrene (BaP), and incidence of lung cancer, which seems to be more evident in cities with more than one million inhabitants.

In the city of Tashkent a study carried out in 1995 by the Sanitary Epidemiological Services using morbidity and air pollution data from 1993-95 established a correlation between air pollution and morbidity by chronic respiratory diseases in the total population and eye irritation among children.

An important limitation of present estimates of the health impact of particulate matter in Uzbekistan is that they cannot rely on the use of more health-relevant indicators, such as PM10 and PM2.5, which indicate the respirable fraction of particulate matter, for which dose-effect curves have been calculated, making it possible to estimate the possible effects of exposure on total mortality, as well as on respiratory and cardiovascular diseases. In addition, only 19 out of 72 monitoring stations are placed in locations that are representative of population exposure.

In addition to particulate matter, the continued use of lead in fuels and by industry means that this pollutant too is of health concern, especially in relation to the potential risk of neuro-developmental effects in children. According to the WHO Air Quality Guidelines, blood lead level in children in the range of 100-150  $\mu\text{g}/\text{l}$  has been consistently reported as having a negative effect on measures of cognitive functioning, such as the psychometric intelligence quotient. However, other sources of exposure to lead may include lead-ceramic pottery, lead-soldered cans and contaminated soil. Studies carried out in Karakalpakstan have shown blood lead levels in pregnant women above 100 parts per billion, although it was not possible to identify a clear source of lead exposure for these women.

Indoor pollution in the residential environment is assessed only occasionally. Asbestos is still allowed and used as construction material, and this results in an increased risk of lung cancer for the exposed population.

According to a survey on smoking carried out by the Ministry of Health's Institute of Cardiology, more than half (50-55%) the men surveyed and approximately 1.5% of the women consumed tobacco. Smoking is most popular (70%) among 20-39-year-olds. In addition to cigarettes, "nas" (chewing tobacco) is widely used. Since 1996, the



advertising of tobacco and alcohol products on television before 10 p.m. and their sale in the vicinity of schools and other establishments for children have been banned.

#### *Drinking water, waste water and health*

Drinking water in Uzbekistan is scarce and of poor quality. This very complex problem has a broad range of health effects. Microbiological and chemical pollution arise mainly from insufficient waste-water treatment, insufficient water disinfection, the difficulty and high cost of removing pesticides from contaminated water, the scarcity of good-quality water near the Aral Sea basin, and the lack of public information and education on the appropriate use of water resources. As much as 10% of the urban population and 40% of the rural population do not have access to piped water. Where piped water is available, leaks and water loss through the distribution system diminish the quantity of water available for consumption. Sewerage treatment in towns where sewerage systems are available has increased by only 0.3% a year during the past three years, and was only 51.1% in 1999 (Karakalpakstan – 31.1%, Khorezm *oblast* – 37.8%). Most rural settlements and more than half the towns do not have waste-water discharge systems.

The number of samples that do not meet the water standards varies during the year and across regions and districts. In 2000, microbiological standards

were breached on average by 10% and 14% of water samples analysed in Khorezm *oblast* and the Republic of Karakalpakstan, with a peak of 69% in December in Karakalpakstan.

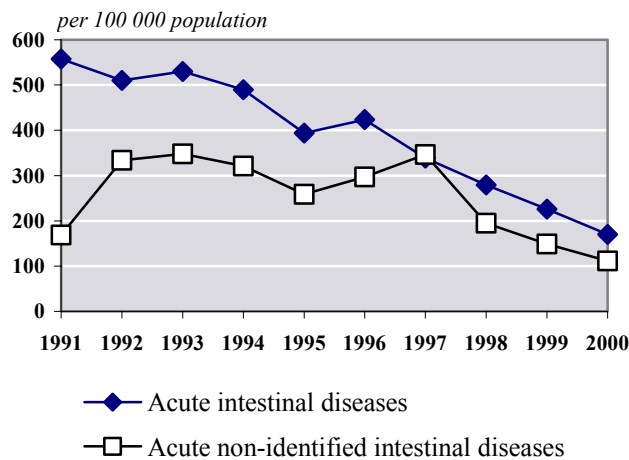
Chemical quality standards were breached by about 21.5% of the samples on a national basis, with the Republic of Karakalpakstan reporting the worst situation (70% of samples exceeding the maximum allowable concentration (MAC)). A study carried out by the Centre for Disease Control (CDC) in 1997 in Nukus found that more than 30% of households with piped water lacked detectable levels of residual chlorine in drinking water.

#### Health effects of polluted drinking water

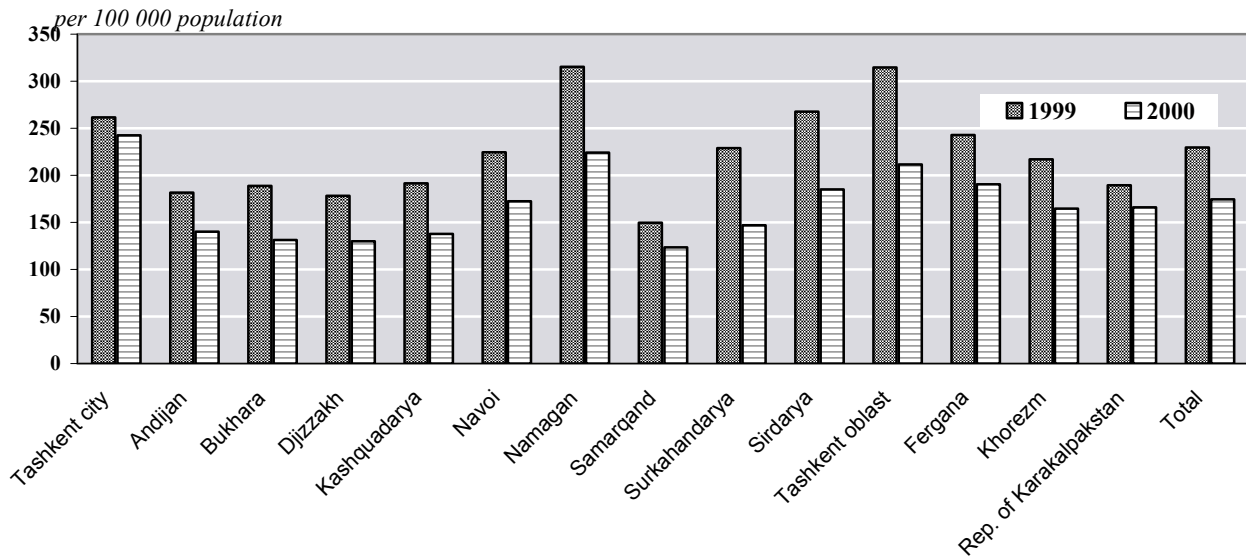
According to the Ministry of Health, acute intestinal disease is decreasing, and the country's averages are lower than in the other Central Asian republics. However, similarly to what has been observed for respiratory diseases, the reduction of inpatient care and the cost of medical services are likely to result in fewer people reporting to the official health-care system.

In 1999, Namargan and Tashkent city and *oblast* reported the highest rates of acute intestinal disease. However, the possibility that other districts underreported cannot be ruled out.

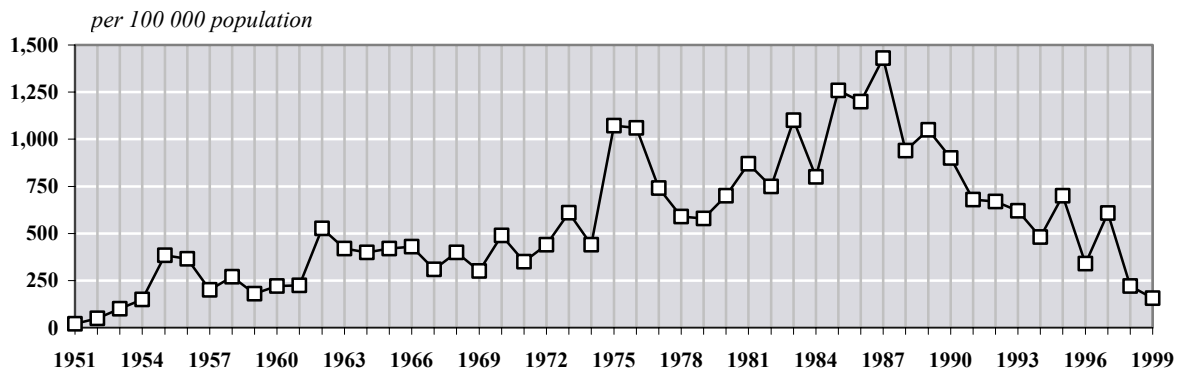
**Figure 12.2: Incidence of intestinal diseases, 1991-2000**



Source: Ministry of Health, 2001.

**Figure 12.3: Incidence of acute intestinal diseases by region in 1999 and 2000**

Source: Ministry of Health, 2001.

**Figure 12.4: Incidence of hepatitis, 1951-1999**

Source: Ministry of Health, 2001.

Since 1998 the Centre for Disease Control has worked with Uzbekistan and other Central Asian republics to study the aetiology of viral hepatitis, introducing viral hepatitis treatment and control concepts and establishing quality national infectious disease laboratories. Hepatitis is believed to be a leading cause of death in Central Asia, possibly second only to cardiovascular diseases and cancer. Incidence of hepatitis differs from district to district and from year to year.

A specific water-related problem in Uzbekistan and other countries of the Aral Sea region is the high level of water hardness and salt. In Uzbekistan it was found that incidence of cholelithiasis increased 4.7-fold, and kidney stones 1.9-fold between 1984

and 1994. During the same period in Karakalpakstan the incidence increased 17-fold times in Munyak, 14-fold in Amudarya, 12-fold in Khojeli and 9-fold in Ellikalla. A high correlation was found between cholelithiasis incidence and water hardness in the Republic of Karakalpakstan.

The pesticide concentrations in treated water reflect those found in the raw water because the treatment process does not remove pesticides effectively. Thus, in 2000 a study carried out by Médecins sans Frontières in Karakalpakstan found that DDT,  $\alpha$ -HCH (hexachlorocyclohexane- $\alpha$  isomer) and  $\beta$ -HCH (hexachlorocyclohexane- $\beta$  isomer) and  $\gamma$ -HCH, i.e. Lindane, were present in low, but appreciable concentrations in all the treated water

analysed. In some cases Lindane concentrations exceeded the standard 55 to 100-fold. Low values of DDT were also found, though *below* the standard, pointing at the persistence of this pesticide even several years after its use has been discontinued following a legal ban. It is difficult to establish a correlation between water contaminated by pesticides and resulting short- and long-term health effects.

### *Food and nutrition*

#### Nutrition

Living standards depend on income, unemployment levels, and food production and prices. Low incomes are mainly reflected in the consumption of basic food products and in the shift from more nutritious and expensive food towards less expensive staple food. Although most people in rural areas own animals, and the price of some food, such as bread, is controlled by the State, there has been a change in the diet of the Uzbeks. However, little systematic information is available. Some nutritional surveys were carried out after the droughts in 2000, but no results were available at the time of the EPR mission. Historical data indicate that diet is made up of cereals, milk and dairy products, vegetables, meat, eggs, vegetable oil (mainly from cotton seeds), potatoes and some fruit. Only 16% of foodstuffs were imported in 1999, and in 2000 even less. The average daily calorie consumption per capita was 2,590 kcal in 1998, one of the lowest in the WHO European region. According to the Ministry of Health, children's calorie intake is approximately 25% lower than it should be to meet Regulation 0097-00 of 2000. This Regulation provides a very detailed description of standard diets, food mix, quantities, calories and recommended daily intakes of different nutrients for different groups of the population, including children. For them, the standard daily calorie intake ranges from 1,644 kcal for children under 3, to 2,267 kcal for children aged 3-6, to 3,830 kcal for children aged 7-13, and depends on the health status of the children and the type of school or institution they are attending.

Overall per capita food consumption increased between 1992 and 1996, the consumption of milk

products declined. As a result of an unbalanced diet, 17.8% of those surveyed were overweighted.

In screening surveys of the population aged 20–59 years, high blood cholesterol was found in between 19.4% and 21% of those surveyed. Average daily cholesterol consumption was 2.8 grams in 1970, 2.1 grams in 1990 and 1.7 grams in 1998.

#### Food quality

Food quality is the responsibility of the Sanitary Epidemiological Service (SES), whose laboratories collect samples from different food “objects” (i.e. food industries, canteens, health care institutions, schools, working places, catering, etc.) and analyse different types of foods for chemical and biological contamination through stations at the national, regional (oblast), district (rayon) and municipal levels. Food analyses cover toxicological elements, such as heavy metals (Hg, Pb, Cd), mycotoxins (aflatoxins), botulin, nitrosamines pesticides and nitrates, and are meant to assess compliance with existing standards.

Nitrate concentrations have been falling in recent years following a reduction in the use of fertilizers in agriculture. In 1992, 10.2% of all samples failed to meet the standard against 5.3% in 1998. The decrease was generalized. Only in Surkandarya district did nitrate concentrations increase, from 8.6% in 1992 to 15.3% in 1998. This may be attributable to a change in the analytical methodology.

A comparison of different types of food that did not meet the SES requirements in 1999 and 2000 is outlined in Table 12.3).

Food contamination by pesticides is reported to be low, although not all Sanitary Epidemiological Service stations are equipped to carry out these analyses and the methods used do not allow for a precise quantification of potential contaminants. In 2000, the type of food with the highest number of samples exceeding the limits for pesticides was fruit and vegetables (1.6%), followed by fish (1%), milk and dairy products (0.3%), meat and bread (0.2%), oils (0.1%) and sugar and sweets (0.05%).

**Table 12.3: Food safety**

Type of food	Samples analysed		Samples which did not meet the standards	
	Number		as % of total samples	
	1999	2000	1999	2000
<b>Total</b>	<b>178,488</b>	<b>192,231</b>	<b>11.3</b>	<b>8.7</b>
Meat, eggs, chicken	7,888	8,492	4.4	5.1
Milk, dairy	14,399	14,306	8.8	8.7
Fish	950	997	4.0	4.8
Bread	23,303	24,649	6.3	5.3
Sugar and sweets	16,579	18,357	6.6	4.8
Vegetables	45,549	54,760	4.9	3.9
Potatoes tested for nitrates	45,441	45,483	4.8	4.3
Fruit of wild origin	163	127	3.0	5.5
Vegetable oil	6,980	7,082	11.0	8.7
Drinks	10,381	10,920	21.6	15.0
Honey	472	490	18.8	15.5
Children's food	2,204	2,130	9.1	6.9
Preserves	4,179	4,438	2.2	11.1

Source: Sanitary Epidemiological Service, 1999 and 2000.

### Health effects of contaminated food

Both biological and chemical contamination of food may pose similar health risks as the consumption of contaminated water. Although analysis of the data of the Ministry of Health has shown a decreasing trend in typhoid fever, paratyphoid and other Salmonella infections, underreporting cannot be excluded. As in all countries, Salmonella infections follow a seasonal pattern, and cases are often clustered around the place where contamination originally occurred, leading to outbreaks of the infection. Therefore, in addition to the number of cases of the disease, the number and places where outbreaks occurred are also highly relevant to study the disease and contain it effectively. However, no data on numbers and places of outbreaks were made available in the course of the EPR mission.

Forms of botulism A and B are reported to be present in Uzbekistan, although no statistical data were made available. Most cases of botulism are related to homemade canned food, especially tomatoes and other vegetables, either distributed in market places or consumed at home.

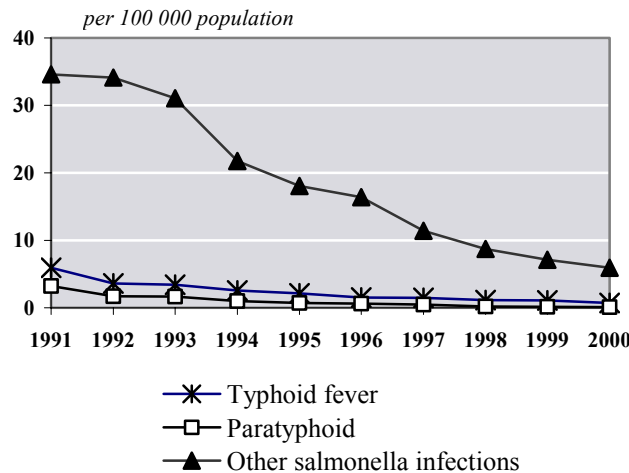
In addition to biological contamination, the use of pesticides and mineral fertilizers also continue to pose a risk of food contamination. Although there

seems to be some awareness, especially among the rural population, about the risks and types of chemical contamination of food, there is less awareness of possible biological contamination.

For more than 30 years pesticides, such as DDT, Aldrin, Dieldrin, and Lindane, herbicides and defoliants have been used in large quantities and some of them are still used today. Although some of them were banned ten years ago, their presence can still be traced in soil, air (particles) and water. The drying-up of the Aral Sea has exposed the seabed to strong winds, which have transported contaminated dust all over the country. A combination of these factors has contributed to the detection of relatively high levels of DDT and other organochlorine compounds in soil, air and water.

It is not yet clear what the major source of exposure to these chemicals is in Karakalpakstan. The scarce data about pesticide contamination of drinking water indicate that  $\beta$ -HCH is found in low but detectable quantities. However, the main source of exposure is likely to be the consumption of contaminated animal fat from beef, sheep, chicken, milk products (e.g. butter) and probably cottonseed oil, which is commonly used for cooking oil in that region. For infants, the main post-natal source is breast milk.

**Figure 12.5: Incidence of typhoid, paratyphoid and other salmonella infections, 1991-2000**



Source: Ministry of Health, 2001.

There is a lack of information on current levels of exposure to pesticides entering the food chain, and some recent studies had conflicting results. Markedly higher blood levels of polychlorinated biphenyls (PCB), dichlorodiphenyltrichloroethane (DDT) and its metabolite dichlorophenyl-dichloroethylene (DDE) and beta-hexachlorocyclohexane ( $\beta$ -HCH) have been reported in schoolchildren in Kazakhstan, close to the Aral Sea, compared to blood levels in children from the Netherlands. It cannot be excluded that children in the Uzbek part of the Aral Sea are similarly affected.

The preliminary results of a study carried out in Karakalpakstan on blood samples from pregnant and non-pregnant women, umbilical cord of newborn babies, breast milk samples and samples of butter, formula feed and cottonseed oil showed high levels of pesticides and dioxins in both human samples and food samples. Dioxins in breast milk exceeded levels found in Ukraine 2.5-fold. The same study also showed a considerably higher maternal body burden of the so-called "environmental estrogens" such as DDE and  $\beta$ -HCH compared to levels observed in most west European countries.

To clarify the role of the food chain in the exposure to pesticides, Médecins sans Frontières in collaboration with WHO has recently completed research into the level of pesticides, dioxins and polychlorinated biphenyls in various locally

produced foodstuffs which are common in the Karakalpak diet.

#### Hospital waste

Little and sometimes contradictory information is available on hospital waste disposal and treatment. Of the total amount of waste generated by health-care activities, almost 80% is comparable to domestic waste. The remainder is considered hazardous material. Observations from visits to health-care centres in Uzbekistan during the EPR mission suggest that the practice of disinfecting disposable syringes with hypochlorite or hydrogen peroxide continues, and the possibility of inadequate decontamination poses a major risk for the transmission of very serious diseases, such as hepatitis B, C and HIV through contaminated syringes. There are also indirect health risks through the release of toxic pollutants during the treatment or disposal of hospital waste. Landfilling, the most common practice in Uzbekistan, can potentially contaminate drinking water. Occupational risks may be associated with the operation of certain disposal facilities. Inadequate incineration or the incineration of materials unsuitable for incineration can result in the release of pollutants into the air. At present, there are virtually no environmentally friendly, low-cost options for the safe disposal of infectious wastes. Incineration has been widely practised, but alternatives are becoming available, such as autoclaving, chemical treatment and microwaving, and may be preferable under certain circumstances.

Landfilling may also be a viable solution for parts of the waste stream if practised safely. However, action is necessary to prevent the important disease burden currently created by this waste.

#### *Ionizing and non-ionizing radiation*

Uzbekistan has no nuclear power plants. Its radioactivity background is influenced by the high concentration of natural radioactive elements in soil (Maily-Suh deposit, Kyrgyzstan, bordering on the Fergana valley in Uzbekistan), radon concentration in oil and water (Gazly settlement, Bukhara region) and by anthropogenic factors, including mining and processing of radioactive and poly-metallic ores, mining of uranium-bearing brown coal, production and use of phosphate fertilizers.

Overall, local authorities believe that the radioactive situation is stable and of no great concern, although additional research is needed to prevent and reduce the impact from existing sources of contamination, especially the mining of uranium. This may result in leakage, washing out, dusting and penetration of toxic elements from the storage of waste from mining and processing enterprises into groundwater. To identify possible environmental radioactive contamination, some research has been done around the town of Mayli-Suu - the industrial zone of the former uranium deposit.

High concentration of toxic gases, mercury and radon in residential and public buildings has been identified as another concern.

#### *Noise*

Only a limited number of regional SES stations have the necessary equipment to carry out regular monitoring of noise, at sites chosen by the Chief Medical Doctor. In most cases, noise is measured as part of inspections and in response to complaints.

While on industrial sites noise limits are set as a function of the activities to be carried out, the noise limits for residential areas are set at 40 dBA during the day time (from 7 a.m. to 11 p.m.) and at 35 dBA during the night time (from 11 p.m. to 7 a.m.). Buildings older than 50 years are given an additional tolerance of 5 dBA.

Measures to reduce exposure to noise include the requirement for manufacturing sites to be located at least 500 m from residential buildings. In Tashkent,

heavy vehicles have been banned from the city centre. They have to use bypasses, where most fuel stations have been relocated. In addition, vehicle inspections also include measurements of noise emissions. The approval given by the Government to the relocation of the international airport, where night flights are allowed, 60 km away from Tashkent is expected to reduce noise, although no clear timetable exists for the relocation.

Overall, noise emissions from industrial sites are decreasing as a result of improved technologies and reduced production. However, noise from transport is expected to increase. In some apartments, noise from traffic has been found to reach levels of up to 70-80 dBA even when all windows were shut. An area of concern, and a potential source of social tension, is the increasing number of complaints by in the residents of buildings where noisy activities take place.

#### *Occupational health*

Although general working conditions are said to have improved, recent research in the mining, non-ferrous, engineering and chemical industries and in a number of light industries (cotton ginning, footwear production, sericulture, garment industry, carpet production, silk industry) conducted by the Occupational Health and Professional Pathology Department of the Scientific Research Institute of Sanitation, Health and Occupational Disease contradict this. The main issues related to occupational health are: under-reporting; lack of individual and collective protective measures and instructions on how to use them; lack of laboratory data, lack of specialized treatment; lack of information and specific training and education.

The main responsibility for the health of workers lies with their employers. The first level of reporting and inspection for occupational disease and safety is the Occupational Health Division, which is part of the *oblast* Sanitary Epidemiological Stations, and has its own Sanitary and Health Laboratory (one laboratory doctor for 25,000 workers). Since the transition period the environmental health services have been dealing mainly with small and medium enterprises, which do not have the appropriate infrastructure to protect the environment and public health. Bigger and strategic enterprises have independent occupational health services. This dichotomy increases the difficulty of developing a comprehensive picture of occupational disease in the country and contributes

to the likely under-reporting of occupational diseases.

Patients diagnosed with a potential occupational disease are treated by specially appointed medical institutions of the local public health agencies, and referred to the Scientific Research Institute (NII) of Sanitation, Health and Occupational Disease in Tashkent and University Hospital II of Tashkent to confirm the diagnosis. Worker diagnosed with an occupational disease are entitled to 12 months' salary and, depending of the disability, a pension. However, the loss of real purchasing power of official salaries and the fear of being dismissed may act as deterrent to the reporting of occupational diseases.

On average around 300 cases of occupational diseases are certified each year. Not surprisingly, these occur in those districts with the highest concentration of industry, e.g. Tashkent *oblast*, Tashkent city, Fergana and Andijan. In the year 2000, 228 cases were classified as occupational diseases, including 55 cases of chronic poisoning, 37 cases resulting from vibration, 32 cases of chronic bronchitis, 18 cases of peripheral neuropathies, 23 cases of allergic dermatitis and 35 cases of hearing impairment. Five cases of acute poisoning resulted from an accident in a chemical plant.

At the workplace, the highest levels of indoor air pollution are observed in the cotton-cleaning and cotton-processing plants (where dust is the most important pollutant) and in the chemical and oil industries. However, in more recent years some technological improvements have resulted in a reduction in indoor pollutants, as well as in days of sick leave. For example, in the Textile Factory in Fergana, sickness rates among workers decreased from 43.2 per 100 workers in 1996 to 37.9 per 100 in 1998, following the introduction of new technologies and the modernization of production. One of the Government's main occupational health priorities is women's labour and the protection of women's health. About 1 million Uzbek women are currently working in industry, and approximately 15% of them work in very hard and hazardous conditions.

More information is needed in particular with regard to the information and protection of the workers.

## 12.3 Environmental health policy and management

### *Legal instruments and institutions*

The main legislative acts relevant to environmental health are briefly reviewed in the following paragraphs. According to the Constitution (art. 55), the State has to protect the land, its natural resources, its water resources, flora, fauna and other national assets.

The Law on Nature Protection, adopted in 1992, sets the main legal, economic and institutional framework for environmental protection and the rational use of natural resources, and guarantees the right to a safe environment. Other relevant laws include the following:

- The Law on the State Sanitary Supervision, 3 July 1992
- The Law on Water and Water Use, 6 May 1993
- The Law on Labour Protection, 6 May 1993
- The Subsoil Code, 22 September 1994
- The Law on Local Authorities
- The Labour Code, 21 December 1995
- The Law on the Protection of Public Health, 29 August 1996
- The Law on the Protection of Ambient Air, 27 December 1996
- The Law on the Quality and Safety of Foodstuffs, 30 August 1997
- The Law on the Protection and Use of Wildlife, 26 December 1997
- The Law on Radiation Safety, 31 August 2000.

Parliament adopts legislation on health care, approves the national health-care budget and controls its application. Health-care laws are debated within its Labour and Welfare Committee. The Ministry of Finance draws up the budget to be approved by Parliament and allocates funds to the regions, including funds for health services and capital investments.

The Ministry of Health develops health-care legislation and regulations, sets quality and quantity standards for the health services, monitors the quality of health care, identifies priorities for medical research, monitors public health, develops curricula for the training of health professionals, issues licences and certificates to health-care providers and coordinates international medical aid. Uzbekistan's Ministry of Health provides guidance to the Karakalpak Minister of Health and is the

supervisory authority for regional, city and district health departments.

The Cabinet of Ministers, the Ministry of Internal Affairs, the Ministry of Defence, the Railway Administration, the Civil Aviation Administration and the National Air Company provide parallel health services. The Union of Writers and Artists also runs its own comprehensive network of health services and about 75 large industrial enterprises have their own medical departments too. All parallel health services come under the overall supervision of the Ministry of Health.

Until 1991, the legislative and regulatory framework of the former Soviet Union applied to Uzbekistan's health-care system. Planning and management were centralized. The focus was on secondary and tertiary health care, provided through an extensive network of health-care facilities. Since independence in 1991, Uzbekistan's health-care system has been moving from central planning and government finance to a mixed public and private system.

In principle, the system provides universal coverage. As stated in the 1992 Constitution, "everyone shall have the right to receive skilled medical care". In June 1998, the Cabinet of Ministers issued a Decree on the reform of the health-care system. The decree sets the priorities for reform for the 1998–2005 period. It also lists the facilities delivering State-funded health care and those liable to switch towards paid services; sets out a programme for developing rural medical centres throughout the country between 2001 and 2005; estimates future workforce needs and medical education provision; and foresees a programme to convert medical schools into professional colleges in 1999–2005.

The gradual abandoning of universal health care coverage is resulting in several inequities associated with the budget crises and the drop in the share of GDP spent on health care from 6% to 3%. As the health budget shrinks, people increasingly have to pay for health services and drugs, which disadvantages those on subsistence incomes.

The decree of 1998 also states the need for a fundamental reform of health-care financing. It confirms the establishment of the State Centre for Emergency Medical Care with regional branches, outlines its structure and sets regulations for the operation of the emergency health-care system.

Financing is provided by the regional budgets, local income and penalty fees collected from entities (e.g. enterprises) which do not comply with sanitary norms (In 1998, the SES issued 52,681 administrative fines and collected a total of 77,707,996 sum (ca. US\$ 220,000). In addition 830 cases were passed to the investigation bodies, 25,150 operating units were stopped and 30,286 people found to be guilty removed from their posts.

Responsibility for environmental health lies primarily with the Department of Sanitary Epidemiological Supervision. Based on article 2 of the Law on State Sanitary Surveillance, it has overall control over the sanitation and infectious disease status and supervises all sanitary epidemiological institutions. This Department is divided into two main sections: the Division of Sanitation is responsible for the control of health problems related to the environment (working conditions, water, food, air, noise, radiation, etc.), while the Division of Epidemiology is responsible for the prevention of diseases, tackles communicable diseases and carries out epidemiological surveillance and reporting. The same structure and division of responsibility exist at *oblast* and *rayon* levels.

The national level, through the Research Institute of Sanitation, Hygiene and Occupational Disease, is also responsible for providing the scientific expertise for the development and updating of technical norms and standards, which are based on the concept of maximum permitted concentrations. Since independence, Uzbekistan has drawn up over 80 sanitary norms and regulations, 16 of which deal with protection from infectious diseases, food and drinking-water quality, and the collection, storage, transport, deactivation, and disposal of solid household waste. There are also standards for air pollution. These regulations represent the main environmental quality management tool and the reference against which compliance is assessed.

Besides the national level, which is responsible for the overall coordination of activities and reporting carried out at *oblast* or *rayon* levels, as well as for the provision of technical assistance, training and counselling to the local level, there is a large network of stations of the Sanitary Epidemiological Services- (SES). In total, there are 253 such stations at national, regional and district level, with some 13,000 health personnel, of whom about 5,000 have specialist medical training in sanitary epidemiology



Mirroring the organization at national level, the SES centres are responsible for both epidemiological and sanitation surveillance. They carry out inspections to ensure the enforcement of the Law on State Sanitary Supervision; monitor food and water quality; measure noise and air pollution; supervise the implementation of the regulatory standards which govern the four main areas subject to SES control, namely workplaces, communal buildings (i.e. offices, public buildings, hospitals and other places open to the public), structures for children (i.e. schools, kindergartens, summer camps, boarding schools) and food processing (food-processing plants, shops, catering businesses, restaurants, canteens, and other places where food is handled, sold or consumed).

In addition to the above, the Sanitary Epidemiological Stations systematically assess compliance with the sanitary and epidemiological environmental health rules of land-use planning for the development of new settlements, or new industrial areas, as well of any activity with a potential effect on health and the environment (e.g. construction, reconstruction and improvements of industries, development of new products, materials, foods; pollution prevention and remediation of surface and subsoil).

From a conceptual point of view, the above assessment is similar to carrying out environmental health assessments of projects, ad policies and development plans. Importantly, no activity can be initiated without a certificate of compliance from the SES. In total, 28 SES stations across the country are accredited and equipped to make these assessments. The scope of both the sanitary and the ecological expertise is defined by law (see Chapter 2), which stipulates that the two processes are complementary. The most important differences between the “sanitary expertise” and the general practice of environmental health impact assessment are the lack of public involvement and the inspective nature of the expertise, which is based on verifying compliance with existing standards and technical norms and making sure that the implementation of these projects and plans follows the relevant norms, rather than on a prospective or retrospective assessment of the health impacts on the population at risk based on a determination of likely exposures.

*Policy commitments relevant to environmental health*

Uzbekistan adopted the “Health for All” policy after joining the World Health Organization in 1992. Cooperation with WHO started in 1993 and the WHO Liaison Office was established in Tashkent in 1995.

The National Environmental Health Action Plan (NEHAP), approved in 1999 by the Government, was developed with WHO support, and the participation of a large working group which, in addition the Ministry of Health, involved many other agencies and research institutions, including the State Committee for Nature Protection, the Ministries of Energy and Electrification, of Justice, of Communal Services, and of Macroeconomics and Statistics. It is intended to help put environmental health higher on the political agenda, create a common understanding of priorities in environmental health, and set out the required action.

In addition to the ongoing cooperation with a number of international organizations active in the health sectors, such as WHO, the United Nations Population Fund (UNFPA), the United Nations Children’s Fund (UNICEF), UNDP, many international NGOs, such as Médecins sans Frontières and the International Society of Doctors for the Environment (ISDE), both of which have field programmes in the Aral Sea basin, operate in Uzbekistan. While international collaboration can help to tackle some environmental health issues, even greater value could be added if local health experts were more involved. This would also provide opportunities for strengthening local capacity in environmental health research.

The exact number of health-related NGOs in Uzbekistan is uncertain. According to a telephone survey undertaken in 1999, at least 45 NGOs are engaged in health-related activities. NGOs are rarely officially regarded as partners in social sector development and therefore technical coordination between the governmental and the voluntary sectors is limited.

### *Environmental health information systems*

The Ecology and Public Health Information System (EPHIS) Division was established in the Sanitary Epidemiological service in 1990. At the moment, one expert staffs it at the national level. It is responsible for providing training on health data reporting to experts from regional SES, and for suggesting preventive or corrective measures and research that should be carried out at regional and district level on the basis of environmental and health indicators. The Division plays also a coordinating role, by making available information that is not normally available at the local level (such as statistics from other agencies and regions). The Division is also responsible for the coordination of the NEHAP implementation.

From a territorial and administrative point of view, EPHIS is organized on three levels: local, regional and national.

Data collected by EPHIS are also used to calculate the indicators to rank the different regions and districts according to their environmental and health conditions. The classification is based on a scale of 5, and includes composite indicators reflecting environmental pollution and potential dangers to health. The regions of Karakalpakstan, Khorezm and some districts of the region of Buchara are classified as “ecological disaster zones”, while most other regions are classified as “ecologically unstable” (rank 2) or “ecologically near to critical” (rank 3).

The State Committee for Nature Protection uses a similar approach to classify the various regions of the country on the basis of their environmental vulnerability. Although the criteria used overlap to a great extent, there are sufficient differences to keep the two systems separate. A project supported by the Asian Development Bank attempted to make proposals on how these two systems could be merged, and contacts have been made between the Ministry of Health and the State Committee for Nature Protection to reach an agreement. However, work to adopt common criteria is still in progress.

While this classification system based on aggregated indicators helps to develop a broad picture of relevant issues, there are some difficulties when it comes to studying and intervening on priority areas within the various criteria. This is a problem common to any system based on composite indicators (such as the atmospheric pollution index), which can “mask”

the primary source of a problem. In the end this may prevent the development of specific measures capable of tackling a problem area. The WHO has developed a list of basic indicators for environmental health reporting, and it is currently being tested in eastern Europe in the context of reporting on progress in the implementation of NEHAP. The EPHIS participates in developing these indicators, and it is hoped that some of the experience and methods being developed at the international level can also help the work in Uzbekistan.

### *Professional education in environmental health*

Environment and health training is carried out by the State System of Hygiene Education. Several specialized institutions, such as the Scientific Research Institute of Sanitation, Hygiene and Occupational Disease, Tashkent State Medical Institutes I and II, Tashkent Medical Paediatric Institute, Tashkent Institute of Medical Doctors Training, Samarkand and Andijan Medical Institutes, provide training on hygiene.

Another major opportunity for capacity building, which has so far not been fully taken advantage of, is “on-the-job training” offered to local experts in international projects, such as those in the Aral Sea basin.

## **12.4 Conclusions and recommendations**

Following a deterioration of some key health indicators (life expectancy and mortality) in the early 1990s, some improvement has been reported in more recent years, notably with respect to infant and maternal mortality, which is also the result of the attention paid to family-planning policies. Areas of high concern remain respiratory and infectious diseases, tuberculosis and food- and water-borne infections such as hepatitis A and diarrhoeal diseases. An emerging issue, to be further investigated, is the long-term effect of exposure to pesticides and fertilizers, through contaminated food, water and, in some regions, dust.

Attention needs to be paid to problems connected to hygiene, such as the reported high level of hospital transmission of hepatitis B, which could be overcome by using only sterile or sterilized syringes (abandoning the risky practice of disinfecting used syringes with hypochlorite or hydrogen peroxide).

Pronounced regional differences exist with respect to both mortality and morbidity. This reflects in part the concentration of major environmental problem in the Aral Sea basin (water crisis and dust pollution) and the high industrial pollution in other regions (Navoi, Fergana Valley). As a result, in Karakalpakstan mortality rates by respiratory and infectious diseases are twice those reported at the national level, and the highest in the country. In the Aral Sea basin, where a series of health hazards and unfavourable socio-economic conditions, adversely affect human health, even more attention should be given to the complex cause-effect relationship.

The major air pollution issues are increasing road transport (and the continuing use of leaded fuel), emissions from some highly polluting industrial activities (especially in the Fergana Valley and Navoi region) and wind-blown dust in the Aral Sea area. Emissions from stationary sources, such as factories and energy plants, have been reduced in the past few years. These sources are losing their relative importance as emissions from the transport sector, which is now the most important source of air pollution, especially in urban areas, increase. In anticipation of a strong rise in road traffic, other health impacts, such as those caused by increasing emissions of pollutants and noise, need to be addressed, together with those resulting from traffic accidents. A special concern in the Aral Sea basin is the extremely high level of dust deposition by the strong winds prevailing in the region. The dust contamination by pesticides requires an urgent assessment of the possible health impacts on the population exposed to contaminated respirable dust.

Recommendation 12.1:

- *The Ministries of Transport and Health and the State Committee for Nature Protection should develop a comprehensive approach to the improvement of transport-related health effects, building on the strategies and plan of actions of the WHO Charter on Transport, Environment and Health.*
- *The Ministry of Health and the State Committee for Nature Protection, in collaboration with relevant industries, should continue the implementation of appropriate technical measures (e.g. filters) to reduce emissions from localized point sources, such as factories and energy plants. A combination of incentives and repressive measures (inspections and fines) should be used to promote technological improvements.*
- *The Ministry of Health should promote research to clarify the health impacts of dust, especially the short and long-term effects of exposure to dust contaminated by pesticide residue on the respiratory system.*
- *Glavhydromet and the State Committee for Nature Protection should reorganize the air pollution monitoring network, building on possible synergies between the equipment and facilities available to the Ministry of Health. Air quality monitoring could be made more useful for assessing health effects if some monitoring stations were relocated to places that are more representative of population exposure and if the measuring of TSP was replaced with PM10, a more reliable indicator of human exposure to particulate matter.*
- *The comprehensive programme should also harmonize air quality standards with the WHO Guidelines on Ambient Air.*

*See Recommendation 6.1*

The poor quality and scarce quantity of drinking water is the most important environmental health issue. In addition to chemical and microbiological contamination, another risk is posed by extremely high water salinization and water hardness. However, more high-quality research is needed to clearly identify the potential sources and the health impacts, and draw up appropriate policies.

Recommendations on Water: see Chapter 5.

The magnitude and severity of the biological and chemical contamination of food is not completely understood, partly due to the lack of appropriate monitoring facilities available to SES in many districts and regions. From available studies the following recommendations can be drawn.

Recommendation 12.2:

- *The Ministry of Health and the food industry should adhere to and implement the WHO food and nutrition action plan as a matter of urgency.*
- *Local needs assessments and inter-sectoral collaboration (e.g. between veterinary services and Ministry of Health food monitoring structures) should be included in local food protection programmes.*
- *A code of hygiene practices should be distributed to all food industries and local authorities.*
- *The Hazard Analysis and Critical Control Point (HACCP) system should be implemented.*

- *Food handlers should be trained in the principles of food safety and hygienic handling of food.*
- *Information gathering and dissemination should be strengthened, including surveillance of food-borne diseases.*
- *Information campaigns to combat botulism should be improved.*
- *Research should be carried out to clarify the health consequences of consuming food (e.g. milk and dairy products, butter, animal fats and oils) contaminated by pesticides or their by-products.*

*Recommendation 12.3:*

*The Ministry of Health should implement measures for the safe disposal of hospital waste, in particular with respect to the safe disposal of syringes. See Recommendation 7.4*

*The incidence of hepatitis B calls for an enforcement of hygienic measures, in particular the use of sterile, single-use disposable syringes and other medical devices and equipments.*

*Recommendation 12.4:*

*The Ministry of Health and the State Committee for Safety in the Manufacturing and Mining Industries in cooperation with enterprises and workers' representatives should:*

- *Reintroduce individual protective measures and provide workers with information about their occupational health risks;*
- *Apply economic instruments to encourage enterprises to observe health and safety standards, as well as to report all occupational diseases;*
- *Take into greater account the psychological and social dimensions of occupational health;*
- *Improve the registration of occupational diseases and injuries at regional level and across all economic sectors using general registration criteria and providing detailed and accurate information.*

The development and adoption by the Government of the NEAP and NEHAP represented an opportunity for looking at environmental and health issues from a cross-sectoral perspective, and identifying priorities and areas for action on the basis of a broad consensus of the different agencies and sectors involved. The potential for cross-sectoral cooperation remains largely untapped, however. The "vertical" organization within the Ministry of Health does not facilitate "horizontal" exchanges of information between

different departments of the same Ministry, nor between different ministries.

*Recommendation 12.5:*

*The Ministry of Health, the State Committee for Nature Protection and the different agencies that have been participating in the development of the NEAP and NEHAP should continue to cooperate closely in the implementation of these plans. They should select priorities on the basis of those identified in these policy documents. An integrated approach should then be developed to environmental health management and effective and participatory procedures to carry out environmental health impact assessments.*

*Recommendation 12.6:*

*The State Committee for Nature Protection and the SES should explore possibilities for sharing their systematic monitoring activities, with a view to optimizing available resources, avoiding duplication and making the information provided more consistent.*

*The State Committee for Nature Protection and the SES should also look at ways of streamlining their respective expertise processes in order to develop a single system of ecological expertise that would integrate environment and health assessments.*

*Recommendation 12.7:*

*The Ministry of Health and the Committee for Nature Protection should revise existing standards and develop new ones taking into account the principles of health risk assessment and toxicological criteria, including exposure pathways, and the vulnerabilities of special population groups. The WHO guidelines provide an example of this approach.*

*Recommendation 12.8:*

*The Ministry of Health should increase the resources available to the Ecology and Public Health Information System Division for the assessment and investigation of health effects and the development of a communication structure for feedback to the reporting regions and districts.*

Many international organizations, NGOs and research institutions including from western countries are active in Uzbekistan, investigating major environmental health problems, e.g. those affecting the Aral Sea region. Local experts are often involved in the practical execution of the research, though very often with a marginal decisional role, and with scarce participation in the development of study protocols. This represents a

missed opportunity for increasing local capacity in investigating environmental health issues based on the most recent methodological developments.

Recommendation 12.9:

*The Ministry of Health should increase local capacity in environmental health research by doing its utmost to make it part of international and national research projects. Local awareness about*

*existing funding mechanisms and opportunities to develop research proposals for submission to interested donors should also be increased, the results from local research should be more widely published in the international peer-reviewed literature and local experts should be more involved in the definition of study designs, and in the critical evaluation and discussion of the results.*

## ***ANNEXES***

# ANNEX I

## SELECTED ECONOMIC AND ENVIRONMENTAL DATA

Selected economic data	
	Uzbekistan
<b>TOTAL AREA (1 000 km<sup>2</sup>)</b>	447.40
<b>POPULATION</b>	
Total population, 2000 (100 000 inh.)	245.82
- % change (1994-2000)	12.00
Population density, 2000 (inh./km <sup>2</sup> )	54.94
<b>GROSS DOMESTIC PRODUCT</b>	
GDP, 2000 (US\$ billion)	13.50
per capita, 2000 (US\$ per capita)	550
<b>INDUSTRY</b>	
Value added in industry, 1999 (% of GDP)	14.3
<b>Industrial output</b>	
- % change (1994-1999)	...
<b>AGRICULTURE</b>	
Value added in agriculture, 1999 (% of GDP)	29.0
Agricultural output	
- % change (1994-1999)	...
<b>ENERGY SUPPLY</b>	
Total supply, 1998 (Mtoe)	46.3
Energy intensity 1998 (toe/ US\$ 1 000)	3.1
Structure of energy supply, 1998 (%)	
- Coal	2.2
- Oil and oil products	14.9
- Gas	81.8
- Others	1.1
<b>ROAD TRANSPORT</b>	
- 10 000 vehicles	...
- % change (1993-1998)	...
- private cars per capita (veh./1 000 inh.) 1996	...

Sources: Uzbekistan and UNECE.

## Selected environmental data

	Uzbekistan
<b>LAND</b>	
Total area (1 000 km <sup>2</sup> )	414.2
Protected areas (% of total area)	4.6
Nitrogenous fertilizer use, 1998 (tonne/km <sup>2</sup> arable land)	14.4
<b>FOREST</b>	
Forest area (% of land area)	...
<b>THREATENED SPECIES</b>	
Mammals (% of known species)	...
Birds (% of known species)	...
Freshwater Fish (% of known species)	...
<b>WATER</b>	
Water withdrawal (% of gross annual availability) 1998	...
Fish catches 1998 (t)	9,764
<b>AIR *</b>	
Emissions of sulphur oxides, 1998 (kg/inh.)	15.3
Emissions of sulphur oxides, 1998 (kg/US\$ 1 000 GDP)	24.9
Emissions of nitrogen oxides, 1998 (kg/inh.)	3.0
Emissions of nitrogen oxides, 1998 (kg/US\$ 1 000 GDP)	4.8
Emissions of carbon monoxide, 1998 (kg/inh.)	2.9
Emissions of carbon monoxide, 1998 (kg/US\$ 1 000 GDP)	4.6
<b>WASTE GENERATED</b>	
Industrial waste 1999 (kg/US\$ 1 000 GDP)	1,580
Municipal waste 1999 (kg/inh./day)	0.64

Sources: Uzbekistan and UNECE.

Notes:

\* Air emissions from stationary sources.



## **ANNEX II**

### **SELECTED MULTILATERAL, REGIONAL AND SUB-REGIONAL AGREEMENTS**

#### Selected bilateral and multilateral agreements

Worldwide agreements		Uzbekistan	
as of 5 April 2001			
1949	(GENEVA) Convention on Road Traffic	y	
1957	(BRUSSELS) International Convention on Limitation of Liability of Owners of Sea-going Ships	y	
1958	(GENEVA) Convention on Fishing and Conservation of Living Resources of the High Seas	y	
1960	(GENEVA) Convention concerning the Protection of Workers against Ionizing Radiations	y	
1963	(VIENNA) Convention on Civil Liability for Nuclear Damage	y	
	1997 (VIENNA) Protocol to Amend the 1963 Vienna Convention on Civil Liability for Nuclear Damage	y	
1963	(MOSCOW) Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water	y	
1969	(BRUSSELS) Convention on Civil Liability for Oil Pollution Damage	y	
	1976 (LONDON) Protocol	y	
1969	(BRUSSELS) Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties	y	
1971	(RAMSAR) Convention on Wetlands of International Importance especially as Waterfowl Habitat	y	
	1982 (PARIS) Amendment	y	
	1987 (REGINA) Amendments	y	
1971	(GENEVA) Convention on Protection against Hazards from Benzene (ILO 136)	y	
1971	(BRUSSELS) Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage	y	
1971	(LONDON, MOSCOW, WASHINGTON) Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea-bed and the Ocean Floor and in the Subsoil thereof		
1972	(PARIS) Convention on the Protection of the World Cultural and Natural Heritage	y	R
1972	(LONDON) Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	y	
	1978 Amendments (incineration)	y	
	1980 Amendments (list of substances)	y	
1972	(GENEVA) International Convention for Safe Containers	y	
1973	(WASHINGTON) Convention on International Trade in Endangered Species of Wild Fauna and Flora	y	R
	1983 (GABORONE) Amendment	y	
1973	(LONDON) Convention for the Prevention of Pollution from Ships (MARPOL)	y	
	1978 (LONDON) Protocol (segregated ballast)	y	
	1978 (LONDON) Annex III on Hazardous Substances carried in packaged form	y	
	1978 (LONDON) Annex IV on Sewage	y	
	1978 (LONDON) Annex V on Garbage	y	
1974	(GENEVA) Convention on Prevention and Control of Occupational Hazards caused by Carcinogenic Substances and Agents (ILO 139)	y	
1977	(GENEVA) Convention on Protection of Workers against Occupational Hazards from Air Pollution, Noise and Vibration (ILO 148)	y	
1979	(BONN) Convention on the Conservation of Migratory Species of Wild Animals	y	R
	1991 (LONDON) Agreement Conservation of Bats in Europe	y	
	1992 (NEW YORK) Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS)	y	
	1995 (THE HAGUE) African/Eurasian Migratory Waterbird Agreement (AEWA)	y	
	1996 (MONACO) Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)		

Source: UNECE and Uzbekistan.

y = in force; S = signed; R = ratified; D = denounced.

(Continued)

## Selected bilateral and multilateral agreements

Uzbekistan

1982	(MONTEGO BAY) Convention on the Law of the Sea	y	
1994	(NEW YORK) Agreement Related to the Implementation of Part XI of the Convention	y	
1994	(NEW YORK) Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks		
1985	(VIENNA) Convention for the Protection of the Ozone Layer	y	R
1987	(MONTREAL) Protocol on Substances that Deplete the Ozone Layer	y	R
1990	(LONDON) Amendment to Protocol	y	
1992	(COPENHAGEN) Amendment to Protocol	y	
1997	(MONTREAL) Amendment to Protocol		
1986	(VIENNA) Convention on Early Notification of a Nuclear Accident	y	
1986	(VIENNA) Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	y	
1989	(BASEL) Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	y	R
	1995 Ban Amendment		
	1999 (BASEL) Protocol on Liability and Compensation		
1990	(LONDON) Convention on Oil Pollution Preparedness, Response and Cooperation	y	
1992	(RIO) Convention on Biological Diversity	y	R
	2000 (CARTAGENA) Protocol on Biosafety		
1992	(NEW YORK) Framework Convention on Climate Change	y	R
	1997 (KYOTO) Protocol		R
1994	(VIENNA) Convention on Nuclear Safety	y	
1994	(PARIS) Convention to Combat Desertification	y	R
1997	(VIENNA) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management		
1997	(VIENNA) Convention on Supplementary Compensation for Nuclear Damage		
1998	(ROTTERDAM) Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade		

Source: UNECE and Uzbekistan.

y = in force; S = signed; R = ratified; D = denounced.

(Continued)

## Selected bilateral and multilateral agreements

Regional and subregional agreements		Uzbekistan	
as of 5 April 2001			
1950	(PARIS) International Convention for the Protection of Birds	y	
1957	(GENEVA) European Agreement - International Carriage of Dangerous Goods by Road (ADR)	y	
1958	(GENEVA) Agreement - Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts.	y	
1968	(PARIS) European Convention - Protection of Animals during International Transport	y	
1979	(STRASBOURG) Additional Protocol	y	
1969	(LONDON) European Convention - Protection of the Archeological Heritage	y	
1978	(OTTAWA) Convention on Future Multilateral Cooperation in the North West Atlantic Fisheries	y	
1979	(BERN) Convention on the Conservation of European Wildlife and Natural Habitats	y	
1979	(GENEVA) Convention on Long-range Transboundary Air Pollution	y	
1984	(GENEVA) Protocol - Financing of Co-operative Programme (EMEP)	y	
1985	(HELSINKI) Protocol - Reduction of Sulphur Emissions by 30%	y	
1988	(SOFIA) Protocol - Control of Emissions of Nitrogen Oxides	y	
1991	(GENEVA) Protocol - Volatile Organic Compounds	y	
1994	(OSLO) Protocol - Further Reduction of Sulphur Emissions	y	
1998	(AARHUS) Protocol on Heavy Metals		
1998	(AARHUS) Protocol on Persistent Organic Pollutants		
1999	(GOTHENBURG) Protocol to Abate Acidification, Eutrophication and Ground-level Ozone		
1991	(ESPOO) Convention on Environmental Impact Assessment in a Transboundary Context	y	
1992	(HELSINKI) Convention on the Protection and Use of Transboundary Waters and International Lakes	y	
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1993	(OSLO and LUGANO) Convention - Civil Liability for Damage from Activities Dangerous for the Environment		
1994	(LISBON) Energy Charter Treaty		
1994	(LISBON) Protocol on Energy Efficiency and Related Aspects		
1994	(SOFIA) Convention on Cooperation for the Protection and Sustainable Use of the Danube River	y	
1998	(AARHUS) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters		

Source: UNECE and Uzbekistan.

y = in force; S = signed; R = ratified; D = denounced.

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