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Committee on Environmental Policy

# ENVIRONMENTAL PERFORMANCE REVIEWS

# TAJIKISTAN

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**NOTE**

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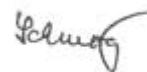
# *Foreword*

Environmental Performance Reviews for countries-in-transition were initiated by Environment Ministers at the second "Environment for Europe" Conference in Lucerne, Switzerland, in 1993. As a result, the UNECE Committee on Environmental Policy decided to make the Environmental Performance Reviews a part of its regular programme.

Ten years later, at the Fifth Ministerial Conference 'Environment for Europe (Kiev, 21-23 May 2003), the Ministers confirmed that the UNECE programme of environmental performance reviews (EPR) had made it possible to assess the effectiveness of the efforts of countries with economies in transition to manage the environment, and to offer the Governments concerned tailor-made recommendations on improving environmental management to reduce their pollution load, to better integrate environmental policies into sectoral policies and to strengthen cooperation with the international community. They also reaffirmed their support for the EPR programme as an important instrument for countries with economies in transition, and decided that the programme should continue.

Through the Peer Review process, Environmental Performance Reviews also promote dialogue among UNECE member countries and harmonization of environmental conditions and policies throughout the region. As a voluntary exercise, the Environmental Performance Review is undertaken only at the request of the country itself.

The studies are carried out by international teams of experts from the region, working closely with national experts from the reviewed country. The teams also benefit from close cooperation with other organizations in the United Nations system, including the United Nations Development Programme, the United Nations Environment Programme, the World Bank and the World Health Organization, as well as with the Organization for Economic Cooperation and Development.

The Environmental Performance Review of Tajikistan is the twenty-first in the series published by the United Nations Economic Commission for Europe. I hope that this Review will be useful to all countries in the region, to intergovernmental and non-governmental organizations alike and, especially, to Tajikistan, its Government and its people.

Brigita Schmögnerová
Executive Secretary

# *Preface*

The Environmental Performance Review (EPR) of Tajikistan began in October 2003, with the preparatory mission, during which the final structure of the report was discussed and established. Thereafter, the review team of international experts was constituted. It included experts from Sweden, Switzerland and Ukraine together with experts from the secretariats of the United Nations Economic Commission for Europe (UNECE), the Regional Office for Europe of the United Nations Environment Programme (UNEP/ROE) and the European Centre for Environment and Health of the World Health Organization (WHO/ECEH).

The review mission took place from 26 March to 8 April 2004. A draft of the conclusions and recommendations as well the draft EPR report were submitted to Tajikistan for comment in July 2004. In September 2004, 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 expert representatives of the Tajikistan Government, focusing, in particular on the conclusions and recommendations made by the international experts.

The EPR report, with suggested amendments from the Expert Group, was then submitted for peer review to the UNECE Committee on Environmental Policy on 13 October 2004. A high-level delegation from the Government of Tajikistan participated in the peer review. The Committee adopted the recommendations as set out in this report.

The report covers twelve issues of importance to Tajikistan, concerning the framework for environmental policy, management of pollution and natural resources and economic and sectoral integration. Among the issues receiving special attention during the reviews were poverty, environment and economy; the policy, legal and institutional framework; environmental expenditures and privatisation; information, public participation and education; management of air, water and waste; agriculture; biodiversity; and eco-tourism. Since the end of its five-year civil war in 1997, Tajikistan has been rebuilding its institutions, legal framework and its economy. Considerable attention has been given to reducing poverty, raising environmental awareness among the population, halting land degradation, protecting biodiversity and reducing energy consumption, among others.

The UNECE Committee on Environmental Policy and the UNECE review team would like to thank both the Government of Tajikistan and the many excellent national experts who worked with the international experts and contributed with their knowledge and assistance. UNECE wishes the Government of Tajikistan further success in carrying out the tasks before i to meet its environmental objectives and policy, including the implementation of the conclusions and recommendations to support and promote environmental protection and especially to improve overall national living standards, and to strengthen international cooperation.

UNECE would also like to express its deep appreciation to the Governments of Germany, Hungary, the Netherlands, Sweden, Switzerland and the United Kingdom for their support to the Environmental Performance Review Programme, to the European Centre for Environment and Health of the World Health Organization for its participation in the Review, and to the United Nations Development Programme, the World Bank and WHO for their contributions to the work in Tajikistan and the preparation of this report.

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## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACTED | Agency for technical cooperation and development |
| ADB | Asian Development Bank |
| AKDN | Aga Khan Development Network |
| BOD | Biological Oxygen Demand |
| CAR | Central Asian Republics |
| CBD | Convention on Biological Diversity |
| CFCs | Chlorofluorocarbons |
| CIDA | Canadian International Development Agency |
| CIS | Commonwealth of Independent States |
| CITES | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| CORINAIR | COoRdinated INformation AIR |
| CPI | Consumer price index |
| DDT | Dichlorodiphenyltrichloroethane |
| DG RELEX | European Commission Directorate General External Relations |
| EAP | Environmental Action Programme |
| ECEH | European Centre for Environmental Health |
| ECHO | European Commission, Humanitarian Aid Office |
| ECO | Economic Cooperation Organization |
| EEA | European Environment Agency |
| EECCA | Eastern Europe, the Caucasus and Central Asia |
| EIA | Environmental Impact Assessment |
| EMEP | Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe |
| EU | European Union |
| FAO | Food and Agriculture Organization of the United Nations |
| FDI | Foreign Direct Investments |
| GBAO | Gorno-Badakhshan (Kuhistoni Badakhshan) Autonomous *Oblast* |
| GDP | Gross domestic product |
| GEF | Global Environment Facility |
| GHG | Greenhouse gases |
| GIS | Geographic Information Systems |
| GMO | Genetically modified organisms |
| GNP | Gross national product |
| GOST | State Standard of the USSR |
| HACCP | Hazard Analysis and Critical Control Point |
| HCFCs | Hydrochlorofluorocarbons |
| HDI | Human Development Index |
| IAEA | International Atomic Energy Agency |
| ICAS | Intergovernmental Council for the Aral Sea |
| ICRP | International Commission on Radiological Protection |
| ICSD | Interstate Commission on Sustainable Development |
| ICWC | Inter-State Commission for Water Coordination |
| IDP | Internally displaced people |
| IFAS | International Fund for Saving the Aral Sea |
| IMCP | Integrated Mining and Concentrating Plant |
| IMF | International Monetary Fund |
| IOM | International Organisation of Migration |
| ISAR | Initiative for Social Action and Renewal in Eurasia |
| IUCN | World Conservation Union |
| MAC | Maximum allowable concentration |
| MEAs | Multilateral environment agreements |
| MLRWR | Ministry of Land Reclamation and Water Resources |
| NEAP | National Environmental Action Plan |
| NEHAP | National Environmental Health Action Plan |

| | |
|---|---|
| NGO | Non-governmental organization |
| NHDR | National Human Development Report |
| NRC | National Reconciliation Council |
| NSAP | National Strategy and Action Plan on Conservation and Sustainable Use of Biodiversity |
| ODS | Ozone-depleting substances |
| OECD | Organisation for Economic Co-operation and Development |
| OSCE | Organization for Security and Cooperation in Europe |
| PCI | Peaceful Communities Initiative |
| PIP | Public investment programme |
| PM | Particulate matter |
| POPs | Persistent Organic Pollutants |
| PPI | Producer price index |
| PPP | Purchasing power parity |
| PRSP | Poverty Reduction Strategy Paper |
| REAP | Regional Environmental Action Plan for Central Asia |
| RRS | Regions under Republican Subordination |
| SCEPF | State Committee for Environmental Protection and Forestry |
| SCSPM | State Committee for State Property Management |
| SDR | Standardized death rate |
| SES | Sanitary Epidemiological Station, Sanitary Epidemiological Service |
| SoE | State of Environment Report |
| SPECA | United Nations Special Programme for the Economies of Central Asia |
| TNP | Tajik National Park |
| TSP | Total Suspended Particulates |
| UN | United Nations |
| UNDP | United Nations Development Programme |
| UNECE | United Nations Economic Commission for Europe |
| UNEP | United Nations Environment Programme |
| UNESCAP | United Nations Economic and Social Commission for Asia and the Pacific |
| UNFCCC | United Nations Framework Convention on Climate Change |
| UNICEF | United Nations Children's Fund |
| USAID | United States Agency for International Development |
| USSR | Union of Soviet Socialist Republics |
| WHO | World Health Organisation |
| WTO | World Tourism Organization |
| WUA | Water User Association |
| WWTP | Wastewater treatment plant |

# GLOSSARY OF LOCAL TERMS

| | |
|---|---|
| *dekhkan* | farmer |
| *hukumat* | city (town) administration (executive body) |
| *jamoat* | village (*kishlak*) administration (executive body) |
| *kishlak* | village |
| *kolkhoz* | collective farm |
| *majlis* | elected council (at various levels) |
| *Majlisi Oli* | National Assembly (Parliament) |
| *Majlisi Milli* | Upper chamber of National Assembly |
| *Majlisi Namoyandagon* | Lower chamber of National Assembly |
| *mahalla* | local community |
| *oblast (region, viloyat)* | large administrative unit, equivalent of state or province |
| *raion (district)* | small administrative unit, equivalent of county |
| *sovkhoz* | state-owned farm |
| *tabiat* | nature |
| *Vodokanal* | municipal water supply and wastewater discharge company |

# SIGNS AND MEASURES

| | |
|---|---|
| .. | not available |
| - | nil or negligible |
| . | decimal point |
| g | gram |
| kg | kilogram |
| mg | milligram |
| µg | microgram |
| m | metre |
| mm | millimetre |
| m³ | cubic metre |
| km | kilometre |
| km² | square kilometre |
| km³ | cubic kilometre |
| ha | hectare |
| l | litre |
| mln | million |
| min | minute |
| ºC | degree Celsius |
| MW | megawatt |
| KWh | kilowatt-hour |
| GWh | gigawatt-hour |
| Ci | curie |
| R | roentgen |
| µR | microroentgen |

## Currency

**Monetary unit: Somoni**
**One Somoni is 100 Dirhams**

Exchange rates: IMF

| Year | Somoni / US$ |
|------|------|
| **1995** | .. |
| **1996** | .. |
| **1997** | 0.56 |
| **1998** | 0.78 |
| **1999** | 1.24 |
| **2000** | 2.08 |
| **2001** | 2.37 |
| **2002** | 2.76 |
| **2003** | 3.06 |

*Source* : IMF. International
Financial Statistics, April 2004.

# *INTRODUCTION*

## I.1 The physical context

Tajikistan is a landlocked country located in South-East Central Asia, with a land area of 143,100 km$^2$. Tajikistan is bordered to the north by Kyrgyzstan (border length 630 km), to the east by China (430 km), to the south by Afghanistan (1,030 km), and to the north and west by Uzbekistan (910 km). The Gorno-Badakhshan Autonomous *Oblast* occupies about 45% of the country.

Tajikistan is a mountainous country with 72 peaks above 6000 m. The Tian Shan, Gissar-Alay and Pamir mountain systems cover about 93% of the country's land area. The altitude within the country varies from 300 to 7,495 m above sea level and almost half the country lies above 3,000 m. Earthquakes are frequent because Tajikistan is situated on an active seismic belt that extends throughout the entire South-Eastern section of Central Asia.

The Pamir mountain range in the east boasts the country's highest mountain peak, Qullai Ismoili Somoni (7,495 m). The Tian Shan range occupies northern and central Tajikistan, with smaller spurs extending across the north-west into Uzbekistan. The western third of the country is foothills and steppes (semi-arid grassy plains). Lowland areas are confined to river valleys in the south-west and to the extreme north, where a small part of the territory extends into the fertile Fergana Valley. Due to the mountainous terrain, only 5% of Tajikistan's land area is cultivated.

The climate is continental, with considerable seasonal and daily fluctuations in temperature and humidity. The country's very complicated relief structure, with huge variations in elevation, creates unique local climates with great temperature differences. Precipitation depends on the location and orientation of mountain ranges and on the air mass circulation. Mean annual precipitation in the hot deserts of southern Tajikistan and the cold high-mountain deserts of the eastern Pamirs varies from 70 to 160 mm, while precipitation in central Tajikistan can exceed 2,000 mm.

July is the warmest month and January the coldest, but mean annual air temperature varies widely. In the valleys and foothills it is between +6 to +17°C, but in the high-mountain areas, like the western Pamirs, the climate is harsh and the mean annual air temperature is close to 0, rising up to +6 to +8°C at lower altitudes. The climate is particularly severe in the eastern Pamirs, where the mean annual air temperature ranges from -1 to -6°C. The coldest temperature ever recorded (-63°C) was at Bulunkul Lake.

The high mountains are permanently covered by snow and ice. The glaciers, estimated to hold water reserves of 550 km$^3$, cover aproximately 6% of the country's entire land area. But they are shrinking; during the 20$^{th}$ century the largest glacier, Fedchenko, regressed 1 km in length, 11 km$^2$ in size and 2 km$^3$ in volume.

The rivers of Tajikistan are important sources of fresh water for the Aral Sea. The glaciers and permanent snow feed the rivers of the Aral Sea basin with over 13 km$^3$ of water a year. The major rivers are the Syr Darya (total length 2,400 km), which flows for 195 km across the Fergana Valley in the north, the Zeravshan, which runs through central Tajikistan, and the Kafirnigan, Vakhsh and Panj rivers, all of which together drain more than three fourths of Tajikistan's territory.

Tajikistan has over 1,000 lakes, 80% of which are more than 3,000 m above sea level. They cover more than 680 km$^2$ and most of them are in the eastern Pamir region. The largest is the salt water Lake Karakul (380 km$^2$), in the north-east of the country at an elevation of 3,914 m. The deepest freshwater lake is the 490-m deep Sarez (3,239 m above sea level, 86.5 km$^2$) in the western Pamirs.

**Figure I.1: GDP – composition by sector in 1990 and 2002 (per cent of total GDP)**



| | 1990 | 2002 |
|---|---|---|
| Services | 28.8 | 38.2 |
| Transport | 6.8 | 4.1 |
| Construction | 11.0 | 4.2 |
| Agriculture | 30.1 | 29.1 |
| Industry | 23.3 | 24.4 |

Legend: ■ Industry  ■ Agriculture  □ Construction  □ Transport  □ Services
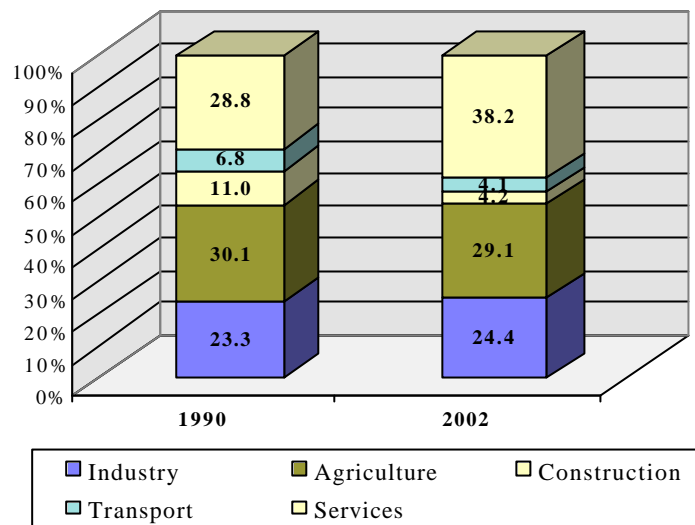
*Source* : UNECE common statistical database, 2004.

Tajikistan's flora is rich and diverse, with 9,771 plant species. Vegetation on the steppes includes drought-resistant grasses and low shrubs. The mountain slopes are covered with dense forests of coniferous trees, such as spruce.

The country's variety of natural environments, ranging from hot deserts to cold alpine areas, is home to a very diversified fauna. Deer, wolves, foxes and badgers live on the steppes, and brown bears, lynxes, wolves and wild boar inhabit lower mountain regions. Its rare or endangered species include the Tajik markhur, the Siberian horned goat, the Marco Polo argali mountain sheep, the Urial sheep, the Bukhara red deer and the snow leopard.

## I.2    The human context

Tajikistan has a population of 6,438,000 and the average population density is 44.9 persons per km$^2$. The lowlands of northern and western Tajikistan are the most densely populated, but population density varies a bit according to the geographical area. Tajikistan was the least urbanized republic of the former Soviet Union and even in 2001 only 28% of its population lived in urban areas. The largest city is the capital, Dushanbe, with 562,000 inhabitants. Other cities include the important cotton-processing centre Khujand (population 149,000), Kulob (population 78,000) and Qurghonteppa (population 60,000).

Many Tajiks live abroad, while Tajikistan is home to large group of Uzbeks and other minorities. The largest ethnic group is the Tajiks. The Turkic-speaking Uzbeks are the largest minority group. They live primarily in the Fergana Valley and in the vicinity of Kulob in south-central Tajikistan and Tursunzade in western Tajikistan. The number of Russians, the third largest group, has been diminishing since 1989, when they started to emigrate to the Russian Federation. By 2003 they represented only a very small proportion of the population. Other ethnic minorities include Tartars, Kyrgyz, Ukranians, Turkmen and Koreans.

The 1994 Constitution recognizes Tajik as the official State language and Russian as the language of inter-ethnic communication. Tajikistan has, since 1940, been using the Cyrillic script. The traditional and predominant religion of Tajikistan is Islam.

The demographic indicators of Tajikistan have changed noticeably during the past 10 years. The fertility rate decreased from a high 5.0 in 1991 to 3.1 in 2001. The birth rate also fell almost 30% from 38.8 (per 1000) in 1990 to 27.3 in 2002. Even though the country experienced a civil war in the 1990s, infant mortality decreased from 40.4 (per 1000) in 1990 to 27.9 in 2001. During the same period life expectancy increased. In 2001 average life expectancy was 72.0 years (73.9 years for women and 70.2 years for men) (see table I.1).

**Table I.1: Demography and health indices, 1990-2002**

|  | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Birth rate (per 1000) | 38.8 | 39.1 | 32.4 | 33.5 | 34.2 | 34.1 | 30.1 | 30.6 | 31.3 | 29.8 | 27.0 | 27.2 | 27.3 |
| Fertility rate | .. | 5.0 | 5.1 | 4.8 | 4.0 | 4.1 | .. | 3.5 | 3.4 | .. | 3.1 | 3.1 | .. |
| Mortality rate (per 1000) | 6.2 | 6.1 | 6.6 | 8.9 | 7.1 | 6.1 | 5.5 | 4.9 | .. | 4.2 | 4.2 | 4.2 | .. |
| Infant mortality rate (per 1000) | 40.4 | 40.4 | 48.1 | 46.5 | 40.6 | 30.9 | 31.3 | 30.7 | 23.4 | 19.4 | 15.5 | 27.9 | .. |
| Life expectancy at birth (years) | 70.0 | 70.3 | 68.0 | 61.9 | 65.9 | 68.0 | 68.6 | 70.4 | .. | 72.0 | 72.1 | 72.0 | .. |
| Female life expectancy at birth (years) | 72.6 | 72.9 | 70.8 | 68.2 | 68.4 | 70.6 | 71.5 | 73.1 | .. | 74.0 | 73.9 | 73.9 | .. |
| Male life expectancy at birth (years) | 67.4 | 67.6 | 65.3 | 56.6 | 63.5 | 65.4 | 65.9 | 67.8 | .. | 70.0 | 70.3 | 70.2 | .. |
| Population aged 0-14 years (%) | 43.2 | 43.4 | 43.6 | 43.9 | 44.0 | 44.2 | 44.2 | 43.9 | 43.5 | 43.0 | 42.2 | 41.3 | 40.3 |
| Population aged 65 years or over (%) | 3.8 | 3.9 | 3.9 | 3.9 | 3.9 | 3.8 | 3.7 | 3.6 | 3.6 | 3.6 | 3.7 | 3.8 | 3.9 |

*Sources* : WHO. Health for All database. http://hfadb.who.dk/hfa/ or www.who.dk on 04.05.2004

Tajikistan is a developing country and more than 80% of the population lives below the poverty line as defined by the United Nations. At the same time, as a result of the free and universal education system, with nine grades of compulsory general education for all children, most people 15 years of age and older can read and write. The literacy rate in 2001 was 99.3%. Among Tajikistan's institutions of higher education, the largest are the Tajik National State University, the Tajik Agrarian University, Tajik Medical University and the Tajik Technical University, all located in Dushanbe.

In 1985, Tajikistan's human development index (HDI) measured by the United Nations Development Programme (UNDP) was 0 .736 (on a scale of minimum 0.0 to maximum 1.0) and the country ranked 48th out of 122. The 1990 HDI was exactly the same as in 1985, but Tajikistan's relative position weakened, dropping to 57th out of 136 countries. In 1995, during the civil war, HDI fell to 0.665 and a rank of 112th. In 2002, the most recent figures, HDI rose slightly to 0.671, but ranking fell to 116th out of 177 countries.

## I.3    The historical and economic context

*History*

In September 1991 the Tajik Supreme Soviet declared Tajikistan's independence from the Soviet Union. The Soviet Union was officially dissolved in December and most of the former Soviet republics, Tajikistan included, joined a political alliance called the Commonwealth of Independent States (CIS). In November 1991 the former first secretary of the Communist Party of Tajikistan won the country's first direct presidential election.

Anti-government demonstrations began in Dushanbe in March 1992. The banned opposition parties staged demonstrations and called on the President to resign. In early May these clashes escalated to a civil war after government troops fired on demonstrators killing several people. Mass demonstrations forced the President to resign in September.

In December 1993, CIS sent about 25,000 peacekeepers to Tajikistan. In early 1994 the Government announced that it was willing to negotiate with the opposition, and in September a temporary ceasefire accord was reached. The ceasefire took effect in October and the United Nations sent an observer mission to monitor it, simultaneously facilitating the peace talks between the two sides.

In an election held in November 1994, the voters elected Mr. Emomali Rahmonov as President and at the same time approved a new constitution that reinstated the presidential system. Talks resumed, resulting in a new ceasefire agreement in December and in February 1997 a preliminary peace agreement was signed.

In the subsequent negotiations, the Government agreed to legalize the opposition parties and distribute 30% of high-level government posts to opposition leaders. In June 1997, both sides signed a peace accord and formed the National Reconciliation Council, a joint council of government and opposition representatives to oversee the implementation of the peace terms.

The civil war (1992-97) was one of the most violent internal conflicts among the post-Soviet Union republics. An estimated 50,000 to 100,000 lives were lost and close to 1 million people were forced to flee their homes. Hundreds of thousands of people were internally displaced or became refugees. According to some estimates, almost half a million people emigrated to the Russian Federation and as many as 70,000 to northern Afghanistan.

In January 1998 the Government granted an amnesty to all opposition leaders in exile and appointed one of the opposition leaders as First Deputy Prime Minister. In September a national referendum approved major constitutional amendments, which created a new bicameral legislature, extended the presidential term of office from five to seven years and legalized the right to form religion-based parties. In November 1998 Mr. Rahmonov was re-elected President. Legislative elections were held in 2000. Members of the opposition were appointed to 30% of all government posts, as agreed in the 1997 peace treaty. After the elections the National Reconciliation Commission was dissolved.

The Russian Federation's military presence in the country continued after the civil war according to a treaty signed in 1999. Tajikistan is also contributing forces to the CIS Collective Rapid Reaction Force, formed in 2003 under the auspices of the CIS Collective Security Treaty.

*Economy*

In 1990 Tajikistan had the lowest GDP per capita in the Soviet Union. In addition about 47% of total government revenue came from the Soviet Union's budget, which made Tajikistan the highest transfer recipient of all the Soviet republics. When Tajikistan gained independence, these transfers dried up overnight. With its subsidies gone and its trade relations severed, Tajikistan started the transition to a market economy. One year later, civil war broke out, and the transition was largely halted for five years, until 1997.

The mainstay of Tajikistan's economy is electricity, cotton and aluminium. Tajikistan has the potential of being one of the world's largest hydroelectricity producers, but due to the lack of investments, only 10% of its hydroelectric capacity is used. Even so, hydropower covers 50% of the country's energy needs and 95% of its electricity consumption. For other energy sources, such as oil and gas, Tajikistan is dependent on imports.

Tajikistan was the third largest cotton-producing republic in the Soviet Union, producing about 11% of its cotton. Cotton production peaked at 1,000,000 tons/year, but the civil war and several years of drought brought production down. Even in 1999, after four years of recovery, production was only two thirds of the pre-independence level.

Aluminium production dominates the industrial sector. The Tajik aluminium plant at Tursunzade near the border with Uzbekistan is one of the largest in the world. In the first half of 2003, aluminium accounted for about 40% of the country's total industrial output. In 2002, about 307,000 tons of the plant's 500,000-ton annual production capacity was in use. Approximately 95% of the smelter's production is exported and, in the first half of 2003, aluminium brought in more than half the country's export earnings, but also consumed two thirds of its annual electricity production.

About 80% of Tajikistan's total export earnings are derived from aluminium and cotton, a figure that has been almost constant for the past 10 years. Non-diversification and reliance on two main export products make Tajikistan vulnerable to fluctuations in global commodity prices and terms of trade. On the other hand, Tajikistan has succeeded in diversifying its export markets since independence. In 2002 nearly 75% of exports went to non-CIS markets.

After independence Tajikistan's GDP dropped dramatically to a low, in 1996, of 30% of its 1989 level. GDP has picked up and, especially since 2001, growth has been robust, at around 10% a year. This seven-year continuous growth period has brought GDP to 47.7% of its 1989 level. Even though GDP per capita has grown since 1995 and currently stands at US$ 189 per person, measured by purchasing power parity in 2001 it was only 42% of its 1990 level.

Tajikistan's official unemployment has been under 3% throughout the past 10 years, but UNDP estimates real unemployment in 2003 at 33%. Inflation was rampant in the first half of the 1990s. In 1993 the consumer price index (CPI) peaked at 2,136%. Since then inflation has fallen to 71.7% in 1997 and to 10.2% in 2002.

Tajikistan has been unable to attract foreign direct investment (FDI), and cumulative FDI in 2002 was only US$ 201 million. The flow of FDI has been the lowest among the members of the Commonwealth of Independent States and this has caused the Government to finance its deficits and public investment programmes through external borrowing resulting in a relatively heavy debt-service burden. Negligible FDI added to a low domestic savings rate and a high debt-service cost constrain the Government's freedom of action and options for strengthening the economy.

## I.4    The institutions

The head of State is the directly elected President, who may serve no more than two consecutive terms of seven years each. The President appoints the Prime Minister and the members of the Government, but these appointments are subject to legislative approval.

The legislature, *Majlisi Oli,* has two chambers. The lower chamber, *Majlisi Namoyandagon*, sits permanently. Its 63 members are elected by popular vote for a five-year term: 22 are elected by proportional representation (in which representatives are elected from party lists in proportion to the number of votes that each party receives) and 41 are elected from single-member constituencies (geographical areas that each have one representative).

The upper chamber, *Majlisi Milli*, convenes at least twice a year and has 33 members, who are indirectly elected for a five-year term; 25 are elected by local deputies and 8 are appointed by the President.

The Constitution provides for an independent judiciary. The Supreme Court is the highest court. The other high courts are the Supreme Economic Court and the Constitutional Court. The President appoints the judges of these three courts, with the approval of the legislature. Other courts include the Military Court, the courts of the Gorno-Badakhshan Autonomous *Oblast* and local courts. All judges are appointed for a five-year term.

Tajikistan is divided into five regions: Sughd *Oblast*, Khatlon *Oblast*, the Gorno-Badakhshan Autonomous *Oblast* (GBAO) and Regions under Republican Subordination and the capital city, Dushanbe. *Oblasts*, in turn, are subdivided into *raions.* Regions under Republican Subordination comprise several cities, including the capital, Dushanbe, and *raions.* These administrative units have local representative organs (*majlisi*), whose members are elected for a five-year term. The President appoints their chairmen.

## I.5    Environmental context

Although water is abundant and Tajikistan supplies roughly 50% of the water of the Aral Sea basin, its water resources are poorly managed, creating transboundary and internal quantity and quality problems. So water is Tajikistan's top environmental priority.

*Water treatment and drinking water availability*

Only about 60% of the population has access to treated water, which does not always comply with health norms. The rest of the population uses surface water, which is sometimes contaminated because of the low level of sewage treatment and the proliferation of uncontrolled rubbish dumps.

*Water caused natural disasters*

Precipitation that exceeds the land's capacity to absorb it causes landslides, mudslides and floods. Tajikistan has about 50,000 landslides a year. Because people settle in vulnerable areas, the landslides cause hundreds of deaths and millions of dollars worth of damage.

*Land degradation*

The most economically detrimental land degradation occurs in agricultural areas. Agriculture also accounts for 90% of water consumption. High water tables, erosion and salination are diminishing soil productivity and erosion affects 60% of the irrigated land. This is a major problem in a country were only 5% of the land area is arable and agriculture accounts for about quarter of GDP.

*Waste and chemicals*

Mining and cotton-growing generate large quantities of waste and contaminate land with chemicals. Mining waste makes up 77% of total accumulated waste and the cotton industry saturates the land with chemical fertilizers. Harmful levels of toxic pesticides, herbicides and defoliants are found throughout the country.

# Table I.2: Selected economic indicators, 1990-2003

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GDP (change, 1989=100) | 100.2 | 91.7 | 62.1 | 52.0 | 40.9 | 35.8 | 29.8 | 30.3 | 32.0 | 33.1 | 35.9 | 39.5 | 43.3 | 47.7 |
| GDP (% change over previous year) | 0.2 | -8.5 | -32.3 | -16.3 | -21.3 | -12.4 | -16.7 | 1.7 | 5.3 | 3.7 | 8.3 | 10.2 | 9.5 | 10.2 |
| GDP in current prices (million somoni) | 0.073 | 0.134 | 0.645 | 7.071 | 17.865 | 69.8 | 308.5 | 518.4 | 1,025.2 | 1,345.0 | 1,806.8 | 2,528.8 | 3,365.5 | 4,757.8 |
| GDP in current prices (million US$) | .. | .. | .. | .. | .. | 648.7 | 1,049.8 | 924.6 | 1,317.2 | 1,097.1 | 986.7 | 1,057.3 | 1,217.9 | 1,553.1 |
| GDP per capita (US$) | .. | .. | .. | .. | .. | 111.2 | 177.1 | 153.6 | 215.0 | 178.2 | 159.4 | 167.5 | 189.2 | 241.3 |
| GDP per capita (US$ PPP per capita) | 2,988.3 | 2,750.6 | 1,871.0 | 1,584.7 | 1,249.4 | 1,101.1 | 920.5 | 939.8 | 984.0 | 1,030.0 | 1,133.2 | 1,253.2 | .. | .. |
| Industrial output (% change over previous year) | 1.2 | -3.6 | -23.7 | -5.8 | -17.3 | -6.9 | -10.5 | -0.7 | 2.7 | 2.0 | 3.7 | 6.1 | 3.9 | 5.2 |
| Industrial output (annual 1989=100) | 101.2 | 97.6 | 73.9 | 68.1 | 50.8 | 43.9 | 33.4 | 32.7 | 35.4 | 37.4 | 41.1 | 47.2 | 51.1 | 56.3 |
| Agricultural output (% change over previous year) | 4.3 | -8.3 | -18.0 | -1.2 | -6.5 | -16.1 | -8.6 | 0.2 | 6.3 | 3.1 | 12.7 | 11.0 | .. | .. |
| Labour productivity in industry (% change over previous year) | -1.3 | -2.0 | -22.3 | 5.2 | -21.6 | -1.7 | -23.1 | 11.6 | 12.4 | 21.8 | 20.2 | 13.5 | 8.9 | .. |
| CPI (% change over the preceding year, annual average) | 5.9 | 112.9 | 906.8 | 2136.1 | 239.4 | 443.1 | 270.2 | 71.7 | 43.0 | 26.3 | 24.0 | 36.5 | 10.2 | 17.1 |
| PPI (% change over the preceding year, annual average) | .. | 163 | 1316.5 | 1080 | 327.8 | 276.1 | 255.2 | 77.5 | 30.2 | 43.6 | 44.0 | 26.8 | 9.3 | 15.0 |
| Registered unemployment (% of labour force, end of period) | .. | .. | 0.4 | 1.1 | 1.8 | 1.8 | 2.4 | 2.8 | 2.9 | 3.1 | 3.0 | 2.6 | 2.7 | .. |
| Balance of trade in goods and non-factor services (million US$) | .. | .. | -55 | -183 | -127 | -59.0 | -16.0 | -60.0 | -139.0 | -27.0 | -46.0 | -121.0 | -123.8 | -240.0 |
| Current account balance (million US$) | .. | .. | -53.0 | -208.0 | -170.0 | -89.0 | -75.0 | -61.0 | -120.0 | -36.0 | -62.0 | -74.0 | -15.1 | -50.0 |
| "     "     (as % of GDP) | .. | .. | .. | .. | .. | -13.7 | -7.1 | -6.6 | -9.1 | -3.3 | -6.3 | -7.0 | -1.2 | -3.2 |
| Net FDI inflows (million US$) | .. | .. | 9.0 | 9.0 | 12.0 | 20.0 | 18.0 | 18.0 | 25.0 | 21.0 | 24.0 | 9.0 | 36.1 | 20.0 |
| Net FDI flows (as % of GDP) | .. | .. | .. | .. | .. | 3.1 | 1.7 | 1.9 | 1.9 | 1.9 | 2.4 | 0.9 | 3.0 | 1.3 |
| Cumulative FDI (million US$) | 0 | 0 | 9 | 18 | 30 | 50.0 | 68.0 | 86.0 | 111.0 | 132.0 | 156.0 | 165.0 | 201.1 | .. |
| Foreign exchange reserves (million US$) | | 1.0 | 1.0 | 2.0 | 1.0 | 4.0 | 14.0 | 36.5 | 53.6 | 55.2 | 92.9 | 92.6 | 89.5 | 111.9 |
| (as months of imports) | .. | .. | 0.05 | 0.04 | 0.02 | 0.06 | 0.21 | 0.54 | 0.89 | 0.96 | 1.34 | 1.44 | 1.25 | 1.29 |
| Net external debt (million US$) | .. | -1.0 | 42.0 | 507.0 | 759.0 | 813.0 | 853.0 | 1,069.5 | 1,125.4 | 1,177.8 | 1,133.1 | 946.4 | 892.5 | 898.1 |
| Exports of goods (million US$) | .. | .. | 185 | 456 | 559 | 779.0 | 770.0 | 746.0 | 586.0 | 666.0 | 788.0 | 652.0 | 738.2 | 799.0 |
| Imports of goods (million US$) | .. | .. | 240 | 639 | 686 | 838.0 | 786.0 | 806.0 | 725.0 | 693.0 | 834.0 | 773.0 | 861.9 | 1,039.0 |
| Ratio of net debt to exports (%) | .. | .. | 22.7 | 111.2 | 135.8 | 104.4 | 110.8 | 143.4 | 192.1 | 176.9 | 143.8 | 145.2 | 120.9 | 112.4 |
| Ratio of net debt to GDP (%) | .. | .. | .. | .. | .. | 125.3 | 81.3 | 115.7 | 85.4 | 107.4 | 114.8 | 89.5 | 73.3 | 57.8 |
| Exchange rates: annual averages (somoni/ US$) | .. | .. | .. | .. | .. | 0.11 | 0.29 | 0.56 | 0.78 | 1.23 | 1.83 | 2.39 | 2.76 | 3.06 |
| Population (1000) | 5,303 | 5,465 | 5,571 | 5,638 | 5,745 | 5,835 | 5,927 | 6,018 | 6,127 | 6,157 | 6,189 | 6,313 | 6,438 | .. |

*Source* : UNECE Common statistical database and National Statistics, 2003.

*Deforestation and desertification*

The rate of deforestation has accelerated in the past 10 years. Deforestation exacerbates soil erosion and desertification, and makes steep land more prone to landslides.

*Biodiversity*

Uncontrolled urbanization, agricultural expansion and human activity have worsened the environment and diminished biodiversity. The 1990 civil war also took its toll on biodiversity. Land degradation, deforestation and desertification are threatening Tajikistan's rich flora and fauna.

**Table I.3: Ministries**

Ministry of Agriculture
Ministry of Communication
Ministry of Construction
Ministry of Culture
Ministry of Defence
Ministry of Economics and Trade
Ministry of Education
Ministry of Emergencies and Civil Defence
Ministry of Energy
Ministry of Finance
Ministry of Foreign Affairs
Ministry of Health
Ministry of Industry
Ministry of Internal Affairs
Ministry of Justice
Ministry of Labour and Social Protection
Ministry of Land Reclamation and Water Resources
Ministry of State Revenues and Levies
Ministry of State Security
Ministry of Transport

*Source* : State Committee for Environmental Protection and Forestry, 2004.

**Figure I.2: Map of Tajikistan**
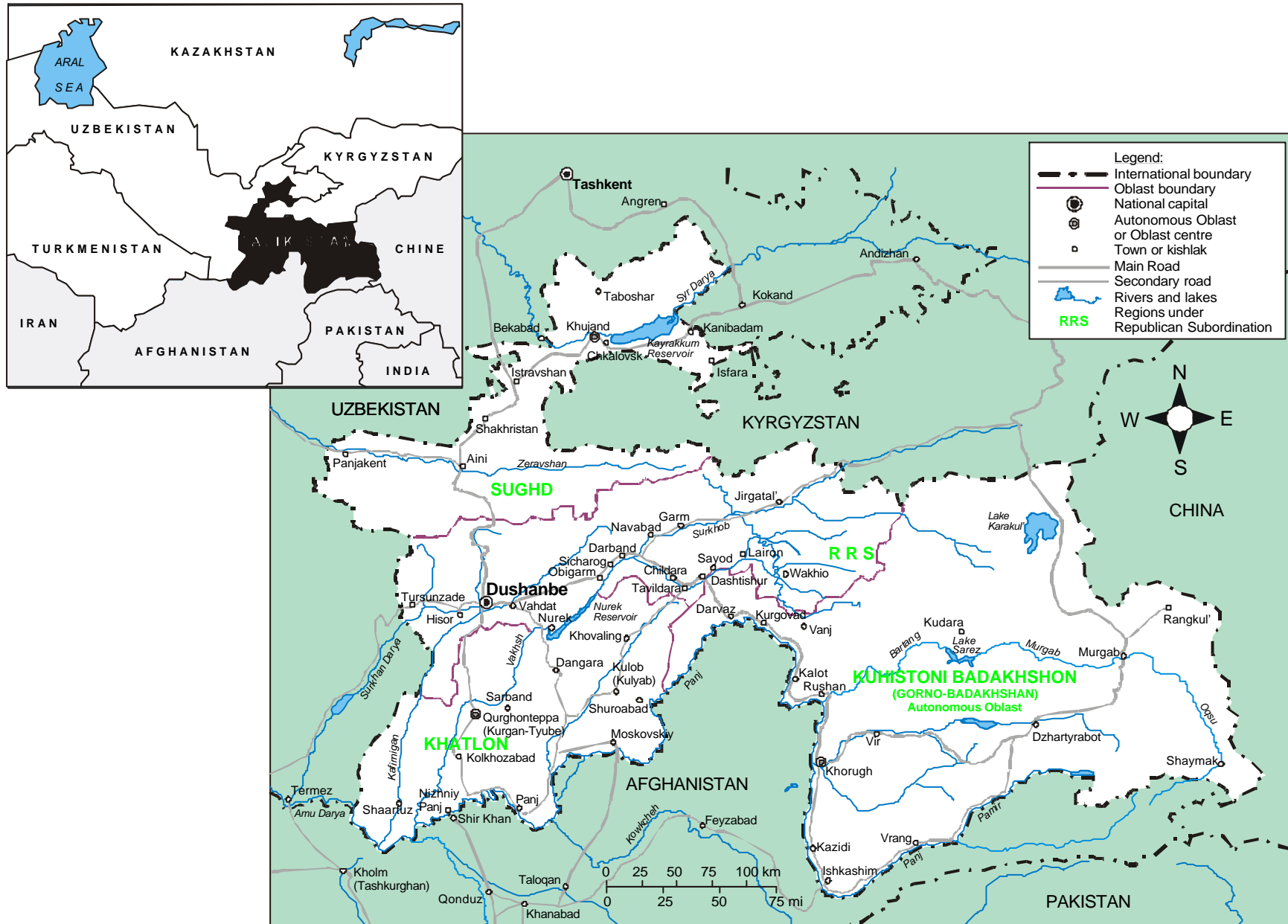


*The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.*

# PART I:  THE FRAMEWORK FOR ENVIRONMENTAL POLICY AND MANAGEMENT

*Chapter 1*

# POVERTY, ENVIRONMENT AND ECONOMY

## 1.1    Introduction

Any analysis of the environmental situation in Tajikistan needs to take into account the overall economic development of the country and the living conditions of its people. Environment, economic development and poverty in Tajikistan are clearly interlinked. Tajikistan's poor are highly dependent on natural resources for their livelihood and are amongst the most affected by environmental imbalances, in particular desertification, contamination of water sources and the consequences of natural disasters, including droughts and floods. At the same time, Tajikistan's poor are often the unwitting agents of environmental degradation. For lack of alternatives, people pollute water resources with household rubbish and waste water, cut already scarce forest resources for firewood, and attempt to keep herds of livestock that exceed the carrying capacity of the land.

## 1.2    Socio-economic developments

### *The macroeconomic situation*

Tajikistan's socio-economic development during the past 15 years has been characterized by two major events: its independence in 1991 and the ensuing civil war, which broke out in 1992 and lasted until 1997.

During the Soviet era Tajikistan was one of the least affluent republics – in 1990 its gross domestic product (GDP) per capita was estimated to be the lowest in the Soviet Union. Compared with other Soviet republics, Tajikistan received the highest transfers from the Soviet Union's budget – they amounted to as much as 47% of its total government revenue. After independence these transfers disappeared abruptly. The country's GDP sharply declined as budget allocations from Moscow ceased, economic ties with the republics of the former Soviet Union were disrupted and as the command economy began a difficult transition to a market-based system.

This already difficult situation was aggravated by the 1992 –1997 civil war. The civil war took an estimated 50,000 to 100,000 lives and forced close to 1 million people to flee their homes, becoming either internally displaced people or refugees in other countries. Many of those sought refuge in other parts of the Commonwealth of Independent States (CIS) – mainly the Russian Federation. The International Organization for Migration (IOM) has put the number of Tajik migrants in the Russian Federation at close to 500,000; unofficial estimates are as high as 1 million.

Between 1992 and 1997 GDP contracted by more than 50%. Following the signing of the peace accords in 1997, structural reforms and increasing political stability made some macroeconomic progress possible. In 1997, the first signs of a recovery were recorded, with official statistics showing GDP growth of 1.7%, which accelerated to 10.2% in 2002. Nonetheless, at the end of 2003, GDP still stood at only 47.7% of its 1989 level.

Industry was also severely affected by the civil war but it began to record strong growth with the official end of the war in 1997. Nevertheless, production still remains below pre-independence levels and aluminium production – Tajikistan's main industrial output – amounted in 2002 to just over two thirds of its 1990 level.

Industrial decline means that agriculture is more important than ever for Tajikistan, although its output has also been severely affected by the overall political and economic developments since independence. The cotton industry, which constitutes Tajikistan's main agricultural activity, dropped sharply after the collapse of the Soviet Union and the ensuing civil war. It has been recovering since 1999, but even after four consecutive years of improvement, cotton output remains at less than two thirds of its pre-independence levels.

**Figure 1.1: Real GDP development, 1989 = 100**
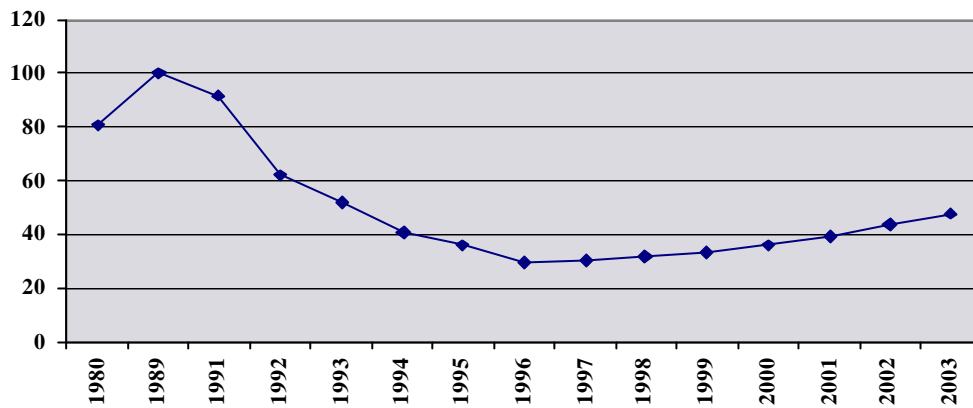
*Employment and income*

The long civil war and the disruption of economic links stemming from the collapse of the Soviet Union have contributed to a widespread decline in incomes. Average annual GDP per capita was estimated at just US$ 180 in 2003.

Following the decline in industrial production, employment, in particular in industry, fell sharply. Although official unemployment rates have remained low throughout the past decade (2.5% in 2003), actual unemployment is estimated to be much higher – as high as 33%. This is due to the fact that the official rates do not account for people who resort to subsistence agriculture for lack of alternatives.

The overwhelming majority of the labour force has suffered falling real wages. The average monthly public-sector wage stands at less than the equivalent of US$10, one of the lowest average wage levels in Eastern Europe, the Caucasus and Central Asia (EECCA), and is estimated to cover about half of the cost of the minimum consumer food basket. Few households, however, rely solely on income from government wages. Farming, both for subsistence and for sale, as well as small- and micro-scale trading, offer more reliable sources of household income.

**Figure 1.2: Employment in industry, 1989 = 100**
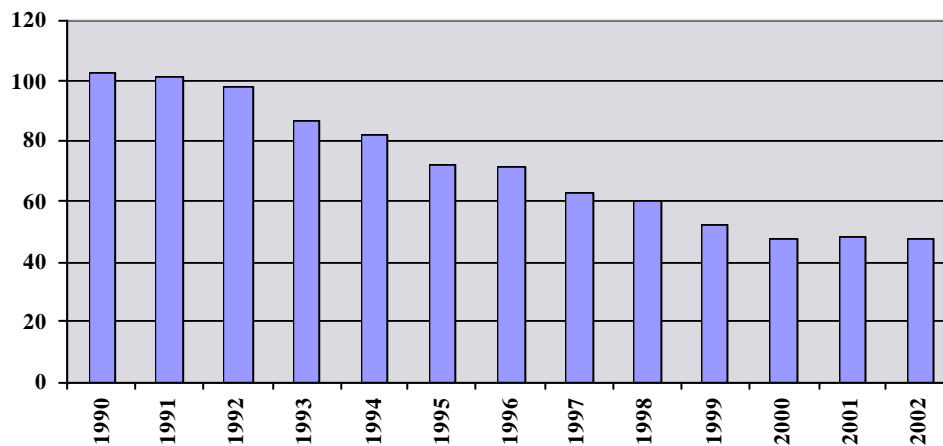
An additional important source of household income is remittances from abroad. The shortage of jobs in Tajikistan and the low wages have forced many people to seek both seasonal and permanent work abroad. A poverty reduction monitoring survey, conducted by the Government in cooperation with the Asian Development Bank (ADB) in 2002, revealed that 17.2% of the surveyed households had family members holding jobs outside the country during the preceding 12 months. According to the Economist Intelligence Unit (EIU), remittances from abroad could amount to between 40% and 75% of Tajik GDP.

Labour migration could develop into a considerable problem for the country, as the most qualified tend to leave. This leads to a decrease in human resource capacities, which is aggravated by declining levels of education.

The education system has been deteriorating owing to a decrease in available resources and years of social and economic upheaval. School attendance is compulsory for nine years; however, economic difficulties have forced some children to work to alleviate family hardship. According to official estimates, the literacy rate is 98%, but it is likely to be lower in practice. The teaching profession has suffered greatly. Since the early 1990s, some 4,000 qualified teachers and school managers have emigrated or left the profession. Many teachers are trying to supplement their meagre salaries (US$ 7 a month in 2002) through agricultural and other activities and consequently have less time and energy for teaching.

### Poverty

The macroeconomic downturn with its consequences on income and employment has also had an impact on the prevalence of poverty in the country. The most comprehensive source of information on poverty to date is the 1999 Tajikistan Living Standard Survey. An updated assessment of the living standards is currently being conducted by the Government, in cooperation with the World Bank. Its results are expected to become available in July 2004. In 2002, the Asian Development Bank, in cooperation with the State Committee for Statistics, conducted a poverty reduction monitoring survey, which gives a multi-dimensional overview of poverty developments.

Estimates of the incidence of poverty in Tajikistan can vary considerably depending on the type of measurement used. In 1999, 83% of the population was living below the poverty line of the State Committee for Statistics (20,000 Tajik roubles in 1999). In 2003, using the same line adapted to the consumer price index, poverty fell to 68%, according to preliminary results of the living standard survey currently being carried out by the World Bank. (In using indexation based on data from the State Committee for Statistics and the International Monetary Fund (IMF), the equivalent of the 1999 poverty line would be 49.55 somoni (US$ 18)[1] in 2003.)

For the 2002 poverty reduction monitoring survey, conducted by the State Committee for Statistics and ADB, a different methodology was used. The entire population was divided into five groups (quintiles), each containing 20% of the population, with the first being the poorest and the last being the wealthiest depending on the amount of assets owned by a household. The quintiles were then used to examine linkages between wealth of a household and a wide range of other features such as education, employment as well as geographic and demographic characteristics. The survey also attempted to measure the personal perception of poverty by including a household self-evaluation. In it 53.3% classified themselves as poor.

There are clear differences in living standards between urban and rural areas. According to the 2002 poverty reduction monitoring survey, 5.1% of the urban population falls into the bottom two "wealth" quintiles and nearly 60% into the wealthiest category. The opposite situation is observed in rural areas: more than half of the population (52.9%) is in the bottom two wealth groups and only 5.4% in the wealthiest category. Poverty incidences also vary across the country. According to the preliminary results of the 2003 World Bank living standard survey, poverty is the highest in the Khatlon and Sughd *Oblasts* as well as in Gorno-Badakhshan Autonomous *Oblast* and the lowest in Dushanbe, which demonstrates that poverty is indeed worse in rural areas and regions. Lack of access to education and employment opportunities in rural areas puts the population at higher risk of poverty because there are few alternatives to subsistence agriculture. The main feature of poverty is food insecurity with the

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[1] 1 somoni = US$ 0.36.

nutritional situation being particular threatening children's health. An additional threat is natural disasters including landslides, with people living in Gorno-Badakhshan Autonomous *Oblast*, especially in the vicinity of Lake Sarez, being particularly exposed.

Poverty is also unevenly distributed among different population groups, with families with many children and the elderly being affected most. According to the poverty reduction monitoring survey, 49.6% of families with five or more children fall into the bottom two wealth quintiles and only 10.1% into the wealthiest category, and more than 43% of the elderly (above 65 years of age) fall into the bottom two groups and 15.6% into the wealthiest category.

## 1.3    Environment and sustainable livelihoods

*Priorities for improving livelihoods*

Interestingly, the 2002 poverty reduction monitoring survey polled public opinion on the priorities for improving living conditions. The 6000

households participating in the survey were asked which areas they would wish the Government to tackle first to reduce poverty. Respondents were given a list of areas and their answers were assessed using the following scale: (1) very important, (2) important, (3) not important, (4) indifferent. The results of the survey are summarized in the table below:

Water supply tops the list, followed by job creation and food security. Transport infrastructure and power supply also rank high. It is striking to see that of the top five priorities at least three, water supply, food security and power supply, are closely linked to environmental concerns. In addition, even "job creation" has a much stronger relevance to environmental concerns than might seem at first sight. The lack of job opportunities is the prime cause for people's dependency on natural resources for their livelihood. It therefore lies at the heart of the problem of environmental degradation through human behaviour and explains the high dependency of Tajikistan's poor on the environment, in particular the land.

**Table 1.1: Household priorities for improving living conditions**
*(answering "very important" as per cent of total possible answers)*

| Priorities | | Total (%) |
|---|---|---|
| 1 | Water supply | 69.2 |
| 2 | Job creation | 67.6 |
| 3 | Food aid | 64.5 |
| 4 | Road improvements | 58.0 |
| 5 | Power supply | 56.7 |
| 6 | Anti-drugs policy | 53.5 |
| 7 | Public transport | 51.4 |
| 8 | Anti-corruption policy | 47.5 |
| 9 | Security | 44.4 |
| 10 | Housing construction | 43.8 |
| 11 | Hospitals | 42.2 |
| 12 | Vaccinations | 39.1 |
| 13 | Training | 37.4 |
| 14 | Primary schools | 33.5 |
| 15 | Family planning | 33.3 |
| 16 | Waste management | 26.8 |
| 17 | Public administration reforms | 24.3 |
| 18 | Access to fertilizers | 19.9 |

*Source* : State Statistical Committee and Asian Development Bank. Poverty Reduction Monitoring Survey, 2002.

*Land pressure*

Tajikistan's rural and mountainous areas have experienced increasing population pressure throughout the past 15 years. The economic crisis and the transition, the decline in industrial production and the paucity of economic opportunities, have caused many people to leave the cities and to turn instead to Tajikistan's rural areas and already scarce arable land (arable land only constitutes 5% of the country's territorial surface) for subsistence farming. Tajikistan's rural settlements are facing the highest demographic increase among the countries of CIS. According to the IOM, the crisis is exacerbated by the return of population groups that were displaced under the Soviet regime to work in the Khatlon and Fergana cotton regions in the 1950s.

These migration trends, together with high birth rates in mountain regions, low employment levels and few economic opportunities apart from agriculture, aggravated by the poor condition of infrastructure, put great pressure on natural resources through the intense use of arable land, water and forests. Excessive cattle pasture, dry-farming, the use of mountainous lands for farming and overgrazing by animal herds have significantly contributed to soil erosion as well as land degradation.

*Agriculture*

Land degradation has a detrimental impact on living conditions, as agriculture is the main source of income for the poor. Seventy-three per cent of Tajikistan's population lives in rural areas, and depends on the land for subsistence and food. Food security is a major concern – according to information of the World Food Programme, 1.478 million people need food aid. Solving the food supply problem greatly depends on the rational use of land and a functioning agricultural sector. However, it is very difficult for Tajikistan's poor to survive from agriculture alone, and land degradation is not the only reason.

A number of problems in agriculture contribute to poverty among the rural population, for instance:
* Incomplete land reform which does not allow for the effective use of land and the full use of agricultural production opportunities;
* Equal access to land is impeded by the complicated and costly procedure for getting land-use certificates;

* Weaknesses in the current management and operation of major agricultural subsectors, such as cotton; and
* Degrading infrastructure, in particular in irrigation.

It was hoped that the land reform begun by the Government in the early 1990s would ease the life of the rural population and increase agricultural production. Land privatization does seem to be having a positive effect on production, but the impact on the farmer is less clear. (See also chapter 10 on agriculture and land management.) The new farm owners rarely understand their rights, and they are easily persuaded to cultivate the land according to the instructions from the *raion* government. This normally means dedicating much of the land to cotton production. Reportedly, many farmers have been told that they might lose their land rights if they do not comply with cultivating requirements. An additional problem has been that obtaining a land-use certificate is often both difficult and expensive.

Poor farmers have limited access to credit, to vital inputs and to training in agricultural management. They do not know where to sell their produce or animals other than on local markets, which are flooded with products at harvest time. Consequently, in most cases, old farm operations have not changed much and farmers get little benefit out of their agricultural activities.

This problem is particularly acute in cotton production and has been described by the United Nations Development Programme as follows: "The sector is deeply indebted and farmers capture little of the benefits of plentiful water and sun. Cotton, the most valuable crop on the export markets, returns conspicuously low margins for farmers. The cotton market is controlled by so-called investors, who enter into annual contracts with farmers, act as intermediaries for extending loans and typically take a proportion of the crop for repayment of the loan. Despite formal deregulation, the district governments administer the entire system, assigning crop area quotas and planned output targets to collective farms and private farmers alike and often being the only place where farmers can obtain the necessary inputs. Export operations remain the province of those few with the influence and connections necessary to obtain an export licence. Future contracts between farmers and investors have been concluded on bad terms for farmers who have little familiarity with such

financial instruments and in most cases are unaware of the consequences of the contract they enter and have very limited access to market information and little knowledge or experience of fair contracting arrangements."

The case of the cotton sector demonstrates that inadequate restructuring, vested interests, indebtedness and poor knowledge of market information amongst farmers reduce the considerable potential of agricultural production, and in particular of cotton production, to redress rural poverty.

The problem is compounded by the lack of physical infrastructure and the poor condition of the irrigation systems. (See also chapter 8 on water resources management.) The marketing structure is hampered by poor internal and external communication and transport systems – roads, railways and terminal storage facilities.

### Water supply and sanitation

The significance of water for poverty alleviation cannot be underestimated. Irrigation water not only increases crop yields; satisfactory water quality is essential for the good health of the population (see chapter 12 on human health and the environment). In addition, water is the key to Tajikistan's competitive advantage in two major industries: cotton production and hydropower. Properly developed and regulated, these industries have the potential for improving the country's economy and alleviating poverty.

Household supply with piped water has been decreasing in recent years. Additionally, the quality of water treatment has deteriorated. According to UNDP, under-investment has halved treatment capacity since independence. Bacteriological contamination of water is clearly a problem. Substandard water quality resulted in large typhoid outbreaks between 1997 and 2001 as well as an increase in diarrhoeal disease cases. It is clearly the poor who are affected the most by the deteriorating system of water supply as they have the least access to any form of piped water, as table 1.2 indicates.

Sewage systems are also in constant decline. Ageing pipelines and a lack of maintenance have caused serious problems. Settlements have great difficulties in raising funds for maintenance and repairs, and the central budget is too tight to provide finances. In cities and settlements, household waste tends to pile up in poorer areas, threatening the water supply and creating conditions for the spread of diseases.

### Energy supply

Energy supply is almost as much a concern to households as water supply. Household provision with energy has deteriorated sharply since the early 1990s. In 1989, 52.2% of urban and 1.7% of rural households enjoyed centralized heating. This share has decreased rapidly since then. According to the 1999 living standard survey, only 5.9% of households used central heating or water radiators. The situation had improved slightly by 2002, at the time of the poverty reduction monitoring survey, but was still well down on 1989.

**Table 1.2: Access to drinking water**

(by population quintiles, in %)

| | Population quintiles (1= poorest) | | | | | Total |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | |
| Piped water at home | 6.7 | 8.9 | 16.8 | 35.3 | 75.8 | 28.7 |
| Piped water from neighbours | 2.0 | 2.5 | 3.8 | 4.1 | 3.0 | 3.1 |
| Public standpipes | 15.1 | 23.5 | 25.5 | 16.5 | 10.5 | 18.2 |
| Protected well | 7.0 | 7.9 | 10.0 | 8.9 | 2.3 | 7.2 |
| Unprotected well | 1.2 | 0.5 | 0.7 | 2.4 | 0.3 | 1.0 |
| Spring | 21.8 | 12.8 | 7.6 | 4.7 | 1.6 | 9.7 |
| River, lake, pond | 40.3 | 40.6 | 32.1 | 25.8 | 6.1 | 29.0 |
| Delivered | 3.5 | 2.3 | 2.2 | 1.5 | 0.3 | 2.0 |
| Other sources | 2.4 | 1.0 | 1.4 | 0.9 | 0.3 | 1.2 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

*Source*: State Committee for Statistics and Asian Development Bank. Poverty Reduction Monitoring Survey, 2002.

**Table 1.3: Access to heating**

| | 1999 | | | 2002 | | |
|---|---|---|---|---|---|---|
| | Total | Urban | Rural | Total | Urban | Rural |
| Central heating | 0.4 | 1.3 | 0.1 | 6.5 | 19.2 | 0.2 |
| Water radiators | 5.5 | 12.5 | 2.8 | 0.9 | 2.1 | 0.3 |
| Electric heaters | 12.4 | 40.6 | 1.9 | 10.8 | 30.3 | 1.2 |
| Coal stove | 5.6 | 4.2 | 6.0 | 2.6 | 3.4 | 2.2 |
| Wood stove | 45.0 | 24.6 | 52.6 | 28.2 | 15.1 | 34.7 |
| Straw, manure | 23.6 | 7.4 | 29.6 | 37.4 | 14.5 | 48.6 |
| Others | 7.7 | 9.4 | 7.0 | 13.7 | 15.5 | 12.8 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

*Sources* : Government of Tajikistan. Tajikistan Living Standard Survey, 1999 and State Committee for Statistics and Asian Development Bank. Poverty Reduction Monitoring Survey, 2002.

The situation is similar for energy sources for cooking. Before the transition 85% of households had gas and electric stoves for cooking, 92.5% in urban and 81.5% in rural areas. However, in 1999 only 25.3% of households had gas or electric stoves. This increased to 35.3% in 2002, with most of the households with access to gas and electricity living in urban areas.

Consequently, households are turning to other sources of energy to meet their needs. Fuel shortages (coal, natural gas) have forced people in cities and rural areas to cut trees and to burn dung and other waste. The basic fuel for cooking in rural areas is wood: in 2002, 47.9% of households used it. Moreover, more and more rural households are using widely available and cheap traditional manure as cooking fuel: 31.4% in 2002 (compared to 21.9% in 1999). The use of wood, straw and manure, however, exposes people, and especially women, to damaging smoke. In this regard, it should be noted that there has in recent years been a rise in respiratory diseases. Additionally, forest cutting leads to the removal of critical biomass, which reduces land productivity but also causes soil to be less fertile and land to erode.

### Biodiversity

The cutting of trees and brushwood also constitutes a major threat to biodiversity. Together with overgrazing, poaching and human intrusion into wildlife, it is a severe attack on the country's natural treasures. Tajikistan possesses unique natural and recreational resources, a beautiful virgin ecosystem and rich biodiversity. However, insufficient environmental protection and poverty have had an adverse impact on the environment. Wildlife habitats are being reduced across the country due to human intrusion, which was particularly common during the civil war. The problems of illegal fishing, hunting and berry picking are widespread. These human activities not only threaten the country's natural resources but also endanger its potential as a promising destination for ecotourism, which would bring employment opportunities to the rural poor.

### Natural disasters

Probably the most forceful expressions of the consequences of loss of biodiversity and environmental degradation are natural disasters. Owing to its geography Tajikistan is particularly prone to water-related disasters. Steep mountain slopes and unstable soils contribute to the approximately 50,000 landslides that occur annually. These fragile and unstable conditions make the land all the more susceptible to damage caused by human activity. Deforestation, cultivation and overgrazing of slopes, strip mining and road building exacerbate the instability of mountainous areas. The regions most prone to landslides, mudslides and floods are the slopes and valleys of the Hisor, Karategin, Vakhsh, Darvaz, Vanch, Yazgulem and Piotr Pervyi ranges, as well as the Murgab basin and Lake Sarez region. Anthropogenic impacts are particularly striking in the Hisor-Zeravshan zone, where grazing, agriculture and industry (particularly mining) have taken their toll on the fragile slopes.

The incidence of natural disasters causing casualties among inhabitants in risk areas has been increasing steadily over recent years. According to IOM, environment-related migration is therefore becoming a major concern for the Government, which has identified a total of 700 families requiring urgent relocation due to environment-related factors and a remaining 10,037 families as potential ecological migrants over the next five years.

## 1.4    Decision-making framework

The Government has taken a number of initiatives to analyse the roots of poverty and to find ways to overcome it. Most importantly, in May 2002, the Government approved the poverty reduction strategy paper (PRSP), committing itself to improving the quality of life of the population through a series of reforms in a wide range of sectors.

Although PRSP acknowledges that natural disasters, water pollution, soil erosion and desertification have a serious impact on the poor, environmental concerns are addressed in a concrete manner mainly in the framework of the agricultural sector, where it calls for a number of reforms aimed at: further restructuring collective and State farms and developing family *dekhkan* farms; improving irrigation and drainage systems; eliminating informal quotas on agricultural production, especially cotton; encouraging competition among consumers of cotton and other agricultural products to ensure more favourable conditions for farmers; and facilitating the development of the agricultural processing industry through the promotion of the creation of small and medium enterprises in this area.

Additional measures call for simple and inexpensive systems of land registration and a reduction in the cost of land-use certificates, programmes for advising farmers about their legal rights, solving the problem of debts of agricultural enterprises, especially when debts are taken over by newly established *dekhkan* farms, as well as effecting changes in institutional mechanisms to ensure the transparent, fair and regulated transfer of land and other assets of agricultural entities to individuals or groups of individuals. The Government also pledged to develop an appropriate legal framework for the promotion, creation and operation of rural credit and savings associations as well as to encourage the private provision of agricultural inputs.

The need to create jobs is one of the main focuses of the poverty reduction strategy. Measures in this regard aim at establishing an appropriate legal and regulatory framework for the development of enterprises and workplaces, privatization of State enterprises, including agricultural enterprises, establishing a national job creation programme and developing financial markets. The poverty reduction strategy also addresses the need to further develop the country's infrastructure in various subsectors, in particular energy, transport, water supply and communications.

As part of the poverty reduction strategy, targets for implementation and a set of indicators to follow up its implementation were developed. The implementation is supervised by the PRSP Monitoring Department, which was set up specifically for this purpose as part of the executive administration of the President. Its main responsibilities are defining an institutional process for monitoring the strategy, processing and consolidating information obtained through monitoring processes from public entities and other organizations, discussing poverty trends with government representatives as well as non-governmental organizations, and developing proposals for improving the implementation of the strategy. An important tool for the work of the PRSP Monitoring Department is the Advisory Committee, which includes, besides representatives of the PRSP Monitoring Department, representatives from international organizations as well as international and local NGOs, a representative of the Ministry of Finance and a number of other organizations. The Committee is headed by the President's economic policy adviser.

The resource requirements for implementing the poverty reduction strategy are estimated at approximately US$ 690 million. Up to US$ 125 million is to be provided from the budget, while the largest part would need to be covered from external sources. In this context it is positive to note that the poverty reduction strategy formed the basis for the Government's 2004-2006 public investments and technical assistance needs programme, which is its planning tool for public investment programmes and for directing foreign investments and assistance.

Two other initiatives need to be mentioned in the context of the Government's efforts towards sustainable development and poverty reduction: the National Sustainable Development Report Rio+10 and the Economic Development Programme to 2015. The National Sustainable Development Report, prepared for the 2002 World Summit on Sustainable Development in Johannesburg (South Africa), calls for a number of policy actions for sustainable development that are largely consistent with those stipulated in the poverty reduction strategy. In particular, it advocates the promotion of small enterprises and private businesses as alternatives to employment in agriculture and calls for further reforms in the agricultural system, in

particular through further privatization and the development of *dekhkan* farms. The National Commission on Sustainable Development has been formed under the Government to follow up, report and monitor the implementation of the report's recommendations. The Commission is composed of representatives from different ministries and is chaired by the Prime Minister.

In March 2004 the Government adopted the Economic Development Programme for the period until 2015. The programme sees poverty reduction as a prerequisite for sustained economic development. It stresses the importance of creating employment opportunities, as well as the need to raise pensions and salaries for public employees, to provide professional training, to create a system of social assistance, to promote the creation of small enterprises, to raise the minimum wage to the subsistence level, to organize social work, to provide government regulation for external labour migration, to fight corruption and to regulate the informal economy. The programme also calls for agricultural reforms.

The different government initiatives point towards important directions with regard to poverty reduction. At the core of all initiatives is the need to create employment opportunities in order to widen the income-generating options for the poor, in particular the rural population, and the need to address current imbalances in the agricultural sector. The establishment of systems for monitoring implementation of the initiatives is positive. In particular, an institutional structure to follow up the implementation of the poverty reduction strategy is in place and best use should be made of it. The development, with support of the World Bank, of a review of the poverty reduction strategy in early 2004 has been very helpful, as it gives a good account of measures already taken in view of the actions proposed in the strategy. Progress has in general been slower than hoped for when drawing up the strategy. However, a number of measures have been taken and, although limited, some progress has been made.

For instance, a system has been developed for helping poor families with their monthly gas and electricity bills (Resolution on Stipulating and Providing Reimbursement to Poor Families and Individuals Entitled to Benefits in Accordance with the Constitution in Line with Price Increase of Electricity and Gas adopted by the Government in March 2003). Moreover, the social protection system has been improved through the cash allowance programme for children from poor families; and public salaries and pensions have gone up.

The Government has set up financial support schemes to help households from mountainous areas and from areas affected by natural disasters migrate. However, these migration schemes face a number of difficulties as a result of inadequate funding and problems with the allocation of land plots, infrastructure and water supply. Efforts have also been made to regularize external migration. Amendments made in 2002 to the Law on Migration aim at regularizing labour migration to guarantee migrants' rights, by for example establishing licensing requirements for agencies and organizations involved in recruiting Tajik labour for work abroad.

Progress has also been made in privatization, including in the agricultural sector, through the further promotion of *dekhkan* farms. Despite all the problems still associated with these farms, the transfer of farmland to households is an important step in the right direction. Information on agricultural productivity confirms this: *dekhkan* farms are more productive (2,030 kg/ha) than other farms (1,890 kg/ha).

Problems related to employment remain some of the most severe and complicated to solve. In 2002, the Government adopted the State Employment Programme and, in 2003, the Employment Promotion Programme for 2003-2005. Activities under the two programmes include the development and improvement of vacancy advertisement systems as well as the promotion of micro-credit systems. However, the existing regulatory and economic environment still makes it difficult for businesses to be established and grow.

Public information measures also need to be mentioned. There are many environmental education initiatives throughout the country to raise public awareness, principally of the negative impact that the unsustainable use of natural resources can have on people's livelihoods (see chapter 4 on information, public participation and education for more information). However, more needs to be done, particularly by the Government, when it comes to informing the population, especially farmers, about their legal rights.

## 1.5    Conclusions and recommendations

The Government has increasingly realized that environmental problems cannot be solved without paying attention to people's living conditions, especially among the rural population. Its poverty reduction strategy is an important step in comprehensively addressing the problems related to poverty. According to UNDP, "an effective strategy for tackling the problems of poverty, development and environment simultaneously should begin by focusing on resources, production and people and should cover demographic issues, enhanced health care and education, the rights of women, the role of youth and of indigenous people and local communities and a democratic participation process in association with improved governance." The Government's poverty reduction strategy offers such an integrated approach and does outline many of the most important issues to be tackled to ensure sustainable livelihoods for the population. Moreover, with the establishment of the PRSP Monitoring Department a potentially powerful institutional mechanism for the coordination and implementation of the strategy has been put in place.

Probably the biggest drawback of the strategy is that no priorities have been set among its numerous actions. The strategy calls not only for actions in a great number of areas, such as health care, education and infrastructure, but also for many different measures within each area. Related to the environment, the strategy calls, for example, for "the preparation and approval of a national strategy and action plan on conserving biodiversity, elaborating and adopting a national strategy on disaster management, monitoring of environmental protection, development of an appropriate legal and regulatory framework, purchasing of monitoring equipment, preparation and approval of a national environmental action plan, development and approval of a first national communication on climate change and developing non-traditional energy sources for rural energy supply," in addition to various measures in agriculture, water and health which also address environmental concerns. All these actions are without doubt important. However, without assigning to them any priority, there is a danger that resources are not put to the most efficient use.

The challenge for the Government is therefore to set clear priorities and to support their effective and efficient implementation. The PRSP Monitoring Department has an important role to play here. As an intergovernmental body, it is potentially well situated to coordinate and prioritize the implementation of the strategy.

*Recommendation 1.1:*
*(a) The PRSP Monitoring Department should take the lead role in setting priorities for implementation of the poverty reduction strategy and for developing an action plan based on these priorities;*
*(b) The PRSP Monitoring Department should make sure that the measures included in the State Environment Programme, in the National Environment Action Plan (NEAP) which still has to be adopted and the recommendations of the National Sustainable Development Report Rio+10 are taken into account and that cooperation with the respective Committees is taking place. A National Sustainability Strategy, which might be developed, should integrate the different plans and programmes.*

Prioritizing the strategy's actions is ultimately the task of the Government, and the PRSP Monitoring Department should have a lead role in the process. Given, however, the size of the agricultural sector, its impact on natural resources and the environment and its strong relationship to people's livelihoods and to poverty, addressing the problems in this sector should be a matter of urgency.

*Recommendation 1.2:*
*Given the importance of the agricultural sector in Tajikistan, the measures in the poverty reduction strategy related to agricultural production and rural development should be addressed urgently. The Ministry of Agriculture, the Ministry of Land Reclamation and Water Resources and the State Committee for Land Administration should work closely with the regional and district governments in the implementation of these measures, with priority given to:*
*(a) Implementing, in cooperation with community-based organizations, programmes to inform farmers about their legal rights to acquire and use land. This includes informing farmers about the full implications of futures contracts, particularly in the cotton sector;*
*(b) Monitoring strictly the implementation of the land reform, in particular the distribution of land among workers of agricultural production entities;*
*(c) Providing farmers with training opportunities in agricultural production techniques, including the use of fertilizers and pesticides. The training should include awareness-raising*

*on the consequences of unsustainable agricultural practices, especially with regard to land degradation and erosion;*

*(d) Encouraging the establishment of rural lending and savings associations;*

*(e) Promoting a wider range of employment options in rural areas;*

*(f) Ensuring metering of water use in irrigation agriculture.*

The success of the poverty reduction strategy will also depend on the involvement of all major stakeholders, including civil society. The mandate of the PRSP Monitoring Department explicitly provides for the involvement of both governmental and non-governmental institutions in monitoring and evaluating the implementation of the strategy. At present, some non-governmental organizations have expressed their dissatisfaction with the extent to which civil society has been included.

*Recommendation 1.3:*
*The PRSP Monitoring Department, in the execution of its tasks, should strengthen the involvement of governmental and non-governmental stakeholders, both in the setting of priorities for implementation and in the monitoring process.*

# *Chapter 2*

# *POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK*

## 2.1    Introduction

Tajikistan has a relatively well-developed framework of primary laws for environmental protection and related issues, but this is less true for secondary legislation. Environment-related norms are set out in a number of general laws and laws applicable to specific environmental issues, procedures or types of natural resources. Tajikistan's current legislation, including in the area of environmental protection, has been developed on the basis of laws and regulations adopted during the Soviet period. Rather than devise a completely new set of legislation from scratch, Tajikistan has gradually adjusted and supplemented existing legal acts as changing conditions have required. Accordingly, existing environmental regulations form a unified system. However, as the legislation often reflects approaches to environmental management from Soviet period, certain modern issues are not regulated at all, or regulated inappropriately. In recent years, due to significant technical assistance from other countries and active international cooperation, including accession to several United Nations conventions and regional treaties, environmental legislation is being harmonized with the model regulations recommended within the framework of such conventions or treaties.

## 2.2    Organization of environmental protection

Tajikistan follows the principle of separation of State power into three branches: the legislative, the executive and the judiciary. Accordingly, the legislative branch has the key role in defining the policies, strategies and rules for the environment and nature protection, which it exercises by adopting laws. However, the executive branch, represented by the President and the Government, also has a significant role in setting the rules, as the Government is authorized to adopt implementing legislation, which establishes specific requirements. Also, the role of the executive in enforcing environmental legislation is extremely important in that all local (*oblast*, city and *raion*) divisions of the State Committee for Environmental Protection and Forestry are also subordinated to the *hukumat*s, which are the local divisions of the executive (principle of double subordination).

The Government approves the regulations of the ministries and State committees and determines the structure of their central administration, including the State Committee for Environmental Protection and Forestry, and is responsible for the coordination of their work and inter-agency cooperation. Additionally, the Government: (1) formulates uniform State policies on nature use, environmental protection and ecological safety; (2) takes measures to ensure individual rights to a healthy environment and ecological safety; (3) coordinates the joint activities of State executive bodies to protect nature and implement State-wide and intergovernmental regional ecological programmes, to prevent natural and "technogenic" disasters and eliminate their consequences; and (4) organizes the protection and sustainable use of natural resources, for instance by regulating natural resource use.

*Hukumat*s (local executive authorities) implement environmental laws and other legal acts in the *oblasts*, *raions* and towns and in Dushanbe. Their chairmen are appointed by the President and approved by the *majlis*.

*The State Committee for Environmental Protection and Forestry*

In January 2004, the Ministry of Nature Protection was abolished and replaced by the State Committee for Environmental Protection and Forestry, pursuant to a presidential decree. The State Committee's Regulation was approved by governmental resolution in March 2004. It foresees a staff of 74 for the State Committee's central administration. The total number of all staff in the State Committee is now close to 2,400, mainly due to the addition of nearly 2,000 employees from the former State Forestry Enterprise, *Tajikles*. Its Collegium, or board, reviews and decides on the most complex issues. It also confirms the appointment of the local environmental protection committees' chairs, who are nominated by their *hukumats*.

In addition to its central administration, the State Committee has 11 departments, as well as local offices (environmental protection committees) in each *oblast*, *raion* (district) and city. These local committees also report to their *hukumats*. Their organizational structure largely mirrors the structure of the State Committee, although in some cases a "department" may contain only one specialist.

Every department in the scheme below has its own regulation defining its structure and responsibilities. Each is approved by the State Committee's Chair, except that of the Forestry Department's State Forestry Guards, which was approved by Governmental Regulation.

As the central State executive body responsible for environmental protection, the sustainable use of resources, forestry and hydrometeorology, the State Committee's most important functions are to:

- Define the main strategies for the protection, study, conservation and sustainable use of resources, the mitigation of the effects of climate change;
- Prepare and publish biennial state-of-the-environment reports;
- Draft laws and other regulatory documents, including environmental standards, instructions and methodologies for the use of resources;
- Issue individual permits for the use of specific resources and withdraw these if the user violates their terms;
- Set quotas for the hunting and collection of certain species of animals and plants, as well as for the import of ozone-depleting substances;
- Carry out ecological expertise of planned activities;
- Define the system of specially protected territories and maintain State cadastres of such territories, forests, plants, water bodies and hazardous waste;
- Develop the system of economic instruments encouraging a sustainable use of natural resources;
- Set limits on the use of all types of natural resources and rates;
- Organize ecological tourism and recreation within the specially protected territories; and
- Manage the special (extrabudgetary) environmental fund.

Moreover, the Committee may, among other things: (1) obtain relevant information from other governmental bodies, legal entities or individuals; (2) request reports from top officials of other governmental bodies and issue mandatory orders; (3) suspend or limit economic activities that violate environmental protection legislation; (4) prohibit the import or transit of hazardous cargo, if environmental norms and regulations are violated; and (5) prohibit projects, if their construction or renovation violates environmental requirements.

The State Committee's functions and scope of activities are broader than those of its predecessor, the former Ministry of Nature Protection. In particular, in accordance with the 2003 Presidential Decree on the System of Central Executive Bodies, the State Committee is expressly called upon to coordinate environmental activities with other ministries. Thus, it must now formulate and implement uniform environmental strategies and policies as a basis for this coordination with, inter alia, the Ministry of Health, the Ministry of Industry, the State Committee for Land Administration, the Ministry of Agriculture, the Ministry of Land Reclamation and Water Resources, the Ministry of Economy and Trade, the Ministry of Finance and the Ministry of Education.

However, it has not yet begun to coordinate inter-ministerial environmental activities. In part that could be attributed to the absence of a history of joint activities of various ministries except in the form of providing written comments to the Government on proposals developed by another ministry. An encouraging sign is that there are regular, if limited, joint activities between the State Committee's local offices and the *hukumats* (e.g. reforestation campaign in Sughd *oblast*; close cooperation between Dushanbe's local environmental committee and its *hukumat* on reforestation around the city and improving household waste collection and management). The State Committee's central administration, however, has failed so far to engage in closer cooperation (or coordination) with other ministries (e.g. failure to produce study materials specific to Tajikistan for ecology classes in educational institutions, which should have been done jointly with the Ministry of Education).

**Figure 2.1: Structure of State Committee for Environmental Protection and Forestry**
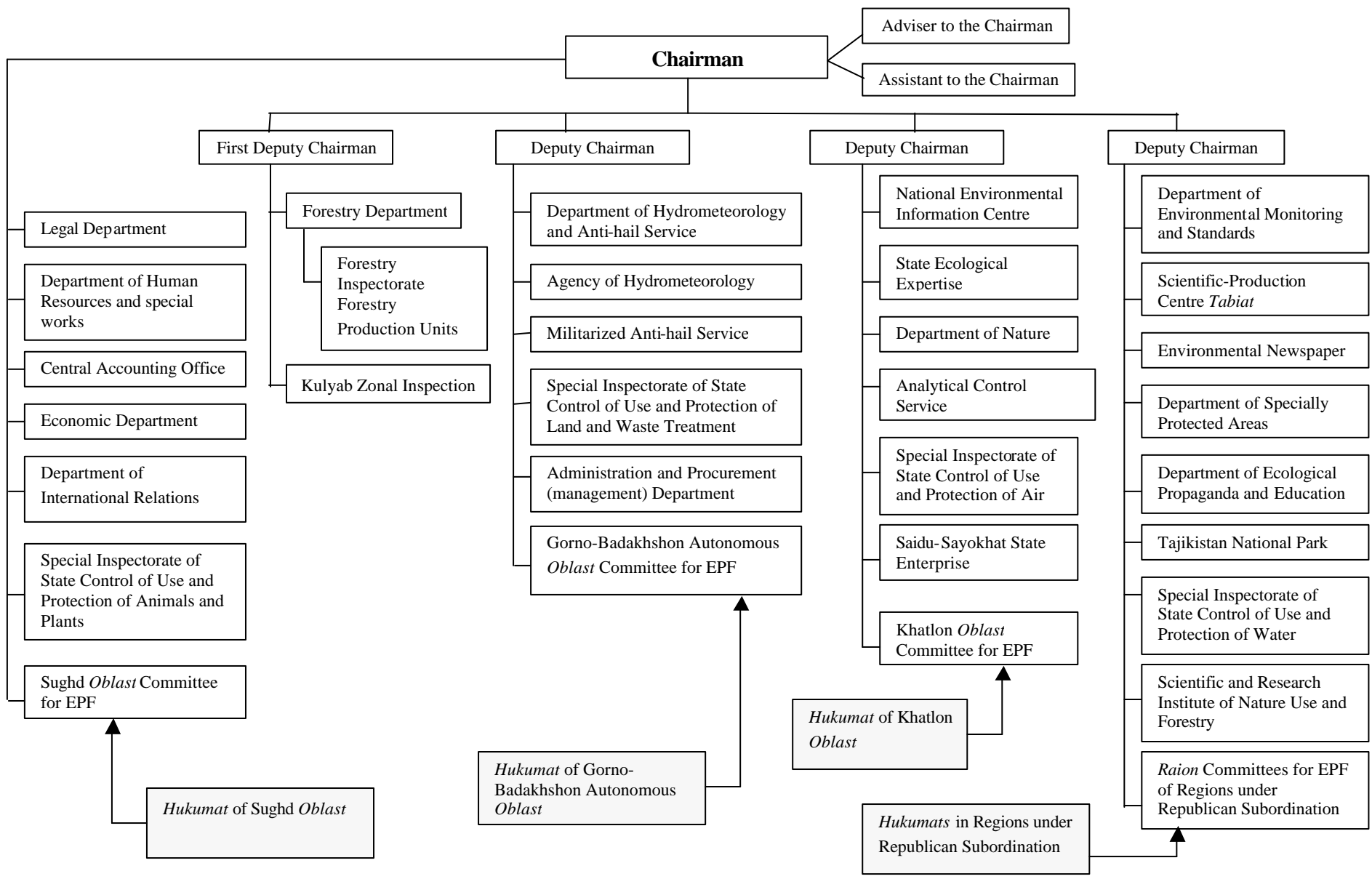
The recent merger with the former State Forestry Enterprise, *Tajikles*, and its 46 production units has also distracted the State Committee from its core tasks. The core tasks of such production units are to plant, grow, harvest and process commercial forest. It is questionable whether the State Committee is suitable for running commercial forests or, indeed, if it should manage enterprises at all, given that its central functions are environmental protection and ensuring the sustainable use of resources.

### Inspection

The State Committee has an analytical control service, a State ecological expertise department, and five special inspectorates:
- Special Inspectorate of State Control of Use and Protection of Water Resources (State Water Inspectorate);
- Special Inspectorate of State Control of Air Protection and Use (State Air Inspectorate);
- Special Inspectorate of State Control of Use and Protection of Animals and Plants (State Animals and Plants Inspectorate);
- Special Inspectorate of State Control of Use and Protection of Land and Waste Treatment (State Land and Waste Inspectorate);
- Forestry Inspectorate.

While carrying out State control functions, officials of SCEPF may:
- Access any enterprise or other object and review any relevant documents and test the operation of purification equipment and facilities and measuring equipment;
- Verify compliance with environmental standards and performance of plans of nature protection activities;
- Issue mandatory orders to enterprises to mitigate environmental violations;
- Impose administrative sanctions and request the law enforcement bodies to initiate criminal proceedings against offenders and to sue offenders for damages in civil courts; and
- Suspend or terminate activities harmful to the environment or human health.

The inspectorates can act independently within the powers expressly defined by law (e.g. Code of Administrative Violations, Law on Nature Protection). Each *oblast* and town environmental committee has a department or a specialist from each of the inspectorates, the Analytical Control Service and Ecological Expertise or (less frequent) one inspector for all types of inspections. Each of the five special State inspectorates is responsible for the prevention and prosecution of violations in respect of a specific resource.

Generally, the local inspectors are well integrated into the local environmental protection committees, with the exception of the forestry inspectors, who used to be supervised by the former State Forestry Enterprise. One of the reasons is that certain formal procedures required to complete the merger of the State Forestry Enterprise into the State Committee are still pending. For example, the property of the former Forestry Enterprise has not been officially transferred to the State Committee and their budgets have remained separate.

The inspectorates and especially their chiefs decide on the division of responsibilities between their staff at head office and local staff. As a consequence, employees of the head office sometimes carry out inspections without notifying their local counterparts.

Inspections are often carried out jointly by the State Committee and the local environmental protection committees, generally at the request of the latter. Joint inspections with more than one inspectorate do occur but are not common. (See also chapter 3, on Economic instruments, environmental expenditures and privatization.)

Fishing or hunting inspectors and forestry guards are authorized to carry and use firearms, if necessary to perform their official duties. Under the Law on Nature Protection and the Code of Administrative Violations, State inspectors are authorized to prepare official investigation documents required for imposing sanctions on individuals and entities violating environmental regulations and their managers. If the investigation leads to the conclusion that an offence is a misdemeanour under the Code of Administrative Violations, the inspectors may decide to impose an administrative fine. If, however, an offence qualifies as a crime, the documents regarding the investigation are transferred to law enforcement bodies.

According to staff of some local environmental protection committees, their capacity is insufficient to carry out regular inspections of all entities within their territory. Nevertheless, each local environmental protection committee develops its annual plans for the inspections (subdivided into quarterly plans) and reports on its performance to the central administration. In practice, however, if a

violation is discovered during an inspection and an order to correct it is issued, the inspectors rarely have an opportunity to come back to the violator to check compliance until the next year or later. For that reason, the inspectors tend to target bigger (more visible) enterprises or respond to specific complaints from the population (e.g. reports about illegal waste dumping or tree cutting). For the same reason, a relatively small number of violators are subjected to fines or required to compensate for damage. Inspectors usually do not impose fines or file claims for damages unless they discover that the violation has not been corrected during their second visit.

### The Ministry of Land Reclamation and Water Resources

The Ministry of Land Reclamation and Water Resources is responsible for the development and maintenance of irrigation channels, reservoirs and associated equipment, land melioration and the irrigation of new land, the distribution of water to agricultural consumers and the collection of payments from them, and the promotion of consistent technical policy. The Ministry also establishes norms and limits of water withdrawn by consumers and monitors water use efficiency; provides the State Committee for Environmental Protection and Forestry with data on water consumption; maintains the Land Reclamation Cadastre, issues "passports" to individual irrigation, drainage, amelioration systems and analyses data obtained in the process; investigates violations of applicable regulations and transfers such cases to the State Committee for further consideration and possible imposition of sanctions. The Ministry's approval is also needed for the construction or rehabilitation of any enterprise that uses water in its production cycle.

Permits for the use of water for irrigation are issued to users (individuals and agricultural enterprises) by the Ministry rather than by the State Committee. This is not an ideal situation, since this leaves the State Committee without any control or even information on how much water is used, or how much water contaminated with agrochemicals or mineral salts is dumped into rivers. Generally, there is little interaction between the Ministry of Land Reclamation and Water Resources and the State Committee for Environmental Protection and Forestry and the Ministry of Agriculture, even though 85% of water consumption is for irrigation. There have been joint inspections of water users by the Ministry and the State Committee, but these

appear to be rare. More commonly both compete for control over water resources, resulting in a failure to share data and a lack of coordination in decision-making.

Related issues are discussed in more detail in chapter 8, on Water resources management and chapter 10, on Agriculture and land management.

### The Ministry of Agriculture

The Ministry of Agriculture has very limited functions regarding nature protection. The most important are its obligation to control the import, export, production, processing or storage of agricultural produce, waste materials and equipment to protect the quality of the final products and ensure ecological safety in general. The Ministry is also responsible for the quarantine of plants and animals, as well as the coordination of scientific research on land use and the application of chemicals in agricultural production. It cannot impose administrative sanctions on violators of environmental legislation. They are imposed by the special inspectorates, to which the Ministry may report a violation. In Sughd *oblast*, the local division of the Ministry and the environmental protection committee have also inspected land users' compliance with land-use regulations together.

However, the Ministry does have its own State Inspectorate on Plants Quarantine and State Veterinary Inspection, which may impose administrative fines on violators of plants quarantine and veterinary regulations without involving the State Committee.

### The State Committee for Land Administration

The State Committee for Land Administration, which was established in 2001, is responsible for developing land-use policy and carrying out land reform. Among its most important environmental functions are: State control of efficient use and protection of land; and maintenance of the Land Cadastre; State registration of the right to land use; planning of rational land use within the boundaries of settlements; proposing rates of land tax, payments for land use and fines for violations of land-related legislation; participating in decision-making on the rehabilitation of polluted or degraded land; and preparing documents for the provisional and final allocation of land to various facilities by relevant executive bodies.

The Committee may impose administrative fines on violators of land-related legislation, issue mandatory orders to stop such violations and orders to suspend the financing of facilities constructed or operated by violating such legislation or stop the financing of the violating entities. It may suspend or terminate the operation of a facility or stop any other activity that violates land-related legislation, including that applicable to construction, prospecting and extraction of mineral resources, melioration or reforestation, and agrochemical treatment of land. The Committee does not usually need to coordinate its activities or interact with the State Committee for Environmental Protection and Forestry to perform its functions.

### *Local governments*

Under the Law on Local Self-Governance and Local Economy, local *majlis* (councils of people's deputies) are elected by direct vote in towns and villages, Gorno-Badakhshan Autonomous *Oblast*, Dushanbe and the *oblast*s. Under the Law, these local councils are authorized to coordinate the environmental protection and use of resources by the enterprises in their jurisdiction. A local council may suspend the operation of an enterprise that fails to obtain approval for its plans.

Normally such decisions are taken by the *majlis* through the local division of the appropriate ministries and committees (e.g. State Committee for Environmental Protection and Forestry, State Committee for Land Administration, or the Ministry of Health). However, a direct vote by a *majlis* on the closure of a particular enterprise or a similar issue is legally possible.

Local councils may: (1) grant or withdraw land parcels and monitor their sustainable use; (2) register ownership or land-use rights; (3) designate nature and other objects as ecologically, culturally or scientifically valuable and nominate them for monument status; (4) set rules for water use, including water consumption by households and farms; (5) control compliance with the rules for use of forests and reforestation and correct extraction of mineral resources, as well as orderly hunting and fishing. Environmental law (e.g. against poaching or illegal construction) is enforced by the local staff of the special inspectorates (which are part of the local environmental committee). Nominations for natural monument status are, however, decided directly by the *majlis*.

Self-government bodies in the communities, such as *mahalla* (local community, gathering of residents) or street block centres and councils may also monitor the sustainable use of land, water and other resources, although they may not impose sanctions on offenders, unless specifically authorized to do so by a higher (first level) local council.

Local town councils may issue certificates for the use of land, allocate land plots from the agricultural reserve, and protect and control the use of water, forests, air and resources below the surface within their jurisdiction, including issuing permits for the extraction of common mineral resources and organizing environmental protection.

Local councils of the third level effect State control over the use and protection of land within their jurisdiction; decide on the eviction of users from agricultural, forest or other land for road construction, industrial development, the construction of pipelines, power lines and similar facilities; after consultation with the councils of the second level, decide on the reallocation of land among users; issue permits for geological, geodesic, mapping, prospecting and other surveys; effect State control over the protection and use of water, forests, mineral, air and biological resources within their jurisdiction; allocate water bodies for use by prospective consumers; participate in planning reforestation, forest use, and forest fire protection; control mineral resources extraction; develop and effect measures on environment protection, sustainable use, conservation and replenishment of natural resources; control rules for hunting and fishing, and direct activities of public nature protection organizations and associations of hunters and fishermen.

## 2.3 The policy framework and its implementation

### *The State Environment Programme*

The State Environment Programme for 1998-2008, adopted by the Government in 1997, is intended to define the direction of the country during its current transition. The Programme recognizes the importance of a continuously healthy and clean environment for successful economic development, as well as the dependence of human survival on the viability of the biosphere. Hence, the Programme calls for a balance to be struck between economic interests and the carrying capacity of the environment.

The main tasks are defined as the need to involve all sectors of society (government, business, non-governmental organizations and the general public) in protecting and improving the environment, and to teach everyone about the importance of using natural resources sustainably and the best approaches to achieving it. The Programme describes the environment in each *oblast* in detail and analyses their environmental issues. It sets out the activities needed to restore or maintain an ecological balance or rectify a particular environmental problem. It also lists urgent practical measures, for instance:

- Preventing land erosion;
- Allocating land for highly productive crops;
- Reforestation, expanding specially protected territories;
- Restoring the good quality of air, water and other resources;
- Encouraging local industries to use environmentally friendlier raw materials; and
- Decreasing energy consumption by industry through the introduction of energy-saving technologies.

In 1998, the Government adopted Measures to Implement the State Environment Programme. This document identifies the nature of each action, how it should be implemented, the governmental bodies responsible for the activity and the time frames within which the activity should be completed. Each year the State Committee for Environmental Protection and Forestry prepares a progress report on the basis of similar reports from its local divisions. According to its officials, some of the actions envisaged are being implemented, however, very often with delays of a year or two, primarily because of a lack of funding.

Some activities have been largely implemented: specially protected territories already cover one fifth of the country. Also, reforestation efforts are yielding results in the densely populated areas in the Hisor Valley, in Dushanbe and its surroundings, and in Sughd *oblast.* At the same time, water management has remained very poor and sewage treatment facilities are inadequate. For example, the construction of a biogas reactor for the sewage collector of Khujand is less than 10% complete and was suspended, despite its obvious importance for the Sughd *oblast* and downstream territories, because funding from the Sughd *oblast* environmental protection committee ran out.

According to the Sughd *oblast* committee's officials, a search for alternative sources of funding, including the State budget, yielded no positive results.

*State Programme on Environmental Education*

The State Programme on Environmental Education of the Population until 2000 and for the period until 2010 was adopted by the Government in 1996. The key principles underlying the education are strict economy of natural resources, self-limitation in consumption and recycling of accumulated waste and gradual transition to closed-cycle production at all enterprises. The Programme calls for a system of continuous and universal environmental education and gives emphasis to environmental education for managers of enterprises that may adversely impact the environment or who work in nature protection. (For more information, see chapter 4, on Information, public participation and education.)

*National Strategy and Action Plan on the Conservation and Sustainable Use of Biodiversity*

In September 2003, the Government adopted the National Strategy and Action Plan on the Conservation and Sustainable Use of Biodiversity and established the National Biodiversity and Biosafety Centre to oversee its implementation. The Strategy and Action Plan are intended to provide the basis for sustainable development of all biodiversity, from genotypes of plants and animals, communities and ecosystems, to soils, wild and cultivated plants and domestic animals. (For more information, see chapter 9, on Biodiversity and forest management.)

*National Action Plan for the Mitigation of Climate Change*

The National Action Plan for the Mitigation of Climate Change was adopted by the Government in June 2003. The Plan sets priorities and measures to address the problem of climate change, to develop a capacity for further research and analysis of the climate system, and to strengthen international cooperation in this area. The measures are meant to serve as a basis for planning and decision-making at all State levels and in all relevant sectors. (See also chapter 6, on Air quality management.)

*National Action Programme to Combat Desertification*

In 2001, the Government appointed the Chair of the State Committee for Land Administration to coordinate the development of a national action programme to combat desertification. The Programme was completed and adopted by the Government in December 2001.

The Action Programme analyses the threats to Tajikistan from desertification and soil degradation, the contributing factors and the environmental, economic and social consequences. A strategy to combat desertification recommends, inter alia, monitoring the desertification process and creating an information system on desertification problems; classifying the territory according to the degree of soil degradation; improving anti-erosion methods to combat soil degradation; drafting new and modifying existing legislation on the use of natural resources; increasing the participation of the local population and non-governmental organizations; and developing social and economic instruments for action against desertification.

## 2.4    Legal framework

Tajikistan's environmental legal framework consists mainly of government resolutions and resolutions of various ministries and committees (especially the State Committee for Environmental Protection and Forestry). Moreover, Tajikistan has ratified several international conventions in recent years and they have also been included in its legal system (see chapter 5, on International cooperation).

Tajikistan has an efficient system for developing and adopting new legislation, thanks to the clearly defined legislative process and, more importantly, to the outstanding performance of all those involved in the process, whatever their levels.

*Constitution*

Adopted in 1994 and amended in 1999 and 2003, the Constitution declares that the State undertakes to ensure a healthier environment and guarantees the efficient use of natural resources for the benefit of the people of Tajikistan. Under the Constitution, land and mineral resources, water, air, animals and plants, as well as other natural resources, belong exclusively to the State.

Although the Constitution declares that the State acknowledges, respects and protects individual rights and freedoms and that State bodies and officials should grant access to information related to individual rights and interests, it does not contain an express guarantee of environmental safety or the right for individuals to use natural resources, including such essential ones as air, water and land.

*Framework environment law*

The framework environment law is the Law on Nature Protection adopted in 1993. It was amended in 1996 to delineate the environment-related powers of various governmental bodies – the Government, the then Ministry of Nature Protection and the local *majlis*. The 2002 amendments concern ecological expertise of specially protected territories and define the environmental rights of the general public more precisely. The Law stipulates that Tajikistan's environmental policy should give priority to environmental actions based on scientifically proven principles to combine economic and other activities that have an impact on the environment with nature preservation and the sustainable use of resources. Also, individual rights to a healthy and favourable environment should be observed. The Law is designed to govern the interaction between nature and the community so as to protect the interests of both.

The Law defines the applicable legal principles, the protected objects, the competencies and roles of the Government, the State Committee for Environmental Protection and Forestry, the local authorities, public organizations and individuals. Most importantly, the Law stipulates measures to secure public and individual rights to a safe and healthy environment. For instance, it requires a combined system of ecological expertise and environmental impact assessment of any decision on an activity that could have a negative impact on the environment. Furthermore, it requires and outlines the procedure for developing environmental quality standards. The Law also defines environmental emergencies and ecological disasters and prescribes the order of actions in such situations, defines the obligations of officials and enterprises to prevent and eliminate the consequences, as well as the liabilities of the persons or organizations that caused damage to the environment or otherwise violated the Law.

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**Box 2.1: Legislative process**

The development of a draft (in this case, environmental) law usually proceeds along the following pattern. A department of the State Committee's central administration draws up an initial draft and submits it for review to the other relevant departments, including the Legal Department. When the State Committee's Chair approves it, the draft is submitted to the Presidential Executive Staff's Department for Ecology and from there to the relevant ministries. Once the ministries' opinions are available, the Presidium of the Government reviews the draft and, if satisfactory, recommends it for review by the Government. If approved, the draft is sent to the *Majlisi Oli* or to the President for submission to the *Majlisi Oli*. Once the relevant commission within the *Majlisi Oli* approves the draft, it is voted by the lower chamber of *Majlisi Oli* in a plenary meeting. If adopted by the lower chamber, the draft is submitted to the upper chamber for approval. Afterwards the law is sent to the President for signing and subsequent publication.

The general public, including NGOs, does not currently have any role in the legislative process, except for the extremely rare occasions when one of the State bodies may decide at its own initiative to seek public opinion on the draft.

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The Law establishes several types of controls over compliance with environmental legislation: State control, ministerial control, enterprise control and public control. State control is effected by the State Committee for Environmental Protection and Forestry, the Sanitary Inspectorate of the Ministry of Health, the Inspectorate for Industrial Safety and the Mining Inspectorate.

Ministerial control is carried out by each ministry (and other State agency) over the objects subordinated to it. Enterprise control means that each enterprise should control the compliance of its own activities with environmental legislation. In practice, both ministerial and enterprise control are less effective than State control because of the strong self-interest involved. When violations occur, neither the supervising ministries nor the enterprises themselves are likely to suspend their own offending activities or report the offences to the State Committee or law enforcement bodies.

Public control is carried out by public organizations or trade unions and can be exercised with respect to any governmental body, enterprise, entity or individual. However, their role is essentially limited to reporting possible violations to the law enforcement bodies or local divisions of the State Committee, as neither individuals nor public organizations have the special equipment needed to discover less obvious violations. Neither do they have independent enforcement powers. The State Committee's local environmental committees, however, have indicated that even such limited forms of public participation in controlling compliance with environmental legislation are of great assistance to them.

The truly distinctive feature of the Law on Nature Protection is that it has a separate chapter on public environmental education, which was, apparently, used for the National Programme on Environmental Education. (See also chapter 4, on Information, public participation and education.)

*Law on Specially Protected Territories*

The 2002 Law on Specially Protected Territories gives priority to specially protected territories over economic and socio-economic interests. However, it also expressly allows the use of specially protected territories if scientists conclude that a particular type of use satisfies economic interests without causing any ecological harm.

Each type of specially protected territory is subject to a different protection and use regime (e.g. all activities are prohibited in strict nature reserves, while certain areas of natural parks can be used for tourism and other limited economic activities). However, all such territories should be regarded as a united system and may be owned only by the State. They should also be recorded in the Cadastre of Specially Protected Territories, maintained by the State Committee. (See also chapter 9, on Biodiversity and forest management and chapter 11 on Ecotourism, mountains and natural parks.)

*Other laws*

The list of laws in box 2.2 is not meant to be exhaustive and does not include secondary legislation. Some of these laws are discussed in more detail in the other chapters of this Review. For the complete list of environment-related legislation mentioned in the Review, see Annex II.

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**Box 2.2: Selected environment-related legislation**

Air quality
- Law on Air Protection Law on Hydrometeorological Activity

Mineral resources
- Law on Minerals

Water
- Water Code

Land management
- Land Code
- Law on Land Administration
- Law on Land Valuation

Forests
- Forestry Code

Animals and plants
- Law on Protection and Use of Animals
- Law on Protection and Use of Plants
- Law on Plants Quarantine

Health and safety
- Law on Securing Sanitary and Epidemiological Safety of the Population
- Law on Veterinary Medicine
- Law on Salt Iodization
- Law on Quality and Safety of Food
- Law on Industrial Safety of Hazardous Installations
- Law on Radiation Safety

Waste and chemicals management
- Law on Production and Consumption Waste
- Law on Production and Safe Handling of Pesticides and Agrochemicals

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## 2.5 Environmental impact assessment and ecological expertise

There is no ecological audit for existing activities, but there has long been a system of ecological expertise for new activities. Environmental impact assessment is in its early stages.

### *Ecological expertise*

According to the 2003 Law on Ecological Expertise, ecological expertise is intended to prevent negative impacts on the environment as a result of a proposed activity, forecast impacts from activities that are not considered as necessarily damaging to the environment and create databases on the state of the environment and knowledge about human impact on the environment.

This Law and the Law on Nature Protection envisage two types of ecological expertise – State ecological expertise and public ecological expertise, which are not given equal importance. While State ecological expertise is a prerequisite for beginning any activity that may have an adverse environmental impact, public ecological expertise becomes binding only after its results have been approved by a State ecological expertise body.

Public ecological expertise may be initiated both by individuals and by environmental public organizations. However, such independent expertise may be performed only by public organizations that, according to their charters, focus their activities on environmental issues and only if performing such public ecological expertise is expressly mentioned in their charters. Even then, public ecological expertise may not be initiated unless an application for such expertise has been registered by the local executive body (*hukumat*). Furthermore, the *hukumat* may refuse such registration on formal grounds. Public ecological expertise is currently an overly complicated undertaking that requires a public organization to devote significant time, effort and money to complying with formal legal requirements instead of concentrating all resources (which are usually scarce) on the core activity – carrying out public ecological expertise.

The 1994 Resolution of the Council of Ministers on Approval of the Regulation on State Ecological Expertise defines the legal status of the body responsible for carrying out State ecological expertise, which is currently the State Committee for Environmental Protection and Forestry. The State Ecological Expertise is authorized to invite leading scientists and qualified outside specialists

to participate in the review. Approval should be issued within 45 days, unless the project developer agrees to an extension, and remains valid for two years, if the decision is positive.

According to the Sughd *oblast* environmental protection committee, all developers apply for a State ecological expertise, at least for new construction, as it is not possible to obtain land until a positive preliminary decision is submitted to the *hukumat*'s Land Allocation Committee. Upon completion of the construction, the final approval of the State Ecological Expertise should be submitted before the enterprise is allowed to begin operating. The number of applications for expertise for renovation of an existing facility (which is also subject to ecological expertise) is lower, as renovations (of medium and small enterprises) are less visible. The State Expertise seldom rejects projects, preferring to provide an opportunity for the applicant to correct any identified problems.

The Procedure for Licensing Activities in the Field of Ecological Expertise, adopted by the Government in July 2003, provides for both individuals and legal entities that want to be ecological experts to apply for a licence to the State Committee. The licence is issued to successful candidates within 15 days for a term of up to two years (with a possibility of extension at the request of the licensee). The licensee can be subject to a review by the State Ecological Expertise for compliance within the term of the licence.

<center>Environmental impact assessment</center>

In Tajikistan, environmental impact assessment is a component of State ecological expertise, as set out in the 2002 amendments to the Law on Nature Protection and in the Law on Ecological Expertise.

The identification of objects subject to environmental impact assessment under these two laws is quite broad – it includes the planning of all new facilities and activities that may have an impact on the environment. Once environmental impact assessment is undertaken, it is subject to mandatory review by the State Ecological Expertise.

The laws also call upon the Government to approve a list of activities and objects for which environmental impact assessment is mandatory. The State Committee has now begun to draft the list and the procedure for carrying out the environmental impact assessment for submission to

the Government. However, there have been almost no public hearings, although this is required by the operative laws.

## 2.6 Licensing, permitting, ecological norms and standards

Although licences and permits are not clearly differentiated by law, licences generally give the right to engage in a certain activity, while permits give the right to a certain resource. Sometimes those terms are used interchangeably. In the context of environmental legislation, it is usually necessary to have both a licence for an activity (e.g. for prospecting activities or treatment of hazardous waste) and a permit to take or discharge (e.g. to extract mineral resources or to deposit waste).

*Licences*

Licences are regulatory instruments to regulate certain potentially hazardous activities where minimal qualifications and strict adherence to rules are required to ensure that they are carried out efficiently, safely and do not result in potentially very significant and irreparable damage to the environment and human health. In particular, licences are required for participation in ecological expertise; handling hazardous waste; and for activities in industrial safety, sources of ionizing radiation, production and handling of pesticides and other agrochemicals. Licences are normally issued by the relevant industry regulator (ministry or committee) or an entity to which it has delegated such right. For example, licences to tourist companies with foreign clients are issued by the Ministry of Economy and Trade. Licence fees are set by the Government or the industry regulator.

Licensing is also used to ensure the most efficient and sustainable use of natural resources. For example, licences are required for prospecting, collecting or extracting mineral resources, or for constructing underground facilities not related to mining.

The Law on Ecological Expertise and the Regulation on the Commission for Chemical Safety set up a registration system for chemical and biological substances, fertilizers, and other substances and compounds that are intended for initial use in or imported to Tajikistan. These substances and compounds should undergo mandatory State testing in laboratories and production (field) facilities to assess their

biological, toxicological and environmental characteristics. If the testing results are positive, the substance or compound must be registered with the said Commission and included in the List of Chemical Substances and Biological Compounds that are Permitted for Use.

### *Permits*

Permits are usually meant to ensure the sustainable use of natural resources. There are two types of permits: permits to take natural resources and permits for emissions or discharges.

#### Resource permits

These permits allow their holders to take a certain number or amount of a particular natural resource within a defined territory and time period. They are issued both to individuals (e.g. to hunt a particular species of animal or harvest particular plants) and to organizations (e.g. permits to extract ground or surface water for a particular use).

By law, permits are needed for any commercial use of any resource. The authority that issues the permit and the legislation (government resolution) that applies depend on the resource. In addition, the Law on Nature Protection sets out several requirements on the siting, design, construction, modernization and exploitation of enterprises, buildings and other installations.

#### Permits to discharge polluted matter

This type of permit is issued by the relevant inspectorate (e.g. State Water Inspectorate or State Air Inspectorate) of the State Committee's local environmental protection committees to industrial or agricultural enterprises and municipal utilities that release by-products into the environment. The permits allow releasing a certain amount of polluted matter (gases, liquids, solid waste) into the environment. The permits are normally granted for one year and indicate the maximum allowed concentration of the pollutants in the released matter, the maximum volume of the polluted matter and the pollutants allowed.

### *Environmental norms and standards*

Norms are set for air and water pollution, noise, vibration, magnetic fields and other physical factors, as well as residual traces of chemicals and biologically harmful microbes in food. Exceeding

their thresholds results in administrative action, including financial sanctions.

Several ministries determine environmental quality standards, each in its field of responsibility. For example, admissible levels of noise, vibration, magnetic fields and other physical factors have been set by the Ministry of Health. The then Ministry of Nature Protection set rates for the discharge of pollutants into water and air and also for the disposal of solid waste.

## 2.7    Implementation and compliance

A number of legal acts establish liability for violations of environmental laws, which can be enforced by several State bodies.

In particular, the 1998 Code of Administrative Violations establishes administrative liability for organizations, their officers and individuals for a range of violations, from the careless treatment of land to violation of the rules for water use or water protection or failure to comply with a State ecological expertise. The bodies authorized to enforce administrative liability, each for a certain type of environmental offence, are numerous. In particular, administrative sanctions for ecology-related violations can be imposed by the administrative commissions of *hukumat*s, courts, the State Committee's inspectors, the Veterinary Inspectors of the Ministry of Agriculture, and the State Committee for Land Administration. Their specific competence to investigate certain types of violations and impose sanctions is described in the Code.

The most common administrative sanction is a fine of up to 10 minimal monthly salaries for individuals and up to 15 minimal salaries to officers of organizations. As the minimal monthly salary in Tajikistan is relatively low (around US$ 2.5 currently), the penalty does not appear to be severe. However, real incomes are also low (US$ 15 per month), so a fine of 10 to 15 minimal salaries is a significant burden for the average citizen. Violators may get off with a warning.

Problems with enforcement of environmental legislation stem, however, from the fact that the authorities    have    few resources to conduct systematic inspections. It usually takes a year for the State Committee's inspectors to return to an enterprise to verify compliance with a previous order to correct violations discovered during

inspections. Only during the second visit will the inspector impose a fine on the enterprise's manager if the order has been ignored.

According to the State Committee's inspectors in Sughd *oblast*, about 50% of violators now pay fines promptly, but in 2001, for example, only 10% did so. The reason for the improvement is that the inspectors have started to report all non-payers to the lawyer of the Sughd environmental protection committee, who initiates court proceedings against the non-payers. Such cases are resolved by general courts in favour of the Sughd environmental protection committee within two to eight weeks. It takes a little longer to obtain a judgement from an economic court against an enterprise, if the inspectors file a claim for damages. Although economic courts, as a rule, review these cases relatively quickly, it may nevertheless take several months before all appeals are heard. The State Committee is not subject to the mandatory State fee for filing court cases.

The State Committee may also suspend activities of enterprises that violate environmental legislation. In Sughd *oblast*, the activities of 70 enterprises were temporarily suspended in 2003 by the local environmental protection committee.

The prosecutor's office and the police investigate environmental crimes and could play a fairly significant role in the enforcement of environmental legislation. The State Committee's authority to investigate administrative violations and impose administrative fines does not overlap with the authority of the prosecutor's office or the police to investigate and prosecute crimes. In fact, there is a degree of cooperation between them, as local environmental protection committees transfer cases to the police or the prosecutor's office if their inspectors uncover a violation that may qualify as a crime.

The 1998 Criminal Code covers crimes against ecological safety and the environment, such as violations of ecological safety at work, poaching, spoiling land, violation of rules for the protection and use of underground resources. The maximum fine is up to 2,000 minimal monthly salaries and the maximum sentence is up to eight years in prison. In reality, however, according to the State Committee's Legal Department, only two criminal cases were initiated in connection with ecological crimes in recent years. Both cases involved military personnel and neither has been transferred to court upon conclusion of the investigation.

## 2.8 Conclusions and recommendations

In the beginning of 2004, the Ministry of Nature Protection was transformed into the State Committee for Environmental Protection and Forestry. As a result, the State Committee has had only a few months in which to develop its new structure, integrate new responsibilities, with particular reference to forestry, and assign staff. It is understandable that these tasks have delayed its main activities.

The State Committee has important tasks and broad powers in environmental protection, the sustainable use of resources, forestry and hydrometeorology. One of its key roles is to effect inter-agency coordination in these areas and it should do so as soon as possible.

Equally important is the need for the State Committee to ensure that the work of the forestry production enterprises be fully integrated into the overall functions of the State Committee, and that it focus its scarce resources on its main responsibilities.

*Recommendation 2.1:*
*(a) The Government should establish an inter-ministerial commission, including representatives of all relevant ministries and State committees, chaired by the State Committee for Environmental Protection and Forestry, to facilitate and strengthen cooperation and coordination of policies, plans and actions related to environmental protection, the sustainable use of natural resources and forestry;*
*(b) The State Committee for Environmental Protection and Forestry should review its new structure internally and establish a department on air protection, water and waste management in order to promote environmental permitting properly and to avoid conflict of interests in issuing permits and checking their enforcement by one and the same structure (the inspectorates).*

Vertical coordination within the State Committee and its local environmental protection committees also requires attention. At present, there appears to be little exchange of knowledge or experience between the two. This raises problems, in particular, in inspections. At the moment, there is a lack of clarity and consistency regarding who initiates and carries out an inspection: the central office or the staff of the local committees. It

appears that the central office has discretionary power in this regard, and it does not even need to inform or involve the local committee.

Finally, all of the inspectorates need to be strengthened, with both human and financial resources. It is important that inspectors are able, inter alia, to inspect violators in a timely manner to ensure their compliance

*Recommendation 2.2:*
*The State Committee for Environmental Protection and Forestry should:*
- *Establish clear and precise rules of procedure for carrying out and reporting on inspections, including establishing the respective responsibilities of central and local inspectors;*
- *Provide the necessary means for the inspectorates to ensure compliance with the relevant laws;*
- *Ensure sharing of information among the inspectorates;*
- *Provide intensive training to inspectors and consider setting a national standardized and mandatory recruitment exam for all inspectors.*

The legislation on environmental assessment, including amendments of 2003, consists of a combined process of environmental impact assessment and ecological expertise. Both the laws and a draft list of activities and objects subject to EIA have been prepared.

The legislation also provides for public ecological expertise, which should give individuals and organizations an opportunity to participate in the overall ecological expertise process. Implementation of this right is, however, highly constrained and has very little practical meaning at present.

*Recommendation 2.3:*
*The State Committee for Environmental Protection and Forestry should redesign the principles and procedures of ecological expertise with environmental impact assessment legislation based on international experience and practices. In doing so, it should as a minimum:*
*(a) Clearly define all important steps of the environmental impact assessment process, including: screening, scoping, consultations, public hearings, access to information, decision-making and access to justice;*
*(b) Define procedures for public participation that facilitate a meaningful dialogue with non-governmental organizations and other appropriate entities and are consistent with the Aarhus Convention (see Recommendation 4.5).*

*Chapter 3*

# ECONOMIC INSTRUMENTS, ENVIRONMENTAL EXPENDITURES AND PRIVATIZATION

## 3.1    Introduction

After independence, Tajikistan began developing its own set of legislation on economic instruments for environmental protection. In doing so it has not dismantled the existing structure but rather attempted to gradually adjust it to the changing conditions. Norms and regulations that were developed to implement the new laws are often based on methodologies and approaches used in the Soviet period. Tajikistan has introduced a system of national and local environmental funds (since November 1998 – special funds for nature protection). The revenues for these funds, coming from various fees, charges and fines, are supposed to be earmarked specifically for environmental purposes.

Tajikistan has a relatively well-developed legal framework for economic instruments for and financing of environmental protection. Economic instruments and provision of funds for nature protection are outlined in a number of environment-related laws and regulatory documents. While the legal framework, including supporting secondary legislation, is mostly in place, implementation is not satisfactory. The main policy objective of introducing economic instruments – to encourage environmentally sound activities in industry, agriculture and other sectors of the economy – is not being achieved. There are several interconnected reasons for this, such as the sharp decrease in economic activity following the break-up of the Soviet Union, the civil war and the low income of the majority of the population. Only since 1997 has the growth of GDP resumed, but in 2003 it was only about half of its 1989 level (see chapter 1, on Poverty, environment and economy). With many enterprises completely shut down or functioning at low capacity, environmental considerations are often low on the list of priorities. Admittedly, the decrease in production has resulted in a corresponding reduction in environmental pollution, but economic instruments played no significant role in this. Another related problem is

the insufficient capacity of bodies responsible for implementing the economic instruments.

## 3.2    The decision-making framework

*The legal framework*

Law on Nature Protection

The legal basis for the implementation of economic instruments is the Law on Nature Protection. It outlines the economic mechanism for environmental protection to develop incentives for governmental bodies, enterprises, organizations and citizens to take measures for environmental safety, rational use and renewal of natural resources. The Law introduces the "polluter pays" and the "user pays" principles, according to which users are charged for the right to use natural resources within established limits and for excess use. Polluters are charged for emissions and discharges of pollutants, waste disposal and other types of pollution within established limits and for excess pollution.

The Law lists a number of economic instruments for environmental protection, including the following:
- Charges for the use of natural resources;
- Charges for emissions and discharges of pollutants;
- Charges for waste disposal and other types of pollution;
- Tax breaks and lower interest rates for enterprises that use cleaner technologies;
- Fines and compensation for damage to the environment and human health; and
- Additional taxation of those enterprises whose activity is dangerous to the environment.

The Law also allows local authorities to introduce other types of economic incentives for environmental protection.

The Law establishes three sources of financing for environmental protection: State and local budgets; State and local nature protection funds; and

voluntary contributions from individuals and legal entities. Nature protection funds are created specifically for expenditures related to environmental protection, reclamation of losses and compensation for damage to nature. Revenues come from: payments for the use of natural resources, emissions and discharges of pollutants, and waste disposal; fines for violations of environmental legislation; and voluntary contributions.

The Government determines the norms, methods of calculation and application of fees, charges and fines for the use of natural resources and environmental pollution and the procedure for establishing and using the environmental fund revenues. The fees, charges and fines are subject to indexation to take inflation into account.[2]

### Secondary legislation

In addition to the Law of Nature Protection, several resolutions and regulations provide guidance on implementation, for instance:

- The Procedure for Determining Payments and Payment Limits for Environmental Pollution and Waste Disposal approved by the Council of Ministers in 1993 and subsequent directives provide practical guidelines for the application of economic instruments.

- The Directive Document on Nature Protection "Methodological instructions on charging payments for environmental pollution" (RD-01-93) outlines the procedure and methods for calculating various fees and charges related to environmental pollution, and, in its 2001 additions and amendments, provides new norms to calculate fees for emissions, discharges and waste disposal and other fees, charges and compensation for damage to the

environment to take account of inflation as envisioned in the Law on Nature Protection. The documents were issued by the then Ministry of Nature Protection, with the approval of the Ministry of Economy and Trade and the Ministry of Finance.

- The 1998 Regulation on the State and local special funds for nature protection specifies the sources of revenues for the funds, the distribution of revenues between local and State funds and the purposes for which the funds may be used.

Unfortunately, the rates for fees, charges and fines (even after recent adjustments) are too low to encourage the introduction of anti-pollution measures and the rational use of natural resources. As a result, revenues for the environmental funds are also low. In addition, a large proportion is spent on administration rather than on projects. These issues will be discussed in more detail in other parts of the chapter.

Certain provisions of the Law on Nature Protection related to economic mechanisms do not have secondary legislation to implement them. For example, the Law envisions the establishment of insurance funds for environmental protection. Such funds have not been established. The Law stipulates that enterprises and organizations, irrespective of their ownership, that use low-waste and waste-free technologies and production processes, and engage in recycling or other environmentally beneficial activities should be given preferential tax treatment and loan terms. The Tax Code, however, has no provisions for tax breaks for companies that introduce these measures. There is also no mechanism to encourage banks to grant environmentally conscious companies loans on preferential terms. There is no information on the local authorities applying any additional economic incentives as they are allowed by law. Thus a potentially useful economic mechanism (of positive reinforcement rather than punitive) remains unused. In practice, enterprises whose activity is dangerous to the environment are not subject to additional taxes although this is provided for.

### Other environment-related legislation

The Law on Air Protection defines the economic mechanism for air protection, including its objectives, sources of financing for air protection measures, and payments for air pollution (within and beyond established limits). The Law on

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[2] In Tajikistan, various types of fees and charges, including those for excess pollution are called payments. The term "fine" is used exclusively for personal liability. For the purposes of this Review and in accordance with the terminology accepted by OECD, the term "user charge" is used henceforth for payments for the use of natural resources, "emission charge" for environmental pollution (including waste disposal) within established limits, "service charge" for a payment related to the provision of a service (e.g. water supply), "fee" for payments related to licences and permits, and "fine" for all kinds of liabilities related to excess pollution or use (both for companies and for persons). The term "compensation for damage" is also used.

Production and Consumption Waste states that payments for waste disposal depend on the volume of waste and its toxicity. For both laws the procedures for calculating the charges are described in Directive Document RD-01-93 (see above).

The Law on Minerals contains provisions on payments for prospecting for and extracting mineral resources. The Regulation on the Amount, Procedure and Conditions of Applying Charges for the Right to Extract Mineral Resources and the Regulation on the Procedure for Licensing of Extracting Mineral Resources spell out the procedures.

The Water Code contains provisions for particular uses of water for which there is a charge and for compensation of damage to water sources. The Procedure for Rewarding Water Users that Implement Measures for the Rational Use and Protection of Water defines these measures and sources of funding for paying bonuses. The measures include the development and application of water-saving technologies, the application of advanced technologies for waste-water treatment, the construction of water and waste-water treatment facilities, the application of a closed-loop water-supply system and the introduction of technological processes that prevent the generation of polluted waste water. There is no special national or local fund to pay bonuses for taking such measures. The money would have to come from the enterprises themselves and are allowed only when financial savings result from the activities described above. Usually, however, such activities require substantial investments before yielding any financial savings. As a result there is no financial basis for rewarding these activities.

### The policy framework

Several policy documents mention the need for economic instruments for environmental protection and environmental expenditures. The most recent is the National Strategy and Action Plan on the Conservation and Sustainable Use of Biodiversity approved by the Government in September 2003. It outlines the economic instruments that would stimulate the sustainable management of natural resources, in particular biodiversity conservation, and possible sources of funding. It recommends, inter alia: taxation on favourable terms for biodiversity conservation measures; special taxes on processes that affect biodiversity, including investment in roads construction and electricity transmission lines in State protected areas; a

compulsory insurance mechanism for technologies that affect the environment; preferential loan terms for investment in biodiversity conservation; and fees for visiting and crossing protected areas.

The need for a law to address payment for water as a resource is set out in the 2001 Concept on the Rational Use and Protection of Water, but this law has not yet been developed.

The State Environment Programme for 1998-2008 lists economic instruments to improve the environment and sets out the need to improve the funding of environmental projects and programmes. Among the recommendations for funding is a proposal to increase the budgetary allocation earmarked for environmental protection to at least 5% of the State budget by 2010. Another recommendation is to set aside part of the revenues from privatization (without specifying the percentage). The Measures to Implement the State Environment Programme include such actions as developing tax breaks to encourage the rational use of natural resources and the application of cleaner technologies and developing a programme of investment projects to improve the environmental situation. No information on the implementation of these measures and recommendations is available.

Tajikistan has a reasonably developed and consistent structure of economic instruments for environmental protection. The Government is well aware of their importance. Unfortunately, the instruments are not sufficiently adjusted to the country's current economic and social conditions. Consequently, the policy objectives for the use of economic instruments and environmental expenditures remain unfulfilled.

## 3.3 Implementation of economic instruments for environmental protection

### Instruments for waste management

Instruments for waste management include emission charges for the disposal of recyclable materials and of non-toxic (including solid municipal waste) and toxic industrial waste, and service charges for the collection and disposal of waste by municipal services. The local (*oblast*, city and *raion*) environmental protection committees set the limits for waste disposal for enterprises, review and approve the calculation of emission charges (done by the enterprises and submitted to the committees) and collect the payments. The State Land and Waste Inspectorate and the local

committees inspect (separately or, occasionally, jointly) enterprises to check their compliance with environmental legislation, including paying all relevant environmental charges (see also chapter 2, on Policy, legal and institutional framework). Inspectors may issue fines for violations of waste-related legislation (including disposal of waste without permit and illegal dumping).

Emission charges for the disposal of recyclable materials are equal to their wholesale prices. In theory, this should serve as an incentive for enterprises to look for a market for recyclables or recycle on-site. According to the Department of Waste of the State Land and Waste Inspectorate, a lack of recycling facilities for most of the materials means there is almost no collection or trade in recyclables (see chapter 7, on Waste management). The only exception is waste paper (there are small factories that can process it). The emission charge for the disposal of waste paper is 0.168 somoni/ton.[3] For other recyclables, emission charges range from 0.024 to 0.24 somoni per ton or per cubic metre, which, in some cases (e.g. for ash, some rubber waste and metallurgical slag), is even lower than for non-toxic industrial waste and solid household waste (0.12 somoni/$m^3$). Emission charges for the disposal of non-toxic (including solid municipal waste) and toxic industrial waste are listed in table 3.1.

Even though emission charges for waste disposal are low (equivalent to US$ 0.04/m3 for non-toxic industrial waste), they are the main source of revenues for environmental funds. In Sughd oblast, for example, they raise over 223,000 somoni (roughly 66% for waste disposed within limits and 34% for excess waste), which is almost two thirds of the total revenues of the oblast's environmental funds.

Cities set their own service charges for waste collection and disposal. In major cities where such a service exists there is usually one municipal enterprise responsible for waste collection (see also chapter 7, on Waste management). The system of service charges in Khujand, the second largest city in Tajikistan, is typical for major cities. The collection, transport and disposal of solid waste are the responsibility of the *SpecAvtoBaza* (Special Depot) for Sanitary Cleaning of the Khujand City Department of Housing and Municipal Services. The Khujand Special Depot sets the service charges for all its clients. According to its staff, these are

based on the premises of cost recovery and are approved by the City Department of Housing and Municipal Services, the *hukumat* and the city's anti-monopoly committee. Enterprises located in the city must sign a contract with the Khujand Special Depot for waste collection and disposal. Their charges are based on the actual amount of waste collected. The rates in effect at the beginning of 2004 are listed in table 3.2 (lower rates were in place before 2004). The Khujand Special Depot has a contract with the *hukumat* to collect waste from city streets and sewage (from latrines). These services are paid for by the municipality and provide the largest (almost 80%) and the most reliable source of revenue for the Khujand Special Depot (see table 3.3).

Service charges for household waste in Khujand for 2004 are set at 3 somoni (US$ 1) per person per year. While this figure is extremely low in absolute terms, it is in fact over 0.5% of average per capita income (see Chapter 1 on poverty, environment and economy). This may explain why few households pay (about 25% in 2003 and even less in previous years). Another reason, according to the Department of Housing and Municipal Services, is that people pay for utility services that may be cut off, such as electricity or natural gas, first, while waste collection is viewed as a lower priority. There is also anecdotal evidence that people often pay cash directly to waste collection truck drivers to ensure proper service. All these factors suggest that household waste collection may be organized more effectively by private companies working under contract for city departments of housing and municipal services.

Total planned revenues for 2004 of the Khujand Special Depot are 50% higher than in 2003 (1.05 million somoni). Even though, according to its specialists, this will cover costs if collected in full, the budgeted expenditures will, at best, cover continued operation and minimal maintenance. The budget does not provide for the acquisition of new trucks or the construction of a new landfill (which is badly needed, as the existing one in the north-eastern industrial part of the city has already exceeded its capacity). It is, therefore, not possible to speak of "cost recovery" in the normal sense.

Economic instruments for waste management are not sufficient to provide incentives to reduce waste generation, increase recycling and introduce cleaner production technologies, even though emission charges for waste disposal provide the bulk of the revenues for environmental funds.

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[3] Exchange rate of 3 somoni/US$ is used in the chapter.

**Table 3.1: Emission charges for waste disposal (non-recyclable) within permitted limits**

somoni

| Type of waste | Unit of measurement | Emission charges * |
|---|---|---|
| Non-toxic mining waste | ton | 0.0024 |
| Non-toxic industrial waste | m$^3$ | 0.012 |
| Solid municipal waste | m$^3$ | 0.012 |
| Toxic waste (by toxicity class) | | |
|   Extremely toxic (class I) | ton | 13.44 |
|   Highly toxic (class II) | ton | 5.76 |
|   Moderately toxic (class III) | ton | 3.84 |
|   Low toxic (class IV) | ton | 1.92 |

*Source*: Ministry of Nature Protection. Directive Document on Nature Protection on introduction of additions and amendments to the "Methodological instructions on charging payments for environmental pollution" RD-01-93. Dushanbe, 2001.
* Original charges are multiplied by 2.4, the *coefficient of indexation* set in 2001

*Instruments for air quality management and instruments related to transport*

The main economic instruments for air quality management are fees for air emissions from stationary and mobile sources. The division of responsibilities between the State Air Inspectorate and the local (*oblast*, city and *raion*) environmental protection committees is similar to that between the State Land and Waste Inspectorate and local committees. A slight difference is that a number of large enterprises (e.g. Tajik aluminium plant and Khujand furniture factory) are under the direct control of the State Air Inspectorate and are not subject to control by local committees.

The inspectorates set air emission limits, review and approve the calculation of emission charges submitted by enterprises and collect the charges. Inspectors may issue fines for violations of legislation related to air protection (including air emissions without permit and major releases due to accidents or breakdowns in equipment).

Table 3.4 lists the emission charges for selected air pollutants. The complete list contains 123 compounds, but few are measured (for some pollutants, the enterprises that might emit them are no longer functioning). Local coefficients are applied to these rates. The coefficients are based on the environmental situation and environmental importance of a particular area. For example, the local coefficients are 2.0 for Dushanbe, 1.7 for Kurgan-Tyube (administrative centre of Khatlon *oblast*), 1.4 for Khujand (administrative centre of Sughd *oblast*), and 1.6 for the Tursunzade *raion* (where the Tajik aluminium plant is located). These rates (and local coefficients) are applicable to emissions within established limits. The fine for excess emissions is five times higher. The fine for emissions of air pollutants due to accidents or breakdowns in pollution abatement equipment is set at 10 times the rate for emissions within limits. (See also chapter 6, on Air quality management.)

**Table 3.2: Service charges to enterprises for waste collection and disposal in Khujand, 2004**

somoni/m$^3$

| Type of enterprise | Service charges |
|---|---|
| State-owned industrial enterprises | 4.0 |
| State-owned social and cultural organizations (schools, hospitals, theatres, etc.) | 3.0 |
| Private (commercial) enterprises | 5.2 |
| Other enterprises and organizations (private schools, dental surgeries, etc.) | 3.8 |
| Enterprises that collect and transport waste to the landfill themselves | 3.2 |
| Waste collection from city streets | 3.0 |
| Collection and disposal of sewage (from latrines) | 6.0 |

*Source*: Khujand Special Depot. Approved rates of charges for waste collection and disposal in Khujand for 2004.

**Table 3.3: Revenues of the Khujand Special Depot from service charges for
waste collection and disposal, 2003**

| Source of revenue | Planned revenue | Actual revenue | Collection rate |
|---|---|---|---|
| | somoni | somoni | per cent |
| Households | 228,268 | 57,067 | 25 |
| Organizations and enterprises | 74,000 | 41,459 | 56 |
| Municipality | 397,077 | 372,877 | 94 |
| **Total** | **699,345** | **471,403** | **67** |

*Source* : Khujand Special Depot. Budget 2003.

Emission charges are supposedly based on the actual amount of pollutants emitted per year. It is the responsibility of the enterprise itself to report the total amount, but in practice no enterprise (with the exception of the Tajik aluminium plant) has the monitoring equipment that would make this possible (see also chapter 6, on Air quality management). Calculations are therefore based on the type and quantity of equipment that produces emissions, the time that the equipment is in operation and the use of pollution abatement equipment.

The limits are usually set on the assumption that the enterprise operates at full capacity. Since most enterprises operate at a reduced capacity, they often request and receive a corresponding reduction in emission charges. Inspectors from the local committees and from the State Air Inspectorate inspect enterprises to ensure compliance and to check the accuracy of reporting.

While there is a system of emission charges in place, it yields marginal results in terms of both the revenues collected and providing an incentive to reduce air pollution. For example, in Sughd *oblast*, the local environmental funds received a total of 8,775 somoni (US$ 2,925) from air pollution emission charges and fines in 2003. The Tajik aluminium plant, which accounts for over 40% of Tajikistan's total industrial output, pays approximately 12,500 somoni (a little over US$ 4,100) a year in emission charges for air pollution (see table 6.4). Its revenues from aluminium exports in the first half of 2003 were US$ 200 million. These figures suggest that current emission charges do not provide any incentive to install pollution abatement equipment. The aluminium plant is the only enterprise that has been upgrading its air pollution abatement equipment (spending on average 290,000 somoni per year in 2000-2002), but it is unlikely that the main reason for this major

upgrade was the need to reduce air pollution charges.

Inspectors (in coordination with staff of environmental funds) have discretion to waive or reduce emission charges for air pollution from a State-owned enterprise taking into account the overall economic state of the enterprise. Directive Document RD-01-93 singles out enterprises that produce heat and electricity for households for application of such waivers and reductions. An enterprise that benefits from such a waiver or reduction must then invest that money in measures to reduce or prevent air pollution. According to the State Air Inspectorate and local environmental protection committees, such agreements take place but no specific examples have been provided.

**Table 3.4: Charges for emissions of selected air
pollutants from stationary and mobile sources
within permitted limits**

| | somoni/ton |
|---|---|
| **Pollutant** | **Emission charges *** |
| $NO_2$ | 2.0 |
| NO | 1.0 |
| $SO_2$ | 1.0 |
| CO | 0.024 |
| HF | 14.0 |
| Hydrocarbons | 0.05 |
| Total suspended particulates (soot) | 1.0 |
| Dust from cement production | 4.0 |
| Cotton and flax dust | 1.4 |

*Source* : Ministry of Nature Protection. Directive Document on Nature Protection on introduction of additions and amendments to the "Methodological instructions on charging payments for environmental pollution" RD-01-93. Dushanbe, 2001.

\* Original charges are multiplied by 2.4, the *coefficient of indexation* set in 2001

**Table 3.5: Annual owner's tax for selected types of motor vehicles**

| Type of motor vehicle | Somoni per vehicle |
|---|---|
| Cars | 5.4 |
| Cars with natural gas engine | 2.8 |
| Trucks and buses with petrol engine | 8.0 |
| Trucks and buses with diesel engine | 5.0 |
| Diesel locomotive | 32.4 |
| Aeroplane | 29.0 |

*Source* : Ministry of Nature Protection. Directive Document on Nature Protection on introduction of additions and amendments to the "Methodological instructions on charging payments for environmental pollution" RD-01-93. Dushanbe, 2001.

Another instrument related to air quality management and transport is an annual motor vehicle tax (see table 3.5). Its purpose is to generate budget revenues (for *oblast*, city and *raion*). The rates remain very low and do not reflect the environmental impact of vehicles.

The overall effectiveness of the instruments for air protection and those related to transport is low both in terms of encouraging environmentally sound activities in these areas and as a means of generating revenues for State and local budgets and for environmental funds.

*Instruments for water resource management*

There are several economic instruments in water resources management. They include emission charges for the discharge of pollutants into water, service charges for water supply and waste-water treatment and disposal, and fines for violations of water-related legislation.

The division of responsibilities between the State Water Inspectorate and the local (*oblast*, city and *raion*) environmental protection committees is similar to that between other inspectorates and local committees. The local committees establish limits for enterprises to discharge pollutants into water sources and for the abstraction of water, review and approve the calculation of emission charges submitted by enterprises and collect the charges. Inspectors may issue fines for violations of water-related legislation (including the discharge of pollutants or the abstraction of water without permit and major releases of water pollutants due to accidents or breakdowns in equipment).

Service charges for water supply and waste-water discharge in cities are set and collected by local *vodokanals* (municipal water supply and waste-water discharge companies that are part of departments of housing and municipal services). These rates have to be approved by the municipal department of housing and municipal services, the *hukumat* and the local anti-monopoly committee.

While consumers have to pay for water supply, there is no user charge for water as a resource (in line with the Constitution). Until recently there was no service charge for the use of water for irrigation, which makes up approximately 85% of all water use (see also chapter 8, on Water resources management). The Ministry of Land Reclamation and Water Resources now charges farms, agricultural and industrial enterprises for water delivered through its water-supply system. Table 3.6 provides information on the current service charges for water supply and waste-water discharge.

Even though the rates for households are per cubic metre, in practice the charges are based on the number of people registered in an apartment or a house because there are no water meters (and with the current rates there is no economic justification for their installation). The *vodokanals* convert the rates based on per capita water consumption norms. In Dushanbe, the combined water supply and waste-water discharge service charge is 30 dirhams (0.3 somoni) per person per month; in Khujand, 1.0 somoni. Even these low rates are often not affordable, and for certain categories of residents they are waived or reduced based on their income.

Dushanbe *Vodokanal* reports that its collection rate (from all types of customers) was 63% in 2003 and its revenues are 140,000 to 150,000 somoni/month. This amount is inadequate for proper maintenance of the water supply and waste-water disposal infrastructure, including the proper treatment of waste water before discharge. Even with a 100% collection rate, current tariffs would not result in a cost recovery that included upgrading of infrastructure (see also chapter 8, on Water resources management).

**Table 3.6: Rates for water services, 2004**

|  | Prices |
|---|---|
| Water supply through the Ministry's irrigation network: | dirhams/m$^{3*}$ |
|    Irrigation | 0.6 |
|    Industrial enterprises | 1.0 |
|    Local *Vodokanals* | 0.0 |
|    Hydroenergy | 0.0 |
| Water supply and waste-water disposal by Dushanbe *Vodokanal* : |  |
|    Households |  |
|     Drinking-water supply | 1.5 |
|     Waste-water disposal | 1.0 |
|    Industrial enterprises |  |
|     Supply | 10.0 |
|     Disposal | 5.0 |
|    Other municipal uses (schools, hospitals, administrative buildings) |  |
|     Supply | 5.0 |
|     Disposal | 3.0 |
| Water supply and waste-water disposal by Khujand *Vodokanal*: |  |
|    Households | 8.0 |
|    Industrial enterprises | 50.0 |
|    Other municipal uses (schools, hospitals, administrative buildings) | 10.0 |

*Sources* : Ministry of Land Reclamation and Water Resources, Khujand and Dushanbe Vodokanals, 2004.
*Note* : * 100 dirhams equal one somoni.

Inspectors of the committees for environmental protection focus more on regulatory and punitive measures related to the use of water resources and the discharge of pollutants than on the collection of emission charges for discharges within limits. For instance, they impose fines for violations of water legislation (including improper or unauthorized water use) and for non-compliance with earlier orders to correct violations, charges for damage from the discharge of pollutants, and the full or partial closure of an enterprise that does not adhere by the pollutant discharge limits.

The system of emission charges and reporting is similar to that for air pollution. Emission charges for the discharge of pollutants into water are specified for 197 compounds, including 101 pesticides. Emission charges for selected compounds are listed in table 3.7. Enterprises must report on their water use and waste-water discharges (including amount of pollutants in waste water) to the State Committee for Statistics and the State Committee for Environmental Protection and Forestry. However, no information is available on the money collected for the discharge of pollutants within established limits. According to the Sughd *oblast* environmental protection committee, the environmental funds there have not received any revenues from this source. The combined revenues from fines and compensation for damage in Sughd

*oblast* in 2003 stood at 48,400 somoni (or 14% of total revenues of the environmental funds in the Sughd *oblast*), but no breakdown is available on how much is related to water use and pollution.

**Table 3.7: Emission charges for the discharge of selected pollutants into water reservoirs within permitted limits**

|  | somoni/ton |
|---|---|
| Pollutant | Emission charges * |
| Dry residue | 0.024 |
| Suspended particles | 48 |
| Oil and oil products | 720 |
| Sulphates | 0.24 |
| Chlorides | 0.096 |
| Phenols | 30,240 |
| Arsenic | 720 |
| Lead | 312 |
| Cyanides | 720 |
| Formaldehyde | 312 |

*Source* : Ministry of Nature Protection. Directive Document on Nature Protection on introduction of additions and amendments to the "Methodological instructions on charging payments for environmental pollution" RD-01-93. Dushanbe, 2001.
* Original charges are multiplied by 2.4, the *coefficient of indexation* set in 2001

The current structure of service charges for water use does not provide the financial incentive to protect and use water rationally, nor does it ensure cost recovery for water services. The water emission charges and fines fail to reduce and prevent water pollution and to generate revenues for environmental funds.

*Instruments for natural resource management*

Instruments for natural resource management that are discussed in this chapter include payments for the exploration and extracting of mineral resources and fines for poaching. For information on payments for land, see chapter 10, on Agriculture and land management. For information on payments related to tourism and hunting licences, see chapter 11, on Ecotourism, mountains and national parks and chapter 9, on Biodiversity and forest management.

Fines for poaching, particularly of endangered species, are the highest of all environment-related fines. They are based on the official minimal monthly salary (currently 7 somoni) multiplied by a coefficient for each species. For example, for *Arkhar* (Pamir mountain sheep) and *Urial* (Bukhara mountain sheep), this coefficient is 4000 (so the fine is 28,000 somoni or US$ 9,300); for snow leopard, red wolf and Bukhara *tugai* deer, the coefficient is 2000; for brown bear, 1000. Forestry inspectors are responsible for protecting endangered species and levying and collecting fines. Collected fines are transferred to local environmental funds, but no information is available on the actual amounts.

Payments for the exploration and extracting of mineral resources are expected to generate budget revenues. The licence fees are calculated as a percentage of the price of extracted material. The range varies from 1-5% for ferrous metals and 2-4% for construction materials (e.g. gravel, sand and clay) to 4-8% for precious metals and stones. The licences are issued by the Government for mineral resources such as oil, natural gas, metal ores and precious stones and by local *hukumats* for so-called common mineral resources (such as sand, clay and gravel). All collected fees for common mineral resources are transferred to the local (*oblast*, city and *raion*) budgets. Licence fees for other mineral resources are divided evenly between the State (50%) and local budgets (50%). These fees totalled 2.7 million somoni in 2002 and 3.7 million somoni in 2003. These revenues are not earmarked for any

specific purpose. The use of this instrument has no environmental implications.

## 3.4 Environmental financing and expenditures

Tajikistan has established several sources of financing for environment-related activities. Domestic sources include State and local budgets, extrabudgetary State and local environmental funds and investments made by State-owned and private enterprises. The Government also contributes funds to joint investment projects with international financial institutions that are not classified as environmental but could be viewed as related to the environment. For 2004, funds from the budget have been allocated to World Bank projects to reduce the risk of a breach of Lake Sarez (130,000 somoni) and to rehabilitate the water-supply system of Dushanbe (2.2 million somoni). For information on environmental financing by international donors (which is several times higher than that from domestic sources) see chapter 5, on International cooperation.

The State budget also provides funds to the State Committee for Environmental Protection and Forestry and to other ministries, State entities and local authorities for environment-related activities. Very little information is available on the environmental expenditures from sources other than the State Committee. Information on environmental expenditures for 2000-2002 is presented in table 3.8.

Figure 3.1 presents the planned budgetary expenditures for 2001-2004 of the now defunct Ministry of Nature Protection (not adjusted for inflation). There is a clear increase in resources in nominal and in real terms, but the absolute amount and the share of the total budget remains small. The budget for 2004 (prepared and approved before the Ministry of Nature Protection became the State Committee for Environmental Protection and Foresty) is 2.92 million somoni (US$ 973,000), which is 0.31% of the total State budget. This figure includes funding for local environmental protection committees. It does not include expenditures for forestry of the new State Committee. So far these two budgets have remained separate despite the merger. The actual expenditures in 2001-2003 were 96–98% of the planned expenditures.

**Table 3.8: Environmental expenditures by various State and State-owned entities, 2000-2002**

*thousand somoni*

| Entity | Purpose | 2000 | 2001 | 2002 |
|--------|---------|------|------|------|
| M inistry of Land Reclamation and Water Resources | Fortification of riverbanks | 40.0 | 138.0 | 250.0 |
| Coordinating Centre | Fortification of riverbanks | 1,143.0 | 804.6 | .. |
| State Forestry Enterprise "Tajikles" | Reforestation; biotechnological, forest protection and fire-fighting measures | 11.8 | 35.9 | 48.8 |
| Tajik aluminium plant | Air protection (upgrading air pollution abatement equipment) | 161.4 | 217.0 | 483.0 |
| Total | | 1,356.2 | 1,195.5 | 781.8 |

*Sources* : State Committee for Statistics. Environmental Protection in Tajikistan: Statistical Summary 1990-2000. Dushanbe, 2002; Communication with representatives of the Ministry of Economy and Trade.

Environmental funds at all levels are intended to be the main source of expenditures on specific environmental projects. Since November 1998, all revenues for environmental funds have gone into special extrabudgetary accounts of local and State environmental funds of the State Committee. The control over targeted use of these special accounts is administered by the Treasury Department of the Ministry of Finance. The State Committee and its local committees make proposals to use their respective environmental funds. The Ministry of Finance must approve the plan of expenditures before disbursing the funds. The local committees must have their environmental fund budgets (planned revenues and itemized expenditures) approved by the State Committee and the *hukumats*. Until November 1998, the then Ministry of Nature Protection both managed and disbursed funds directly. The Government changed the

system to increase accountability of their operations and ensure that the money is spent as intended.

The environmental funds' revenues collected by *raions* and cities "under *oblast* subordination" are distributed as follows: 60% of the money remains at the disposal of the *raion* or city; 30% is transferred to the *oblast* environmental fund and 10% to the State environmental fund. For environmental funds' revenues collected by *raions* and cities "under republican subordination" and by Dushanbe, 60% remains at the disposal of the *raion* or city and 40% is transferred to the State environmental fund (of which 30% is supposed to be earmarked for environmental activities in the particular region that transferred the money). All revenues are subject to a 10% tax that goes into the State budget.

**Figure 3.1: Planned budgetary expenditures of the former Ministry of Nature Protection, 2001-2004**
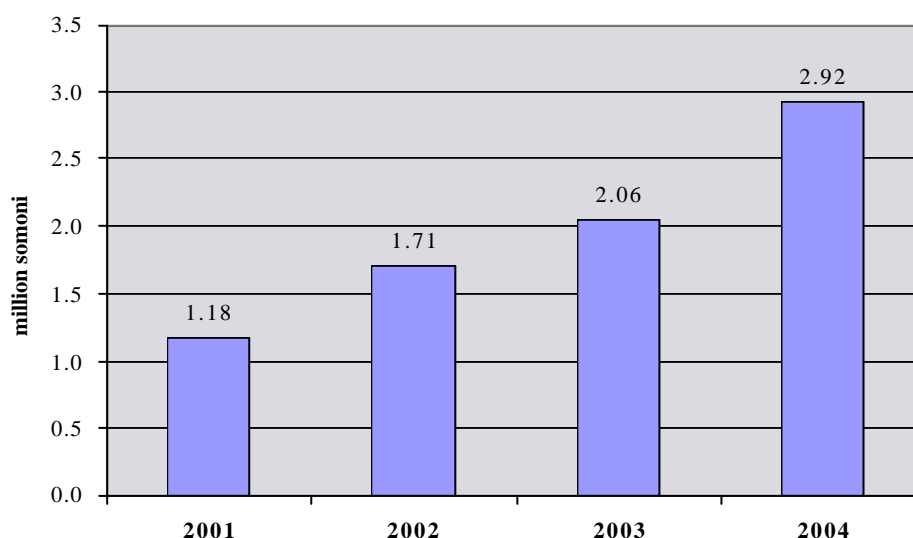


*Sources* : State Committee for Environmental Protection and Forestry; 2004 State budget.

Income into the environmental funds is significant and constitutes one half to two thirds of budgetary allocations to the State Committee. The funds have been growing steadily in recent years. Figure 3.2 presents information on planned and collected revenues by environmental funds of all levels. The local environmental protection committees often have more money available in the environmental funds than they receive from the State budget. For example, in Sughd *oblast* in 2003, the total budget of these local committees was 89,500 somoni, whereas the environmental funds raised 340,200 somoni (almost four times higher).

The breakdown of expenditures from environmental funds is not available. According to the Dushanbe and the Sughd *oblast* environmental protection committees, about 60% is spent on specific environmental projects and about 40% on the administrative and other needs of local committees. The relevant regulation does not specify what percentage has to be spent on particular environmental activities and what share may be used for administrative and other purposes.

For example, in 2003 the environmental fund of Dushanbe (total revenues: 151,000 somoni) spent money on: refuse containers for two of the city's *raions*; environmental education programmes (sponsoring an environmental TV programme, publishing an environmental newspaper); saplings and tree planting; monitoring equipment; protective footgear for inspectors; activities for Ecology Day (including environmental awards); a car for inspections; an office and other supplies; bonuses to the local committee's staff; and the renovation of the committee's building. The fund also pays the salaries of a unit of the Ecological Road Inspection that controls vehicles on the road (including emissions control) and uncovers and prevents illegal logging. There are 29 staff in Dushanbe's committee paid from the committee's budget (including eight in four *raion* committees). The average salary is 20 somoni per month (less than US$ 7).

Low salaries are one of the main reasons for the high turnover of inspectors and other staff, particularly in the *raion* and small town committees.

Activities paid for by the environmental funds may be considered useful. Even purely administrative expenditures may be justified given the low level of budgetary expenditures. Unfortunately, the amount of money available in the environmental funds is too low to make a real difference. Projects such as cleaning up industrial waste or mining tailings, upgrading pollution abatement equipment or building a new landfill require significantly higher investments. However, even the funds currently available could probably be spent more effectively. The allocation of money for specific activities and needs is not transparent. The enterprises that pay fees and charges into the environmental funds, environmental NGOs and the public at large have no say in what activities are selected for funding or how the money is spent in the end.

Although voluntary contributions from individuals and legal entities are possible sources of revenues for the environmental funds, no information is available on whether any such contributions have been made or if there are efforts to attract such contributions. No information is available on environmental expenditures by private enterprises.

Overall, environmental expenditures from domestic sources are inadequate for environmental protection as defined in the Law on Nature Protection. There is also no assessment of the financing needs of environment-related activities. The only reliable estimate for one particular area – biodiversity – is contained in the National Strategy and Action Plan on the Conservation and Sustainable Use of Biodiversity. It estimates the total cost of the Biodiversity Action Plan for a 10-year period at US$ 26.6 million, or close to 8 million somoni per year – more than twice as much as the budget of the Ministry of Nature Protection in 2003 and all environmental funds combined.

## 3.5 Privatization and its impact on environmental protection

*Legal and policy framework and institutional arrangements*

Privatization in Tajikistan started in 1991. However, its more active phase began in 1997 with the adoption of the Law on the Privatization of State Property. It defines the principles and conditions of and limits to the privatization of State-owned property, the responsible authorities, the distribution of revenue resulting from privatization and the provision of information about it through the mass media. The Law does not explicitly define the objectives of privatization.

**Figure 3.2: Revenues of the environmental funds, 2000-2003**
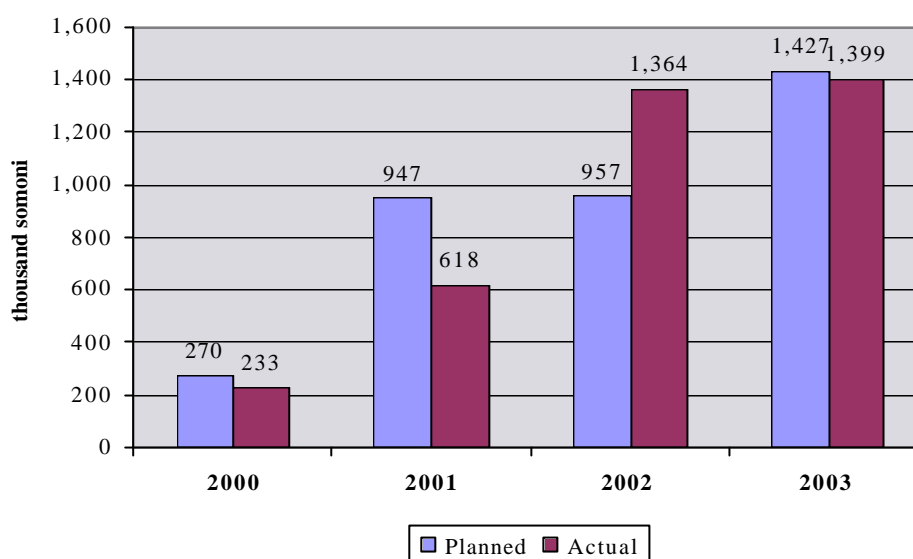
The secondary legislation to apply the Law includes the 1997 Regulation on the Sale of Objects of Privatization at Auctions and Tenders, the 1998 Regulation on the Privatization of Enterprises that are Subject to Privatization According to Individual Projects and the 1997 Resolution on Objects not Subject to Privatization and Objects Subject to Privatization by Decision of the Government (as amended).

The Strategic Plan for the Privatization of Medium and Large Enterprises and the Restructuring of Natural Monopolies and Especially Large Enterprises for 2003-2007 approved by the Government in November 2003 supersedes all amendments to the above-mentioned 1997 Resolution and earlier strategic plans. According to the Strategic Plan, the current stage of privatization aims to further deepen market reforms, create conditions for a more dynamic private sector, attract domestic and foreign investment, decrease the burden on the State budget and create jobs.

Environmental considerations do not figure prominently in the legislative and policy documents on privatization.

The Regulation on the Privatization of Enterprises that are Subject to Privatization According to Individual Projects calls for the creation of a working group, made up of staff of the appropriate ministries and State agencies, to analyse an enterprise's business activity and its competitiveness, to search for potential buyers, and

organize a tender. The working group is also responsible for analysing an enterprise's environmental protection obligations and to collect a broad array of information, including: certificates, licences, permits and court cases associated with the use of natural resources by the enterprise; discharge of waste water; and air, water and soil pollution. No information is available about how strictly this provision is enforced. Past environmental liabilities (such as accumulated waste or toxic spill) are not mentioned explicitly in either environmental or privatization legislation. However, if an enterprise, for example, owes money to an environmental fund, it is supposed to be deducted when its assets are assessed, just like any other debt.

The governmental body responsible for the privatization of State-owned enterprises is the State Committee for State Property Management, established in August 1997. In addition to overseeing privatization, it also coordinates the activities of ministries, State committees and local authorities related to the privatization of State property, both national and municipal. It is also authorized to participate in the creation of a stock exchange and other structures associated with privatization, and implement State policy to attract investment. The local (*oblast*, city, and *raion*) State property committees are responsible for privatizing enterprises in their jurisdiction (usually small and some medium enterprises).

For information on privatization in the agricultural sector, see chapter 10, on Agriculture and land management.

### *Status of privatization*

Updated information on the status of privatization is not readily available even though transparency of the process and access to information about it are among the principles stated in the Law on the Privatization of State Property. The web site of State Committee for State Property Management contained comprehensive information only up to the end of 1998 and some information related to the first quarter of 1999, but by June 2004 it was no longer accessible.

In January 2004 a Deputy Chair of the State Committee for State Property Management said, in an interview with the Russian News Agency, that 7,501 companies had been privatized from 1991 to the end of 2003: 6,925 small and 576 medium or large. The figure is smaller than the earlier planned figure of 8,468. The revenue from privatization in 2003 was slightly over 21.7 million somoni (US$ 7.23 million). The total number of companies sold in 175 auctions and five international investment tenders was 421. In 2004-2007, 459 medium and large enterprises are to be privatized, of which 110 in 2004. According to the State Committee, the privatization of small enterprises is almost complete.

Some economists in Tajikistan point out that the privatization has so far not yielded the expected benefits. In particular, many privatized enterprises are not being rehabilitated and modernized. Their new owners often ignore clauses in contracts related to the type of production activity and sometimes convert an enterprise into a warehouse or rent out the territory and buildings. During the above-mentioned interview, it was also stated that only 65% of privatized companies are still functional. Low initial prices for companies being privatized (compared to similar enterprises in neighbouring countries) may deter potential investors rather than attract them as they view this as a sign of economic problems in the country.

### *Environmental impact of privatization*

There is little evidence of any impact of privatization on the environmental situation in the country. Privatized enterprises are subject to the same environmental laws as other enterprises. No information is available on investments by privatized enterprises into measures to lower their environmental impact, such as the use of cleaner production technologies, the rehabilitation of pollution abatement equipment or the installation of new equipment. According to some local environmental protection committees in Sughd *oblast*, newly privatized companies on average comply better with environmental legislation than State-owned enterprises, including paying environmental charges, conducting ecological expertise when necessary and meeting the requirements imposed by inspectors for improving the environmental situation.

The State Committee for Environmental Protection and Forestry and its local offices are not involved in the privatization process in any way, although they may inspect enterprises both before and after privatization. They are not obliged to disclose information to the new owner on possible environmental liabilities, such as lack of certain permits or of ecological expertise, unless they are asked about this directly. This often results in the new owners encountering unexpected expenditures related to environmental requirements of which they had no prior knowledge.

According to the Strategic Privatization Plan, large enterprises and natural monopolies that are particularly important in terms of their economic output and whose environmental impact is significant will be privatized or restructured. The current legislation and practices do not guarantee that their privatization will not have a negative effect on the environment.

## 3.6    Conclusions and recommendations

The legal framework for economic instruments and environmental expenditures in Tajikistan, including supporting secondary legislation, is mostly in place. Economic instruments are outlined in the framework Law on Nature Protection and in other environmental laws. Government decrees and directive documents of the State Committee for Environmental Protection and Forestry (and the former Ministry of Nature Protection) specify procedures and methodologies for applying most of the instruments, as well as for the proper functioning of environmental funds.

However, certain economic instruments that are listed in the Law on Nature Protection and could be effective in attaining its objectives cannot be implemented because of a lack of secondary legislation. In particular, the absence of provisions

for tax breaks in the Tax Code for companies that invest in environmentally sound technologies and make other environment-related expenditures prevent this instrument from being implemented. Similarly, preferential loan terms for such investments are not being made available.

*Recommendation 3.1:*
*The State Committee for Environmental Protection and Forestry, in cooperation with the Ministry of Economy and Trade and the Ministry of Finance, should develop proposals to amend the Tax Code and other legislation so that the provisions of the Law on Nature Protection related to tax breaks and preferential loan terms for companies making environmental investments can be applied. The banking community should be involved in developing these proposals.*

The current structure of fees for environmental pollution and use of natural resources and charges for services such as water supply and waste disposal does not provide sufficient incentive to use natural resources rationally and reduce environmental pollution. It is less costly to pay a fee or even a fine for excess pollution than to install new pollution abatement equipment or upgrade existing equipment. The fact that there is almost no monitoring equipment often makes those fees arbitrary. At the same time, many enterprises cannot afford to pay even these low fees, charges and fines. Closing down heavily polluting enterprises is possible but not desirable as it is viewed as stifling economic growth and increasing unemployment. Water supply and waste disposal charges to customers, including households, do not provide the funds necessary for cost recovery. This results in a continuing deterioration of services and makes customers even less willing to pay for them, thus creating a vicious circle.

*Recommendation 3.2:*
*The State Committee for Environmental Protection and Forestry, in cooperation with the Ministry of Economy and Trade and the Ministry of Finance, should develop proposals to the Government for reassessing the fees, charges and fines, taking into account the priority objectives of environmental planning and feasibility of measurements of pollution charge base. Such proposals should be designed for better application of the "polluter pays" and "user pays" principles, so that the rates provide incentives to reduce pollution and take environmentally sound measures.*

The environmental funds could be an important source of financing for environmental activities. A large share of the funds is spent for purposes other than environmental projects; those activities should be financed from the State and local budgets. There is little transparency in the way the funds operate, including how decisions on distribution of funds are made and how priorities are set. The Ministry of Finance, which administers control over targeted use of the environmental funds and is responsible for preventing misappropriation and misuse, does not appear to be actively involved in decision-making. No advice is sought from other stakeholders, including enterprises, scientific organizations, environmental NGOs and the general public, on the most efficient use of environmental funds. Not all possible sources of revenues, including, for example, voluntary contributions to environmental funds, are explored. In addition, there is no estimate of the financial needs in the area of environmental protection.

*Recommendation 3.3:*
*(a) The State Committee for Environmental Protection and Forestry, in cooperation with the Ministry of Economy and Trade and the Ministry of Finance should assess the financial needs based on environmental priorities with a view to elaborating a State Environmental Investment Programme. The Programme should clearly show the respective amounts coming from environmental funds, state budget and other resources, including loans.*
*(b) The State Committee for Environmental Protection and Forestry, in consultation with the local environmental protection committees, the Ministry of Finance and other stakeholders, should establish a mechanism to coordinate the use of environmental funds, to ensure both transparent decision-making and the allocation of money to environmental projects of highest priority.*

Privatization in Tajikistan is in its final stage, with the largest enterprises and natural monopolies planned for privatization and restructuring in the next four years. Until now, the process has not been sufficiently transparent. Its effect on the environment has not been analysed so far. Governmental environmental protection bodies are not part of the privatization process in any capacity. The new owners of privatized enterprises often have insufficient information on the past environmental liabilities of the enterprises and their responsibilities in environmental protection.

*Recommendation 3.4:*
*The State Committee for State Property Management should jointly with the State Committee for Environmental Protection and Forestry be involved in decision-making in the privatization process to promote environmental investments by new owners by:*

- *Developing and introducing clauses on past environmental liabilities into the privatization agreements;*

- *Requiring enterprises and industries put up for privatization to carry out environmental audits; and*

- *Including compliance plans, prepared by the new owner, in the privatization agreements. These plans should specify the measures that enterprises and industries have to take to comply with environmental standards and regulations.*

*Chapter 4*

# INFORMATION, PUBLIC PARTICIPATION AND EDUCATION

## 4.1    Introduction

Following its independence in September 1991, Tajikistan experienced various shocks linked to its transition from a centrally planned to a market economy, civil strife, and accompanying economic and social problems. The consequences included:

- Weakened monitoring and assessment of individual environmental media, industrial and municipal pollution and of environmental impacts of natural-resource use in agriculture and forestry;
- Inadequate management of data and information on the environment and a discontinuation of environmental reporting; and
- Decreased interest of the general public in environmental issues in general, and in the environmental performance of public authorities and economic actors, in particular.

Nevertheless, over the past decade, Tajikistan has managed to maintain a minimal hydrometeorological network, prepared countrywide environmental assessments in the areas of biodiversity, climate change and desertification; introduced legislation facilitating public access to environmental information and public participation in environmental decision-making, and launched a State programme of environmental education. However, the need remains large in relation to the available resources and capacity, and many further actions and measures are required.

## 4.2    Environmental monitoring and standards

### *Hydrometeorological observations*

Meteorological observations in Tajikistan are carried out 24 hours a day, seven days a week, and include measurements of temperature, humidity, air pressure, temperature of soil, precipitation, definition of cloud type and quantity, meteorological range of visibility, direction and speed of wind and various types of atmospheric phenomena. The Hydrometeorological Agency under the State Committee for Environmental Protection and Forestry operates 58 meteorological stations, 15 of which are temporarily closed. The meteorological observation network is shown on figure 4.1.

Only 25 to 30 stations report data regularly. Several stations are temporarily closed because of a lack of specialists and, in the case of remote stations, because of financial constraints. As a consequence, in part of the Sughd *Oblast* and some areas of southern and central Tajikistan there are no longer any meteorological observations. Automatic observation and recording of initial data is used at few stations only. There are some instruments to record on paper the data on air temperature, pressure, relative humidity, intensity of precipitation and sunshine duration; however, this does not solve the problem, as these data then need to be processed manually.

Until the 1990s, radiometric observations were carried out at 27 stationary points. Now gamma and beta activity of fall-out is measured at only 16 stationary points. There are no daily tests of radioactive aerosols that fall on the ground.

The Hydrometeorological Agency operates 83 hydrological posts at rivers and lakes. Five of these are located on transboundary rivers. A further 14 posts (3 of which are on transboundary rivers) are out of operation, largely as a result of war destruction, lack of funds for maintenance or replacing equipment, and a reduction in staff. The location of all surface water observation posts is presented on figure 4.2.

The average density of existing posts in the seven basic river basins is 0.8 posts per 1000 km$^2$. This is considered optimum on the rivers Shirkent, Kafirnigan, Zeravshan and Kyzylsu. However, the density is lower in the basins of Syr Darya (0.04), Panj (0.33) and Vakhsh (0.52).

# Figure 4.1: Meteorological observation network
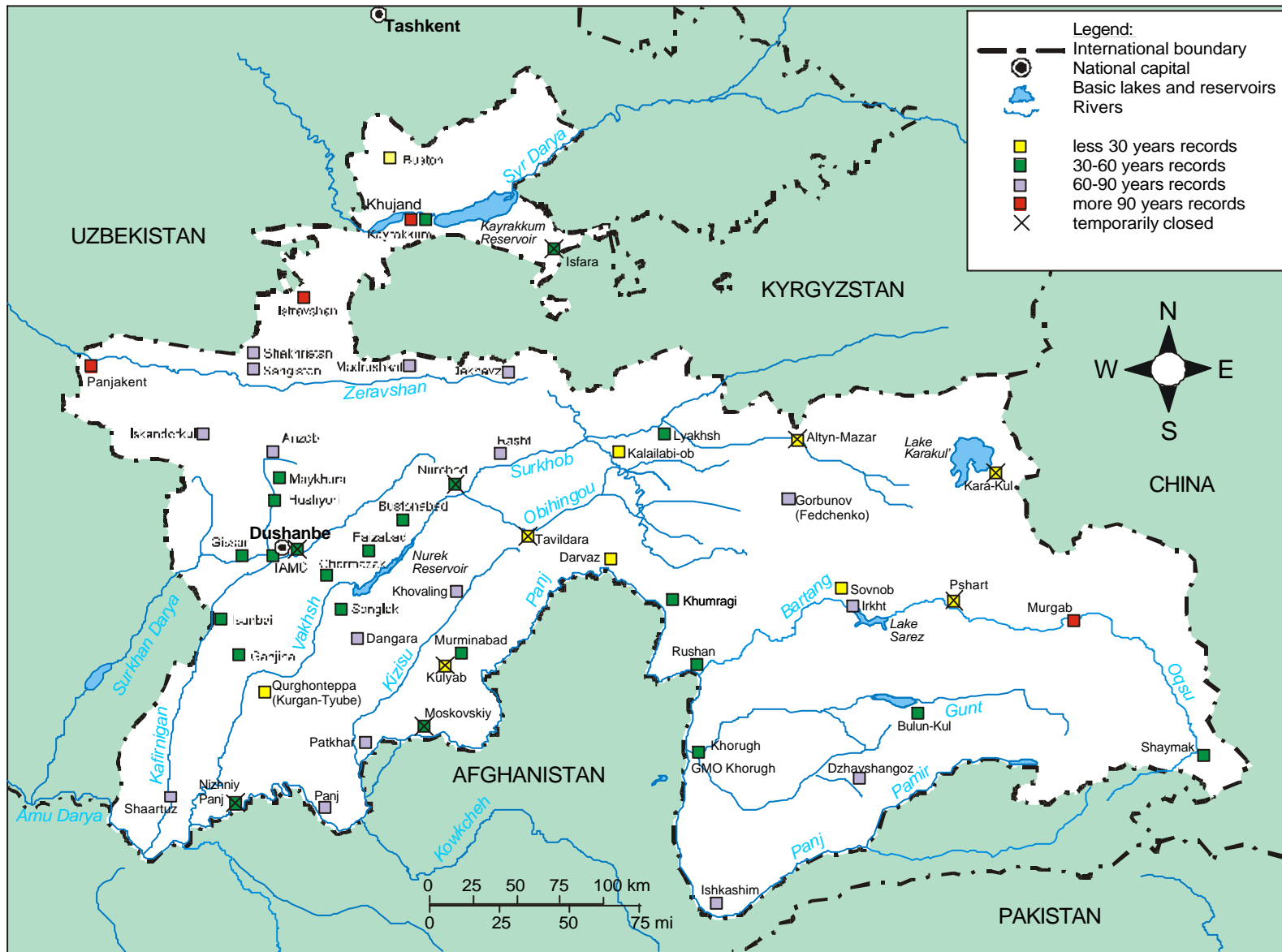


*The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.*

**Figure 4.2: Hydrological observation network**
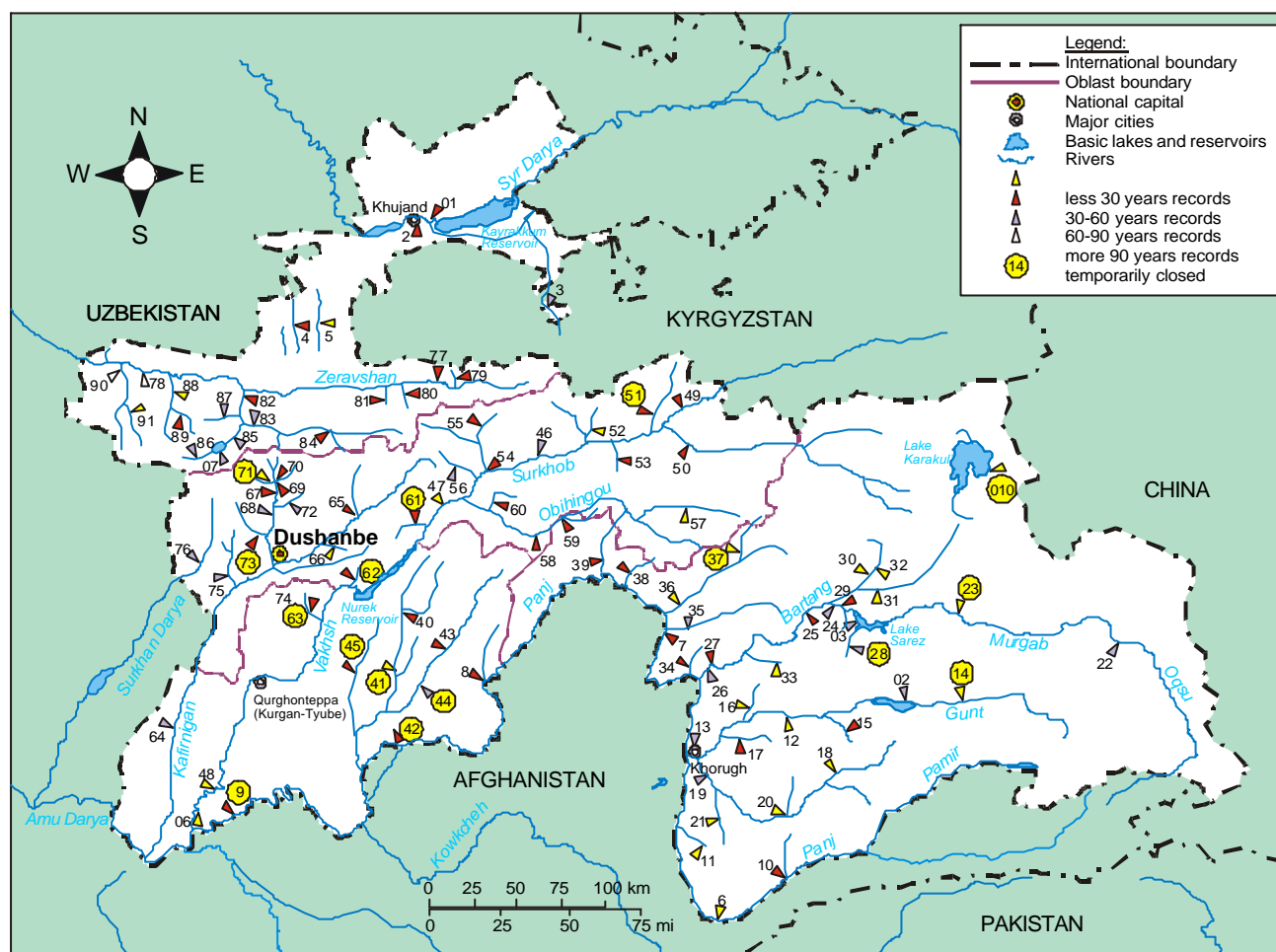


The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

| No. | SUGHD | 20 | Durumdara-Sejd | 60 | Surkhsu-Shakov |
|---|---|---|---|---|---|
| 1 | Syr Darya-Akjar | 21 | Sharfdara-Tusen | 61 | Obigarm-Obigarm |
| 2 | Syr Darya-Kzyl-*Kishlak* | 22 | Bartang-Murgab | 62 | Nurek-Dagana |
| 3 | Isfara-Tash-Kurgan | 23 | Bartang-Pshart | 65 | Sardai-Miyona-Romit |
| 4 | Shirinsay-Auchi | 24 | Bartang-Barchadiv | 66 | Pandema-Ustie |
| 5 | Shogan-Uguk | 25 | Bartang-Nisur | 67 | Varzob-Khushyori |
| 77 | Zeravshan-Khudgif | 26 | Bartang-Shuchand | 68 | Varzob-Dagana |
| 78 | Zeravshan-Dupuli | 27 | GES Shuchand-Shuchand | 69 | Ziddi-Ustie |
| 79 | Samjon-Khudgif | 28 | Lyangar-Ustie | 70 | Panjkhok-Ustie |
| 80 | Guzi-Pid | 29 | Vovzit-Barchadiv | 71 | Igizak-Ustie |
| 81 | Dashtiobburdon-Ronch | 30 | Kudara-Rukhch | 72 | Takob-Takob |
| 82 | Fandarya-Pete | 31 | Kokuibel-Kudara | 73 | Lyuchob-Luchob |
| 83 | Yagnob-Takfon | 32 | Tanymas-Kudara | 74 | Ilyak-Yangiyul |
| 84 | Anzob-Ustie | 33 | Raumiddara-Khijez | 75 | Khanaka-Alibegi |
| 85 | Iskanderdarya-Istok | 34 | Vomardara-Rushan | 76 | Karatag-Karatag |
| 86 | Sarytag-Ustie | 35 | Yazgulem-Motravn | No. | KHATLON |
| 87 | Pasrut-Pinyon | 36 | Vanch-Bichkharv | 8 | Panj-Khirmanjo |
| 88 | Kshtut-Zerikhisor | 37 | Tekharv-Shavru | 9 | Panj-Nizhny-Panj |
| 89 | Daryaurech-Kuloli | 38 | Obiviskharvi-Khurk | 40 | Kyzylsu-Bobokhonshaid |
| 90 | Magiyandarya-Sujina | 39 | Obikhumbou-Ustie | 41 | Kyzylsu-Kurbonshaid |
| 91 | Shing-Ustie | No. | RRS | 42 | Kyzylsu-Samonchi |
| No. | GBAO | 46 | Vakhsh-Garm | 43 | Yakhsu-Karboztonak |
| 6 | Panj-Ishkashim | 47 | Vakhsh-Komsomolabad | 44 | Yakhsu-Vose |
| 7 | Panj-Shidz | 49 | Kyzylsu-Dombrachi | 45 | Tairsu-Shakhbur |
| 10 | Kishtijarob-Lyangar | 50 | Muksu-Davsear | 48 | Vakhsh-res.Tigrov.balka |
| 11 | Garmchashma-Garmchashma | 51 | Pitaukul-Yarmazor | 63 | Dagana-Gofilabad |
| 12 | Gunt-Sardem | 52 | Yarkhych-Khoit | 64 | Kafirnigan-Tartki |

| 13 | Gunt-Khorugh | 53 | Shurak-Kapali | **No.** | **Lakes and water basin** |
|----|--------------|----|---------------|---------|---------------------------|
| 14 | Gunt-Alichur | 54 | Sarbog-Sangimaliki | 01 | Wb. Kayakkum |
| 15 | Tokuzbulak-Duzakhdara | 55 | Komarov-Karamandi | 02 | L. Yashilkul-SB |
| 16 | Patkhur-Patkhur | 56 | Sangikar-Sangikar | 03 | L. Sarez-Irkht |
| 17 | Sharipdara-Ustie | 57 | Obikhingou-Sangvor | 06 | L. Gulikovskoe-res.Tigrov.balka |
| 18 | Shakhdara-Dzhavshangoz | 58 | Obikhingou-Tavildara | 07 | L. Iskanderkul-SVB |
| 19 | Shakhdara-Khabost | 59 | Saryob-Kalaisang | 010 | L. Karakul-Karakul |

The hydrological network observes water levels and water discharge, water temperature, ice thickness, chemical composition of water, suspended sediment concentrations, currents and choppiness on lakes and reservoirs. The scope of observation has been reduced at all operational posts. For example, only one post observes evaporation from water surface. Of the 53 automatic water level recorders, only 4 operate effectively, and only 43 river posts measure water discharge.

In addition, hydrological observational data arrive at the Hydrometeorological Agency irregularly. The status of the Kayrakkum hydrological observatory (formerly a leading scientific and methodological centre) has been downgraded to a standard gauging station. There have been no observations on small rivers of 10-25 km for a long time.

The Aral Sea Water and Environmental Management Project from 1998 to 2002 rehabilitated and re-equipped six river hydrological posts in Tajikistan. The Asian Development Bank (ADB) has assisted the Hydrometeorological Service in the development of software and the hydrological database "Hydromet DB." The Swiss Mission on the Aral Sea helps the Hydrometeorological Agency to develop methods of hydrological forecasting.

Despite this assistance, the needs, particularly with regard to monitoring equipment, remain considerable. Both the meteorological and hydrological networks have no more than 53% of the equipment that they need, and most observation posts have instruments that are out of date. The use of outdated equipment reduces data quality and reliability.

The Hydrometeorological Agency developed a draft programme of hydrological monitoring for 2003-2007. The objective was to rehabilitate all elements of hydrological monitoring to the level that existed until 1990. However, there is not enough financing (some 7 million somoni) from the State budget to adopt the programme and

subsequently implement it. No similar draft programme has been developed for the rehabilitation of the meteorological network.

The Tajik Geological Agency, *Tajikgeologia*, monitors groundwater. It defines zones of groundwater location, their stocks, quality and chemical composition of water in aquifers. The following parameters are measured: pH, conductivity, suspended matter, calcium, magnesium, potassium, sulphate, chloride, iron, $NO_3$-N, total salinity, nitrogen, phosphate, and arsenic. Data are neither shared with other governmental bodies nor published, however.

*Monitoring of air and water quality*

The Hydrometeorological Agency operates three air quality monitoring posts in Dushanbe and one in Kurgan-Tyube. The concentrations of five to eight pollutants are monitored daily. Measurements are made against the established air quality standards. A number of these standards are presented in table 4.1.

**Table 4.1: Ambient air quality standards**

$(mg/m^3)$

| Pollutant | Standards |
|-----------|-----------|
| Particulate matter | 0.150 |
| Nitrogen oxide | 0.060 |
| Nitrogen dioxide | 0.040 |
| Sulphur dioxide | 0.050 |
| Fluoride | 0.003 |
| Formaldehyde | 0.003 |
| Carbon dioxide | 3.000 |
| Ammonium | 0.200 |

*Source*: Asian Development Bank. Environmental Profile of Tajikistan. 2000.

Tajikistan's standards are both generally more stringent than international ones and also more basic. For example, many Western countries set different standards for different sizes of particulate matter (e.g. PM10 and PM2.5), while Tajikistan uses the concept of total suspended particulates (TSP). Similarly, many international standards for air pollutants differ according to length of exposure

(e.g. 1 hour, 24 hours and annually), whereas Tajikistan's standards are based on annual averages.

The Hydrometeorological Agency reports air quality monitoring data monthly to the local environmental protection committees and to the State Air Inspectorate.

The equipment for air monitoring has also deteriorated and is outdated. Furthermore, 17 air quality monitoring posts were destroyed during the civil war. Consequently, air quality is no longer monitored in Khujand, Kulyab, Tursunzade, Sarband and Yavan. The Agency assesses the reconstruction costs of the air quality monitoring network at some US$ 70,000 per monitoring post. Its efforts to get funds from the State budget or to involve the cities themselves in this reconstruction have not been successful so far.

The Hydrometeorological Agency has 108 points for taking water samples to assess surface water quality. In fact, today samples are taken from only 40 points. The current observation network covers 21 rivers and 1 lake in 4 water basins (Vakhsh, Kafirnigan, Zeravshan and Surhandarya), and measures 20 polluting parameters. For comparison, until the 1990s, surface-water pollution was monitored on 46 rivers, 6 lakes and 1 reservoir, and the concentrations of some 40 organic and inorganic pollutants were measured.

Measurements are made against a set of established water quality standards. Several of these standards are presented in table 4.2.

The Hydrometeorological Agency reports water quality monitoring data monthly to the local environmental protection committees and to the State Water Inspectorate.

### Pollution monitoring

There are some 4,000 registered pollution sources in Tajikistan. By law, all polluters are obliged to monitor their emissions and discharges. In fact, only few large enterprises have environmental laboratories, monitoring equipment and trained personnel. The environmental authorities have never reviewed the environmental monitoring stations and laboratories of enterprises. The self-monitoring by some enterprises has been assessed, however, on the basis of fines and penalties for violating environmental regulations.

**Table 4.2. Selected water quality standards**

| Parameter | Limit value |
|---|---|
| Oxygen | Winter - 4.0 mg/litre |
| | Summer - 6.0 mg/litre |
| Salt ammonium | 0.5 mg/litre |
| Biochemical oxygen demand | 3.0 mg/litre |
| Nitrate - ion | 9.1 mg/litre N |
| Nitrite - ion | 0.02 mg/litre N |
| Oil | 0.05 mg/litre |
| Iron | 0.05 mg/litre |
| Copper (ion) (Cu) | 0.001 mg/litre |
| Zink (Zn) | 0.01 mg/litre |
| Phenols | 0.001 mg/litre |
| Chlorides (anion) | 300.0 mg/litre |
| Sulphates (anion) | 100.0 mg/litre |
| Calcium (cation) | 180.0 mg/litre |
| Magnesium (cation) | 40.0 mg/litre |
| Potassium (cation) | 50.0 mg/litre |
| Natrium (cation) | 120.0 mg/litre |
| Chromium (Cr) | 0.001 mg/litre |
| Suspended matter | 1000.0 mg/litre |

*Source* : State Committee for Statistics. Environmental Protection in Tajikistan: Statistical Summary 1990-2000. 2002. (in Russian)

Frequently, monitoring responsibilities at enterprises are vested in the laboratories responsible for technological control over production or product certification. Where no laboratory is available, enterprises contract the sanitary-epidemiological laboratories of the Ministry of Health or analytical laboratories of the State Committee for Environmental Protection and Forestry to do the job. Judging from the annual reports of the Analytical Control Service of the former Ministry of Nature Protection, compliance with environmental regulations is generally poor.

The main task of the analytical laboratories of the State Committee for Environmental Protection and Forestry is to monitor compliance with environmental standards. They check the effectiveness of the air pollution abatement equipment, and take samples of air emissions, water from water bodies in the vicinity of discharge sources, from water bodies used for drinking-water supply and from waste-water treatment plants, as well as samples of soil in polluted areas. They also measure radiation levels and, jointly, with the traffic police, check vehicle emissions. In addition, they check the quality of mineral fertilizers, pesticides and imported chemicals.

There is an analytical laboratory of the Analytical Control Service of the Dushanbe Committee for Environmental Protection and analytical

laboratories of the environmental protection committees in the Gorno-Badakhshan Autonomous *Oblast*, Khatlon *Oblast* and Sughd O*blast*. The first one, for instance, checked 608 water samples and 244 soil samples, monitored compliance of the Tajik aluminium plant, the Tajik cement plant and 43 other industrial enterprises and water treatment plants with environmental standards in 2003. *Raion* branches of the State Committee have to send samples to *oblast* laboratories for treatment.

Some technical assistance has been provided recently to Tajikistan to strengthen its monitoring capacities. Under its "Capacity Building for Environmental Assessment and Monitoring" project (2001-2003), ADB provided the former Ministry of Nature Protection with field monitoring equipment for the express analysis of air and water quality. The World Bank, under its privatization project, provided the Analytical Control Service with chemical reagents in 2003, and, under its Infrastructure Rehabilitation Project (2002-2005) supplied equipment to local environmental authorities in the project areas to monitor surface water and groundwater.

The needs remain great, however. The Gorno-Badakhshan Autonomous *Oblast* and Khatlon analytical laboratories, for instance, find it hard to do their work, mainly because they lack money, staff, equipment, spare parts and chemical reagents. There is an urgent need to establish an additional laboratory in northern Tajikistan to cover remote areas.

Weak coordination between the analytical laboratories and the inspectorates is a general problem. The latter have the power to impose sanctions in cases of non-compliance of enterprises with environmental regulations. Frequently, the laboratories and inspectorates plan their visits in isolation, which leads, sometimes, to a few enterprises being "overvisited", duplication and ineffective use of resources. There is no cooperation with the two analytical laboratories of the Hydrometeorology Service, which continuously measure air and water quality in industrial areas (see above). Each group of laboratories uses different analytical methods, equipment and formats.

Neither the annual report of the Analytical Control Service of the State Committee nor the results of individual inspections are available to the public.

*Other monitoring activities*

There is no continuous monitoring of the use and conditions of land resources in Tajikistan. The measurements of concentrations of toxic chemicals in soils carried out at 25 points throughout the country ceased in the early 1990s.

Biodiversity monitoring is quite limited. The institutions of the Academy of Science undertake observation studies of particular animal and plant species and micro-organisms. The results of the research are published in the Academy's periodicals or as separate books, like the publication *Flora of Tajikistan* (2001). Game and bird numbers are estimated within restricted areas of hunting enterprises. Monitoring of animal and plant species in protected areas has been reduced.

The most favourable situation is in the forestry system: forest resources, including the mountain forests in protected nature areas, are estimated systematically. However, this does not meet the requirements of comprehensive and continuous monitoring. Moreover, the forest assessment data published by the Tajik Forest Research Institute differ considerably from those obtained through remote-sensing observations.

## 4.3 Environmental information management

The absence of automatic data processing is a major problem. Practically all observation materials are processed manually, and only a small portion electronically, leading to a long delay in the publication of meteorological and hydrological yearbooks. The latest hydrological yearbook was issued in 1991. Yearbooks for subsequent years are being compiled.

Tajikistan has accumulated much environmental information, but there is no unified or coordinated database. Few organizations conducting environmental monitoring share data and information or publish their observation results. At times, information can be obtained only through personal contacts. Sometimes it is necessary to pay for such information or have a letter from the relevant ministry explaining why the information is required.

Regional environmental committees have no computerized environmental database. Data are entered by hand on standard forms. Consequently, it takes several weeks for data and information to

reach the State Committee for Environmental Protection and Forestry, excluding processing time.

Under its Capacity Building for Environmental Assessment and Monitoring project (2001-2003), ADB provided the former Ministry of Nature Protection and its *oblast* committees with computer and Internet equipment and software, and conducted on-the-job training to help to establish an environmental information management system. However, the Intranet system ceased to operate after the project's completion**.**

At the moment, the State Committee for Environmental Protection and Forestry has only some 30 desktop (most outdated) and 4 laptop computers. There are few connections to Internet and e-mail. The cost of Internet services in Tajikistan is high (about $3 per hour) and the quality of phone lines and service providers is such that connection is difficult, interruptions are frequent and transmission rates are often below 100 bytes per second during business hours. The cost of mobile phone services is also high. All these difficulties hamper data communication and processing by the monitoring and information entities of the State Committee.

By statute, the State Committee for Environmental Protection and Forestry, together with other governmental bodies, should create a State information system with data on the state of the environment and the use of natural resources as well as information systems on individual natural resources. No steps seem to have been taken so far to implement this.

## 4.4 Environmental reporting and statistics

The Hydrometeorology Service produces daily (on working days) a bulletin with hydrometeorological and air pollution data. It is published in 25 copies and circulated within the Government and submitted to TV and radio.

*Environmental assessments*

Until 1999, the former Ministry of Nature Protection published periodic reports on the state of the environment. The last one covered 1997-1998. In 2000, the Ministry's Nature Protection Science Research Laboratory, with UNEP support, produced an abridged version of the environment report and, thereafter, a similar report for Dushanbe.

By its statute, the State Committee for Environmental Protection and Forestry has to conduct integrated assessments and forecasting of the state of the environment and the use of natural resources, and publish a biennial national state-of-the-environment report. Establishment of a national environmental information centre is foreseen within the State Committee to this end. The centre will be financed by ADB. It is to be seen what practical arrangements will be made to ensure interdepartmental coordination for the preparation of the national report.

*Reporting to the international community*

Tajikistan presented its National Sustainable Development Report Rio+10 to the 2002 World Summit for Sustainable Development in Johannesburg (South Africa).

In 2000, Tajikistan prepared its National Action Programme to Combat Desertification. It contains a comprehensive assessment of its land resources. Two years later, Tajikistan submitted its First National Communication to the Conference of the Parties to the United Nations Framework Convention on Climate Change. It assessed greenhouse gas emissions and their sources in Tajikistan as well as the possible impact of climate change on the country's environment and economy. The National Strategy and Action Plan on the Conservation and Sustainable Use of Biodiversity, published by Tajikistan in 2003, assessed Tajikistan's flora, fauna, their habitats, protected areas, cultivated plants, livestock and forests.

*Environmental statistics*

Tajikistan has a long history of collecting and publishing environmental statistics. The forms of statistical reporting cover:

- Emissions from industry, energy and transport, but no data on greenhouse gas emissions;
- The use of water and the discharge of waste water from industry and households;
- Monthly reporting on activities and annual reporting on sanitary forest cuttings, and on flora and fauna in nature protected areas;
- Data on land resources and their quality, use, protection and rehabilitation;
- Data on the application of mineral fertilizers and other agrochemicals; and

- Data on capital investment in environmental protection and the rational use of natural resources.

There is no statistical reporting on waste.

The State Committee for Statistics is directly responsible for collecting data on the protection of atmospheric air and environmental investments. The State Committee for Environmental Protection and Forestry, the Ministry of Land Reclamation and Water Resources, the State Committee for Land Administration, the Ministry of Health and some other governmental bodies and the Academy of Science are responsible for collecting data in their particular areas and reporting them to the State Committee for Statistics.

In 2000, the Inter-ministerial Coordination Committee for Environmental Statistics was established by government decision. It assisted the State Committee for Statistics in the preparation of a compendium of environmental statistics, "Environmental Protection in Tajikistan: Statistical Summary 1990-2000," which was published in Russian and English in 2002. As a follow-up, the State Committee for Statistics is currently completing an environmental statistics compendium (in Russian only) extending the data coverage to 2001.

Current gaps in statistical data collection relate, primarily, to data on water, soil, waste and air. The Ministry of Land Reclamation and Water Resources, which is responsible for collecting water quality data, has not submitted these data to the State Committee for Statistics since 1996. No public authority regularly collects data on soil quality and land degradation.

Data on industrial waste are reported annually by enterprises to the State Committee for Statistics. However, the most recent data on hazardous waste relate to 1999. Furthermore, there is no stocktaking of municipal waste because the centralized system of administrating housing and municipal services has disintegrated, and because there is no control over the disposal of solid household waste by the municipal services.

Data on air pollution by transport are not collected. In an effort to correct this situation, the State Committee for Statistics has recently developed a reporting form for environmentally sound transport. Data on pollution from stationary sources are presented by territory and not by economic sector or major polluter.

## 4.5 Environmental awareness

The State Committee for Environmental Protection and Forestry publishes a newspaper entitled *Navruzi Vatan* ("New Dawn of the Motherland"). Five issues were published in 2003 and circulated among central government bodies and *oblast* and *raion* environmental authorities. *Oblast* and local environmental authorities also take initiatives to raise environmental awareness. For instance, the environmental protection committee in Dushanbe publishes its own newsletter, *Bargi Sabz* ("Green Leaf"). That of Sughd *oblast* is preparing a publication on its natural wealth.

The mass media are the major factor in public awareness about the state of the environment in Tajikistan. Public awareness assessments show that television is the basic source of environmental information. According to Tajikistan NGOs, the environmental issues that the public appears to be most interested in are household waste disposal, drinking-water supply and treatment, and sanitary conditions in urban areas.

There are programmes such as "We and Nature" and "Animal World" on national TV. In Sughd *oblast*, there are two bilingual TV programmes ("Nature and Us" and "Club of Nature Lovers"). The Dushanbe radio station, *Sadoi Dushanbe,* which transmits throughout the country, provides environmental information through interviews with officials and researchers. The Dushanbe newspaper, *Vecherniy Dushanbe* ("Night Dushanbe"), does likewise. To raise environmental awareness among journalists, the Central Asian Regional Environmental Centre – Office in Dushanbe organized a workshop for the Tajikistan mass media in 2002 together with the Organization for Security and Co-operation in Europe (OSCE).

Some environmental NGOs very actively promote environmental awareness via campaigns, published materials and the Internet. For instance, the Youth EcoCentre, Dushanbe, has published a monthly newsletter, *Tabiat* ("Nature"), since 1995 and circulates it in 200 copies among public authorities, environmental NGOs and international organizations. In addition, the electronic version is sent to 140 e-mail addresses in Tajikistan and abroad. The Youth EcoCentre supports a very informative and regularly updated web site (http://www.*tabiat.*narod.ru) with, among other

things, an electronic database on national environmental legislation. Another NGO, *Radi Zemli* ("For the Earth's Sake"), produces a monthly environmental digest in electronic form.

Access to the Internet in Tajikistan is restricted. There are few users (0.05% of the total population in 2002) because of the poor telecommunication infrastructure and the high installation and use costs. There are opportunities for public Internet access (Internet cafes and public access centres) in cities. Internet access in rural areas is almost non-existent. However, the formation of new Internet companies has improved access to the global network and brought down service costs.

The distribution of environmental information through the Internet is a new issue requiring the attention of the public authorities. Today, few governmental agencies and other public administration in Tajikistan have web sites. The official environmental web site of Tajikistan (http://www.mop.tojikiston.com/) has not been updated since 2001. Only some basic (and outdated) environmental data are posted there. Cooperation with the UNECE Working Group on Environmental Monitoring and Assessment allowed Tajikistan to post some of its environmental policy documents, such as its national action programmes on biodiversity, climate change and desertification, on the Working Group's Catalogue of Environmental Data Sources (http://unece.unog.ch/enhs/wgema/SelectCDS1.asp) . UNECE provided computer equipment and trained staff of the former Ministry of Nature Protection to this end, under a joint project with the European Environment Agency (EEA).

## 4.6    Environmental education

The Law on Nature Protection and the State Programme on Environmental Education that the Government adopted in 1996 established the basis for continuous and comprehensive environmental education in Tajikistan. This includes environmental education at pre-school and school, training of environmental specialists in secondary and higher educational institutions, training courses for officials and awareness raising among mass media representatives and the public at large.

Much has been achieved in higher education. Since 1997 tuition programmes in all higher education establishments include mandatory subjects on ecology and nature protection. Curricula on ecology, chemistry and ecology, geography and

nature protection have been introduced in a number of institutes of higher education such as the Tajik State University, Tajik Technical University, Tajik Pedagogical University and the universities of Khujand, Kulyab and Khorugh.

*Oblast* and local environmental authorities also take initiatives to promote environmental education at their educational institutions. For instance, the environmental protection committee of Sughd *oblast* has developed training materials for an ecology course at the *oblast* technical colleges and its staff is teaching environmental subjects in retraining courses for schoolteachers.

The Ministry of Education and the former Ministry of Nature Protection organized numerous competitions on ecology for pre-schoolers, and schoolchildren and students, and held training seminars on the environment for teachers and educators. In 2002, ecology was included in the educational programme at the 8th grade at schools. A manual was prepared but it has not been published because of a lack of funds. At the initiative of the former Ministry of Nature Protection, a regional seminar on promoting environmental education in Central Asian countries was held in Dushanbe in 2002.

Nevertheless, a number of key actions envisaged by the State Programme on Environmental Education have not been implemented. These include plans to create an environmental education centre at the Tajik Technical University and a non-waste technology centre at the Tajik State University.

NGOs also provide environmental education and they typically target youth. International NGOs, too, provide environmental education and training. The Open Society Institute, for example, provided scholarships for Tajik students to study environmental topics abroad.

There is little training of officials in environmental subjects, such as natural resource management, water management, pollution prevention and control, waste management and technologies, and environmental economics.

The Canadian International Development Agency has committed funds to create a centre to develop and support environmental education and education for sustainable development in Tajikistan, primarily to benefit students of high schools and higher educational institutions, and their teachers. Indirect beneficiaries would be NGOs and local (informal)

self-governing institutions. The project includes the preparation of educational and methodological manuals, the adaptation and translation of manuals published in other countries, and the preparation of documentation for use in training programmes.

## 4.7    Role of civil society

Traditional councils of elders, *mahalla* and neighbourhood councils (informal self-governing bodies in villages and in cities and towns), as well as new forms of public associations, such as NGOs, represent civil society institutions today in Tajikistan. The Law on Public Associations (1998) and the Administrative Code (2000) provide civil society institutions with broad powers.

The environmental NGO sector in Tajikistan is young, but growing. There are some 90 officially registered environmental NGOs, although only about 30 are active. There is an active network of local environmental NGOs centred in Dushanbe but also in other parts of the country. Some are engaged in environmental education and public awareness; others carry out nature protection projects. Some of the most active are the Kukhiston Foundation, the Youth EcoCentre, the Pamir EcoCentre, the Foundation for the Support of Civic Initiatives and the Zumrad Children Environmental Society.

Many environmental NGOs started in 1994, when the Initiative for Social Action and Renewal in Eurasia (ISAR), a United States-based NGO, provided seed grants. ISAR withdrew in 1996, and only the strongest NGOs survived in its absence. The Periphery, a new programme launched by ISAR in 2001 revitalized the NGO movement in Tajikistan. Most environmental NGOs implement their projects with grants from foreign donors. Most donor funding goes to international NGOs (such as AKDN, CARE, ACTED, German Agro Action Tajikistan, Action Against Hunger and CAMP); much less goes to local NGOs.

Membership fees are rare and financial support from the State or the private sector is practically non-existent. Very few NGOs have offices or access to the Internet. Most NGOs have never participated in any capacity-building training. The Central Asian Regional Environmental Centre-Dushanbe Office plays a helpful role by offering its good offices.

There is virtually no business-government dialogue on environmental matters such as environmental compliance, economic incentives and disincentives,

enforcement and governance. The business sector is still very weak and far from restructured. Industry has never been involved in any aspect of environmental strategy formulation and it is only now that discussions are beginning to take place on environmental issues between, for instance, major polluters (such as ore processors) and local environmental committees on the extent of the companies' environmental obligations. So far, none of this has led to the inclusion of these enterprises in any policy formulation mechanism of the Government.

## 4.8    Access to information and public participation

*Legal basis*

Tajikistan's legislation on access to environmental information, public participation in environmental matters and access to justice in environmental matters consists of several laws, including the Law on Nature Protection, which serves as the framework law. The Law on Informatization (2001) addresses access to information in the possession of public authorities, and the Law on Ecological Expertise deals with both access to information and public participation in decision-making in the context of environmental assessment. (See also chapter 2, on Policy, legal and institutional framework.)

The laws together provide a set of principles and guidelines, but there is a relative shortage of procedural rules. None of the laws sets any deadlines for making environmental information available or for refusing information. There is no obligation for the authorities that do not have the requested information to refer the petitioner to the place where such information can be found. It is not stipulated whether or not information should be provided free of charge.

The provisions on public participation and access to justice seem to be the most insufficiently implemented in the national legislation. Substantive rights to participate in environmental decision-making and access to justice in environmental matters are not supplemented with procedural rules. The Law on Nature Protection requires projects that are important for the national economy and may have a significant environmental impact to be subject to national debate or referendum. However, while there is a procedure for a referendum, there is no legally established procedure for a national debate.

Legislation on ecological expertise provides public associations with the possibility of carrying out a public ecological expertise in parallel with the State ecological expertise. To be eligible to participate, the registered charter of the public association should explicitly refer to the conduct of public ecological expertise as one of its goals. Only then may the association receive the documents that are subject to ecological expertise. The relevant local authority should register or refuse applications from public associations within seven days. The law does not provide any opportunity for a public association to challenge a refusal through administrative or judicial proceedings. (See also chapter 2, on Policy, legal and institutional framework.)

Public expertise is based on the model of the State expertise and is meant to give a professional evaluation. According to both the Law on Nature Protection and the Law on Ecological Expertise, "public experts" are subject to the same requirements as "State experts," including liability. However, while the State ecological expertise is at the expense of the proponent, the law obliges the interested public association to finance its public expertise itself.

Granting the possibility of carrying out a public ecological expertise cannot substitute, however, for public participation in the State expertise itself. Contrary to the requirements for the public ecological expertise, there is no obligation for the State expertise authorities to involve civil society in discussion of the documentation that is subject to expertise. These authorities are obliged to inform the mass media, at their request, only about the results of the State ecological expertise.

The Law on Ecological Expertise provides the opportunity for "third parties" to receive information on the State ecological expertise that affects their interests, but there is no definition of "third parties" or of "interests". Nor does the law specifically encourage proponents to enter into discussion with the public.

The Law on Informatization grants access to justice in cases where information is incomplete or refused. According to the Law on Nature Protection, natural and legal persons have the right to challenge in court any activity that harms their health, property and environment. It is not clear if this right is also granted to environmental associations acting in the public interest. The Law

on Ecological Expertise provides for the possibility of challenging the outcome of State ecological expertise.

According to current legislation, the general public or public associations have no access to information and no right to participate in decision-making on environmental permits.

### Current practice

Owing to the restrictive nature of the legislation and a lack of transparency, it was not possible to receive any evidence of genuine public participation in ecological expertise at the State level. However, the environmental authorities of Sughd *oblast* demonstrated an innovative informal approach to involving the public in discussions on ecological expertise. They require the project proponent to submit to the State ecological expertise authorities a certificate from the local neighbourhood or *mahalla* council stipulating that it has no objection to the project. This practice seems to be widespread in other *oblast*s too. There are also cases of local residents pressing *oblast* and local authorities to undertake ecological expertise of projects that have been launched without it.

There are many examples of close cooperation of environmental authorities with NGOs and local self-government bodies. Mostly this cooperation is pursued in environmental education and awareness. There is some experience with the organization of public hearings on draft elements of environmental legislation in the *Majlisi Oli* (Parliament) and NGO involvement in the preparation of environmental action programmes (e.g. on desertification and on biodiversity).

### *Implementation of the Aarhus Convention*

Tajikistan ratified the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) in July 2001. It was translated into Tajik, and the Government established a working group for its implementation, including the development of a national implementation programme in 2002. This working group includes representatives of the *Majlisi Oli*, other government bodies, research institutions, local authorities, NGOs and the mass media. No particular law has been adopted to ensure the Convention's implementation.

With support from the Convention's secretariat and OSCE, the former Ministry of Nature Protection, with NGOs, organized a series of information workshops and a round table to inform the public about the Convention and the applicable national legislation, to promote cooperation of public authorities with the public and to raise public environmental awareness. The Ministry hosted the Second Regional Seminar on the Aarhus Convention for the Central Asian Region in July 2003.

Also with support from OSCE, the Aarhus Resource Centre was opened in Dushanbe in September 2003, subordinated today to the State Committee for Environmental Protection and Forestry. Its purpose is outreach and the promotion of networking among the general public, environmental NGOs, environmental researchers and officials. The Centre has a web site (http://tojikiston.com/aarhus/orhus_center.html) and serves as an environmental information database. It intends to publish a quarterly information newsletter on the environment for circulation among the general public free of charge, to create a library on environmental law and to prepare manuals and guidebooks for the public on the basis of international experience. A series of workshops will be organized, in the short term, on environmental law, environmental impact assessment and genetically modified organisms. A press group is being established to promote environmental programmes and printed materials through the mass media.

## 4.9    The decision-making framework

### *Policies and strategies*

The State Environment Programme for 1998-2008, approved by the Government in 1997, and the Measures to Implement the State Environment Programme, approved by the Government in 1998, aimed to improve the monitoring of water, air, land, sanitary conditions, vegetation, fauna and protected areas, and increase the number of analytical laboratories; develop inventories of pollution sources, databases, environmental maps and a national environmental information system; introduce integrated assessment of environmental conditions and impacts; apply remote-sensing data for environmental assessments; develop a regional geographic information system; and promote environmental education, training and raise awareness. Some of these goals had clear

timeframes for implementation. No funding sources were identified, however.

Implementation has been monitored in end-of-year reports from the former Ministry of Nature Protection to the Government. Some progress has been made in environmental education and awareness raising, possibly as a result of the State Programme on Environmental Education. In environmental monitoring and information management, it seems that little or no progress has been made so far.

The strategic documents that were developed over the past three years to comply with international conventions on biodiversity, climate change, desertification and the ozone layer contain provisions to improve monitoring and observation, and to raise public awareness. It is too early to assess their implementation. However, the chances of success are relatively high in view of the current and upcoming external financial support from the international community to the action programmes.

### *The legal framework*

The key legislation on environmental monitoring, information management, environmental education and public participation includes:

- The Law on Nature Protection;
- The Law on Minerals;
- The Law on State Sanitary Control;
- The Law on Protection and Use of Animals;
- The Law on Air Protection;
- The Law on Public Petitions;
- The Law on State Secrets;
- The Law on Public Organizations;
- The Law on Informatization;
- The Law on Hydrometeorological Activity;
- The Law on Ecological Expertise;
- The Resolution of the Council of Ministers on Approval of the Procedure for State Control over Environmental Protection and Use of Natural Resources;
- The Resolution of the Council of Ministers on Approval of the Regulation on State Ecological Expertise;
- The Government Resolution on the State Programme on Environmental Education of the Population until 2000 and for the period until 2010;
- The Government Resolution on the State Environment Programme for 1998-2008; and

- The Government Resolution on Measures to Implement the State Environment Programme.

*The institutional framework*

The State Committee for Environmental Protection and Forestry is responsible for, inter alia:

- The organization and conduct of systematic hydrometeorological observations, and monitoring of the state of the environment;
- Coordination of an integrated system of environmental monitoring;
- Drawing up inventories of pollution sources;
- Integrated assessment and forecasting of the state of the environment and natural resources and supply of relevant information to public authorities and the population;
- Participation in the creation of information systems on the environment and natural resources;
- Publication of national reports and communications on the state of the environment and natural resources;
- Development of environmental standards;
- Development of inventories of protected areas, plant species, surface waters, hazardous waste and forests; and
- Participation in the creation of a system of continuous environmental education and training, and in raising awareness among the population.

The relevant responsibilities of other governmental bodies are as follows:

- Ministry of Land Reclamation and Water Resources - monitoring of water use;
- Tajik Geological Agency *Tajikgeologia* - monitoring of groundwater;
- Ministry of Internal Affairs – monitoring of transport emissions (with the State Committee for Environmental Protection and Forestry);
- State Committee for Land Administration, the Ministry of Agriculture and the Academy of Agricultural Sciences - monitoring of land resources;
- Ministry of Health- monitoring of environmental health indicators;
- Ministry of Education – environmental education (with the State Committee for Environmental Protection and Forestry); and
- State Committee for Statistics – environmental statistics (in cooperation with the above-mentioned bodies).

## 4.10 Conclusions and recommendations

Over the past decade, environmental monitoring in Tajikistan has been reduced to a minimum in the face of the civil war and severe economic conditions. Air, water, soil, biodiversity and waste monitoring are very weak. Many monitoring stations are closed because of a lack of specialists or money. The remaining networks are equipped with outdated instruments. The use of outdated equipment undermines data quality and reliability. Moreover, Tajikistan lacks uniform methodologies across different monitoring areas, and its environmental standards and classification systems are often incompatible with international ones. As a result, assessments of Tajikistan's current and emerging environment problems (like unrecorded upland developments) are handicapped by gaps in data and information.

The environmental authorities are making efforts to maintain monitoring activities in key areas such as hydrometeorological observations and industrial pollution. The environmental authorities perceive a need for more monitoring equipment, facilities and mobility of monitoring staff without, however, having a clear idea of the monitoring priorities or the way in which the information gained is to be used.

Improved environmental planning and management largely depends on access to accurate data about environmental conditions. In Tajikistan, environment-related information is collected and stored in many ministries, committees, departments and organizations. Besides various entities within the State Committee for Environmental Protection and Forestry, several other ministries and agencies collect and manage environmental data. However, there is practically no coordination among all these public authorities on the location of monitoring stations, sampling or data exchange.

Most of the information exists in hard copy only. The speed of information interchange is very low. It takes several weeks for information generated by local environmental committees to reach the State Committee. Some improvements and partial computerization have been introduced recently as a result of foreign technical assistance, in particular. Much remains to be done.

The State Committee for Environmental Protection and Forestry has to systematically discuss information needs and set monitoring priorities, in coordination with other ministries and agencies, on

the basis of the requirements of national environmental legislation and policy documents and Tajikistan's commitments to international environmental conventions. The *Recommendations on Strengthening National Environmental Monitoring and Information Systems in Eastern Europe, the Caucasus and Central Asia*, which were endorsed at the fifth "Environment for Europe" Conference in Kiev in 2003, will provide helpful guidance in this regard.

*Recommendation 4.1:*
*The State Committee for Environmental Protection and Forestry should:*
*(a) Develop, as a matter of urgency, an integrated programme for the rehabilitation of all its monitoring networks and the introduction of an effective computerized data management system. In preparing the integrated programme, the State Committee should follow the format of the draft programme of hydrological monitoring that was prepared by the Hydrometeorological Agency.*
*(b) Explore with the oblast, city and* raion *authorities, business and industry and the donor community all possibilities for co-financing their implementation of the above-mentioned programme before requesting funds from the State budget*
*(c) Design the requirements for self-monitoring by enterprises as a complementary system to the State monitoring networks.*

*Recommendation 4.2:*
*The Inter-ministerial Coordination Committee for Environmental Statistics should improve coordination of environmental monitoring and assessment by reaching an agreement on the following:*
- *Priorities for monitoring and assessment:*
- *Indicators to be measured;*
- *Unified sampling and analytical methods;*
- *Work-sharing arrangements between institutions involved in monitoring the same media;*
- *The step-by-step development of integrated assessment systems;*
- *The revision or the development of new environmental standards that are compatible with international ones;*
- *Coordinated or unified data reporting formats, protocols and procedures;*
- *The creation of a harmonized national environmental database using modern information technologies.*

Environmental reporting encompasses the various "outputs" of monitoring and information systems. This is a key area that requires particular attention in Tajikistan. Apart from the environmental statistical publications, no comprehensive environmental publication is published in Tajikistan on a regular basis. The absence of a regular objective scientific assessment of the state of the environment and of trends in the main environmental indicators makes it difficult to appreciate the impact and the effectiveness of decisions. Ad hoc publications cannot substitute for regular and comprehensive assessments.

It is important for the State Committee for Environmental Protection and Forestry to comply with its mandate to publish regular, biennial state-of-the-environment reports. These are required by the Aarhus Convention, to which Tajikistan is Party, and they are needed by the *Majlisi Oli* (Parliament) and the Government for law- and policy-making. The State Committee for Environmental Protection and Forestry is not using international guidelines to produce environmental reports such as the "Guidelines for the Preparation of Governmental Reports on the State and Protection of the Environment" endorsed at the Kiev Ministerial Conference "Environment for Europe".

*Recommendation 4.3:*
*The State Committee for Environmental Protection and Forestry should:*
*(a) Prepare and publish biennial state-of-the-environment reports and ensure their wide availability*
*(b) Establish, with the involvement of other ministries and agencies, a working group of officials and experts responsible for specific environmental data flows to contribute to and to revise draft state-of-the-environment reports;*
*(c) Consider nominating the working group as the national focal point for cooperation with the UNECE Working Group on Environmental Monitoring and Assessment, the preparation of the pan-European assessment report for the sixth "Environment for Europe" Conference in Belgrade in 2007 and other relevant international initiatives.*

The Law on Nature Protection and the State Programme on Environmental Education provide a basis for continuous and comprehensive environmental education in Tajikistan. Some key actions envisaged in the State Programme on Environmental Education have not been

implemented, however. These include plans to create an environmental education centre at the Tajik Technical University and a non-waste technology centre at the Tajik State University, as well as to publish environmental manuals for schools. Training of officials in environmental subjects is also lacking.

There are discussions under way with donors to create a centre to develop and support environmental education and education for sustainable development in Tajikistan. The project would benefit students of high schools and higher educational institutions, and their teachers, NGOs and local authorities would also benefit.

*Recommendation 4.4:*
*The State Committee for Environmental Protection and Forestry, jointly with the Ministry of Education, should establish a centre to develop and support environmental education for sustainable development as stipulated in the State Programme on Environmental Education. To guide the work of the centre, they should consider establishing an advisory board of officials from the State Committee for Environmental Protection and Forestry and all relevant Ministries, prominent environmental educators, researchers and NGO researchers and NGO representatives, among others. It could, as a priority, develop practical proposals for training professionals, training teachers and trainers and preparing educational and methodological manuals for use in educational programmes at schools, technical colleges and universities.*

Tajikistan's legislation on access to environmental information, public participation in environmental matters and access to justice in environmental matters consists of several laws, one of which is the framework Law on Nature Protection. The laws provide some general rules, definitions and principles, but few procedural rules.

Provisions on public participation seem to be the most insufficiently implemented. The legislation on ecological expertise provides public associations with the possibility of carrying out a public ecological expertise in parallel to the State ecological expertise, but it makes "public experts" liable for the results. While the State ecological expertise is at the expense of the programme or project proponent, the law obliges the interested public association to finance its own expertise.

There is no obligation on the State ecological expertise authorities to involve the population in any discussion of the documentation that is subject to expertise. Programme or project proponents are not obliged to enter into discussion with the public. These restrictions on public participation are in breach of the Aarhus Convention, to which Tajikistan is a Party.

The State Ecological Expertise of the State Committee for Environmental Protection and Forestry is not transparent. Ecological expertise authorities in the *oblasts* seem to be more open to dialogue with the public and they enjoy more confidence and support from the local population. They initiated innovative (albeit informal) ways of obliging project proponents to ensure support from the residents. There are also cases of local residents pressing *oblast* and local authorities to undertake State ecological expertise of projects that have been launched without it. (See also Recommendation 2.3)

*Recommendation 4.5:*
*The State Committee for Environmental Protection and Forestry should prepare, for submission to the Government and, thereafter, to the* Majlisi Oli, *amendments to the Law on Ecological Expertise to streamline its provisions with those of the Aarhus Convention. Particular attention should be given to:*

- *Clarifying the accessibility of environmental information;*
- *Informing the public about applications for projects which require ecological expertise;*
- *Setting deadlines for supplying information;*
- *Setting timeframes for different phases of public participation;*
- *Clarifying the definition of the public concerned which should be informed;*
- *Involving the public in the State ecological expertise.*

*Pending the adoption of such amendments, the State Committee for Environmental Protection and Forestry should issue detailed guidelines on public participation for its ecological expertise branches using international experience, including the guidelines on public participation prepared under the Convention on Environmental Impact Assessment in a Transboundary Context.*

*Chapter 5*

# *INTERNATIONAL COOPERATION*

## 5.1 Framework for international environmental cooperation

Tajikistan has had only little more than a decade to develop its international relations and cooperation in the field of the environment. Cooperation is also constrained by its per capita GDP, which is still lower than in any other country in Eastern Europe, the Caucasus or Central Asia (EECCA). Since its independence, Tajikistan has taken new directions in its environmental policy and strategies, but these efforts have materialized more slowly than expected and still require substantial revision and updating. The State Environment Programme for 1998-2008 was adopted in 1997, and the draft national environmental action plan (NEAP) is expected to be adopted in the near future. An earlier attempt in 1999 to draft a NEAP was never approved. The 1996 State Environment Programme contains a number of implementation measures, but these are not prioritized (see also chapter 2, Policy, legal and institutional framework).

Two issues of environmental transboundary significance for Tajikistan stand out: one concerns the transboundary air pollution emitted by the Tajik aluminium plant near the Uzbek border (discussed in chapter 6, on Air quality management); the other concerns transboundary water. The latter is particularly important and is discussed in more detail below.

Tajikistan has acceded to seven international environmental agreements but only one of the five UNECE environmental conventions. (See box 5.1 and annex II.) However, it participates as an observer in the work of some of their governing bodies. 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 follow-up are among the reasons for the lack of progress.

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**Box 5.1: Multilateral environmental agreements**

Tajikistan has acceded to:

The 1998 UNECE Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters
     Date of accession: 17 July 2001
The 1994 United Nations Convention to Combat Desertification
     Date of accession: 16 July 1997
The 1992 United Nations Framework Convention on Climate Change
     Date of accession: 7 January 1998
The 1992 United Nations Convention on Biological Diversity and its 2000 Cartagena Protocol on Biosafety
     Date of accession: 29 October 1997 / 12 February 2004
The 1972 Convention for the Protection of the World Cultural and Natural Heritage
     Date of accession: 28 August 1992
The 1985 Vienna Convention for the Protection of the Ozone Layer, the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer and the 1990 London Amendment
     Dates of accession: 6 May 1996 / 7 January 1998 / 7 January 1998
The 1979 Bonn Convention on the Conservation of Migratory Species of Wild Animals
     Date of accession: 1 February 2001
The 1971 Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat
     Date of accession: 18 November 2001

Tajikistan joined the United Nations in March 1992 just prior to the United Nations Conference on Environment and Development in Rio de Janeiro (Brazil). It has established cooperation with a number of United Nations bodies, particularly the United Nations Economic Commission for Europe (UNECE), the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF), with such international financial institutions as the World Bank and the Asian Development Bank (ADB), and with other organizations such as the Organization for Security and Co-operation in Europe (OSCE).

Tajikistan is a member of several regional and subregional organizations, including the Economic Cooperation Organization (ECO), the International Fund for Saving the Aral Sea (IFAS), the Inter-State Commission for Water Coordination (ICWC) and the Interstate Commission on Sustainable Development (ICSD). ECO is an intergovernmental regional organization for social and economic development. It began in 1985 with only three member States – the Islamic Republic of Iran, Pakistan and Turkey – but grew to ten when Afghanistan, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan joined in 1992. Its original purpose was to reduce customs tariffs and promote commerce among the States. Environmental protection cooperation within ECO is handled by its Directorate for Energy, Natural Mineral Resources and Environment. ECO cooperates closely with UNESCAP. IFAS, ICWC and ICSD are discussed below.

## 5.2    Institutional arrangements

The State Committee for Environmental Protection and Forestry's Department of International Relations, with four staff members, is responsible for international cooperation. The Department is entrusted with the implementation of the multilateral environment agreements (MEAs) to which Tajikistan is a Party and acts as focal point for all but one.

The Government has established working groups for each convention with representatives from stakeholders in other ministries and at times from non-governmental organizations. They meet regularly, normally every two months. They are generally chaired by the national focal points within the State Committee. However, the working group for the Convention to Combat Desertification is chaired by a focal point from the Ministry of Agriculture. There are, in addition, coordination meetings among all biodiversity-related conventions (Convention on Biological Diversity, Ramsar Convention and Bonn Convention), with the Convention on Biological Diversity's coordinator taking the lead. The Russian Federation represents Tajikistan's interests at meetings on the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), since Tajikistan has not acceded to it.

**Table 5.1: Donor commitments for PIP 2001-2003, by sector**

| Sector | Total 1998-2000 | | Total 2001-2003 | |
|---|---|---|---|---|
| | million US$ | % | million US$ | % |
| Economic management | 0.00 | 0.0 | 16.80 | 6.0 |
| Agriculture | 43.00 | 40.5 | 32.00 | 11.4 |
| Irrigation and rural water supply | 0.00 | 0.0 | 11.70 | 4.2 |
| Water supply and sewage | 0.00 | 0.0 | 17.00 | 6.0 |
| Energy | 0.00 | 0.0 | 81.00 | 28.8 |
| Transport | 9.70 | 9.1 | 66.90 | 23.6 |
| Communication | 0.00 | 0.0 | 15.00 | 5.3 |
| Education | 15.60 | 14.7 | 0.00 | 0.0 |
| Health | 5.40 | 5.1 | 8.70 | 3.1 |
| Social security and labour | 20.00 | 18.8 | 13.80 | 4.9 |
| Environment | 0.00 | 0.0 | 0.00 | 0.0 |
| Private sector development | 0.00 | 0.0 | 19.00 | 6.7 |
| Multisector and other | 12.50 | 11.8 | 0.00 | 0.0 |
| Total | 106.20 | 100.0 | 281.90 | 100.0 |

*Source* : Republic of Tajikistan. Public Investment Programme and Technical Assistance Needs 2004-2006.
May 2003.

**Table 5.2: Projected PIP 2004-2006, by sector (US$ mln)**

| Sector | 2004 | 2005 | 2006 | Total 2004-2006 |
|---|---|---|---|---|
| Economic management | 0.60 | 2.20 | 4.60 | 7.40 |
| Agriculture | 11.49 | 9.40 | 16.60 | 37.49 |
| Irrigation and rural water supply | 15.13 | 13.40 | 9.33 | 37.86 |
| Water supply and sewage | 10.95 | 10.03 | 2.92 | 23.90 |
| Energy | 40.17 | 40.64 | 27.60 | 108.41 |
| Transport | 34.60 | 13.90 | 6.06 | 54.56 |
| Communication | 12.01 | 1.35 | 1.29 | 14.65 |
| Education | 7.28 | 5.49 | 9.20 | 21.97 |
| Health | 3.02 | 1.00 | 1.50 | 5.52 |
| Social security and labour | 4.50 | 4.50 | 4.31 | 13.31 |
| Environment | 0.30 | 0.45 | 0.50 | 1.25 |
| Private sector development | 4.00 | 4.00 | 3.50 | 11.50 |
| Multisector and other | 17.23 | 1.20 | 5.20 | 23.63 |
| Total | 161.28 | 107.56 | 92.61 | 361.45 |

*Source* : Republic of Tajikistan. Public Investment Programme and Technical Assistance Needs 2004-2006. May 2003.

The State Committee has also established a working group for the Stockholm Convention on Persistent Organic Pollutants (POPs), which Tajikistan signed on 21 May 2002.

The working groups are advisory in nature and discuss issues related to the national implementation of the MEAs and preparations for upcoming meetings. They constitute a crucial coordination and information-exchange mechanism. They are also important for preparing Tajikistan's position at international meetings, but are not used to prepare legislation. MEAs are normally implemented nationally through government resolutions and not by transposing the MEA requirements into enforceable legislation. However, legislation is under preparation for the implementation of the Aarhus Convention.

## 5.3 Bilateral cooperation

Public funding for environmental projects in Tajikistan is extremely limited and donor commitments to the environmental aspects of the public investment programme (PIP) during 2001-2003 went into water supply and sewage and not into other environmental projects. The following tables are taken from the 2003 Public Investment and Technical Assistance Needs Programme.

For 2004-2006, PIP aims at a very limited investment into environmental projects and a huge cut in water supply and sewage from around US$ 10 million a year in 2004 and 2005 to less than US$ 3 million in 2006.

**Table 5.3: Distribution of grant and technical assistance programme 2004-2006, by sector**

| Sector | Number of projects | Project cost million US$ | Project cost % | Sources of financing, % Government | Sources of financing, % External |
|---|---|---|---|---|---|
| Economic management | 14 | 14.73 | 16.4 | 2.8 | 97.2 |
| Agriculture | 5 | 6.60 | 7.3 | 0.0 | 100.0 |
| Irrigation and rural water supply | 3 | 4.64 | 5.2 | 0.0 | 100.0 |
| Water supply and sewage | 1 | 0.60 | 0.7 | 0.0 | 100.0 |
| Energy | 6 | 4.60 | 5.1 | 0.0 | 100.0 |
| Transport | 9 | 3.73 | 4.1 | 0.8 | 99.2 |
| Communication | 1 | 0.38 | 0.4 | 0.0 | 99.2 |
| Education | 3 | 2.45 | 2.7 | 1.6 | 98.4 |
| Health | 8 | 20.93 | 23.3 | 4.5 | 95.5 |
| Social security and labour | 9 | 8.49 | 9.4 | 1.0 | 99.0 |
| Environment | 5 | 1.79 | 2.0 | 2.8 | 97.2 |
| Private sector development | 12 | 5.57 | 6.2 | 6.5 | 93.5 |
| Multisector and other | 7 | 15.51 | 17.2 | 0.0 | 100.0 |
| Total | 83 | 90.02 | 100.0 | 2.1 | 97.9 |

*Source* : Republic of Tajikistan. Public Investment Programme and Technical Assistance Needs 2004-2006. May 2003.

Tajikistan's environmental management activities are primarily donor-financed; even so, projects that can be classified as purely environmental accounted for less than 2% of the overall foreign assistance. It is not possible to provide an accurate account of donor funding for all environment-related activities, since many are embedded in commitments to agriculture, water, energy, transport, education and health. It is clear, however, that neither domestic funds nor donor assistance nor their sum are sufficient to meet the needs of the environmental sector or the objectives stated in the State Environment Programme.

The existing policy structure does not provide an adequate framework for donors to follow when designing their programmes for assistance. The State Environment Programme for 1998-2008, the poverty reduction strategy paper (PRSP) and convention-related strategy papers contain measures for implementation, but there is no comprehensive and prioritized action plan for environmental protection that could serve as guidance for bilateral and multilateral financing.

## 5.4　Subregional cooperation

*Transboundary water*

The five Central Asian Republics – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan – share the waters of the Syr Darya and Amu Darya basins. The current water allocation system was established under the Soviet Union within the unified framework of economic relations when the water resources were allocated to favour the development of irrigation farming in downstream countries. Water regulating facilities were constructed in the upstream countries, Tajikistan and Kyrgyzstan, to supply water to the lower reaches. Irrigation farming in the upstream countries was less developed, and in compensation they got energy resources, and agricultural and industrial products. At independence, the principles of water allocation stayed in force, as agreed among the five countries, but the upstream countries were deprived of the previous compensation. As a result, conflicting national economic priorities have led to clashes of interest over discharge schedules.

The water regime in the Syr Darya basin has been the main subject of negotiations among the governments for over a decade. To meet Kyrgyzstan's demands for increased supplies of energy resources and the water needs of Kazakhstan and Uzbekistan in the summer, a decision was made to define mutual obligations of these countries in a water and energy exchange agreement. Protocols and agreements on this basis have been signed annually since 1995, with the current agreement between Kazakhstan, Kyrgyzstan and Uzbekistan signed on 17 March 1998. Tajikistan signed up to it on 17 June 1998.

This has not solved the problem, however. Conflicting energy and irrigation needs of the five States have made compliance difficult, leading to calls for further negotiations. In the long run, allocation could become even more complex due to the growing water needs of Afghanistan. In addition, the current approach has not taken sufficient account of a number of environmental problems in the watershed. Specifically, the following issues have been recognized as crucial and requiring joint action: (a) conservation of glaciers and the feeding of rivers by glaciers; (b) support to the stability of mountain forests, which play a vital role in river flow patterns; (c) erosion of mountain slopes; (d) waterlogging of land caused by reservoirs and irrigation in areas generating run-off; (e) subsidence in areas with loess soils and measures to prevent it; (f) safe operating conditions of industrial and municipal waste dumps, including prevention of leakage of radioactive, toxic and other harmful substances into surface water and groundwater; and (g) prevention of mudflows and elimination of their consequences for the environment.

### Inter-State water organizations

Inter-State institutions have been established to provide a structural basis for States to negotiate and manage subregional water issues. The Inter-State Commission for Water Coordination (ICWC), representing all five Central Asian countries, was set up in 1992. It has five members appointed by the governments, which have equal rights and responsibilities with regard to the joint consideration of national water supply issues, including environmental requirements. Decisions are by consensus. Among its responsibilities are the development and coordination of annual consumption quotas, the management of allocation based on actual water availability, the coordination of regional water management policy, and the development of joint programmes.

In 1993, two new organizations were set up to coordinate the expanded Aral Sea Basin Programme: the Intergovernmental Council for the Aral Sea (ICAS) and the International Fund for

Saving the Aral Sea (IFAS). In 1997, both merged into a new IFAS. IFAS comprises the Heads of State of the five countries and its Executive Committee is made up of their Deputy Prime Ministers.

Tajikistan is also a Party to:
- The 1998 Agreement between the Governments of Kazakhstan, Kyrgyzstan and Uzbekistan (and later also Tajikistan) on the use of water and energy resources in the Syr Darya basin, environmental protection and the rational use of natural resources;
- Annual agreements between the Governments of Tajikistan and Uzbekistan, relating to the Syr Darya.

However, most agreements provide just a general approach to solving current water problems, without detailed implementation procedures. Agreements on specific issues might be facilitated through the adoption by the Central Asian States of a regional water strategy that would provide a common perspective on the allocation and the rational use and conservation of water resources.

At present, agreement is constrained not just because of competing needs, but also because of the economic difficulties faced by all five countries, the poor condition of the water management infrastructure, the absence of coordinated economic mechanisms for the rational use of water, and a legal basis for cooperation that primarily consists of framework agreements which do not cover the entire range of relevant issues and fail to define detailed procedures for the preparation and adoption of decisions, and joint follow-up on commitments.

The inter-State structures, such as IFAS and ICWC, are important, but they lack the capacity fully to enforce their decisions and recommendations, including those on water allocation and abstraction.

## SPECA

The Cooperation Strategy to Promote the Rational and Efficient Use of Water and Energy Resources in Central Asia has been formulated within the framework of the United Nations Special Programme for the Economies of Central Asia (SPECA). The project has been funded from the United Nations Development Account and implemented jointly by UNECE and UNESCAP. SPECA is looking at future water use in Central Asia in the short (to 2005), medium (to 2010) and long term (to 2025) with a view, inter alia, to achieving integrated development of the region for environmental safety and economic and social sustainability.

## Dushanbe Fresh Water Forum

Dushanbe was the venue of the International Fresh Water Forum in August 2003, and Tajikistan has attempted to establish itself as the lead country for fresh water discussions. Tajikistan has not signed up to the UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes. Of the five Central Asia republics, only Kazakhstan is a Party to this Convention. In view of the very difficult issues connected to transboundary water in the region, it is particularly important that Tajikistan, as well as the other Central Asia States, accede to it.

### *Interstate Commission on Sustainable Development (ICSD)*

The Interstate Commission on Sustainable Development is a forum established by the five Central Asian countries originally to prepare their national sustainable development reports for the World Summit on Sustainable Development in Johannesburg (South Africa) in 2002. It began its work in 2000.

In its activities, ICSD follows decisions taken by the Heads of the Central Asian States, the International Fund for the Aral Sea and the United Nations Conference on Environment and Development (Rio de Janeiro, 1992) and the World Summit on Sustainable Development.

Its main functions are organizing and coordinating regional sustainable development strategy development; managing regional environment and sustainable development programmes, action plans and projects; coordinating activities relating to the MEA obligations of Central Asian countries; supporting the harmonization of legislation and methodology for the environment; and supporting inter-State information exchange and establishing a regional information database on environment and sustainable development.

ICSD has a secretariat, a scientific information system (head office in Turkmenistan and branches in Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan) and a steering committee that includes experts, NGOs and donors. Its chair rotates every two years among the five Environment Ministers

(or equivalent). Tajikistan's representative is the Chairman of the State Committee for Environmental Protection and Forestry.

ICSD is a potentially important forum that could provide strategic linkages among global, regional and subregional processes. However, the Steering Committee and its national set-up in Tajikistan have not yet been able to influence these linkages and tangible outcomes of its work are yet to be seen. The linkages in Tajikistan between a number of programmes, plans and strategies, such as the State Environment Programme for 1998-2008, the strategic plan for sustainable development, the Regional Environment Action Plan for Central Asia and the draft NEAP are not clear.

### Regional Environmental Action Plan for Central Asia (REAP)

The Regional Environmental Action Plan for Central Asia was developed under ISDC auspices and with support from ADB, UNEP and UNDP. It has five basic ecological priorities: air pollution, water pollution, land degradation, waste management and mountain ecosystems degradation. Each of the five Central Asian States has the lead for one of these priorities. Tajikistan has the lead for mountain ecosystems degradation.[4] REAP identifies both short-term (2002-2007) and long-term measures (2007-2012) for each of the five issues as well as for public involvement.

After REAP was launched, the five Environment Ministers recommended that the process should be continued with a broader focus and extended objectives. Its second phase is currently under discussion, and a memorandum of understanding is expected to be signed between ECO and UNEP in September 2004.

Implementation of REAP is the responsibility of the Interstate Commission on Sustainable Development. The Central Asian Regional Environment Centre has been entrusted, within the terms of its mandate, with involving the public in a broad discussion and implementation of REAP. Funding for a part of the implementation is being provided by ADB, UNEP and UNDP through, inter alia, a UNDP project.

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[4] Uzbekistan is the lead country for air pollution; Kazakhstan, for water pollution; Turkmenistan, for land degradation; and Kyrgyzstan, for waste management.

Implementation also depends on the five Central Asian countries entering into supportive international agreements and developing a common approach to national legislative and regulatory groundwork to secure environmental protection and monitoring.

The development of REAP could contribute to Tajikistan's efforts to establish an overarching framework for environment and for donor assistance, but there is a risk that the work on REAP will evolve separately from the implementation of the EECCA Environment Strategy under the "Environment for Europe" process (see below), in effect creating two parallel regional strategies. This could add to the proliferation of policy documents for Tajikistan unless due attention is paid in its preparation.

## 5.5    Regional cooperation

*"Environment for Europe" process*

The "Environment for Europe" process started in 1991. Tajikistan participated in the third, fourth and fifth Ministerial Conferences (Sofia, 1995; Aarhus (Denmark), 1998 and Kiev, 2003).

Tajikistan participates in both the Pan-European Biological and Landscape Diversity Strategy and the Task Force for the Implementation of the Environmental Action Programme (EAP Task Force) established at the second "Environment for Europe" Conference in Lucerne (Switzerland).

### "Invitation to Partnership"

During the Kiev Ministerial Conference, Tajikistan joined the other four Central Asian States to present an "Invitation to Partnership on Implementation of the Central Asian Sustainable Development Initiative," noting the geopolitical importance of Central Asia in the UNECE region for the maintenance and enhancement of security, the preservation of a wholesome and healthy environment and the conservation of landscape and biological diversity.

The five States called for new frameworks for intersectoral and subregional cooperation to tackle the problems of the environment, water and security, and they suggested that a multilateral agreement and joint programme could be worked out between all the participants in the process, including countries, donors, the business community and the civil sector as a starting point.

The proposal for a regional agreement was also reflected in the Central Asia progress review on the implementation of Agenda 21 and the statement by ICSD at the World Summit on Sustainable Development.

The possible core elements of such a regional agreement were identified as follows:
- Reaffirmation of political will at the highest level and the adoption of a defined number of commitments by Central Asian countries to achieve sustainable development goals;

- Agreement with donors on foreign aid and the participation of Central Asia in the implementation of the interconnected decisions taken at Johannesburg, Monterrey (Mexico), Doha and Davos (Switzerland) and on the mobilization of foreign and domestic funding;

- Preparation and signing of international legal instruments on transboundary issues, the environment and security in Central Asia;

- Establishment of a subregional United Nations commission in Central Asia, the strengthening and broadening of the powers of existing subregional organizations, and the setting-up of a public forum for development issues;

- Organization of a wide-ranging discussion with the public, government structures, the business community and local authorities on sustainable development goals and measures to achieve them; and the involvement of all stakeholders in the decision-making process;

- Strengthening the capacity of non-governmental organizations, ministries for environmental protection and water management departments to fulfil their commitments;

- Establishment of an information gateway for Central Asian development;

- Establishment of a public foundation for sustainable development in Central Asia with the involvement of Governments, donors, the business community and the public at large; and

- Preparation and implementation of projects to meet goals and commitments.

The Central Asian States also proposed that the existing subregional institutions and mechanisms created by their Heads of State should be consolidated and strengthened, and that IFAS should be given United Nations status.

<u>EECCA Strategy</u>

The Kiev Ministerial Conference adopted the Environment Strategy for Countries of Eastern Europe, the Caucasus and Central Asia (EECCA). Tajikistan, as one of the 12 EECCA countries, participated. The Strategy calls for concerted action in and seeks support for:
- Improving environmental legislation, policies and institutional framework;
- Reducing the risks to human health through pollution prevention and control;
- Managing natural resources sustainably;
- Integrating environmental considerations into the development of key economic sectors;
- Establishing and strengthening mechanisms for mobilizing and allocating financial resources to achieve environmental objectives;
- Providing information for environmental decision-making, promote public participation and environmental education; and
- Identifying and addressing transboundary problems and strengthen cooperation within the framework of international conventions.

There is, as yet, no clear linkage among REAP, the EECCA Strategy or the Central Asian Sustainable Development Initiative.

## 5.6  Global cooperation

*Sustainable development*

Tajikistan participated in the 2002 World Summit on Sustainable Development. In their preparation for the Summit, the Central Asian countries developed and proposed a partnership initiative for sustainable development in the subregion – the Central Asian Agenda 21 – which was incorporated into the concluding documents of the World Summit. The initiative envisages the integration of processes that are already under way and the strengthening of cooperation mechanisms among sectors, countries and donors in order to achieve common development goals. An important role in this initiative is assigned to the programme of action to improve the environmental, social and economic situation in the Aral Sea basin in the period 2003-2010, the European Environmental Programme and other international programmes and initiatives.

As noted earlier, Tajikistan participates in the subregional Interstate Commission on Sustainable Development.

*Common Country Assessment for Tajikistan*

In 2003, the United Nations system carried out a Common Country Assessment for Tajikistan as the first step in designing a framework for UN development assistance for 2005 to 2009. The Assessment, which involved 20 United Nations organizations, key government officials and non-governmental partners, was closely linked to the poverty reduction strategy and the millennium development goals.

It identified five development challenges that were common to all eight sectors assessed:
- Increased access to information, decision-making, services, resources and assets;
- Institutional reform to promote efficiency, transparency and inclusiveness;
- Decentralization to enhance cohesion and accountability;
- Capacity-building to strengthen professionalism, leadership and employable skills; and
- Data analysis and evaluation to improve policy planning and implementation.

*International financing*

Tajikistan became a member of the World Bank in June 1993. A World Bank liaison office was first established in Dushanbe in October 1996 and upgraded to a full-fledged country office in December 1998. Since 1993 the World Bank's commitments to Tajikistan have totalled US$ 324 million for both lending operations and grants, largely in agriculture, water and poverty reduction.

The World Bank's Country Assistance Strategy for Tajikistan for 2003-2005 supports the Government's poverty reduction strategy, primarily by improving basic community infrastructure and encouraging economic growth through programmes of micro- and small-scale credits and transferring land-use rights to farmers. It also includes a long-term programme of institutional building to promote the emergence of a market economy. The World Bank is also supporting the development of a national environmental action plan in Tajikistan.

Since 1996, the International Development Association has approved loans for 18 projects (plus three supplemental credits) worth about US$ 322.1 million. In addition, grants worth over US$3.5 million have been made available for building institutions and for post-conflict assistance. The International Finance Corporation has approved eight investment loans worth approximately US$ 28 million.

Shortly after the finalization of PRSP in 2002, the Government of Tajikistan agreed with the International Monetary Fund (IMF) to limit borrowing on concessional terms. The main concerns were the availability of counterpart funds and funds to operate and maintain loan-financed projects. During a consultation in May 2003, donors pledged US$900 million for the next three years, about US$ 700 million of which was in the form of grants.

Tajikistan has been a member of ADB since 1998. The ADB Country Strategy and Programme 2004-2008 for Tajikistan foresees assistance worth about US$ 25 million, with an additional US$10 million for regional projects. In 2005-2006, lending is expected to be US$ 30-35 million per year. In December 2002, ADB signed a poverty reduction agreement with Tajikistan, in which it focuses its assistance on: (i) strengthening rural development through institution building that will support policy implementation and the private sector; (ii) rehabilitating power and rural infrastructure; and (iii) strengthening regional cooperation through improved customs services and transport links. ADB carried out a country environmental analysis of Tajikistan in 2003.

GEF is currently supporting eight projects in Tajikistan, with a total grant worth US$ 7.019 million. The projects are related to biodiversity, climate change, ozone depletion, POPs, agriculture and watershed management and a national capacity needs self-assessment. GEF, in addition, provides grants for six regional projects in which Tajikistan participates. Totalling US$ 43.769 million, these cover activities in ozone depletion, biodiversity, international waters and land degradation.

## 5.7 Cooperation in multilateral environmental agreements

Tajikistan has ratified or acceded to eight conventions and two related protocols.

*Global conventions*

1992 United Nations Framework Convention on Climate Change. Tajikistan acceded to the Convention in 1998, but it has not ratified its Kyoto Protocol. The Government is preparing an assessment of the national potential for implementation and has ongoing projects funded by GEF to develop an energy plan. The legislation for the implementation of the Convention and the Protocol has not yet been prepared. The Government adopted its National Action Plan for the Mitigation of Climate Change in 2003. The Kyoto Protocol provides a framework for accessing international investments through its Cleaner Development Mechanism. Tajikistan is considering acceding to this Protocol, and a preparatory GEF-funded project is addressing issues related to the introduction of the Mechanism. (See also chapter 6, on Air quality management.)

1994 United Nations Convention to Combat Desertification in those Countries Experiencing Drought and/or Desertification, Particularly in Africa. Tajikistan acceded to the Convention in 1997 and submitted national reports in 2000 and 2002. In 2001 it adopted its National Action Programme to Combat Desertification. There has not yet been a comprehensive review of the legislative foundation for the implementation of the Convention. (See also chapter 10, on Agriculture and land management.)

Stockholm Convention on Persistent Organic Pollutants (POPs). Tajikistan signed the Convention, but it has not yet ratified it. Tajikistan is currently implementing a GEF-funded project aimed at developing capacity and preparing the country for ratification and implementation. (See also chapter 6, on Air quality management.)

Vienna Convention for the Protection of the Ozone Layer. Following accession to the Vienna Convention, the Montreal Protocol and its London Amendment, Tajikistan has an ozone-depleting substances (ODS) officer participating in the global ozone network and has implemented GEF-funded projects, particularly changing the refrigerants used at the "Pamir" refrigerator plant, which was completed in 2003. (See also chapter 6, on Air quality management.)

Convention on Biological Diversity. Tajikistan acceded to the Convention in 1997 and to its Protocol on Biosafety in February 2004. The

Government adopted its National Strategy and Action Plan for the Conservation and Sustainable Use of Biodiversity in September 2003. (See also chapter 9, on Biodiversity and forest management.)

Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat. With five Ramsar wetland sites, Tajikistan acceded to the Ramsar Convention in 2001. However, due to the very limited domestic funding available to implement it, very little is being done for these sites apart from their designation as Ramsar sites and very basic management systems. (See also chapter 9, on Biodiversity and forest management.)

Bonn Convention on the Conservation of Migratory Species of Wild Animals. Tajikistan acceded to the Bonn Convention on 1 February 2001 and, on 16 May 2002, signed a memorandum of understanding concerning the conservation and restoration of the Bukhara deer.

Convention for the Protection of World Cultural and Natural Heritage. Tajikistan acceded to this Convention on 28 August 1992; to date, it has not submitted its list of eligible cultural or natural sites. (See also chapter 9, on Biodiversity and forest management.)

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Tajikistan is not a Party to the Basel Convention. Given the large amount of accumulated hazardous waste in the country and the lack of means to dispose of it properly, acceding to this Convention should be a priority. (See also chapter 7, on Waste management.)

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Tajikistan is not a Party to CITES. Trade in endangered species is a problem for biodiversity in Tajikistan, and ratifying CITES should also be a priority. (See also chapter 9, on Biodiversity and forest management.)

*UNECE conventions*

Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters. Tajikistan acceded to the Aarhus Convention in July 2001 and is preparing to ratify its Protocol on Pollutant Release and Transfer Registers, which it signed during the Kiev Conference in May 2003.

Convention on the Protection and Use of Transboundary Watercourses and International Lakes. Tajikistan has not acceded to the Convention, but, as noted earlier, it is important that it should do so as soon as possible.

Convention on Environmental Impact Assessment in a Transboundary Context. Tajikistan has not acceded to the Convention, but there are strong indications that it intends to do so in the near future.

Convention on Long-range Transboundary Air Pollution. Tajikistan has not acceded to the Convention or to any of its Protocols. Stronger links with the Convention, and particularly its EMEP Protocol, would aid the development of a monitoring strategy, the creation of emission inventories and the development of an air quality strategy in general. While implementation of this Protocol may not be a priority, it should be used as a tool for promoting air quality locally, regionally and nationally. (See also chapter 6, Air quality management.)

Convention on the Transboundary Effects of Industrial Accidents. Tajikistan has not acceded to the Convention. Given both its reliance on transboundary waters and its problems with natural disasters (e.g. mudslides, avalanches and floods, including near mining tailings), it is important for Tajikistan to become a Party to the regional legal framework provided by the Convention.

## 5.8    Conclusions and recommendations

Several multilateral environmental agreements (MEAs) are highly relevant for the environmental challenges that face Tajikistan. Even though technical assistance and financial support are often essential to enable compliance with these agreements, MEAs provide a means to strengthen international cooperation, promote environmental security and provide useful tools and information.

Among the MEAs to which Tajikistan is not a Party, there are at least four that are of particular relevance and importance, and accession to them should be pursued without delay. These are the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the Convention on Long-range Transboundary Air Pollution, and the Convention on the Protection and Use of Transboundary Watercourses and International Lakes. The first three are addressed in recommendations 9.3, 7.6, and 6.3.

One of the most critical environmental issues in Tajikistan concerns water management and mountain ecosystems. The countries in the region have conflicting interests in relation to water use (irrigation), energy production and consumption, and pricing of water and energy. Although IFAS and other regional and subregional cooperation address some of these issues, there is a need for an improved and regular dialogue around the management of the water resources and a legal framework for regional cooperation. The past 10 years of experience have not yet yielded an efficient, effective and comprehensive approach to the management of the region's crucial, shared water resources.

*Recommendation 5.1:*
*The State Committee for Environmental Protection and Forestry should promote:*
* *The ratification of the Convention on the Protection and Use of Transboundary Watercourses and International Lakes; and*
* *The further development, adoption and implementation of a regional water strategy that would provide a common perspective on the allocation and the rational use and conservation of water resources.*
*The Cooperation Strategy to Promote the Rational and Efficient Use of Water and Energy Resources in Central Asia (SPECA) may provide the basis for the development of this strategy.*
*(See also recommendations 6.1, 7.1 and 9.3)*

A recurring obstacle to the implementation of MEAs is the lack of funding. In a country where two thirds of the population lives below the poverty line, environmental issues are not always perceived as a priority. Part of this problem lies in the perception of "the environment." When clear links are made between, for example, the environment and drinking water, the environment and sanitation, the environment and health, and the environment and agriculture, it is clear that poor environmental conditions are both a direct cause and a direct consequence of poverty.

The challenge, however, is not only to design funding applications, but also to set priorities and clearly define the actions needed to address those priorities. Tajikistan has made considerable progress in recent years in developing a range of

policies and strategies for the environment and nature protection, both at regional and national levels, but there is no single statement of relative priorities accompanied by an action plan.

*Recommendation 5.2:*
*The State Committee for Environmental Protection and Forestry should:*
- *Finalize the national environmental action programme as soon as possible;*
- *Ensure that the NEAP provides a framework for understanding the linkages among existing strategies and plans at both national and regional levels and that it sets a limited number of priorities for short-term, medium-term and long-term action;*
- *Establish a regular dialogue with the donor community.*

*(See also Recommendation 1.1)*

A key feature in enforcing MEAs is well-developed national legislation that enables national inspectors and enforcement officers to act and courts to respond appropriately. In both UNEP (2001) and UNECE (2003) guidelines for enforcement of and compliance with MEAs, it is recommended that legislation should be developed prior to ratification (or accession). In this manner, a country is better able to identify gaps, duplication or contradictions in responsibilities and management practices of ministries, government agencies and local authorities and consistency with other obligations, including those related to other MEAs.

*Recommendation 5.3:*
*The State Committee for Environmental Protection and Forestry and, where relevant, other ministries should:*
- *Develop comprehensive legislation for the implementation of the multilateral environmental agreements to which Tajikistan is already a Party;*
- *In the future ensure that the need to develop new or modify existing legislation is analysed prior to accession or ratification.*

# PART II: MANAGEMENT OF POLLUTION AND OF NATURAL RESOURCES

*Chapter 6*

# *AIR QUALITY MANAGEMENT*

## 6.1    Introduction

Air quality in urban and rural areas has improved over the past decade. The main causes are a decrease in industrial production after independence and the consequences of the 1992-1997 civil war. Estimates indicate that approximately 119,000 tons of harmful substances were emitted into the atmosphere in 2003. Industry and energy are responsible for almost 34,000 tons, of which almost 22,000 tons are emitted by the Tajik aluminium plant alone.

Estimated air emissions from mobile sources account for 85,000 tons for the same year. Moreover, the vehicle fleet is ageing: 65% of the fleet is 8 to 30 years old. Poor fuel quality and incomplete combustion compound the situation and suggest that it may worsen in the future unless counter measures are taken.

## 6.2    Air emissions

Air emission estimates are calculated according to the 1986 Compendium on the Calculation of Emissions of Air Pollutants by Various Processes, which has not been updated since. Emissions are based on the chemical components of a given element used by the machinery. It does not take into account the machinery's ageing. As noted earlier, mobile sources account for approximately 70% of total air emissions (68.7% in 2000) (see table 6.1). Table 6.1 also shows the distribution of air pollution across the country. Urban air, which is affected by industrial complexes, wind patterns and transport, is more polluted in Dushanbe and Tursunzade. Tursunzade is particularly affected by air pollution from stationary sources, which account for 75.7% of total air pollution.

The main stationary sources of air pollution in Tajikistan are either point sources, such as mining, metallurgy, chemical industries, building, mechanical processing, light industries and heat and power plants or diffuse sources, such as agriculture.

### Industry

Industry is the biggest stationary polluter. Large stationary sources of atmospheric air pollution include the Tajik aluminium plant, Isfara metallurgical plant, Tajik cement plant, Yavan chemical plant, Vakhsh nitrogen-fertilizer plant, Dushanbe refrigerator plant, Dushanbe reinforcing steel factory and mining enterprises. For various reasons, industry, with the exception of the Tajik aluminium plant, has not been able to modernize its equipment. The Tajik aluminium plant accounts for about 60-70% of all emissions from stationary sources (21,899 tons, or 68.75% of the total in 2001), but it has succeeded in modernizing abatement pollution equipment for two production lines and plans to modernize the remaining (see table 6.4). Although industrial production fell considerably during the 1990s, stationary sources continue to account for a large part of Tajikistan's air pollution (see table 6.2). In Dushanbe, the major air polluter is the cement plant. Due to an increase in production from 50,000 tons to 250,000 tons, estimated emissions tripled between 1999 and 2003 (see table 6.3).

**Table 6.1: Estimated air emissions from stationary and mobile sources**

thousand tons

|  | 1999 | | | 2000 | | |
|---|---|---|---|---|---|---|
|  | Stationary | Mobile | Total | Stationary | Mobile | Total |
| Tajikistan | 35.1 | 76.2 | 111.3 | 29.6 | 65.0 | 94.6 |
| Dushanbe | 1.5 | 9.3 | 10.8 | 1.2 | 8.3 | 9.5 |
| Gorno-Badakhshan Autonomous Oblast | 0.0 | 2.4 | 2.4 | 0.1 | 2.3 | 2.4 |
| Sogd oblast | 6.5 | 30.6 | 37.1 | 4.9 | 28.0 | 32.9 |
| Hatlon oblast | 2.5 | 13.7 | 16.2 | 1.0 | 11.2 | 12.2 |
| Regions of republican subordination | 24.6 | 20.2 | 46.8 | 22.4 | 15.0 | 37.4 |

*Source* : State Committee for Statistics. Environment Protection of the Republic of Tajikistan, 2000.

**Table 6:2 Estimated emissions of pollutants from stationary sources, 1990-2002**

thousand tons

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | 115.4 | 100.5 | 80.8 | 63.8 | 70.0 | 43.8 | 30.1 | 32.0 | 32.5 | 35.1 | 29.6 | 32.2 | 30.8 |
| Solid pollutants | 35.0 | 28.7 | 19.2 | 15.2 | 34.2 | 7.5 | 4.5 | 6.3 | 6.4 | 7.2 | 6.2 | 6.5 | 5.3 |
| Gaseous and liquid | 80.4 | 71.8 | 61.6 | 48.6 | 35.8 | 36.3 | 25.6 | 25.7 | 26.1 | 27.9 | 23.4 | 25.3 | 25.5 |
| Sulphur dioxide | 17.5 | 17.0 | 12.0 | 8.3 | 4.2 | 2.8 | 1.9 | 1.8 | 1.8 | 1.8 | 1.4 | 2.6 | 1.2 |
| Carbon monoxide | 50.1 | 42.9 | 41.3 | 33.8 | 28.5 | 27.8 | 22.5 | 22.0 | 22.4 | 24.8 | 20.2 | 20.9 | 21.9 |
| Nitrogen oxides | 8.4 | 7.1 | 5.5 | 3.8 | 1.6 | 1.0 | 0.5 | 0.9 | 0.8 | 0.8 | 1.2 | 0.5 | 0.6 |
| Hydrocarbons | 2.2 | 2.1 | 1.3 | 1.5 | 1.1 | 0.1 | 0.4 | 0.8 | 0.8 | 0.2 | 0.1 | 0.7 | 0.8 |
| Others | 2.1 | 1.7 | 0.9 | 0.7 | 0.3 | 4.6 | 0.2 | 0.2 | 0.3 | 0.3 | 0.5 | 0.6 | 1.0 |

*Source*: State Committee for Statistics. Environment Protection of the Republic of Tajikistan,

### Energy

The energy sector is the country's second largest polluter. The number of thermal power stations, including diesel stations, fell from 568 in 1990 to 49 in 2000, as small or damaged power stations were closed. At the same time, the number of hydroelectric power stations increased from 20 to 24. The increased hydropower, however, did not fully compensate for the loss of thermal power stations, and the overall production of energy fell from 17,597 million kWh in 1991 to 14,247 million kWh in 2000. The consumption of fossil fuel decreased from 475,000 tons in 1990 to only 22,200 tons (or 4.7%) in 1999. This led to a sharp drop in emissions of nitrogen oxides and sulphur, which in 1999 were, respectively, only 14% and 8% of their 1990 levels.

Tajikistan has two thermal power plants: one in Dushanbe with an initial capacity of 198 MW and the other in Yavan with a capacity of 120 MW, but closed since 1988. Dushanbe's power plant production is decreasing, which explains why its emissions into the air have decreased over the past few years. Until 2000, the plant used natural gas imported from Uzbekistan. In 2000, due to economic constraints, the plant gradually switched to imported oil.

### *Mobile sources*

### Transport

The number of vehicles increased by 62.35% between 1999 and 2003 (see table 6.5). This has led to an increase in urban air pollution. Table 6.1 shows the share of transport emissions at about 68.7% of total emissions. Transport's share in air pollution has increased because industrial production has dropped and the number of cars has gone up.

**Table 6.3: Dushanbe cement plant: estimated emissions, 1999-2003**

tons

| | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|
| Total | 270.7 | 279.4 | 678.0 | 678.0 | 1,042.8 |
| Dust | 132.3 | 150.6 | 502.5 | 502.5 | 811.8 |
| Sulphur dioxide | 58.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Carbon monoxide | 60.9 | 97.4 | 132.8 | 132.8 | 174.8 |
| Nitrogen oxides | 19.5 | 31.4 | 42.7 | 42.7 | 56.2 |
| Other gas | 132.4 | 128.7 | 175.5 | 175.5 | 231.0 |

*Source*: State Committee for Environmental Protection and Forestry, 2004.

**Table 6.4: Tajik aluminium plant: estimated emissions, 1999-2002**

tons

| | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|
| Total | 24,543.5 | 22,250.7 | 21,899.0 | 21,613.1 |
| Dust | 2,452.0 | 2,379.9 | 2,416.8 | 2,027.3 |
| Total gaseous | 22,091.5 | 19,870.8 | 19,482.2 | 19,585.9 |
| Sulphur dioxide | 700.2 | 700.5 | 700.8 | 692.6 |
| Carbon monoxide | 21,048.6 | 18,823.0 | 18,441.5 | 18,539.4 |
| Nitrogen oxides | 201.3 | 205.5 | 197.0 | 212.6 |
| Hydrocarbons | 21.2 | 22.0 | 22.3 | 22.0 |
| Hydrogen fluoride | 120.2 | 119.8 | 120.7 | 119.4 |

*Source*: State Committee for Environmental Protection and Forestry, 2004.

**Table 6.5: Vehicle fleet**

|      | Cars    | Buses and minibuses | Trucks | Special | Service | Total   |
|------|---------|---------------------|--------|---------|---------|---------|
| 1999 | 126,501 | 7,855               | 45,285 | 3,656   | 1,650   | 184,947 |
| 2000 | 135,430 | 8,234               | 48,478 | 3,915   | 1,945   | 198,002 |
| 2001 | 148,825 | 9,242               | 53,275 | 4,302   | 1,941   | 217,585 |
| 2002 | 178,590 | 11,090              | 63,930 | 5,162   | 2,328   | 261,100 |
| 2003 | 205,375 | 12,754              | 73,521 | 5,939   | 2,678   | 300,267 |

*Source*: Ministry of Transport, 2004.

Although Tajikistan mentions unleaded fuel in its definition of fuel standards, it still uses leaded fuel. Some vehicles, such as the buses in Dushanbe, already use natural gas. Due to the poor fuel quality and badly tuned engines, the estimated average fuel consumption in urban areas is high.

Using public electric transport helps to reduce air contamination. A regular trolley-bus service is provided in Dushanbe and Khujand. Unfortunately, the trolley-buses are old and difficult to maintain. They cause traffic jams for various reasons, such as the obsolete infrastructure and electricity shortages.

### Ozone-depleting substances

The main consumers of ozone-depleting substances are the Dushanbe "Pamir" refrigerator plant, the Tajik railways and the Tajik aluminium plant. They use chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), methyl chloroform ($CH_3CCl_3$) and methyl bromide ($CH_3Br$). A small amount of ozone-depleting substances is used as solvents and foams.

Since Tajikistan ratified the Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol, it has not produced any ODS and imported non-ozone-depleting substances instead. Tajikistan is committed to reducing the consumption of ODS. In 2002 the consumption of ODS was 16% of what it was in 1992 and imports fell from 250 tons in 1990 to about 90 tons in 1998 (see table 6.6).

### Transboundary issues

The 2001 Regional Environment Action Plan for Central Asia developed with UNDP, UNEP and ADB assistance, estimated that Tajikistan was a net importer of air pollution (see chapter 5 on International cooperation). It received roughly 48,600 tons of harmful substances (29,000 tons of $SO_x$, 5,700 tons of $NO_x$ and 13,900 tons of reduced nitrogen ($NH_x$)), while it exported approximately 13,200 tons (1,000 tons of $SO_x$, 2,600 tons of $NO_x$ and 9,600 tons of $NH_x$). Another source of pollution is the storms that bring salt, sand and dust from the drained Aral Sea. The Aral Sea is located in a zone of strong winds from west to east. Residues of pesticides and fertilizers are transported by these storms. The country also suffers from sand carried by desert storms from Afghanistan as well.

The largest contributor to transboundary pollution is the Tajik aluminium plant, which is located close to the Uzbek border. It entered into operation in 1975. A dispute arose between Tajikistan and the Uzbek *oblast* of Surkhandarya in 1992. Hydrogen fluoride emitted by the plant polluted soils and water around the plant but also in the Surkhandarya *oblast*. Analyses in the surrounding area of the plant showed that the main damage came from fluorine and oxidizing components. These are thought to cause diseases of the nervous, respiratory and digestive systems, fluorosis, cancer and birth defects (see chapter 12 on Health and environment).

**Table 6.6: Consumption of ozone -depleting substances, 1999-2002**

tons

| Substances by group           | 1999 | 2000 | 2001 | 2002 |
|--------------------------------|------|------|------|------|
| Total                          | 68.8 | 63.5 | 37.8 | 43.3 |
| Appendix A and B, groups 1,2   | 42.3 | 42.3 | 21.9 | 19.5 |
| Appendix A, group 1            | 42.2 | 42.2 | 21.9 | 19.5 |
| Appendix B, group 2            | 0.1  | 0.0  | 0.0  | 0.0  |
| Appendix C, group 1            | 24.6 | 19.6 | 14.6 | 22.9 |
| Appendix E, group 1            | 2.0  | 1.6  | 1.4  | 0.9  |

*Source:* State Committee for Statistics, Environment Protection of the Republic of Tajikistan, 2003.

The Governments of Tajikistan and Uzbekistan signed a special agreement in 1994 to resolve the environmental problem associated with emissions from the factory and drew up a programme to this end. An intergovernmental commission was established to follow up the progress made to remedy the pollution from the plant. Various actions have been taken such as the installation of two high-efficiency (99%) purifiers in 1998. A six-station monitoring system, designed to take into account weather conditions, was set up within 20 km and close to the border with Uzbekistan. As part of the cooperation, the Hydrometeorological Institute of Uzbekistan reported information on the transboundary pollution from the plant to the Tajik authorities.

The management of the Tajik aluminium plant in cooperation with the local authorities and the former Ministry of Nature Protection drew up an ecological management plan. It consists of concrete actions, such as weekly inspections, complete monitoring of the plant and intensive maintenance to immediately replace defective equipment. Six environmental specialists employed by the plant are responsible for this. To improve staff awareness, there are regular training programmes on ecology. As an enforcement tool, the plant management may penalize staff if negligence leads to an ecological problem. The local air protection inspectorate carries out three or four inspections a year and the State Air Inspectorate a full inspection once a year.

Tajikistan has benefited from different projects financed by international donors for activities related to the Vienna Convention for the Protection of the Ozone Layer, the Montreal Protocol on Substances that Deplete the Ozone Layer and the Stockholm Convention on Persistent Organic Pollutants. A regional project on capacity-building for air quality management and the application of clean coal combustion technologies will begin in 2004. UNECE, in cooperation with the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and UNEP, will be the executing agency.

## 6.3 Air quality

### Monitoring

In the past, the monitoring system consisted of 21 stations measuring 10 pollutants. The volume of data was sufficient to provide a picture of air quality in Tajikistan. Owing to the civil war, the lack of resources and the consequent lack of

maintenance, only four stations, three in Dushanbe and one in Kurgan-Tyube, still measure air pollution. The measurements are scheduled three times a day during peak hours except on Sunday. Concentrations of nitrogen dioxide, sulphur dioxide, sulphate, formaldehyde, ammonia, carbon monoxide, hydrogen sulphide ($H_2S$) and total suspended particulates (dust) are measured in Dushanbe. In Kurgan-Tyube, only nitrogen dioxide, sulphur dioxide, carbon monoxide and ammonia are measured (see chapter 4 on Information, public participation and education).

In July and August, when solar radiation is intense, a monitoring station measures the concentration of troposphere ozone ($O_3$) in Dushanbe once a day, at midday. This helps to take measures to reduce the risk of pollution and to forecast harmful smog formation.

Tajikistan's air quality is rather difficult to assess accurately. The most recent air quality data published for the two towns are from 1999 and 2000. In 2000 Dushanbe's average concentration of ozone exceeded the maximum allowable concentration (MAC) 2.7 times, that of formaldehyde 1.7 times and that of nitrogen dioxide 1.3 times. In that same year, the peak concentration of formaldehyde exceeded MAC 8.6 times, that of nitrogen dioxide 3.8 times and that of ozone 7.2 times. In Kurgan-Tyube, the average concentration of nitrogen dioxide exceeded MAC 1.3 times and the peak concentration 2.2 times.

The Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) to the UNECE Convention on Long-range Transboundary Air Pollution has a mechanism based on the United Nations scale of assessments to finance air pollution monitoring and modelling. The countries that contribute can receive help in defining a strategy for national and international monitoring and in drawing up emission inventories based on international tools such as the CORINAIR (COoRdinated INformation AIR) methodology.

### Self-monitoring

Polluting enterprises, industries, organizations or other legal entities are asked to report annually their emissions to the respective ministries or State committees. The local or city committee for environmental protection and the State Committee

for Statistics receive a copy. The report is checked and sent to the corresponding State agencies.

### Standards and norms

The Ministry of Health is responsible for setting norms and standards for air pollution. However, the current standards for air protection are based on the Soviet Union's GOST standards and have not been updated since 1989. The standards are less sophisticated than many international standards. For example, Western countries have different standard sizes for particulate matter (PM10, PM2.5). Tajikistan uses a concept of dust that is closer to total suspended particulates (TSP). Similarly, international standards differ according to length of exposure (e.g. 10 minutes, 1 hour, 24 hours and annually), whereas Tajikistan's standards are based on daily averages.

Fuel standards also follow the GOST standards mentioned above, the 1983 Methodology for the Definition of the Volume of Pollutants from Transport into the Air and the 1995 Methodology for the Calculation of Pollutants from Mobile Sources (see table 6.7). The main obstacle for compliance with fuel quality standards is the lack of a laboratory able to analyse imported fuel. (See chapter 4 on Information, public participation and education.)

## 6.4 Policy objectives and management practices

### The policy framework

Tajikistan adopted its State Environment Programme for 1998-2008 in 1997. It sets out a long-term strategy for environmental protection. For the protection of the atmosphere, it defines two actions and designates implementing agencies for them.

Firstly, it calls for the evaluation of the effectiveness of existing measures taken to reduce air pollution, including air quality in *raions*, and the creation of a database on air pollution. The implementing agencies are the State Committee for Environmental Protection and Forestry, the Ministry of Industry, the Ministry of Transport, and the Ministry of Finance.

Secondly, it calls for measures to improve air quality and decrease pollutant emissions into the air from industry and transport. For the industrial sector, the State Committee for Environmental Protection and Forestry and the Ministry of Industry should draw up ecological programmes for improving industrial units following the norms and standards developed by the authorities responsible for air management. For the transport sector, the State Committee for Environmental Protection and Forestry, the Ministry of Transport and the Ministry of Internal Affairs should draw up measures for mobile sources.

For a variety of reasons, such as lack of funding, capacity and coordination, actions under the programme are ineffective.

The Government has adopted other programmes related to air:
- The National Programme on Phasing-out the Use of Ozone-depleting Substances in 1999;
- Measures to Implement the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer in 2002;
- The National Environmental Health Action Plan (NEHAP) in 2000; and
- The National Action Plan for the Mitigation of Climate Change in 2003.

**Table 6.7: Petrol specifications in Tajikistan and EU, maximum limits**

| Fuel grade | Parameter | Tajikistan | EU until 1999 | EU since 2000 |
|---|---|---|---|---|
| 76 leaded | Lead | 0.17 g/l | banned | banned |
| 93 leaded | Lead | 0.37 g/l | banned | banned |
| Leaded | Lead | | 0.15 g/l | banned |
| All unleaded | Lead | 0.013 g/l | 0.013 g/l | 0.013 g/l |
| All | Sulphur | 0.1 wt% | 0.05 wt% | 0.015 wt% |
| All | Benzene | .. | 5 vol% | 1 vol% |
| All | Aromatics | .. | .. | 42 vol% |

*Source* : State Committee for Environmental Protection and Forestry, 2003.
*Note* : wt% is weight per cent and vol% is volume per cent.

Tajikistan ratified the Vienna Convention in 1996 and the Montreal Protocol and its London Amendment in 1998. By presidential decree, a governmental working group with the participation of all stakeholders was created to develop a national strategy for the protection of the stratospheric ozone layer and the phasing-out of ozone-depleting substances. This, in turn, led to the development of the National Programme on Phasing-out the Use of Ozone-depleting Substances. Within its framework, an inventory of ozone-depleting substances was drawn up and an action plan was developed for their replacement and technical re-equipment.

It also has projects to cut CFC-12 consumption for refrigerator production and build institutional capacity. Moreover, customs officers received training in identifying all known equipment that uses these substances or facilities for their storage. Norms and standards were set by decree in 2002. To make enterprises and the public more aware, campaigns were organized on the need to phase out ODS. Tajikistan cooperates with its neighbours to prevent the illegal import of ODS.

The National Environmental Health Action Plan (NEHAP), referring to the Public Health Care Strategy till 2005, sets objectives for providing information on indoor and outdoor air pollution and taking measures to bring down air pollution to levels below the World Health Organization (WHO) air quality guidelines (see chapter 12 on Health and environment).

Tajikistan ratified the United Nations Framework Convention on Climate Change in January 1998. In June 2003, the National Action Plan for the Mitigation of Climate Change was approved by the Government. It stipulates a set of measures to reduce the anthropogenic impact on the climatic and atmospheric system and indicates the priorities and measures to be taken by Tajikistan to address the problem of climate change, to develop a capacity for further research and analysis of the climate system, its variability and change, and to strengthen international cooperation and joint efforts to mitigate climate change.

These measures serve as a basis for planning and decision-making at all levels and in all relevant sectors. They are (a) measures to reduce greenhouse gas emissions and improve the state of natural carbon sinks, and (b) measures to adapt to climate change and prevent (minimize) its adverse consequences. The important goal of the Action Plan is to provide basic information on response measures that will meet the objective of the Convention to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climatic system (see chapter 8 on Water resources management for climate impacts on glaciers).

Tajikistan is foreseeing measures to adapt to climate change and to reduce greenhouse gases emissions. These involve permanent research into the impact of climate change on the country, improving all observation and monitoring networks, information campaigns and implementing projects related to climate changes. The country has two stations which are part of the global observation system. Of the country's 58 stations, 10 are involved in the World Meteorological Organization's World Weather Watch.

Tajikistan signed the Stockholm Convention on Persistent Organic Pollutants in May 2002 and is now taking steps to ratify it. With GEF assistance a national implementation plan was made and a national coordinator was appointed in January 2004 to carry it out. The plan has two phases: the first involves the setting-up of working groups or coordination committees with all stakeholders; the second the drawing-up of an inventory of POPs and strengthening of the capacity to manage POPs and chemicals. The inventory should be finished by the end of 2004. The next step will be to draft new legislation, or improve the current one, on the safe management of chemical substances including POPs and POP-containing waste through protocols on the exchange of information on emissions between authorities, agencies and industry, to meet the requirements of the Convention.

Tajikistan ratified the Energy Charter Treaty and its Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects in June 1997.

### The legal framework

Protecting the atmosphere is a major objective of nature protection. The Law on Nature Protection spells out the problem of anthropogenic air pollution and sets priorities for atmospheric protection (see chapter 2 on Policy, legal and institutional framework). The Law on Air Protection sets out the country's basic principles for the protection and rational use of the atmosphere,

the economic mechanisms, and the responsibilities and activities of government agencies.

The Law on Air Protection and the Law on Nature Protection cover ODS, for instance the phase-out by 2004, as does a government resolution. Climate change regulations are laid in the National Action Plan for the Mitigation of Climate Change.

The Law on Ecological Expertise outlines the directions of, and the ministerial involvement into, activities to protect the air. In addition, the Law on Hydrometeorology is the legal basis for hydrometeorological measurements and environmental monitoring.

The Law on Energy sets out the State's objectives for energy, including protecting the environment and the population from harmful emissions from the energy sector. Furthermore, it encourages the development of local and alternative energy resources while preserving the environment.

The Law on Transport calls for the protection of air from exhaust gases based on the standards and norms developed by the Ministry of Health and approved in September 1999.

Other legislation that deals with the inventory and control of harmful emissions into the atmosphere is the Code of Administrative Violations and the Criminal Code, which provide for financial and criminal liability for the infringement of the nature protection legislation (see chapter 2 on Policy, legal and institutional framework).

*The institutional framework*

The State Committee for Environmental Protection and Forestry is responsible for developing environmental policy, drafting legislation, regulations and directives, implementing international agreements and conventions, monitoring the state of the environment, developing methodologies and instructions for environmental impact assessment and specifications of environmental quality, including for air. The State Committee is responsible for gathering, analysing, publishing and disseminating information on the state of the environment, including the volume and concentration of harmful emissions into the atmosphere, and on air quality (see chapter 2 on Policy, legal and institutional framework).

Within the State Committee, the State Air Inspectorate and the Hydrometeorological Agency are particularly relevant.

The Hydrometeorological Agency monitors air pollution. Before the civil war, it operated a mobile monitoring station, but that is no longer functioning. Moreover, the number of staff monitoring water and air fell from 13 to 4. Finally, owing to a lack of funding, only one of its five laboratories is still working albeit with obsolete, but well maintained equipment.

The State Air Inspectorate regularly inspects industry and transport. In addition, it also provides training, capacity-building and methodological support to *raion*s and cities. It is foreseen that emission data from self-monitoring by enterprises will be consolidated in a database maintained by the State Inspectorate. This consolidation will be in effect before 2008 according to the State Environment Programme. At the local level, the air inspectors of the committees for environmental protection have the same responsibilities and tasks. They report to the State Committee.

The Dushanbe Ecological Road Inspectorate, established under the local authority but part of the State Committee, enforces the city's transport policy and reports to the local administration and the State Committee.

The State Ecological Expertise analyses and validates the authorized air pollution emissions by conducting an ecological expert assessment of any economic entity applying for an ecological permit for a new activity. The Forestry Department deals with the sustainable use of forests to prevent the effects of climate change and emissions from forest fires. However, there is no inventory of greenhouse gas emissions from forest fires and burning of biomass. (See chapter 2 on Policy, legal and institutional framework).

Other ministries and State institutions that have specific responsibilities for air management are:
- The Ministry of Industry;

- The Ministry of Internal Affairs, through its State Traffic Police, is responsible for monitoring air emissions from mobile sources;

- The Ministry of Energy monitors air emissions from power and heating plants;

- The Ministry of Transport;

- The State Committee for Statistics compiles environmental data and publishes the statistical bulletin on the environment; and

- The Epidemiological and Sanitary Institute of the Ministry of Health monitors indoor and workplace pollution.

### *Transport policy*

### Policy

In view of the large contribution of road transport to air pollution, a set of response measures is being taken. On the main roads and in urban areas, the State Automobile Police is supposed to measure mobile source emissions and apply penalties when limits are exceeded. The share of cars equipped with gas engines, which are cleaner, is only 4% of the vehicle fleet. Cargo and passenger transport is mainly by motor vehicles. Electric public transport operates in Dushanbe and Khujand and makes up 30% of all passenger transport in these cities.

### Implementation

In 1998, the mayor of Dushanbe took the initiative to implement the second goal for air protection described in the State Environment Programme for 1998-2008 in cooperation with the then Ministry of Nature Protection and the State Traffic Police. A certificate is issued to a vehicle if its emissions are below the limit fixed in the regulations. This certificate allows the driver to use the vehicle in Dushanbe and is valid for three months. When it expires, the owner needs to have the vehicle inspected again to get a new certificate. If the emissions are above the limits, the owner should repair the vehicle so that the exhaust emissions reach the limits. If the vehicle is used without a valid certificate, the owner can be fined.

The main streets in Dushanbe are watered either once a night or twice when it is hot or windy to reduce dust formation.

### *Economic instruments*

### Charges

Pollution charges are described in detail in chapter 3 on economic instruments, environmental expenditures and privatisation.

### Fines and penalties

According to the Code of Administrative Violations, penalties are applied to the manager of an entity that does not follow the norms issued in the permit or does not follow the recommendations from inspectorates. The Code fixes the amount at 15 times the minimum salary for exceeding norms without permission or for failing to meet the recommendations of State or local inspectors. The fine for transport is set at three times the minimum salary.

A legal entity whose activities pollute the air pays for the emissions set in its permit. If the enterprise exceeds the agreed concentration, the penalty is five times the initial value. If concentrations are exceeded due to an accident, it will pay 10 times. If the volume of emissions is exceeded, the legal entity will pay a fee for the excess emissions.

## 6.5    Conclusions and recommendations

The Law on Nature Protection and the Law on Air Protection provide the basis for developing and implementing programmes to combat air pollution. The Law on Air Protection sets out the requirements for monitoring, the organization of activities, the responsibilities of institutions, control and inspections, court procedures, and international cooperation. It is a framework law and requires the issuance of regulations with detailed procedures for air protection. These regulations would be aimed at updating limit values and alert thresholds for basic pollutants, assessing concentrations on the basis of international methods and criteria, and making information available to the public. Their aim would also be to maintain or improve good ambient air quality.

The ambient quality standards are derived from the GOST standards, which are not compatible with international guidelines, and standards such as the WHO health-based air quality guidelines. Switching from GOST standards to internationally accepted standards is complicated and requires both training and financing. It calls not only for changes in quantitative values, but also for changes in the entire data collection, processing and analysis systems.

*Recommendation 6.1:*
*The State Committee for Environmental Protection and Forestry should develop and enforce:*

- *implementing regulations for the Law on Air Protection*
- *national legislation that contains all necessary provisions for implementation of the Stockholm Convention on Persistent Organic Pollutant, the United Nations Framework Convention on Climate Change and its Kyoto Protocol.*

*The State Committee should also promote accession to the Kyoto Protocol.*

The main obstacles to an efficient urban transport policy are the rapid growth in car traffic and an obsolete public transport system. Due to the decrease in industrial production and different factors related to transport, the share of mobile sources in emissions has increased. In 2003, the share of transport emissions was 65%. The ageing car fleet, no real policy on fuel, the lack of inspection and maintenance, and poor fuel quality all increase air pollution.

Emerging problems related to traffic deserve special attention. Appropriate measures include the promotion of public transport and traffic management measures. In addition, a programme of nationwide inspection, maintenance and replacement of old vehicles needs to be established.

Tajikistan's fuel quality and vehicle emissions standards are based on the former GOST system. They do not encourage the replacement of old vehicles, are outdated and do not reflect common international practice.

*Recommendation 6.2:*
*(a) In order to reduce emissions from mobile sources the Ministry of Transport, in cooperation with the Ministry of Health, the State Committee for Environmental Protection and Forestry and the Ministry of Internal Affairs, should develop a sustainable transport strategy. The strategy should, inter alia, address the growing traffic problem; phase out completely the use of leaded petrol and poor-quality fuel; develop public transport; establish differential taxes on transport fuels based on their quality; and establish an effective system of vehicle inspection.*
*(b) The Ministry of Health, in cooperation with the Ministry of Transport, the State Committee on Standardization and the State Committee for Environmental Protection and Forestry, should develop, adopt and implement*
  - *New fuel quality standards, which should, above all, establish limits on: benzene and polyaromatic hydrocarbons; the sulphur*

*content in diesel fuel; and lead in petrol, preliminary to phasing out lead completely;*
- *New emissions standards for mobile sources according to international standards.*

Among the different tasks required to protect human health, the collection of data from mobile and stationary sources is crucial. A reliable monitoring system is a basic tool. Today, the monitoring system does not provide reliable information and only covers Dushanbe and Kurgan-Tyube. The monitoring stations measure few parameters, although WHO advises monitoring at least the six most important pollutants: lead, particulate matter (PM10, PM2.5), carbon monoxide, sulphur dioxide, nitrogen dioxide and ground-level ozone. Ground-level ozone is measured only in Dushanbe.

Except for greenhouse gases, emissions from agriculture, forest fires and the municipal sector are not taken into consideration. In addition, ammonia ($NH_3$), heavy metals and POP emissions are not inventoried. To draw up such an inventory, the CORINAIR methodology, which has been harmonized with the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) of the Convention on Long-range Transboundary Air Pollution, is useful. The example of the Tajik aluminium plant shows the importance for Tajikistan to assess transboundary air pollution in cooperation with its neighbours. Stronger links with the Convention on Long-range Transboundary Air Pollution through accession would aid the development of a monitoring strategy, the creation of emission inventories and the development of an air quality strategy in general. While implementation of the EMEP Protocol may not be a priority for the country, it should be used as a tool for promoting air quality locally, regionally and nationally.

*Recommendation 6.3:*
*The State Committee for Environmental Protection and Forestry should review the issues related to accession to the Convention on Long-range Transboundary Air Pollution and its EMEP Protocol with the purpose of:*
- *Broadening air emission monitoring to include additional substances and emissions sources;*
- *Assess the transboundary movement of pollutants in accordance with the CORINAIR methodology and EMEP guidelines.*

Tajikistan, already a Signatory to the Stockholm Convention on Persistent Organic Pollutants, has indicated its intention to ratify the Convention. The main requirements before ratification are setting up a coordination unit that has already been established, drawing up an inventory of POPs and harmonizing current legislation with the requirements of the Convention.

*Recommendation 6.4:*
*The State Committee for Environmental Protection and Forestry should:*
- *Draw up an inventory of persistent organic pollutant sources and*
- *Promote accession to the Stockholm Convention on Persistent Organic Pollutants.*

*Chapter 7*

# WASTE MANAGEMENT

## 7.1 Introduction

Waste management, including waste from mining, industry, medicine, households and other municipal sources, remains one of the main environmental problems in Tajikistan.

Tajikistan is rich in mineral resources, especially rare metals, semiprecious and precious stones; non-ferrous metals, such as tin, lead, antimony and mercury; and rock that is used as a construction material. There are also deposits of uranium ore. Most of the country's waste, much of it hazardous and radioactive, comes from mining.

The country has coal deposits, but production had declined from almost 500,000 tons annually in 1990 to less than 10% of this amount by 2004. The situation is similar for other hydrocarbons, including oil and gas, of which the country was never a major producer. Hydro resources are the main available energy resource in Tajikistan.

The economic recession, which began shortly after independence and was further exacerbated by the civil war, has resulted in structural changes in the economy. Industrial activities have declined over the past 13 years, but, according to figures that the then Ministry of Nature Protection provided to the Asian Development Bank in 2000, the actual amount of accumulated industrial solid waste has grown, largely due to increasingly inefficient industrial processes. Municipal waste also poses serious problems, largely because of a lack of infrastructure for collection and disposal.

Compounding all of these concerns is Tajikistan's geography. The country is mountainous and vulnerable to natural disasters, including landslides, mudflows, flooding, avalanches and earthquakes. Such natural disasters threaten mining and radioactive waste sites.

One of the major obstacles to addressing these problems is the lack of waste monitoring data. In the analysis that follows, it is important to keep this in mind. Data are generally estimates and not fully reliable.

## 7.2 Generation and storage of waste

*Mining and industrial waste*

Tajikistan processes 40 different kinds of minerals, including minerals containing gold. During the Soviet period, Tajikistan also mined much uranium ore and metal ore, which was processed into uranium pre-concentrate or metals.

Mining and processing uranium and metal ores generates two types of waste:
- Mining waste, which results from the mining and milling of ores. This is mining debris in the form of rock material that has a low content of uranium or other metals, and it is removed from the pits in order to access ores that are richer in uranium content or other metals and that are to be used for further processing. This waste is called rock dump. It is not chemically treated, and is stored near pits and mines.

- Tailings, which result from the enrichment of uranium or other metal ores by a process of leaching with strong acids to obtain uranium or metal pre-concentrates. After the leaching process the waste liquid is neutralized and settled slurry is separated from the liquid. This slurry is called "tailings". The liquid is recycled to the leaching stage.

The mining and processing of uranium and metal ores are the main sources of industrial hazardous waste. They account for approximately 77% of all industrial waste and include 200 million tons of accumulated waste that contains such heavy metals as zinc, lead, cadmium, tungsten, molybdenum and mercury. At present, about 70 mines are operating and 10 enterprises process metal ores.

**Table 7.1: Waste generated in main industrial installations, 1999**

| Location | Production type | Waste thousand tons | Major pollutants |
|---|---|---|---|
| Aininsk district Sogdsk Oblast | Anzob Integrated Mining and Concentrating Plant | 11.7 | Antimony, mercury |
| Adrasman Sogdsk Oblast | Adrasman Integrated Mining and Concentrating Plant | 217.0 | Lead, zinc, gold |
| Pedjikent Sogdsk Oblast | "Zeravshan" Integrated Mining and Concentrating Plant | 560.1 | Cyanides |
| Chkalovsk Sogdsk Oblast | "Vostok-Red-Met" | 147.0 | Uranium, vanadium |
| Tursunzade | Tajik aluminium plant (TadAZ) | 152.0 | Fluorite, gas cleaning slime, flotation tailings |

*Source* : UNDP. Regional Environmental Action Plan for Central Asia. September 21, 2001.

Tailings are currently dumped at 22 sites. According to the State Committee for Environmental Protection and Forestry, eight tailing sites are in poor condition and require immediate rehabilitation. The Government needs to find financial resources urgently and start rehabilitating those sites, which are a threat to people and the environment.

Mining has also generated about 6 millions tons of waste rock.

In 1999 about 1.6 million tons of industrial waste was generated, of which approximately 1.4% is estimated to be toxic. Some of the industries that generate waste are: aluminium, chemical, machine building, construction, cement, nitrogen fertilizers and metallurgy. Altogether, there are approximately 400 sites that generate industrial waste, some of which is hazardous. The types and amounts of waste by factory are contained in table 7.2. for selected enterprises.

Approximately 50 plants generate about 1,000 tons of galvanic toxic waste, which contains cadmium, cobalt, nickel and arsenic, per year. Other hazardous waste comes from spent oil and solvents, medical waste, batteries and varnishes. Stocks of obsolete agrochemicals were depleted in 1994 and fewer are now used. Consumption of pesticides stands at 0.3-0.8 kg/ha.

There is much sludge from the processing of metal ores and from past industrial waste-water treatment.

It contains mercury, antimony, aluminium and lead. It is stored at tailings sites that do not meet international environmental standards.

Accumulated hazardous waste accounts for about 23.3 million tons, of which about 3.3 millions tons is chemical waste. This is dumped over 295.1 ha, including 7 ha which is used for the disposal of chemical waste. There are no centralized facilities for the sanitary storage of hazardous industrial waste. In many cases the composition of the waste is not even known, and some non-toxic industrial waste is transported and dumped together with municipal waste.

Most industrial waste is dumped either on-site or near the facilities that generate it. There are no specific treatment facilities for toxic and hazardous waste. Industrial waste is also sometimes stored in abandoned mining pits and occasionally discharged into rivers. For example, there are 41,900 tons of coal foam, 55,700 tons of coke dust and 21,600 tons of electrolysis lining at the Tajik aluminium plant. The Tajikchimprom chemical plant has 1,300 tons of sodium hydrochloride. This waste could also be used as secondary raw material.

There is no facility for processing or recycling fluorescent lamps, which contain mercury, and their disposal at ordinary landfills is prohibited. Enterprises are obliged to store obsolete bulbs on-site (indefinitely). As storage space dwindles, enterprises often try to dump illegally, thereby posing a serious environmental hazard.

**Table 7.2:  Amounts of waste by factories**

| Enterprise | Form | Amount (tons) | Treatment (recycling) |
|---|---|---:|---|
| Tajik aluminium plant | Carbon foam from processing | 41,903 | 50% treated (reused) |
| | Sludge from smokestack | 2,583 | Not used |
| | Coke dust | 55,706 | Not used |
| | Residual from electrolyser | 26,111 | 10% recycled |
| Isfara chemical plant | Sodium hydrochloride | 13,168 | Not used |
| Vaksh nitrogen fertilizer plant | Spent catalysts containing nickel, iron, | 545 | Not used |
| Tajik cement plant | Asbestos ash | 200,000 | 5% used , recycled |

*Source* : Asian Development Bank. Environmental Profile of Tajikistan. 2000.

The waste classification system dates from the former Soviet Union. It divides waste into four categories, or classes, ranging from slightly dangerous to extremely dangerous, but it does not define which types of waste fall into these categories nor does it provide procedural information on how to identify and classify them. It is important to set up a new waste classification system according to international standards in order to identify the toxicity of accumulated and generated waste.

### Radioactive waste

In the former Soviet Union, Tajikistan was an essential producer of uranium. As a result of uranium ore mining and uranium pre-concentrate production, Tajikistan is left with both radioactive mining waste and radioactive tailings.

There are, in addition, other sources of liquid and solid radioactive waste: old medical equipment, such as X-ray equipment, and radiometric and chemical laboratories. The radiation equipment is old and needs to be replaced and safely disposed of.

There are also radioactive sources in the integrated mining and concentrating plants Vostokredmet in Chkalovsk and Anzob. It is not possible to transport the radioactive material through the mountain passes to Tajikistan's Centre for the Disposal of Radioactive Waste. The Tajik aluminium plant in Tursun Zade also has radioactive sources.

There are at present nine storage sites for radioactive waste; 300 ha hold about 164.3 million tons of radioactive waste from mining ores and another 180 ha hold about 65 million tons of radioactive tailings.

The Centre for the Disposal of Radioactive Waste is in Faizabad, 44 km from Dushanbe, and is supervised by the municipality of Dushanbe. This is a large storage facility for low- and medium-radioactive liquid and solid waste. Built in 1962, it was designed for a total capacity of 2,000 curie, but it is now storing 70,000 curie. It urgently requires rehabilitation.  In addition, the Centre is situated only 6 km from residential areas with about 23,000 inhabitants. To date, there has been no scientific assessment of the impact of this storage on the population and the environment

### Medical waste

All medical waste is dumped together with municipal waste in municipal landfills. According to the State Committee for Environmental Protection and Forestry, medical waste accounts for 5-7% of municipal waste. There is no separation of medical waste nor any facilities for its incineration or environmentally appropriate disposal (see also chapter 12, on Health).

### Municipal waste

About 1,200,000 m3 of municipal waste is generated annually in Dushanbe, and only 640,000 m3 is dumped at official landfills. The rest goes to illegal landfills. Annually about 3.5-4 million m3 of municipal waste is generated nationwide. Almost half is food scraps and kitchen waste. Other components are plastics, leaves and ash, paper and cardboard, glass and ceramics, metals, leather and resins.

Municipal waste is neither treated nor sorted. As there is a shortage of trucks, fuel and lubricants, the collection of solid municipal waste in urban areas is poor. There is no municipal waste service at all in rural areas. As a consequence, waste is fly-tipped within the cities as well as in the countryside.There are 70 official landfills for municipal waste. They hold an estimated 23.6 million m3 of waste and cover roughly 296 ha. However, as indicated, there are also a growing number of unofficial dumps, for which no figures are available.

**Table 7.3: Municipal waste generated in the main cities, 1999**

| City | Population thousands | Waste 1000 m$^3$ | Type of treatment | Major pollutants |
|------|---------------------|-------------------|-------------------|------------------|
| Dushanbe, city | 562 | 213.7 | Collection and transport to the storage site | Medical waste and toxic substances, danger category III and IV |
| Khujand | 149 | 68.9 | | |
| Isfara | 37 | 14.1 | | |
| Kanibadam | 45 | 17.1 | | |
| Ura-Tyube | 51 | 19.4 | | |
| Chkalovsk | 25 | 9.5 | | |
| Gafurov | 28 | 10.6 | | |
| Kurgan-Tyube | 60 | 23.0 | | |
| Kulob | 78 | 29.6 | | |
| Khorugh | 28 | 5.3 | | |
| Tursunzade | 39 | 14.8 | | |
| Kafernikhon | 44 | 16.9 | | |

*Source* : UNDP. Regional Environmental Action Plan for Central Asia. September 21, 2001.

None of the landfills, official or otherwise, meets current international standards and norms. Tajikistan's sanitary norms date from 1984 and are not consistent with current international standards. They need to be revised or new ones need to be drawn up to improve the control of sanitary conditions at waste disposal sites.

There is little or no control of sanitary conditions of municipal landfills. Still, some municipalities are trying to improve the situation. For example, according to the Khujand Department of Housing and Municipal Services and its Special Depot for Sanitary Cleaning (SpecAvtoBaza), the Khujand municipal landfill, which is about 18-20 km from the city centre, is well situated and has not leaked any pollutants into the groundwater. However, it is stretched beyond capacity and needs attention if problems are to be prevented.

The Tajiktextilmash machinery plant in Dushanbe can process secondary raw materials separated from municipal waste to produce goods for non-food purposes. There are a few small facilities for processing waste paper into tissue paper. There are no other facilities for waste separation or processing waste components.

In Dushanbe rubbish collection costs 0.80 somoni per flat per month, regardless of the size of the flat or how many people occupy it. These charges are insufficient to meet costs.

*Introduction of industrial waste recycling and reuse*

One way to protect the environment and save natural resources is to recycle or reuse industrial waste. However, at present it is cheaper for enterprises to pay for extra waste disposal than to invest in the development and introduction of new low-waste processes and measures to minimize the generation of industrial waste. (See chapter 3 for charges on waste disposal.)

Unfortunately, there is no legislation on economic incentives, such as loans and credits, for those enterprises that introduce waste treatment and recycling.

The creation of a cleaner production centre in Tajikistan could facilitate research and development of low-waste technologies and the use of waste as a secondary raw material. One of the key actions in the State Programme on Environmental Education is the creation of a non-waste technology centre at Tajik State University. This centre has not yet been established, but it is important to do so. (See also chapter 4, on Information, public participation and education.)

**7.3    Environmental impact**

Because there is no monitoring, there are no concrete data on the direct or indirect impact of municipal, mining and other industrial waste in Tajikistan. However, given the composition of the waste and the fact that landfills function without any control, it can be assumed that this waste has multiple environmental effects. It causes soil degradation and contamination with heavy metals and organic hazardous substances formed during decomposition. Decomposition and smoke from fires deliberately started to reduce the volume of the landfills contaminate the air with organic substances. In addition, landfills can pollute surface

water, because rainwater leaches organic hazardous substances into open watercourses. In addition, since landfills are not properly fenced off, people and domestic animals have access and may be exposed to conditions that threaten their health.

Tailings sites are particularly dangerous. Tailings liquefy under pressure, for example, during mountain rock slides. This can result in the destruction of dumps, and it can contaminate all the surroundings with heavy metals.

Tailings also contain soluble and active salts formed from rock ore broken down by acids. So they are easily washed out by rain and penetrate into groundwater. Uranium tailings contain a significant amount of uranium 238, which is also washed out by rainwater. If contaminated groundwater or river water is used for drinking or irrigation, the chemicals immediately enter the food chain. Heavy metals and uranium settle in the sludge in the riverbeds. During heavy rains and flooding, these are disturbed and lead to contamination of the rivers.

In the event of a natural disaster, such as a flood, avalanche and rockslide, waste containing radioactive elements and heavy metals may spread in the vicinity of dumps and contaminate the surrounding area.

The greatest potential danger from uranium tailings is radiation exposure from inhaling the radon that they release. If dumps are not fenced off, people, especially children, could be exposed to high-level radiation. For example, the radiation at the disposal site at the Degmai settlement is 200-250 microroentgens per hour. This tailing dump occupies 90 ha and holds about 40 million tons of radioactive waste.

In some cases people use radioactive mining waste as construction material, causing permanent exposure to radon.

**Table 7.4: Risk assessment factors for major industrial landfills**

| Name and location | Type | Waste type | Risk assessment factor | | |
|---|---|---|---|---|---|
| | | | Health | Ecology | Economy |
| Takob Integrated Mining and Concentrating Plant. | Tailing dumps | Flotation tailings with fluorides content | 2 | 3 | 2 |
| Anzob Integrated Mining and Concentrating Plant. | Tailings dumps | Flotation tailings with mercury and antimony | 3 | 4 | 4 |
| Adrasman Integrated Mining and Concentrating Plant. | Tailing dumps | Flotation dumps with lead, zinc, gold | 1 | 3 | 4 |
| "Zeravshan" Integrated Mining and Concentrating Plant. | Tailing dumps | Coal in alkaline with cyanides content | 2 | 2 | 3 |
| Khudjand Rare Metals Integrated Plant | Tailing dumps | Flotation tailings with polymetallic content | 1 | 3 | 3 |
| "Vostok-Red-Met" | Tailing dumps | Radioactive flotation tailings | 4 | 4 | 4 |
| Isfara metallurgical plant | Collectors | Vanadium production cakes, Glauber's salt solution | 2 | 2 | 2 |

*Source*: UNDP. Regional Environmental Action Plan for Central Asia. September 21, 2001.

## 7.4    Policy, legal and institutional framework

### *The policy framework*

There is no overall strategy or policy for waste management. The State Environment Programme for 1998-2008, adopted by the Government in 1997, does not contain a special section on waste, but it does address some of the key issues related to waste management and waste minimization. For example, it covers:

- The rational use of mineral resources;
- The development of low-waste processes and technologies;
- Research and development of environmentally sound methods for the exploration and exploitation of minerals and precious metals, including the recycling of industrial waste;
- The introduction of cleaner production processes in manufacturing and mining industries; and
- The prevention of waste discharging into the environment.

There is no information concerning implementation, however, and it is therefore difficult to judge the current status.

### *The legislative framework*

During the past two years, Tajikistan has begun to establish the legal framework for a more modern waste management system. In 2002, it adopted the Law on Production and Consumption Waste. It standardizes terminology and defines types of waste and technological processes for its use and disposal. It has very strict provisions on State control over all norms and standards for the management of waste, including industrial, hazardous and municipal waste. The Law requires landfills, especially sites that are at risk from natural disasters, to be monitored and a State cadastre of industrial and municipal waste to be developed.

The Law envisages the issuance of "waste passports" with information on the quantity and quality of waste, including its class of toxicity, and the licensing of hazardous waste activities. It also promotes waste minimization, recycling and the separation of valuable components from waste.

In 1993, the Council of Ministers adopted a resolution setting norms and charges for waste.

(See chapter 3, on Economic instruments, environmental expenditures and privatization.)

The State Committee for Environmental Protection and Forestry and other environmental protection institutions are responsible for implementing the Law. The first step in doing so is to develop and adopt regulations, norms and standards. Secondary legislation for licensing hazardous waste was promulgated in June 2003 by government resolution.

In August 2003, Tajikistan adopted the Law on Radiation Safety. It puts the Nuclear and Radiation Safety Agency in charge of radiation control, licensing nuclear activities and establishing an inventory of radioactive waste and sources.

Violators of the Law are punished according to the Code of Administrative Violations.

Tajikistan signed up to the 1999 Special Agreement on the Creation of a Harmonized Classification and Code System for Waste in the Newly Independent States, but this Agreement has never been implemented, largely because of a lack of funds and coordination.

### *The institutional framework*

The State Committee for Environmental Protection and Forestry is responsible for overall waste management and for setting standards for waste generation. The State Land and Waste Inspectorate carries out inspections, issues permits for waste disposal, and develops regulations, norms and standards for the implementation of the Law on Production and Consumption Waste.

However, the Inspectorate is short of personnel, technical equipment and funding and, consequently, not fully effective. For example, data collected by the inspectors on waste management are neither processed nor analysed in a manner that could be used to underpin a strategy or policy for waste management. The scientific laboratory that develops new standards for environmental management faces the same obstacles.

The housing and municipal services are responsible for rubbish collection and disposal in the cities and regions. The departments or divisions of road services (*Dorozhno-expluatatsionny*) are responsible for the bulldozers and tractors that compress waste at the landfills.

Tajikistan is an active member of the International Atomic Energy Agency.

A nuclear and radiation safety agency was established under the Academy of Sciences, and a commission on cooperation with the International Atomic Energy Agency was also set up. The Agency and the Commission are responsible for the overall management of radioactive waste, tailings and radioactive sources. At present the Agency is drawing up an inventory of all radioactive waste and tailings sites and radioactive sources, based on the database on radiation sources of the Ministry of Emergencies and Civil Defence.

The Ministry of Emergencies and Civil Defence has a radiometric and chemical laboratory for measuring radiation, but no equipment for properly measuring radiation at disposal sites of radioactive waste and tailings.

## 7.5 International cooperation

Tajikistan has not acceded to the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal and therefore does not have an international legal basis for cooperating with its neighbours on the movement of hazardous waste. It has no special office for the control of movements of hazardous waste in the country and no statistics on the import, export and transit of hazardous waste. Accession to the Basel Convention would give Tajikistan opportunities for gaining and sharing experience and information on the minimization, treatment, recycling and disposal methods for hazardous waste. In addition, as Tajikistan has no treatment facilities for hazardous waste, some of its hazardous waste could be treated in other countries.

## 7.6 Conclusions and recommendations

Huge quantities of industrial waste have accumulated over many years, including both hazardous and non-hazardous waste, mining waste, waste from polymetallic ore processing and radioactive waste from the mining and enrichment of uranium ore. This waste is stored at industrial sites or nearby. Storage facilities do not meet international standards and norms. Industrial waste containing heavy metals and radioactive waste, which contaminate soil, groundwater and air, pose a special threat to the population and the environment.

Municipal waste is also a big problem, because there are no sanitary landfills. The waste is collected and transported to uncontrolled landfills. There is no waste separation, and only some of the landfills have technical means (bulldozers) for compressing waste. There are many illegal dumps, some along rivers.

There is no strategy on waste management or a specific action programme. The State Environment Programme for 1998-2008 does address waste management issues, such as waste minimization, the rational use of mineral resources, the development of low-waste processes and technologies, research and development of environmentally sound methods for the exploration and exploitation of minerals and precious metals, including the recycling of industrial waste, the introduction of cleaner production processes in manufacturing and mining industries, and the prevention of waste discharging into the environment. This Programme should be used as a basis for the development of a waste management strategy.

The Law on Production and Consumption Waste was adopted in April 2002. It is very comprehensive and covers the main aspects of waste management, including technologies for waste use and disposal, waste passports, monitoring waste landfills, licensing procedures for hazardous waste, waste minimization, recycling and separation of valuable components from waste, cadastre of industrial and municipal waste. To implement it, it is necessary to develop and adopt secondary legislation, including regulations, norms and standards.

The Law on Radiation Safety was adopted in 2003. It puts the recently established Nuclear and Radiation Safety Agency in charge of radiation control, licensing nuclear activities and drawing up an inventory of all radioactive waste and sources. Effectively applying this Law also requires a set of by-laws.

*Recommendation 7.1:*
*(a) The State Committee for Environmental Protection and Forestry, in cooperation with the Ministry of Industry, municipalities and other relevant institutions, should:*
- *Develop and promote the adoption of a strategy and action programme for waste management;*

- *Facilitate the implementation of the Law on Production and Consumption Waste by developing the necessary secondary legislation.*
(b) *The Ministry of Emergencies and Civil Defence, in cooperation with the Nuclear and Radiation Safety Agency, should facilitate the implementation of the Law on Radiation Safety by developing the necessary secondary legislation.*

Many types of industrial waste, and especially mining waste, contain valuable components that could be used as secondary raw material after extraction of the primary metals from polymetallic ores. The establishment of a cleaner production centre in Tajikistan could facilitate research and development of low-waste technologies and use of waste as secondary raw material. One of the key actions in the State Programme on Environmental Education is the creation of a non-waste technology centre at Tajik State University. This centre has not yet been established, but it is important to do so. Such a centre could work on:

- Developing resource-saving technologies for mining and metallurgical industries;
- Waste minimization;
- Recycling and reusing accumulated waste;
- Minimizing and treating industrial waste water;
- Treating galvanic waste; and
- Developing facilities for hazardous waste treatment.

*Recommendation 7.2:*
*The Ministry of Industry and the Ministry of Economy and Trade should:*
(a) *Study the feasibility of industrial processes for the recycling and reuse of industrial waste, especially mining waste, as secondary raw material;*
(b) *Introduce environmentally friendly processes for disposal of industrial waste that cannot be recycled;*
(c) *Speed up the establishment of a cleaner production centre, as stipulated in the State Programme on Environmental Education, taking into account international experience.*

At present industrial and municipal waste disposal sites are not monitored. There are no data on the quality of soil, water and air in the vicinities of these sites. There is little information on waste generation and what is available is not up to date, nor are there data to draw up an inventory of industrial waste disposal sites and landfills.

*Recommendation 7.3:*
*The State Committee for Environmental Protection and Forestry, in cooperation with the Ministry of Industry, municipalities and other relevant institutions, should:*
(a) *Set up an information system on the generation, recycling and disposal of all types of waste and update the system of waste codes and classification taking into account internationally accepted standards;*
(b) *Introduce a waste monitoring system at industrial and municipal landfills;*
(c) *Set up an inventory of all industrial and municipal waste disposal sites, including illegal ones.*

Present municipal waste disposal is not satisfactory. There is no separation, no recycling, few vehicles for waste collection and transport, no sanitary landfills, no municipal waste services in rural areas, and no special programme for raising public awareness about waste.

*Recommendation 7.4:*
(a) *The State Committee for Environmental Protection and Forestry, in cooperation with municipalities and other relevant bodies, should urgently:*
- *Start developing project(s) for the construction of sanitary landfills for municipal waste disposal according to international standards;*
- *Begin rehabilitating those landfills that are overstretched and pose a threat to the population and the environment.*
(b) *The State Committee for Environmental Protection and Forestry, in cooperation with municipalities and other relevant bodies, should study the economic feasibility of:*
- *Introducing the separate collection of municipal waste (paper, glass, metal, aluminium) and teaching the population how to use the system; and*
- *Setting up facilities for recycling and processing valuable components separated from municipal waste.*

There are many storage facilities with radioactive waste from mining operations and radioactive flotation tailings from uranium production as well as a centre for the disposal of radioactive sources and waste. Few meet international standards and norms. They pose a threat to the population and the environment. There is a special danger from these sites in the event of a natural disaster.

*Recommendation 7.5:*
*The Ministry of Emergencies and Civil Defence and the Academy of Sciences, through the Nuclear and Radiation Safety Agency and in cooperation with the State Committee for Environmental Protection and Forestry, should:*
*(a) Start the rehabilitation of mining tailings sites and landfills of radioactive waste, taking into account international experience in this field;*
*(b) Update and speed up the completion of the inventory of all radioactive waste, tailings and sources in the country;*
*(c) Monitor radioactive waste deposits and tailings by replacing or updating obsolete equipment and devices for measuring radiation.*

Tajikistan has not acceded to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. If it were a Party, it would benefit by sharing experience and information on hazardous waste minimization, treatment, recycling and disposal methods. In addition, since Tajikistan has no treatment facilities for hazardous waste, some categories of accumulated hazardous waste could be treated in other countries according to the provisions of the Convention.

*Recommendation 7.6:*
*The State Committee for Environmental Protection and Forestry should prepare all necessary documentation for accession to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and submit to Parliament so that Tajikistan can participate actively in and benefit from international cooperation on hazardous waste management.*

# Chapter 8

# WATER RESOURCES MANAGEMENT

## 8.1 Overview

Water is crucial in Tajikistan both in a national and in a regional context. It is a key economic asset and a vital resource for the nation. It is essential for irrigation agriculture (mostly cotton) and for generating electricity, two major sources of income for the Tajik economy. Moreover, 55% of the water feeding the Aral Sea rises in Tajikistan, putting it at the core of Central Asia's political stakes around the allocation of water resources (see Chapter 5 on International Cooperation). Tajikistan actually withdraws about 20% of the volume of water formed in the country, which is well under the quota of 35% (18 billion $m^3$/year) agreed upon with its neighbours under regional water-sharing agreements. However, Tajikistan plans to increase its water consumption to boost its cotton crops. Its water use might then exceed its quota unless it can improve its water efficiency. Tajikistan does not make the most of its water resources at the moment as it wastes huge amounts owing to its collapsing water infrastructure.

## 8.2 Water resources

*The specific regional context: between the glaciers and the Aral Sea*

Tajikistan is very rich in freshwaters (fig. 8.1). On average 50.9 billion $m^3$ of water is formed annually on its territory. These resources stem from precipitation and melting glaciers, which, along with snowfields, constitute a huge reserve of water (estimated at 845 billion $m^3$, covering 8% of the territory). These waters drain to the Aral Sea basin, where they represent 55% of the total basin flow. They flow to the Amu Darya river (50.2 billion $m^3$) and the Syr Darya river (0.7 billion $m^3$), through Afghanistan, Kazakhstan, Kyrgyzstan, Turkmenistan and Uzbekistan. Therefore, Tajikistan's water resources have an obvious transboundary dimension.

**Figure 8.1: River network according to river length, % of total river length**
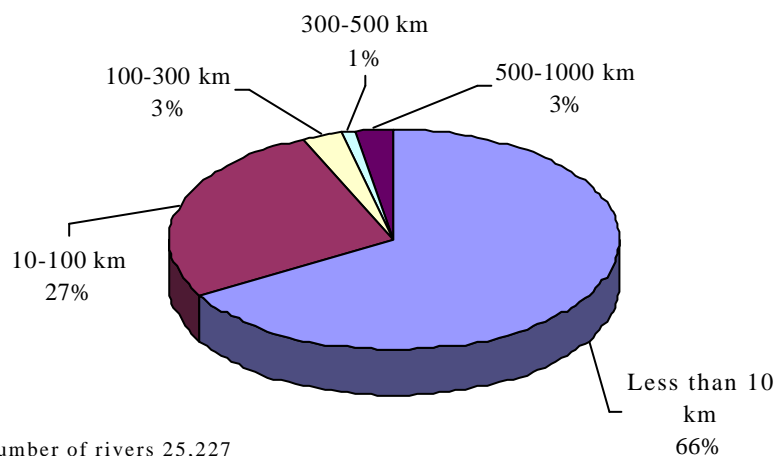


Number of rivers 25,227
Water quantity drained 50.9 billion $m^3$
Total length 69,189 km

*Source* : Tajik Hydrometeorological Agency, 2004.

*Climatic factors and water resources availability*

Climate change prognoses foresee that in the next half century the temperature may increase by about 2-3°C, or even 5°C during the hottest seasons. Already, Tajik glaciers lost more than 20 billion $m^3$ of their ice volume (i.e. about 2.5%, affecting mostly small glaciers) during the 20th century. A further increase in temperature will accelerate glacier retreat. Thousands of small glaciers will disappear, thus reducing the flow of stored water that melts during the summer, at a time when irrigation is essential for downstream agriculture.

Climate change may also change precipitation patterns, causing more floods and other natural disasters as the ecological factors able to retain water flows are extremely weak (forest coverage is 3 to 3.5% of the territory and wetlands 3.5%). Floodwaters and mudflows are frequent (32% of the territory is in a high mudflow risk zone), causing huge damage. Soil erosion by running waters is also an important problem for agriculture.

*Surface water: quantities and quality*

Mountainous Tajikistan has a very dense network of water streams, with almost one thousand rivers with a length exceeding 10 km (see figs. 8.1 and 8.2 and table 8.1). Their maximum run-off is in the summer, when snow and glaciers melt. There are 1300 lakes containing 46 billion $m^3$ of water, and 9 water reservoirs (overall capacity 15.3 billion $m^3$, individual capacity from 0.028 to 10.5 billion $m^3$). The latter are mainly used to produce electricity, to irrigate crops and to protect from mudflows. Most of the lakes (73%) are located in the Pamir-Alai Mountains at an altitude of 3500 metres or more. They are often inaccessible, which makes them difficult to monitor.

Originally of excellent quality, surface waters are polluted by anthropogenic activities. The Varzob river, which supplies Dushanbe's drinking water, is polluted upstream by domestic and industrial waste water. The Kafirnigan river, another major source of drinking-water supply, receives irrigation drainage water and domestic waste water, which causes pollution and bacteriological contamination. The Vakhsh river is polluted by industry (fertilizer production and chemical plants) and also by drained irrigation water containing mostly salts and (though nowadays less) fertilizers and pesticides. The Syr Darya is so polluted by irrigation waste water that it is not suitable for drinking. The Zeravshan river may contain mercury from gold processing. Overall, the surface water quality is affected both by point pollution of domestic or industrial origin as virtually no waste water is treated, and by diffuse pollution from agriculture.

**Table 8.1: Annual water discharge of major rivers**

| Basins and rivers | Length | | Catchment area in Tajikistan | Average annual water discharge | Month of maximal flow |
|---|---|---|---|---|---|
| | Total | In Tajikistan | | | |
| To Aral Sea basin | km | km | thousand $km^2$ | billion $m^3$/year | |
| Sir Darya | 2,212 | 184 | 13.4 | 15.9 | |
| Zeravshan | 877 | 310 | 11.8 | 5.1 | July-August |
| Surhan Darya | .. | .. | 1.6 | 1.1 | July-August |
| Kafirnigan | .. | 387 | 11.6 | 5.1 | May-June |
| Vakhsh | .. | 524 | 31.2 | 19.6 | July-August |
| Panj | .. | 921 | 65.0 | 31.8 | July-August |

*Sources* : Tajik Hydrometeorological Agency and Grida. State of the Environment report, 2002.
*Note* : internal administrative boundaries correspond closely with watershed boundaries.

**Figure 8.2: Physical map of river basins**
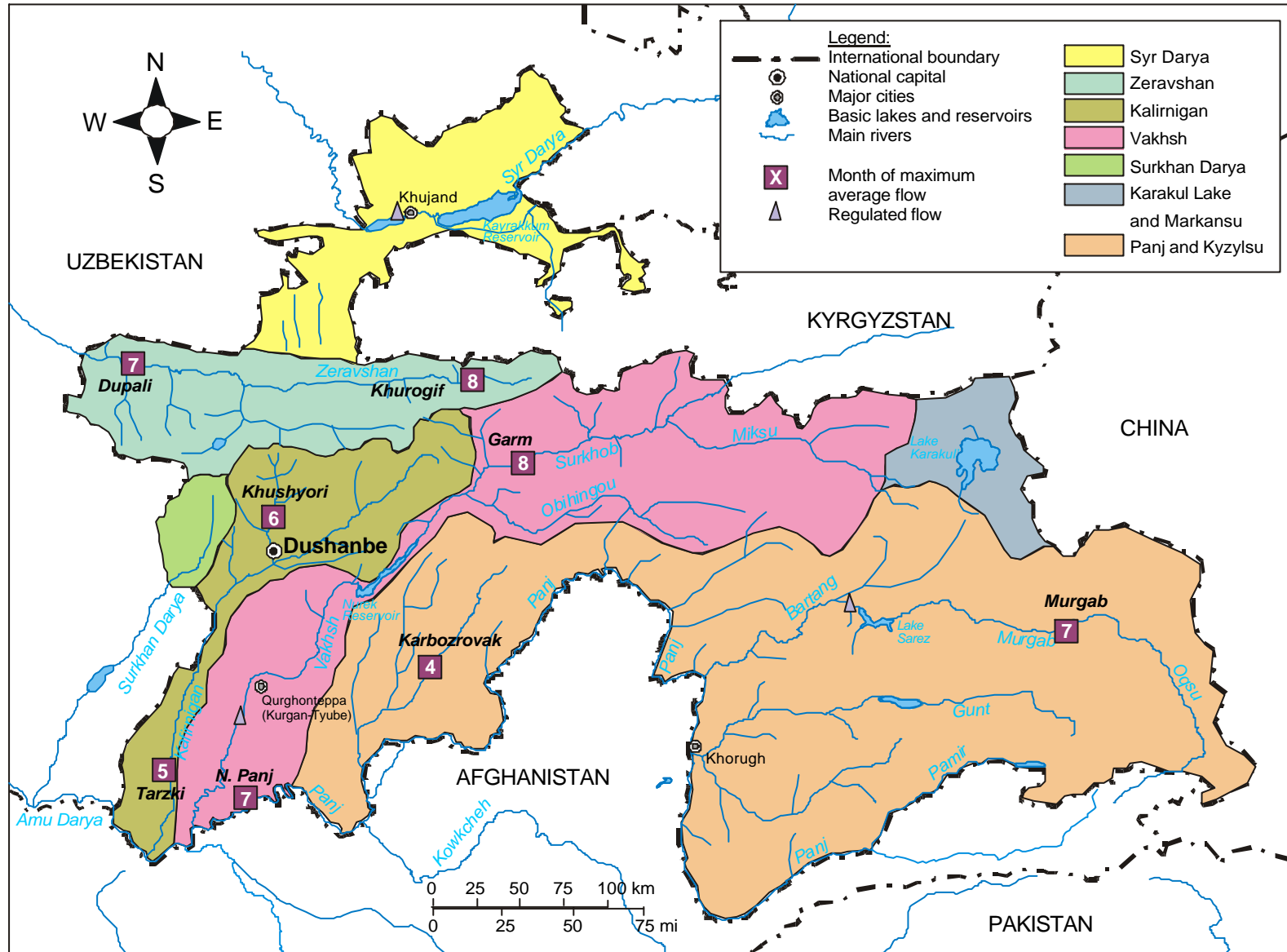


The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

*Groundwater and thermal water*

Significant reserves of groundwater are found in all major river basins. Total reserves are estimated at 123 billion $m^3$. Potential groundwater reserves are estimated at 18.7 billion $m^3$/year, with 6 billion approved for use but only 22.8 billion currently exploited. Accessible water reserves are mainly located under the large river valleys (Syr Darya, Kafirnigan, Vakhsh, Kysylsu and Yakhsu) and intermountain depressions. Originally the quality of groundwater was high, with groundwater in the north highly mineralized due to salinization.

Groundwater has been contaminated by anthropogenic activities (domestic discharges, industry and agriculture) in many places, in particular in the vicinity of factories such as the Nakhsh nitrogen fertilizer plant in Kurgan-Tyube (which resulted in the closing of supply wells), the chemical factory in Isfara and the Tajik aluminium plant in Tunsunzade. Agriculture also pollutes groundwater through the use of fertilizers and pesticides, and the discharge of highly mineralized water from irrigation.

Tajikistan is also rich in medicinal, thermal and mineral water resources and springs, which contain a wide range of chemical elements. Only 30% of their potential is used. The main sources and springs are Yavroz, Khoja-Obigarm and Garm-Chaschma.

*Natural disasters*

Tajikistan is prone to floods, landslides and erosion. The country is very mountainous, with half of the territory above 3000 metres and large areas (6%) covered with glaciers. The relief is characterized by steep rocky slopes, plateaux with pastures (80.6% of the territory) and narrow valleys (about 10% of the territory), where agriculture takes place. Since 1950, the irrigated zones in valleys have more than doubled, and represent 50% of the land suitable for agriculture. These areas have been cultivated at the expense of forests, which have been cut even on steep slopes. The consequence is widespread erosion on pastures and cultivated land, where there is no longer any vegetation coverage to slow down the soil-eroding water flows (see chapter 10).

Floods, mudflows, landslides and avalanches occur every year, destroying roads, bridges, embankments, construction and equipment. For instance, between 1997 and 2004, 5,900 km of roads, 760 bridges, 1,300 km of embankments and 3,800 km of irrigation works were destroyed at a cost of some 240 billion somoni, i.e about US$ 86 million. At high altitudes, many glacial lakes and lakes resulting from rock obstruction of small valleys are threatening to burst and flood downstream areas (see box 8.1 on Lake Sarez). The measures to prevent these disasters and mitigate their consequences were deemed insufficient and in 2001-2002 the Asian Development Bank (ADB) supported the preparation of a strategy to improve flood management.

Tajikistan is also located in a zone with high seismic activity and frequent earthquakes, the magnitude of which often reaches 5-6 on the Richter scale (even 9 in 1911 and 1946). An estimated 100,000 people suffered from earthquakes during the past century. Earthquakes are particularly dangerous because of their potential to cause considerable damage to dams and lakes from rock obstruction, with possible devastating consequences in the valleys downstream (see section on hydro energy below).

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**Box 8.1: Lake Sarez – mitigating the risk**

Located in one of the most earthquake-prone regions in the world, deep in the Pamir mountains of Tajikistan, Lake Sarez was created in 1911 when a strong earthquake triggered a massive landslide, which, in turn, became a huge natural dam along the Murghob river. The resulting lake is perched at an altitude of more than 3000 m and is part of the watershed that drains the towering Akademi Nauk Range. The lake is 61 km long and up to 500 m deep, and holds an estimated 17 billion $m^3$ of water. Scientists have reason to fear that the natural dam might breach, or that large landslides could cause a tidal wave over the dam. The result would be catastrophic flooding along the Pyandzh, Bartang and Amu Darya rivers. Over 5 million people in Tajikistan, Afghanistan, Uzbekistan and Turkmenistan could be at risk, and damage to the environment would be devastating. Preventive and safety measures have been studied to mitigate the risk. The World Bank has provided credits for a disaster prevention project (US$ 0.47 million) to help alert (early warning emergency system) and protect vulnerable communities from a potential flood outburst. Switzerland is funding other components of the project, e.g. the development of a monitoring and early warning system and long-term safety measures (2000-2005).

## 8.3 Water uses and anthropogenic pressures

*Water abstraction, major users and water conservation*

Of a total of 10.7 billion m³ water abstracted in 2002, about 93% was surface water and 7% groundwater. Of the 8.8 billion m³ consumed, agriculture took up most. It consumed 85% of the freshwater intake, while the industrial and domestic sectors (urban and rural) consumed respectively 6% and 9% (fig. 8.3). Over the past 10 years, water consumption has been fairly stable. The decrease observed since 2001 is due to the deterioration of pumps and irrigation channels, and not to a more rational use of water (see table 8.2). In 2002, water consumption was 1,350 m³/cap, while, according to the AQUASTAT database of the Food and Agriculture Organization of the United Nations, the average renewable water resources are 2,600 m³/cap/year. Estimates indicate that more than 25% of water is lost in transit, 40 to 70% in the drinking-water supply network.

The approximately 800 million m3 of groundwater that are withdrawn annually are used for drinking (39%), irrigation (38%) and technological uses (8%). They are pumped from around 4,600 wells (out of a total of 9,000) that are still operational.

The water intakes are carefully planned every year, as they should comply with the interregional water allocation agreement concluded with the neighbouring countries. Internal adjustments are made through careful planning based on consumption forecasts. The consumers express their needs, which are consolidated at *raion*, then *oblast* and finally State levels. Then the Ministry of Land Reclamation and Water Resources proceeds with an operational updating of the schedule and allocates the water intakes in time and place according to the current status of the water resources.

*Hydropower: the greatest economic resource*

Tajikistan is one of the world leading hydropower producers (the highest per capita generator in the world), and hydropower is its greatest economic resource. At present, only 5% of its economically feasible potential is exploited through 17 large and 69 small hydropower plants. Since 2000, average electricity production has been about 15 GWh/year, 96% of hydro origin. The biggest hydropower plants (HPPs) are: Nurek HPP (3,000 MW, height of dam 300 m), Baipazan HPP (600 MW), Golovnaya HPP (240 MW) and Qayrroqqum HPP (126 MW). The small HPPs have a total capacity of 30 MW. New plants are being built: Rogun HPP (3,600 MW, height of dam 335 m), Sangtuda HPPs (670 and 220 MW) and Niznekafarniganskaya HPP (100 MW). They should double current production. In 2001, 15 GWh was consumed, including a 14% loss in distribution. Agriculture consumed 29%, households 18% (both sectors are growing), and industry 39% (shrinking). In 2002, the World Bank and the Aga Khan Foundation agreed to invest US$ 26 million in this sector, and a US$ 40 million project is under way to upgrade Nurek HPP. Bilateral funds are also being made available for these projects, including, for example, US $50 million provided by Iran for the Sangtuda HPP.

**Figure 8.3: Water consumption by sector, 2002**



Total water consumption 8,816 million m³/year
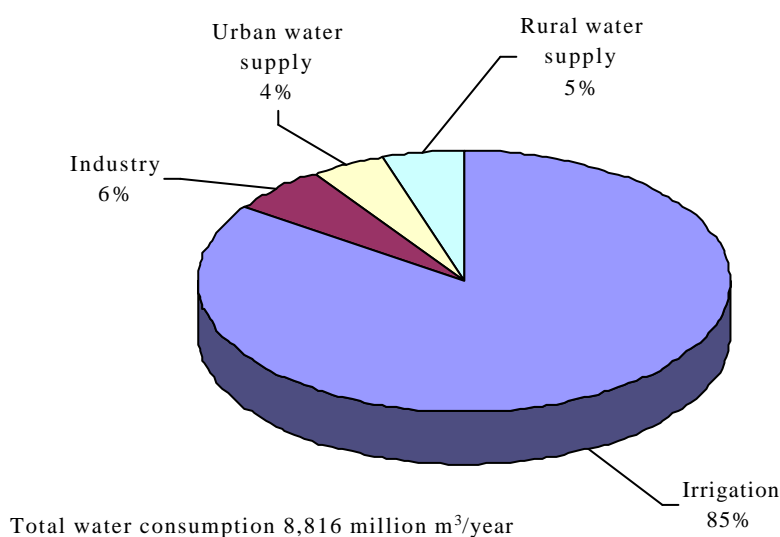
*Source* : Ministry of Land Reclamation and Water Resources, 2004.

### Table 8.2: Use of water resources

million m$^3$

|                              | 1990   | 1995   | 1999   | 2000   | 2001   | 2002   |
|------------------------------|--------|--------|--------|--------|--------|--------|
| Abstracted water             | 13,662 | 12,909 | 13,168 | 13,379 | 13,152 | 10,700 |
| Water used                   | 12,046 | 11,874 | 11,043 | 10,197 | 9,938  | 8,816  |
| Water consumption by sector  |        |        |        |        |        |        |
| Irrigation                   | 9,895  | 9,639  | 9,060  | 8,676  | 8,708  | 7,468  |
| Industry                     | 594    | 944    | 922    | 535    | 454    | 525    |
| Urban water supply           | 485    | 612    | 432    | 384    | 234    | 383    |
| Rural water supply           | 696    | 659    | 608    | 602    | 533    | 440    |
| Fish farming                 | 2      | 0      | 0      | 0      | 0      | 0      |
| Other uses                   | 374    | 20     | 21     | 0      | 9      | 0      |

*Source* : Ministry of Land Reclamation and Water Resources, 2004.

Hydroelectricity is a clean (generating no carbon emissions) and renewable energy. In mountainous Tajikistan, hydropower facilities are equipped with huge reservoirs for storing water upstream of the power plants, and high dams to retain the waters ahead of the reservoirs. There are nine water reservoirs containing 0.028 to 10.5 billion m$^3$ of water, most of them located in the Vakhsh river basin. These facilities need careful monitoring and maintenance as they are located in seismic zones and any breach would threaten the valleys downstream. In Soviet times, dam monitoring and maintenance were planned and ensured at the federal level, and it is a task that Tajikistan on its own can ill afford today. Under-investment in the power infrastructure results in increasing leaks in dams, failing turbines and transformers, reduced staffing and monitoring. Today, Tajikistan's hydropower plants are estimated to lose 30-40% of their power output during the electricity production process (against 10% in normal operating circumstances). Switzerland has similar plants and recognized know-how, and is giving technical and financial support on dam safety to Tajikistan.

Another problem is the growing quantity of suspended solids that are washed out during rainy seasons and floods and accumulate in reservoirs, thus diminishing their retention volume. This is the result of erosion, deforestation, excess ploughing and the destruction of vegetation coverage.

Although it does not consume water as such, hydropower production greatly influences the management of water and the water use pattern of other sectors. The power production installations are expensive to maintain and secure. Electricity demand, which peaks in winter and requires water withdrawals from reservoirs at that time, conflicts with transboundary demands for agriculture that requires water in spring and summer. Hydropower production is an important factor to take into account when drawing up national and regional water allocation plans.

### *Agriculture and irrigation*

Agriculture uses water mostly for irrigation and about 4% for other farming activities. Cotton is the main irrigated crop. The furrow irrigating method, which is used in Tajikistan, is water-intensive with 14,000-16,000 m$^3$/ha, although simply improving and rationalizing irrigation practices could noticeably cut consumption. Cereals, also irrigated, need less water, about 2100 m$^3$/ha. Of a total 815,000 ha of cultivated land, 720,000 ha are irrigated, but 12% is in bad condition because of waterlogging and salinization. There are plans to increase irrigated areas to 1.6 million ha in the coming years.

Intensive water consumption for irrigation results in water shortage in the lower streams of rivers (Isfara, Karatag, Shirkent, and Yakhsu) during the dry season.

Water distribution efficiency is around 50%, i.e. about half the abstracted water is lost in the supply network. This is due to evaporation in the open distribution channels and also to the poor quality of the irrigation infrastructure, predominantly earth irrigation channels. Around 48% of the country's irrigated land depends on pumping systems, with lift heights ranging from 10 m to more than 200 m. According to the Ministry of Land Reclamation and Water Resources, 65% of pumping systems may be out of operation, reducing the water supply by 40% or more.

Water allocations to farms are derived from a quantity estimated by the farmer and a corresponding quota allotted after consolidation of overall water demand by the administration. This system worked well when agriculture was under

State control and agricultural production planned in detail. Since the privatization of State farms began, water quantity adjustments have become difficult, and this is exacerbated by the absence of water metering and control systems. The costly rehabilitation and replacement of the irrigation system is also a serious burden that the State can no longer fully shoulder. In 1999, a model charter for water user associations (WUAs) was drawn up and officially approved by the Government. The objective was to create about 40 WUAs at the time of the privatization of collective and State farms. The Water Code provides that the ownership and maintenance expenses of the irrigation infrastructure will shift progressively over four years to WUAs, which will then be independent. However, the farmers, who are not landowners, cannot afford to pay either for the water they use or for infrastructure maintenance (see chapter 10, on Agriculture).

Fish farming, which was an important economic activity and source of food before independence, has virtually ceased.

Fertilizers that are washed out by irrigation water to freshwater bodies are an important source of diffuse pollution. Consumption has been reduced to 25% of what it was in 1990; of the 40,000 to 100,000 tons of mineral fertilizers still used each year, as much as 10 to 30% is ultimately discharged into rivers, thus contributing to their mineralization and eutrophication, and, eventually, to the mineralization of the Aral Sea (high nitrate, sulphate and potassium contents). Pesticides, irrigation drainage water and manure, all end up in freshwater bodies. A positive environmental consequence of the economic crisis and the drop in farmers' purchasing power is the drastic decrease in pesticide and fertilizer use.

### Industry

In 2002, industry used 0.5 billion m$^3$ of water, about half from below ground. Usually industry is supplied through the public drinking-water system. Industrial processes are often equipped with open water circuits. In 2000, 0.11 billion m$^3$ of – mostly untreated – industrial waste water was discharged.

Industrial production, in particular in heavy, water-polluting industries such as chemicals, metalworking and food processing, has contracted severely since 1991. In northern Tajikistan, where they are mostly developed, ore mining (strontium, silver, mercury, tungsten, antimony, gold, lead, zinc, fluorspar, non-metal and radioactive elements, and salt deposits) results in the discharge of toxic substances from the leaching of mine tailings (such as mercury, zinc or phosphorus) into surface waters, and also into groundwater through percolation. In the south, there are a few big industrial plants. The most polluting plants in the country are the Yavan chemical plant and the Vakhsh nitrogen fertilizer plant (ammonium and nitrate pollution of groundwater) in the south and the Isfara chemical plant in the north. These facilities use technologies from the 1950-1970s. The State Committee for Environmental Protection and Forestry has temporarily closed the Vakhsh nitrogen fertilizer plant, because it failed to comply with pollution limits. The facility's managers consequently installed a purification system and the plant is again on stream, though operating below capacity so far.

### Domestic water supply and waste-water discharge

In 2003, about half of drinking water was supplied from a pipe system (table 8.4 (a)); 96% of the urban population has access but only 40% of the rural population. The system is in bad condition, with no sanitary perimeters around the water uptakes (only 5% of wells are protected). A third of the distribution pipes are broken and much of the rest is leaking. There is a lack of purification facilities and of chlorine for disinfection. Since water is supplied only a few hours a day (because of power shortages), there is back pressure in the worn-out pipes. As a result, 40% of tap water is of poor quality and poses epidemiological risks. Drinking water is also taken up directly from shallow wells, ponds and irrigation canals (25%), from springs (21.2%) and from rivers (9.3%). According to the World Health Organization (WHO), up to 60% of intestinal infections in Tajikistan are water-borne. In 1997-1998, there was a typhoid epidemic with a morbidity of 500 per 100,000 inhabitants (see chapter 12, on Health). Drinking water from surface water bodies frequently causes diarrhoea, dysentery and hepatitis since domestic waste water is discharged without treatment upstream of drinking-water uptakes.

**Figure 8.4: a) Primary sources of drinking water**
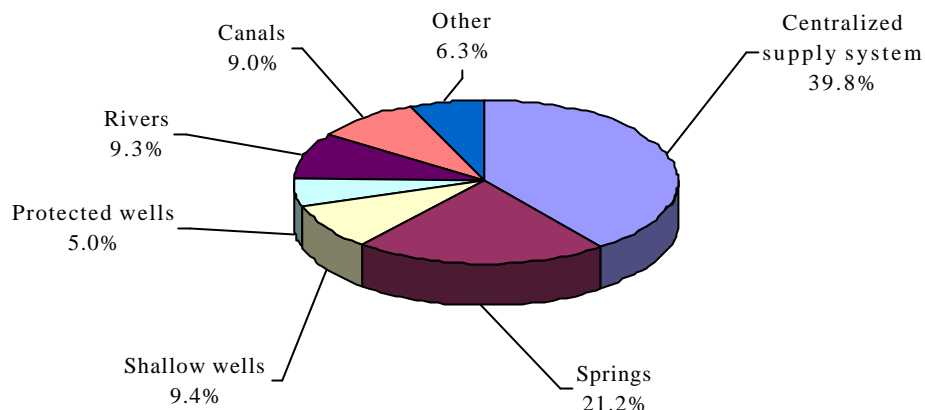


*Source:* Survey by the European Commission, Humanitarian Aid Office (ECHO), National nutrition and water and sanitation survey, Tajikistan, 2003.

Domestic water consumption is reported to be 550 litres/capita/day, 60% of which is lost due to leaks, according to the World Bank. As shown in figure 8.4 (b), daily quantities of water for human consumption at the point of use in rural areas are low, essentially because few homes have direct connections to the pipe system.

**Figure 8.4: b) Overall quantities of water used daily per capita for human consumption, rural areas, 2003**
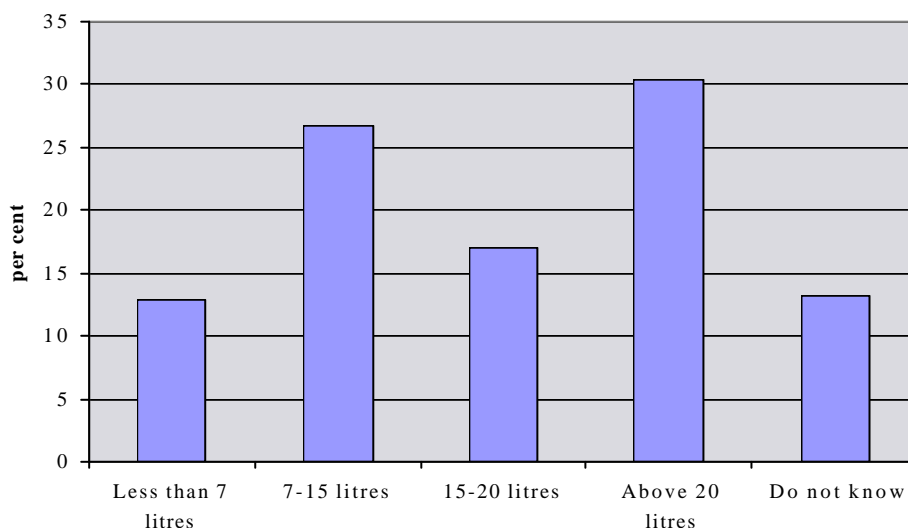


*Source:* Survey by the European Commission, Humanitarian Aid Office (ECHO), National nutrition and water and sanitation survey, Tajikistan, 2003.
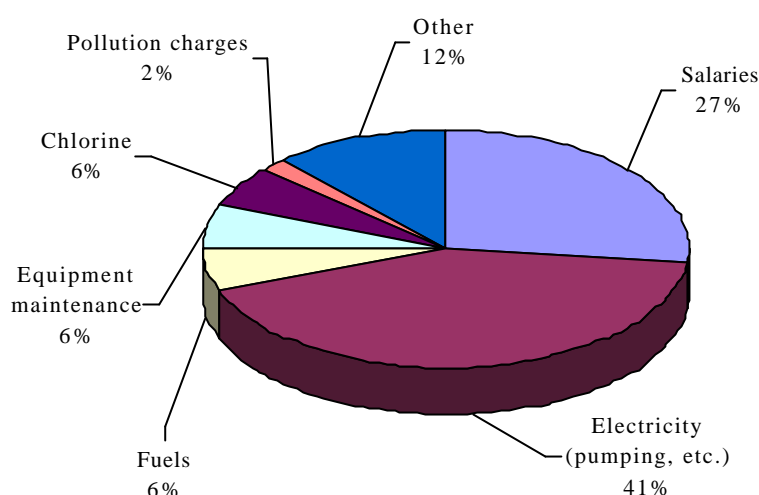
*Note:* It is generally assumed that 50 litres/capita/day is a minimum to cover the four basic human needs: drinking, food preparation, bathing and excreta disposal.

**Figure 8.5: Dushanbe public water service, breakdown of expenditures, 2004**



*Source* : Dushanbe Vodokanal, 2004.

Seventeen per cent of homes are connected to a sewage system, of which only 2% in rural areas. Many rural and some urban settlements have no waste-water treatment plants and use individual latrines that, in approximately two thirds of the cases, are located too close to water streams and pollute them. In 1999, domestic waste-water discharges through sewage systems amounted to 26 million m$^3$. These discharges have been reduced by more than half since 1990, but this is merely because many waste-water treatment plants are obsolete and no longer function. Only 20% of the 57 waste-water treatment plants still work. Except in Dushanbe, there is no biological treatment either because the plants never had the capability or because operating costs (electricity) are high. Intestinal diseases, which are frequent and dramatically increased between 1990-2000, are attributed to unsatisfactory waste-water treatment.

Overall, the drinking-water supply network and purification facilities as well as the sewage network and waste-water treatment plants are in poor condition, deprived of maintenance, crumbling and in many cases no longer in operation. The country cannot afford the investment needed to improve its water infrastructure.

## 8.4 Water management and objectives

### *Policies and strategies*

Sharing water resources is both crucial and complex in Central Asia, where cotton production, one of the most water-intensive agricultural activities on the planet, is a key pillar of the economy. In Tajikistan, the situation is further complicated by a number of interrelated and conflicting interests that affect water resource management, especially the surge in demand for hydroelectricity in winter and for water for irrigation in spring and summer, and the need to manage water with the other Central Asian countries.

The sustainable use of water and its protection are high on Tajikistan's political agenda. The President has officially expressed his strong political commitment to improving the water situation on many occasions. He participated in the United Nations General Assembly when it declared 2003 the International Year of Fresh Water and, in the summer of 2003, he organized the Fourth International Fresh Water Forum in Dushanbe. On that occasion, he emphasized that the national Concept on the Rational Use and Protection of Water, adopted in December 2001, was based on international cooperation among Central Asian countries and aimed at the rational use and conservation of water resources.

The 2001 Concept on the Rational Use and Protection of Water has two essential goals:
- Reaching self-sufficiency in energy and in food production. The Concept puts particular emphasis on improving and further developing hydropower production, since this is a key economic asset.
- Improving and rationalizing irrigation practices, as irrigation is instrumental in

ensuring food security and boosting employment.

Reaching these two goals requires a number of water-conservation objectives to be integrated. For instance, the ADB Agriculture Rehabilitation Project (2001) essentially aims to rehabilitate the irrigation network to prevent water losses, and to cut water consumption by introducing more efficient irrigation techniques, shifting to less water-intensive agricultural practices (even if cotton is to stay the main crop) and metering and pricing water.

Providing safe drinking water and improving sanitation are two other key targets of the President's policy. They are also among the United Nations millennium development goals (box 8.2). As called for in the Concept, a national clean water and sanitation programme has been developed but not yet adopted.

Some of the Concept's other priorities are protecting water resources, developing research and training staff. The State Committee for Environmental Protection and Forestry is responsible for elaborating the Concept and developing both a strategy and an action plan. This, however, has not yet been done.

### *Legislation*

According to the Constitution, water is State property, and the State is entrusted with ensuring its effective use and protection. The fundamental piece of legislation is the Water Code, which was enacted in 2000 and is now implemented through a dozen regulations. The Code strengthens the economic mechanisms for water use, and defines the organizational system for the regulation of water use and protection. It provides the legal basis for the water user associations (WUAs) and their relationship with the State water bodies. However, WUAs cannot own water-supply systems; they can only provide water management assistance. This is a serious drawback. The Water Code updates and clarifies the economic instruments. For instance, payment for water-supply services is clearly outlined. It also defines the rights and obligations of water users.

Nevertheless, this legal framework is insufficient, as pointed out in the Concept on the Rational Use and Protection of Water, which calls for regulations on updating tariffs for water use, on water monitoring, on drinking-water supply and on drinking-water protection. Other laws on water abstraction permits and the creation of an inspectorate have not yet been developed. There is still no legal basis for the abstraction and use of groundwater.

The Water Code does not introduce modern principles. It keeps water management highly centralized, does not provide for integrated management by hydrographic river basin, nor for the coordination of policies and actions among the all the bodies responsible, and says nothing about water monitoring, which is a fundamental management tool.

### *Institutional arrangements*

Water, as a strategic economic asset, has many uses and users. Its management is shared among a number of ministries and bodies, as defined in the 2002 Government Resolution on the Division of Authority to Regulate the Use and Protection of Waters among the Specially Authorized State Bodies. Five bodies are particularly involved:

- The protection of water bodies and their ecosystems is the responsibility of the State Committee for Environmental Protection and Forestry, which is also in charge of hydrometeorology. The State Committee is in charge of overall water resources management, and in particular of the allocation of water among the various sectors of activity, the practicalities of which are left to the responsible ministries or entities. It negotiates the agreements on river water sharing with neighbouring countries and monitors the national application of the water quota.
- The Ministry of Land Reclamation and Water Resources is responsible for the practical implementation of water allocation and supply to the agriculture sector, and is in charge of the operation and maintenance of the infrastructure for irrigation and supply to the rural population. It collects the related water service payments.
- *Tajikgeologia* monitors the aquifers and groundwater quality, and drills new wells.
- The Government Committee for State Control over Industrial Safety and Mining manages thermal and mineral water and ensure the safe operation of industrial mines and monitors the water drained from mines.
- The Ministry of Energy manages water flows for hydroelectricity production.

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**Box 8.2: Tajikistan and the water-related millennium development goal**

The millennium development goal for water, namely *to reduce by half, by 2015, the proportion of people without sustainable access to safe drinking water*, is relevant to Tajikistan. In Tajikistan this means that, by 2015, 80% of the population should have access to drinking water.

In its poverty reduction strategy paper, 2001, the Government expressed its willingness to reach this goal as soon as possible. This would cost an estimated US$ 14.8 million per year over 14 years, of which Tajikistan itself can afford to pay only 10 to 15% (US$ 1.7 million a year).

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All these State institutions have *oblast* and *raion* branches.

Other entities are also involved. The Ministry of Health, responsible for monitoring drinking water quality, and especially water-borne infections, is in charge of a network of 73 sanitary epidemiological stations. These are struggling to do their job as their budgets have been slashed (see chapter 12). The Tajik *vodokanal* units (in *oblasts* and *raions*) and Tajik *kommunservis* (housing and municipal services) operate water-supply and waste-water treatment facilities throughout the country.

This fragmented water management necessitates good relationships among the various ministries and bodies in charge of parts of the system. However, to date, there is little collaboration on this issue among the ministries, departments and municipal bodies. This hampers progress toward integrated water resource management, which is necessary to improve the situation. One example is the difficulty encountered in exchanging data between the State Committee for Environmental Protection and Forestry, which is in charge of measuring water quantities and quality through its Hydrometeorological Agency, and the Ministry of Land Reclamation and Water Resources, which needs such data for managing the water resources for irrigation. Therefore, the data on water resources are consolidated both by the State Committee, with data from its local branches, and by the Ministry. The drawing-up of a computerized water cadastre, which is ongoing as called for in the Water Code (art. 135), should streamline this issue.

*Management tools*

Monitoring

Six different agencies monitor water:
- The State Committee's Hydrometeorological Agency operates the hydrological observation network and monitors water quantity and quality (physical and chemical parameters).

There are 97 water monitoring stations, of which 81 are functioning at present. The frequency of measurements, the kinds of observations and the number of parameters controlled have been substantially reduced since 1991 owing to budget reductions (See chapter 4, on Information, public participation and education).
- The Ministry of Land Reclamation and Water Resources monitors the quantities of water withdrawn from its infrastructure by the different economic users, i.e. agriculture, hydropower, industry and domestic users.
- *Tajikgeologia* is responsible for monitoring the level and quality of groundwater below a depth of 15 m. It does this twice a year, but would like to do it every month if finances were available. *Tajikgeologia* also maintains the State groundwater cadastre.
- The rural and urban water-supply authorities (*vodokanals*) monitor the quality of water supplied to the population. They have great difficulty doing this since most of their laboratories have not worked since the civil war or have no money.
- The 73 sanitary epidemiological stations and laboratories monitor drinking water, in particular its bacteriological quality, and can enforce measures if they uncover pollution.
- The State Committee's *oblast* inspectorate is responsible for monitoring pollution sources and taking punitive action if concentrations exceed the permitted levels. It has four laboratories, which were newly equipped in 2003. They also subcontract chemical analyses to the Hydrometeorological Agency or other laboratories when needed.

In general, the monitoring institutions all have financial difficulties and little valuable information is drawn from the monitoring results at present (See chapter 4, on Information, public participation and education). Any data that do exist are used for punitive action rather than for sustaining protection or conservation measures. The most recent data

officially published on water by the State Committee for Statistics are from 2000.

*Regulatory instruments (standards and permits)*

There is no *water abstraction* permitting system at the moment. However, every water uptake, in particular that for hydropower, irrigation, industry and domestic uses, should be declared to either the State Committee for Environmental Protection and Forestry or the Ministry of Land Reclamation and Water Resources, which issue water use passports (see also chapter 2, on Policy, legal and institutional framework). Only the State Committee can impose sanctions for violations.

Water users report annually to their local environmental protection committees on the quantity of water that they use and the quantity and quality of the waste water (concentration of major chemical elements only) that they discharge to water bodies (see chapter 2). Users include industry, State and collective farms, water user associations, *vodokanal* enterprises, municipalities and industry. These data serve as the basis for calculating water pollution charges. Previously, charges were due only when maximum allowable concentrations (MACs) were exceeded. As of 2004, pollution charges will apply to all polluted discharges to rivers. For instance, Dushanbe *vodokanal* will be charged 0.15 somoni/$m^3$ if the pollutant concentration is below the MACs and five times more if it is above the MACs. Due to the current economic situation, few *vodokanals* will be able to afford these rates.

These data, based on user reports and not measurements, are aggregated annually by the regions and transmitted to the State Committee to provide an overall picture of water resource uses and protection. In parallel, the Ministry of Land Reclamation and Water Resources records the needs and consumption of its rural users, and also measures what it distributes. So two sets of data are generated separately, and they do not correspond (see chapter 2, on Policy, legal and institutional framework).

The local committees on environmental protection verify the preservation, relevant allocation and efficient use of all water resources. They also issue permits and licences for those entities discharging pollution directly into rivers and verify compliance with ambient water quality standards in theory for

197 major polluting agents, but in practice for about 30 (suspended solids, dry residue, biological oxygen demand and oil contents are mandatory). As monitoring functions poorly and local inspectorates are often understaffed, compliance with these standards is rarely checked.

Violations are listed in the Water Code. Some examples are the destruction of water infrastructure, pollution of water bodies, unauthorized water abstraction or water use, deviation from authorized use and non-compliance with water quality standards. In 2003, there were 3385 water inspections and 6763 notifications; enterprises were able to comply with about half of them after taking appropriate measures. The State Water Inspectorate applies fines and, when infringements are severe, actually closes down the facilities until they comply with the law.

Economic instruments

The system of payments for the use of water resources and for water services has existed since 1996. It has simply been incorporated into the 2000 Water Code, but the principles or levels have not been reconsidered. The rates are now being revised (see chapter 3, on economic instruments, environmental expenditures and privatization).

Water charges. The use of water, which is State property, is free of charge to the user. For instance, the hydropower industry does not pay for the water that it uses. Similarly, a company extracting groundwater does not pay for the water that it abstracts. There are water pollution charges, but they seem inadequate and their purpose is not clear. Few *vodokanals* can afford them, so in most *oblasts* the State Committee does not even levy them, preferring to let the *vodokanals* spend this money on repairs and maintenance (see chapter 3).

Water pricing. Consumers do have to pay for water-supply and sewage services (see table 3.7 in chapter 3). The Ministry of Land Reclamation and Water Resources sets the prices for water that is distributed through its infrastructure, i.e. mostly for irrigation. *Vodokanals* set different prices for supplying drinking water and collecting sewage depending on the *oblast* and the user. These prices need to be agreed to by the *hukumats*. *Vodokanals*, municipal water authorities and the Ministry, as owners of the infrastructure, have the legal right to levy these fees; water user associations do not since, by law, they cannot own water-supply systems.

According to the Ministry, few farmers can afford the fees for irrigation water. Moreover, as there is no metering, it is difficult to implement the system correctly and ensure that people pay for what they consume. The water quantities delivered by the primary and secondary channels are well known, but not those shared by communities, where there is no metering. It is therefore particularly hard to set water prices at a level that serves as an incentive to reduce consumption. The revenues from irrigation charges amount to 39 million somoni (i.e. US$ 14 million) per year, which is about 1/6 of the cost of maintaining the infrastructure. The change collection rate has been constantly decreasing for 10 years. Fifty-five per cent of the charges are collected at the moment, of which 25% is paid in cash and 30% in kind (e.g. agricultural products).

The payment for public water services is being increased with a view to ultimately covering the cost of the water distribution and sewage collection systems and facilities. At present, *vodokanals* face a difficult situation as revenues from the charges are insufficient to cover the full cost of operation and maintenance of their pipe networks and treatment plants (see fig. 8.5). Serious repairs and rehabilitation cannot be envisaged without external funds.

The tendency is to increase prices in an attempt to reflect better the cost of the service. For instance, in 2003 prices were multiplied by 2.5 in Khujand to 1 somoni per person per month. Although water is underpriced (30 dirams per person per month in Dushanbe) and mostly unmetered, paying for it is a serious financial burden for many people. Specific measures have been worked out by *oblasts* to ease the burden on the poorest (rebates or compensation). The State also provides subsidies: housing and municipal services received 150,000 somoni (i.e. US$ 53,500) in 2002 to provide water services to the poorest consumers. This is an important measure but is deemed insufficient according to UNDP.

The water sector is not privatized at present. The Water Code provides for the privatization of water assets and the possible introduction of foreign capital. So far, privatization has been limited to small infrastructure and minor equipment; the privatization of strategic assets (major channels, barrages, reservoirs) is not yet envisaged.

<u>Expenditures and investment in water management</u>

Before Tajikistan's independence, significant resources were devoted to water infrastructure, a situation that has changed dramatically:

- In the 1990s, there was a significant yearly allocation from the regular budget to the *water irrigation and drainage* network for maintenance and operation (for instance US$ 72 million in 1990), but those resources were progressively, and drastically, reduced over time (to only US$ 6.5 million/year). As a result, 50% of the irrigation system and 65% of the pumping system is worn out. According to a UNDP report (2003), roughly US$ 130 million (i.e. 26 million per year over five years) would be necessary to rehabilitate all irrigated land, and the operating and maintenance costs would then be about 22 million per year;
- The *hydropower* operating and maintenance budget was US$ 60 million in 1990; it is US$ 40 million today;
- According to the *vodokanals*, the actual budget for *water supply and sanitation* is about 1/3 of what is needed to cover operation and maintenance, i.e. excluding new investment. In 2002, the total budget for water and sanitation was 18.6 million somoni (US$ 6.6 million), of which about 25% came from domestic sources and 75% from external assistance. According to UNDP, to reach the millennium development goals US$ 207 million would be necessary till 2015.

Given the current GDP (US$ 1,210 million in 2002) and the fact that other infrastructures also have to be rehabilitated in the same sector, e.g. flood and landslide protection, and in other sectors (e.g. transport), the water sector is in an extremely difficult situation and Tajikistan will have to set priorities for its strategic investments.

<u>International assistance programmes</u>

Water management has benefited from important foreign funding. Over the past decade, international institutions have allocated about US$ 120 million through investment projects for the rehabilitation and development of the irrigation infrastructure and water-supply and sewage systems. The projects differed in nature and size, from a few big projects with large budgets, to numerous smaller projects developed closer to the local communities. The big

projects would not be possible without grants from donor countries to complement Tajik contributions.

The World Bank is currently financing three major projects: a water-supply and waste-water project in Dushanbe (US$ 19.5-million loan), a rural infrastructure rehabilitation project (US$ 24-million loan); and a risk mitigation project for Lake Sarez (US$ 0.5-million grant).

ADB is focusing on rehabilitating the irrigation and water infrastructure in the poorest regions. In 2002 it started a seven-year project worth about US$ 43.7 million, 20% is funded by Tajikistan and 80% with a loan. ADB also helps in capacity-building and the drawing-up of strategies and policies (for instance the strategy to improve flood management completed in 2001 but not yet implemented by Tajikistan as there is no funding for infrastructure rehabilitation).

Both the World Bank and ADB are preparing other important water projects in view of the poverty reduction strategy paper and the United Nations millennium development goals.

The United Nations also provides financial and technical assistance:

The Global Environment Facility (GEF), through the regional Aral Sea Water and Environmental Management Project (US$ 72 million, including a US$ 12-million GEF grant), has financed elements in Tajikistan, for instance on salinization, dam safety, transboundary water monitoring, efficiency in water use and public awareness.

UNDP water projects aim to provide safe drinking water and sanitation facilities and irrigation to the most vulnerable communities. It has also coordinated contributions from various donor institutions (European Commission's Humanitarian Aid Office (EU/ECHO) and Directorate General for External Relations, United States Agency for International Development (USAID)) and countries, mainly Japan and Switzerland, for clean drinking water projects, especially in rural areas. About US$ 3.8 million have been spent on the rehabilitation of 200 water systems, benefiting more than 1.5 million rural residents. These projects include training on behavioural changes in hygiene and the rational use of water, as well as capacity-building and training of system operators.

Bilateral cooperation in the water sector is also active and is essentially through grants. Water is a priority in Swiss cooperation, which is increasing its contributions to Tajikistan (from US$ 0.5 million budgeted in 2004 to US$ 2.6 million forecast for 2005). Switzerland has projects on dam safety and reservoir management, on hydrological forecasting, on integrated water resource management in the Fergana Valley, and on setting up an information base on water and water-related energy. It also participates in rural water supply and sanitation with UNDP and in the financing of a Dushanbe water supply project.

For 2002-2005, USAID is financing three hydrometeorological stations, which will improve the collection of data necessary to coordinate the allocation of water among the Central Asian countries (recipient Hydrometeorological Agency). USAID is also developing a farm irrigation pilot project to demonstrate good management practices.

In 2002-2003, EU/ECHO spent € 2 million on drinking-water facilities and is currently conducting a pilot study for the introduction of effective integrated water resource management in the Varsh river basin.

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**Box 8.3: A cross-border water project between Fergana Valley neighbours**

Residents of both Vorukh in Uzbekistan and Ravot in Tajikistan have access to the Isfarinka river. Once the growing season begins, farmers from upstream Ravot irrigate their fields, effectively cutting off access for Vorukh. The Peaceful Communities Initiative, a three-year USAID-funded project operating in the Fergana Valley, supported a council of active citizens who designed and implemented a project to optimize water sharing and water use between the two communities. From the design and the procurement of equipment to the digging of trenches, it was the community that turned the idea of accessible drinking water into reality. Three wells were repaired, a 3.5 km water pipeline constructed, with 52 public standpipes. The total cost of the project was about US$ 17,000, half coming from the community. Residents themselves have organized a water user committee to manage the system and collect money from residents.

Education

Education is an effective tool to change water uses and water consumption behaviours. It could be particularly important in Tajikistan to achieve a more sustainable use of water. Despite the efforts of WHO and the United Nations Children's Fund (UNICEF) to develop measures and teaching material for children and women at the local level on the sustainable and safe use of water, there is little education in water conservation for the public at large (see chapter 4, on Information, public participation and education).

## 8.5    Conclusions and recommendations

Water resources are abundant in Tajikistan. As is often the case, however, water management is complicated by the fact that there are many types of uses and users. In addition, the mountainous topography, combined with a high risk of earthquakes and floods, means that it is even more important to have the necessary infrastructure and management in place. Since independence, Tajikistan has had to reorganize all its water management institutions and to cope with a poorly maintained infrastructure at a time of severe economic difficulties. Tajikistan still has to make progress if it wants to meet the ambitious objectives on water that its President set in 2003.

It is difficult to have a clear picture of the situation, not only because water monitoring has been scaled back drastically over the past ten years, but also because data are produced by different institutions, independently and in isolation. Data on water should be regrouped and made widely available in a timely manner to yield an accurate description of the situation and the problems. These data should serve as the basis for water management decisions. In this regard the water sector is a good example of the conclusions drawn in chapter 4 regarding information processing and use, and recommendations 4.1 and 4.2 are particularly relevant to it.

Tajikistan's water policy is expressed in the Concept on the Rational Use and Protection of Water of 2001. If this document is retained as the State policy, its recommendations and objectives should be reviewed, specified, clarified and prioritized, and its cost and social impact estimated through a strategic action plan. This action plan could serve as a target indicator for all projects and actions decided by the Government in the water sector. It should be worked out through both a top-

down and a bottom-up approach, as needs should be inventoried from field level and consolidated at the State level, taking into account national strategic priorities.

According to the Concept, the State Committee for Environmental Protection and Forestry is responsible for drawing up a strategy and action plan. However, there are many stakeholders in water management – in Tajikistan as elsewhere. They all need to be involved to ensure a viable project in which all economic sectors will find their rightful place and cooperate to reach the agreed targets. At the moment, the State Committee is being restructured and does not possess the capacity or expertise to assume a leadership position in those negotiations. For this reason, it would be advisable to set up an inter-ministerial commission on water which, under the coordination of the State authority in charge of the protection and conservation of water, i.e. the State Committee, would develop the strategy and action plan in collaboration with all other ministries and bodies involved in water management.

Implementation of this action plan should be the responsibility of an operational department of the State Committee for Environmental Protection and Forestry. This department should work closely with the inter-ministerial commission on water and regularly report to it on its progress. It should delegate practical and specific tasks to other relevant bodies, e.g. ministries, local environmental protection committees and other important partners such as *vodokanals*.

*Recommendation 8.1:*
*The Government should as soon as possible:*
- *Set up an inter-ministerial commission on water to develop a strategy and action plan for the Concept on the Rational Use and Protection of Water.*
- *Entrust the State Committee for Environmental Protection and Forestry with the coordination of this commission, which should bring together all main bodies involved in water management, as well as local authorities.*
- *Make the State Committee for Environmental Protection and Forestry responsible for implementing the water action plan.*

At the moment, the capacity of the State Committee in water management is limited to a policing role, which is ensured by the State Water Inspectorate. The State Committee has no department specialized in water legislation, policy and strategies with a

long-term approach. Such a unit is necessary if the country wants to move towards modern and decentralized water management policies, including a water ecosystem management approach and an approach by catchment area.

*Recommendation 8.2:*
*The Government should strengthen the capacity of the State Committee for Environmental Protection and Forestry in water management. It should set up a water department to this effect, staffed with experts trained in modern water planning and management approaches. Assistance for staff training should be sought from the international partners developing water projects in Tajikistan.*

All water infrastructure, whether for water supply and sanitation, irrigation or flood protection, is in poor condition. This has a dramatic impact on everyday life in Tajikistan, affecting public health, diminishing food safety, limiting food production, and damaging habitat and other infrastructures. Although costly, action is necessary and urgent.

A major problem is that there are no data on the necessary investment and maintenance costs or priorities for rehabilitating and completing the water infrastructure. As a first step, a full inventory of the water infrastructure and an assessment of its status are required. In the light of this assessment and in view of the State priorities in other sectors (e.g. transport and agriculture), it would then be possible to define and rank priorities for investment in the water sector. The Government needs to set its priorities based on a cost analysis of the various options and their added value (including social implications).

Water infrastructure is known to be capital-intensive. The few data given above show how high the level of investment in water would be if Tajikistan decided to rehabilitate its water infrastructure (see the section on expenditures and investments above). In its present difficult economic situation, Tajikistan should select those projects that are the most urgent and efficient, in the water sector and in other areas as well. Once the priorities have been clearly and comprehensively set, Tajikistan would be in a stronger position to approach the international community for assistance.

When setting priorities for investment, it is important to keep in mind the commitment expressed in the 2001 Concept on the Rational Use and Protection of Water to supply safe drinking water to the population. This is further supported by the 2002 poverty reduction monitoring survey, which showed that safe drinking-water supply is the top priority for Tajikistan (see chapter 1, on Poverty, environment and economy). The Government should also favour the projects that are developed close to the users, as they have proven to be very efficient in the long run because they involve the population and contribute to behavioural training in water protection.

*Recommendation 8.3:*
*The State Committee for Environmental Protection and Forestry, in cooperation with all relevant ministries and bodies, should:*
*(a) Draw up an inventory of all water infrastructures (water supply and sanitation, irrigation and drainage, flood protection, including dams) and assess their status;*
*(b) Set national priorities for investment in water infrastructures taking into account the needs and projects of the various sectors involved in water management. These priorities should follow the strategic lines expressed in the Concept on the Rational Use and Protection of Water, once these have been more concretely specified, and other sub-strategies of the water sector (e.g. strategy on water supply and sanitation, strategy on flood management). These priorities should also be weighed in the overall context of the country's economic and social priorities and investment projects, with due regard to their affordability;*
*(c) Make all information regarding priorities and investment needs in the water sector widely known, in particular to all potential donors; and regularly organize meetings and improve cooperation with donors to keep them informed of the situation;*
*(d) Assess regularly the situation and readjust priorities accordingly, including keeping records of the projects in the water sector.*

Tajikistan also needs to modernize its management of water resources. At present, water resources are managed in a highly centralized and sectoral manner. Experience has proven that a management closer to the users and to the field gives better results. The concept of integrated water management by catchment area (i.e. hydrographic basin) is recognized to be the most efficient and rational and is becoming the international standard. Other Central Asian countries sharing water resources with Tajikistan are introducing it in their practices. The ultimate objective is to manage transboundary water basins at a regional level

(i.e. Syr Darya, Amu Darya and Aral Sea basins) in order to integrate and optimize water use and protection. The shift to a decentralized and integrated approach requires an in-depth reorganization of the institutions. This takes time and requires capacity to be built. In general, this cannot be done at once, but step by step. A first step could be the practical implementation of pilot projects of limited geographic scale, carried out in collaboration with partners having experience of such a watershed management approach (for instance EU/ECHO).

As it is now, the water legislation does not incorporate the concept of management by catchment area, which would require profound changes in the water institutions with decentralization of both decision-making and financing. The Water Code does not yet provide for such a principle and will have to be modified. Nor does it provide for sufficient incentives for water conservation and water protection. For instance, it contains disincentives to discourage users from polluting water (i.e. waste-water charges), but does not offer any positive measures to encourage and help users and polluters to improve water protection (e.g. rebates for investing in protection equipment or planting trees to protect river banks). The World Bank is willing to help in reshaping the water legislation and will start a project this year. Countries with experience in management by catchment area could also contribute. The Government could set up a working group of Tajikistan water specialists to work with foreign experts and benefit from their knowledge.

*Recommendation 8.4:*
*(a) The State Committee for Environmental Protection and Forestry should prepare and submit to* Majlisi Oli, *through the normal channels, a revision of the Water Code so that it fully incorporates integrated water management by hydrographic river basin;*
*(b) In drafting this revision, the State Committee should work closely with the Ministry of Land Reclamation and Water Resources,* Tajikgeologia, *the Government Committee for State Control over Industrial Safety and Mining, the Ministry of Energy and local authorities. It should also consider inviting foreign experts to participate in an advisory capacity.*
*(c) The Government should start implementing integrated water resource management step by step, in particular through pilot projects involving local communities. These can be*

*implemented in limited geographic areas, i.e. sub-basins, to test decentralized management. These pilot experiences should also be used to start building capacity in this new approach;*

Floods are natural and essentially uncontrollable phenomena. Human activities contribute to an increase in the likelihood of extreme flood events and adverse impacts. Tajikistan is particularly prone to them. Such events have frequently occurred in the past, and in July 2004 again, they severely hit the population of Dushanbe. Flood protection measures are insufficient. Although a strategy has been worked out in the past, it has raised little attention and has never been implemented.

Measures should be elaborated and should focus on the development of management plans according to catchment areas, the drafting of risk maps, developing and improving information and communication, and undertaking actions in a concerted and coordinated manner along the whole length of the river.

Flood management programmes should include the following elements: prevention (avoiding construction in risky zones and promoting appropriate land-use, agricultural and forestry practices), protection (structural and non-structural measures), preparedness (flood warning systems, informing the population of what to do), emergency response (developing response plans), recovery (mitigating social and economical impacts) and research (flood forecasting and mapping).

Instead of considering flood management in isolation, it is necessary to see it as part of an integrated and comprehensive approach to river basin management. A serious approach and solid strategy may also be a positive sign to attract foreign assistance to protection infrastructure development and construction.

*Recommendation 8.5:*
*The Authority responsible for river basin management, in close cooperation with all other concerned authorities and competent international organizations, should develop and implement flood risk management plans for each main river basin. These plans would include prevention, protection and mitigation actions and would be coordinated*

The current legal framework requires not only a revision of the Water Code but also a number of regulations, for example, on updating tariffs for

water use, on water monitoring, on drinking-water supply and protection, on abstraction and groundwater use permits and the creation of an inspectorate. These regulations are called for in the Concept on the Rational Use and Protection of Water, and it is essential that they should be drafted and submitted for enforcement as soon as possible to provide a comprehensive and workable legal framework for water management.

*Recommendation 8.6:*
*The respective competent authorities should draft the regulations called for in the Concept on the Rational Use and Protection of Water, including, inter alia, regulations on:*
- *The water tariff structure;*
- *Monitoring water resources;*
- *Drinking-water supply and protection; and*

- *A system of permits for groundwater abstraction and use.*

The President has included providing the population with safe drinking water as a key target of his policy, consistent with the millennium development goals. Furthermore, the Concept on the Rational Use and Protection of Water calls for the development of a national programme on clean water and sanitation. This task was assigned to the Tajikistan office of IFAS in cooperation with the Ministry of Health.

*Recommendation 8.7:*
*The Government should accelerate finalization and approval of the national programme for clean water and sanitation and start implementing it as soon as possible.*

*Chapter 9*

# BIODIVERSITY AND FOREST MANAGEMENT

## 9.1    Introduction

Tajikistan is located in Central Asia, in the mountain desert zone of the Eurasian continent. The natural landscape carries a rich biodiversity because of the large variation in vegetation zones created by a combination of latitude zoning and vertical belts, ranging from hot deserts and subtropics to permafrost and glaciers. The geological structure of Tajikistan is complex and its geodiversity, therefore, high.    Tajikistan is subdivided into five natural zones, or geosystems: foothill plain; low mountain and valley; mid-high mountain, light forest and forest; high mountain; and high mountain snow and glacier. The mountain landscapes cover 93% of Tajikistan. The flora and fauna consist of 23,000 known species, of which 1,932 are endemic.

In 2002, 73% of the population lived in rural areas. Encroachment by humans and their activities (agricultural expansion, housing development, cutting forests for fuel) frequently exerts pressure on protected areas, causing environmental degradation of the landscape, biodiversity loss and increased desertification. Sustainable use of biodiversity is crucial because the country and the rural population very much depend on what they can get from nature.

The most populated natural ecosystems are mid-low mountain semi-savannahs and foothill semi-deserts. Of Tajikistan's total area, 21.6% is protected. Tajikistan has started an impressive number of measures to improve biodiversity. Its main ecosystems are listed in section 9.3 below.

## 9.2    Plant and animal life

The present flora of Tajikistan began to form in the late Mesozoic period. The most important factor in fauna transformation was the gradual climate aridness that began as early as the late Cretaceous period.

The landscapes contain 9,771 species of flora and 13,351 species of fauna (13,000 species of invertebrates and 351 vertebrate animals). Of these, only 12% of the flora and 0.06% of the fauna are endemic. The country's rich genetic resources have many applications and great potential. The local population traditionally uses wild natural products, for example, as raw materials in construction, utensils and dye production. They also gather wild berries (sea buckthorn, barberries, currants, raspberries and haws), mushrooms, nuts and fruits and dozens of medicinal plant species. Farmers raise cattle, sheep, goats and horses, and some people hunt and fish. International hunting is also organized for some species, such as argali mountain sheep, Siberian ibex, urial and Tajik markhor.

Alien and invasive species are a great threat to the biodiversity of mountainous Tajikistan. Many ecosystems occupy small and separate sites that are locally isolated. The risk has increased due to imports of cultivated species of forage, food, medicinal, decorative and other species.

Alien species do not necessarily harm domestic flora or fauna; in fact, they may even be very useful. However, many invasive species are a threat to domestic species. In Tajikistan invasive species have also developed locally due to slight changes in climate. Alien flora species are estimated at 2,375. Most of these (2,265) have been introduced and used for decorative purposes. Invasive flora and fungi species are estimated at 702 and 2,000, respectively.

The fauna of Tajikistan consists of about 50 alien species, of which 30 are invasive. According to Tajikistan's First National Report on Biodiversity Conservation, the number of invasive insects and fish species may be close to 40.

**Table 9.1: The main components of biodiversity**

| No. | Composition | Number |
|-----|-------------|--------|
| 1 | Ecosystems | 12 types |
| 2 | Types of vegetation | 20 types |
| 3 | Flora | 9771 species |
| 4 | Wild relatives of cultivated plants | 1000 species |
| 5 | Endemic plants | 1132 species |
| 6 | Plants, listed in the Red Data Book of Tajikistan | 226 species |
| 7 | Fauna | 13531 species |
| 8 | Endemic animals | 800 species |
| 9 | Animals, listed in the Red Data Book of Tajikistan | 162 species |
| 10 | Agricultural crops | 500 varieties |
| 11 | Domestic animals | 30 breeds |

Source: Tajikistan. National Strategy and Action Plan on Conservation and Sustainable Use of Biodiversity. Dushanbe 2003.

*Rare and endangered species*

Tajikistan decided to prepare its Red Data Book in 1979; it was published in 1988. All included species are protected by the State. All red-listed species living in protected areas are also preserved.

The Red Data Book lists 226 flora and 162 fauna species. The most vulnerable fauna are mammals and reptiles: 44.7% of Tajikistan's reptiles are included in the Red Data Book and half of all its mammals; out of 84 species of mammals, 2 are extinct, 12 endangered and 28 considered rare, declining or undetermined. Among the mammals listed in the Red Data Book are the Bukhara red deer, the Persian gazelle, the Siberian mountain goat and the markhor. The Turan tiger is extinct. A number of birds are also endangered and are listed in the Red Data Book, for example a number of species of waders, birds of prey, pheasants, cranes, plovers, pigeons and swifts. Sixteen plants are extinct.

The total number of species in the Red Data Book, 388, seems very moderate, given that nearly 50% of the species of the mid-mountain mesophilic forest ecosystems are thought to be endangered because of reduced habitat. The total number of flora and fauna species in these ecosystems alone is estimated at 5,090, so 2,500 species may be threatened. This implies that the Red Data Book needs to be updated urgently. The State-of-Biodiversity Report of 2000 indicates a need to improve the structure of the Red List and include 8-12 species of vertebrates, 40-60 species of invertebrates and about 250 plant species.

The use of biological resources is very important. Wild species are widely used and people may not always know whether the species are endangered or not. For example, more than 60 species of wild medicinal plants that grow in forests are used in Tajikistan. Tajikistan tries, through public information and education, to raise awareness and improve understanding of the need to protect the threatened flora and fauna and to use the biological resources sustainably.

## 9.3    Major ecosystems

An important priority for Tajikistan is to preserve and manage its biodiversity and to conserve ecosystems to provide sustainable economic and social development. To this end, it needs to conserve its ecosystems, habitats and species, including its genetic resources. The National Strategy and Action Plan on the Conservation and Sustainable Use of Biodiversity provides the basis for this (see section 9.7). Particularly important is the conservation of ecosystems. Nine are listed in the National Strategy and Action Plan: nival glacier ecosystems, high-mountain desert ecosystems, high-mountain meadow and steppe ecosystems, mid-mountain coniferous forest ecosystems, mid-mountain mesophilic forest ecosystems, mid-mountain xerophytic light forest ecosystems, mid-low mountain savannoid ecosystems, foothill semi-desert ecosystems, and wetlands and water ecosystems. The strategy also identifies three anthropogenic systems. (See table 9.2)

**Table 9.2: Ecosystems**

| Types | Subtypes |
|---|---|
| Nival glacier ecosystem | • Glaciers and snowfields<br>• Rocks and taluses with rare vegetation |
| High-mountain desert ecosystem | • Rare vegetation<br>• Wormwood-teresken, steppe<br>• Dwarf-shrub-steppe |
| High-mountain meadow-steppe ecosystem | • Forbs meadow steppe, thymes<br>• Low-grass meadow, swamp |
| Mid-mountain conifer forest ecosystem | • Various-shrub steppe and light forest<br>• Forbs meadow-forest |
| Mid-mountain mesophyllic forest ecosystem | • Broadleaf forest<br>• Floodplain small-leaf forest<br>• Light forest, foliage tree, mesophyllic shrub |
| Mid-mountain xerophytic light forest ecosystem | • Highgrass, shrub, pistachio<br>• Forbs wormwood, almond |
| Mid-low-mountain semi-savannah (savannoid) ecosystem | • Highgrass<br>• Forbs and shrubs<br>• Low-grass semi-savannah |
| Foothill semidesert and desert ecosystem | • Lowgrass, saltwort-wormwood<br>• Sand, semi-woody, shrub |
| Wetland ecosystem | • Tugai<br>• Meadow, swamp<br>• Wetland |
| Agroecosystem | • Gardens, forestplantations, personal plots<br>• Rain-fed pastures<br>• Irrigable pastures |
| Urban ecosystem | • Municipal<br>• Industrial |
| Ruderal-degraded ecosystem | • Weed, ruderal |

*Source:* Republic of Tajikistan. National Strategy and Action Plan on Conservation and Sustainable Use of Biodiversity. Dushanbe 2003.

Over 30% of the country has been transformed into anthropogenic systems to meet its economic and social needs, but without due regard to the overall impact on both biodiversity and development. (See figure 9.1) These anthropogenic ecosystems include primarily agricultural and urban ecosystems. The agricultural ecosystems, which are found in all natural zones, have considerably increased over the past decade, without proper management, resulting in the destruction of fertile topsoil, salinization, swamping and landslides. Urban ecosystems are located in the most vulnerable environmental areas and have destroyed natural ecosystems irreversibly. Most invasive species are found in urban ecosystems. Attention is now being given to including valuable urban and rural green zones in protected areas.

**Figure 9.1: Main factors of anthropogenic impact on biodiversity**

| Forms of anthropogenic impact on biodiversity | | | |
|---|---|---|---|
| Direct withdrawal | Habitat transformation | | |
| Preying | Habitat degradation | Introducing alien species | Environmental pollution |
| • Hunting<br>• Collection<br>• Felling forests<br>• Fishing<br>• Poaching<br>• Gathering medicinal and food plants | • Ploughing<br>• Forests cutting<br>• Irrigation<br>• Constructing reservoirs and roads<br>• Cattle grazing<br>• Fires | • Choking<br>• Destruction of agricultural crops<br>• Harvest reduction<br>• Poisoning of animals and people | • Water resources contamination<br>• Waste<br>• Industrial construction<br>• Fertilizers and chemicals use |

*Source*: Republic of Tajikistan. National Strategy and Action Plan on Conservation and Sustainable Use of Biodiversity. Dushanbe 2003.

## 9.4    Protected areas

By law, specially protected areas and objects are categorized into nature reserves (*zapovednik*); national parks, including natural and historical-natural parks; strict species management areas (*zakazniks* also called nature refuges); nature monuments, tourism and recreation zones; botanical and zoological gardens; health resorts and other special preserves. The first three categories are the most important for biodiversity.

*Specially protected natural areas*

The first nature reserve was designated in 1938 in the Vakhsh delta. This area was covered with tugai brushwood at that time, and was home to a small population of Turan tigers. It was, consequently, named *Tigrovaya Balka*. The next two nature reserves, Ramit and Dashtijum, were designated in 1959 and 1983. Recently the species management area Zorkul was designated as a nature reserve. Altogether, the nature reserves cover 173,418 ha. However, Ramit has less value since it does not have its original conservation function. It is important to restore this.

Tigrovaya Balka nature reserve is located in the south. (See figure 9.2) There are many tugai forests in the reserve around the lower reaches of the rivers Vakhsh and Panj. The reserve extends over 49,700 ha. Ramit nature reserve is in central Tajikistan. It is situated between the rivers Sarbo and Sardai Migna, the main tributaries of the Kafirnigan, and covers 16,100 ha. Ramit nature reserve was established for the conservation of mid-mountain and high-mountain ecosystems in the centre of Tajikistan. One focus is the protection and restoration of mountain coniferous and broadleaved forests.

Dashtijum nature reserve is located on the southern slope of the Darvazsky ridge (the right bank of the Panj) and extends over 19,700 ha. Populations of markhor, snow leopard and Siberian ibex live there. Zorkul is in the south-east and includes the protected areas of Zorkul lake islands, where bar-headed goose and argali are preserved.
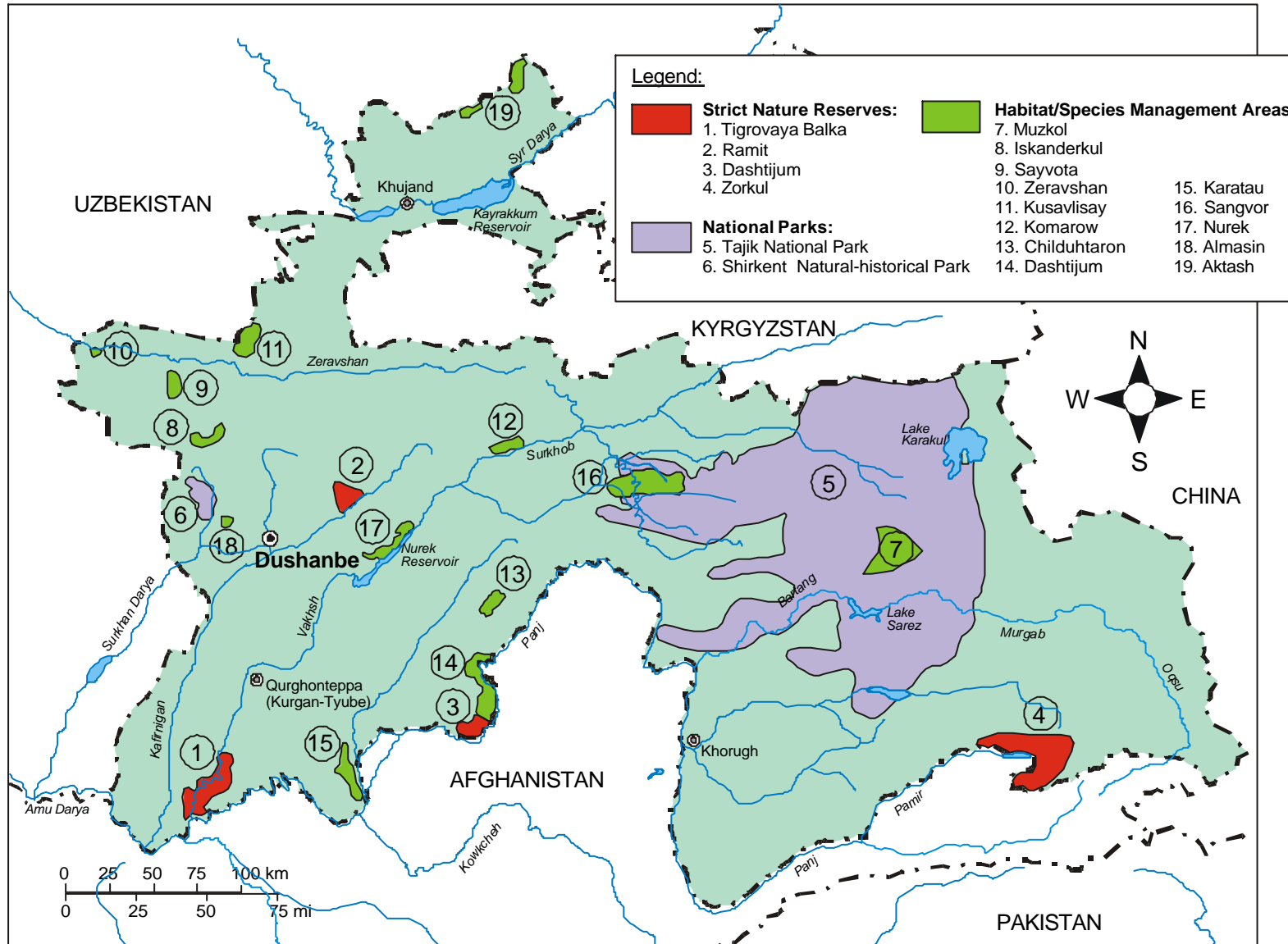
Fifteen species management areas, including Muzkol, Sangvor, Karatau, Komarow, Childuhtaron, Iskanderkul, Dashtijum, Sayvota, Zeravshan, Kusavlisay, Almasin, Nurek and Aktash, were established between 1959 and 1984.

They occupy a total of 313,390 ha. All species management areas are temporary and used for the restoration of selected species of animals and plants, usually those that are endangered or under threat. When comparing maps of protected areas from 2000 and 2002, it appears that Zorkul has been enlarged and upgraded to a nature reserve, and that the species management area Sari-hisor, enlarged from 40,000 to 196,000 ha in 1979, has been withdrawn. One micro species management area was also established.

Until recently, Tajikistan had only one designated national park. Shirkent natural-historical park is located on the southern slopes of the Hisor ridge (near Dushanbe). It holds 30 unique geological nature monuments, including three locations of dinosaur footprints. It was established in 1991 and covers 31,900 ha. Tajik National Park was first established in central Tajikistan in 1992. It includes mountain ridges, rivers, forests, lakes, cliffs and the largest mountain-mainland glaciers, in all about 2,6 million ha. Altitudes range from 1,400 to 7,495 m above sea level. The new Tajik National Park was enlarged in 2002. The national park and the natural-historical park now total 2,603,600 ha.

According to official figures of 1 January 2002, protected areas include 173,418 ha of nature reserves, 2,603 600 ha of national parks and 313,390 ha of species management areas. This is 3,090,408 ha in all or 21.6% of the country. (See table 9.3) The World Conservation Union (IUCN) guidelines recommend that 10% overall and 10% of each relevant habitat type should be protected. Remainders and fragments may have to be completely protected if they are small. Tajikistan's network of protected areas covers all its natural landscapes. This is overall very good. However, Tajik National Park, which includes only three or four ecosystems and two geosystems, makes up most of he protected area. Nearly 80% of the unique ecosystems are located outside protected areas. The current protected areas cover only 4 to 7% of the valuable ecosystems. For others, protection is low, especially since Ramit has undergone economic development and no longer has its conservation functions. In addition, two large species management areas are located within the Tajik National Park. There is, consequently, a great need for further protecting valuable ecosystems outside the high mountains and for improving the ecological network of protected areas.

**Figure 9.2: Nature reserves, national parks and species management areas, 2002**



Legend:

**Strict Nature Reserves:**
1. Tigrovaya Balka
2. Ramit
3. Dashtijum
4. Zorkul

**National Parks:**
5. Tajik National Park
6. Shirkent Natural-historical Park

**Habitat/Species Management Areas:**
7. Muzkol
8. Iskanderkul
9. Sayvota
10. Zeravshan
11. Kusavlisay
12. Komarow
13. Childuhtaron
14. Dashtijum
15. Karatau
16. Sangvor
17. Nurek
18. Almasin
19. Aktash

*The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.*

**Table 9.3: Protected area resources, 1 January 2002**

| Protected area category | IUCN category | Number | Area / thousand ha |
|---|---|---|---|
| 1 Reserves | I | 4 | 173.4 |
| 2 National parks | II | 2 | 2,603.6 |
| 3 Nature monuments | III | 26 | .. |
| 4 Zakazniks | IV | 14 | 313.4 |
| 5 Tourism and recreation zone | .. | 3 | 15.3 |
| 6 Botanical gardens | .. | 5 | 0.7 |
| 7 Botanical stations, temporary and permanent points | .. | 13 | 10.0 |
| **Total** | .. | 67 | 3,116.4 |

*Source*: Tajikistan. National Strategy and Action Plan on Conservation and Sustainable Use of Biodiversity. Dushanbe 2003.

Such work is under way and, according to the State Directorate of Protected Areas, two more parks have been developed in the past two years – the historic-natural park Sary-Khosor (2003, 5000 ha) and the natural park Medvejya Roscha (2004, 1200 ha). The Khujand region is also planning more nature reserves and species management areas. A good example is the new species management area Serdarinskaya, an alluvial area in the region. Serdarinskaya will include both river and land species. The State-of-Biodiversity Report of 2000 indicated plans for 19 new protected areas of almost 600 000 ha.

Tajikistan has designated five wetland sites under the Ramsar Convention. They are Kayrakkum reservoir, Lake Karakul, Lakes Shorkul and Rangkul, Lake Zorkul and the lower part of the river Panj. The last two sites are geographically coordinated with the Zorkul nature reserve and Tigrovaya Balka nature reserve. The reporting of data on the Ramsar sites is still poor. The Academy of Science does have data on the Kayrakkum reservoir.

There are 26 nature monuments that also contribute to the conservation of biodiversity, but they are so small that no area figures are reported. Natural monuments may consist of natural landscapes (e.g. mountains, rock formations, gorges), valuable geological exposures, sites with seismic phenomena, places of growing habitat value, relicts where the numbers of plants are diminishing, and landscapes with a predominance of cultural-historical objects (e.g. ancient parks, avenues, channels). There is a legal basis for enlarging the protected areas around nature monuments should Tajikistan so wish.

Tajikistan acceded to the Convention for the Protection of the World Cultural and Natural Heritage in 1992. It has not so far designated any world heritage site. Tajik National Park would be a good candidate.

*Other protected areas*

Aside from the above categories, botanical gardens, zoological parks and nurseries and botanical stations play an important role in the conservation of biodiversity. In Tajikistan there are five botanical gardens: Central Botanical Garden, Botanical Garden of Tajik State University, Khujand Botanical Garden, Kulyab Botanical Garden and Pamir Botanical Garden. There is one zoo, in Dushanbe, and seven operational nurseries that handle mainly undulate mammals. Unfortunately, due to the socio-economic situation, there has been little collection of new materials and the zoo, botanical stations and botanical gardens are in poor condition.

**9.5    Forest management**

In recent decades, deforestation has become a serious threat. Valuable juniper, walnut, birch and pistachio forests have shrunk by 20 to 25%, and tree cutting has led to an outbreak of weeds, alien and quarantine plant species, erosion, landslides and the impoverishment of winter pastures.

There are 1,941,000 ha bearing forest resources. Forest institutions manage 1,820,000 ha of this total. The three main forest ecosystem types cover 1,580,000 ha. The closed forest of 40% crown coverage or more is estimated at 401,000 ha. All data are reported for the year 2001 according to the National Strategy and Action Plan on the Conservation and Sustainable Use of Biodiversity. The closed forest is small – barely more than 20% of the total. If shrubs and trees are included, the area increases to 730,000 ha at most. Satellite

images show that 694,000 ha are forest or areas covered with trees and shrubs.

Only about 3% of Tajikistan is really forested, and its main function is to protect the environment. Since forests secure water, prevent erosion and protect soils, logging is generally prohibited except for sanitary tree-cuttings and restoration works. Clear-cutting is never allowed, only selective cutting. According to the Forestry Department, forests should cover at least 10% of the country. Much more forest is needed to reduce erosion and also for domestic wood consumption.

Generally, the productivity of the forests is poor. Only 10% has higher growth classes. The total volume in natural forests is estimated to just above 5 million $m^3$. This is less than 13 $m^3$ per ha of closed forest, a very low figure.

Tajikistan's forest resources consist of 200 species of trees and bushes, including rare, relict and endangered species. The major types are tugai forests, broadleaved forests, mixed birch and poplar forests, xerophytic pistachio light forests, desert forests and juniper forests. The structure of the forest is described in the figure below. The main type is three species of juniper covering 115,000 ha. The second largest type is pistachio (78,000 ha). (See figure 9.3)

The by-products from forests are very important. They are, for example, 60 species of wild medicinal plants, nuts, mainly walnut, onion, rhubarb, wild rose and honey. The forest is also used for cattle grazing.

There is no large-scale industrial forestry. The country depends on imports of sawn wood, wood-based panels, paper and paperboard. However, there is legal and illegal logging for domestic consumption.

Since the 1930s increasing amounts of the available arable land have been used for agriculture. As a result, more than 80,000-100,000 ha of forested areas, including tugai, pistachio, almond and broadleaved forests, have been replaced with agricultural crops.

Logging for construction and firewood and cattle grazing have also put pressure on forests. Silvicultural and sanitary cuttings are conducted each year on 7000 ha, yielding 5,000-7,000 $m^3$ of timber, but, according to the 2002 State of Environment Report, illegal logging adds up to another 500 $m^3$ per year. According to the First National Report on Biodiversity Conservation (2003), nearly 6000 ha of forested area with a total volume of 10,000-15,000 $m^3$ are affected by illegal logging each year.

Among the forest losses are good standing juniper forests and the unique pistachio light forests, largely as a result of improper cattle grazing. The situation is particularly bad in the Baldjuan, Muminabad and Khovaling regions. Cattle trample down young plants and so prevent any forest regeneration. Intensive cattle grazing is practised even in nature reserves and parks. Landslides, fires, pests and flooding also affect the forest. Altogether, annual forest destruction as a result of illegal logging, cattle grazing and natural disasters is estimated at 5,000 to 10,000 $m^3$, i.e. 1.5-3 times more than the natural increment and forests renewal in particular regions of Tajikistan.

A programme of reforestation has been in operation for some years. In 1986 some 4,000 ha were planted. In the ensuing years, however, reforestation decreased, declining to 3,000 ha in 2000. Of those areas that have been planted, success has frequently been reduced as a consequence of poor growing locations and species selection.

The Forestry Department manages five nurseries, which produce 2 million trees per year planted over 2,000 ha. The Department also gives away saplings to farmers to promote planting. Unfortunately, many foreign species are used. It would be better to promote domestic species. Dushanbe has also planted trees to restore and increase the green parts of the city and its surroundings.

**Figure 9.3: Structure of the forest area**
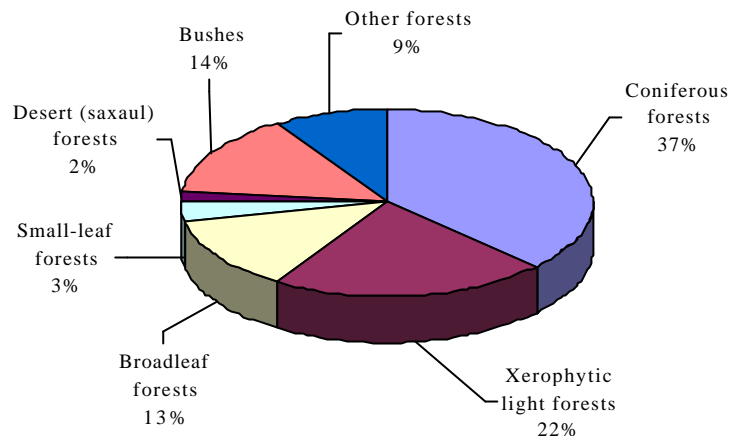
## 9.6    Hunting and fishing

Few people hunt and fish according to official records. Officially there are 11 species of game, 36 of birds and 20 of fish. There are six forestry hunting enterprises, covering 317,500 ha, managed by the Forestry Department. Hunting in these areas is allowed provided the game population is monitored. There are also limits on the number that may be bagged by species.

In addition, the Society of Hunters and Fishermen administers 36 hunting fields totalling 1,005,000 ha. Their sizes vary from 19,000 to 60,000 ha. The Society has 15,000 members and is an NGO and also supports the administration in issuing hunting and fishing licences. All 55 districts have an officer for this purpose. The State Animals and Plants Inspectorate supervises their work. Only paid-up members can obtain licences. In addition every hunter has to provide 36 hours of labour each year.

### *Hunting*

The hunting fields are managed to promote wildlife. The Society's voluntary work aims to improve the hunting grounds with their natural heritage and thus to protect biodiversity. Rehabilitation measures are implemented if necessary. The hunting fields have the potential to serve as an effective way to achieve sustainable hunting in natural sites. The Society helps to limit and control hunting and poaching, and it is willing to cooperate with international organizations on projects. The limits on hunting in the State forestry hunting enterprises are set between 5 and 20% of

the game populations except for animals whose numbers are declining.

The figures on bagged game include wild boar, Siberian ibex, fox, marten, badger, Tolai hare, partridge, pigeon and red marmot, but not waterfowl. Population figures are available only for the Siberian ibex and partridge. The forestry hunting enterprises' limits for 2001 were 48 ibexes out of an estimated population of 18,000 and 14,546 partridges out of an estimated population of 253,560. In 1990 there were an estimated 28,000 ibexes and 442,300 partridges. However, the number of partridge bagged in 2000 is reported to be 210.

More effort should be put into better presenting statistics on game population estimates, hunting limits and bagged game. In the First National Report on Biodiversity Conservation only two species, Siberian ibex and partridge, are reported with estimated populations and hunting limits. Statistics on actually bagged game need to be checked.

Poaching is widespread, and it is therefore difficult to get accurate figures on the total hunt. The National Strategy and Action Plan on the Conservation and Sustainable Use of Biodiversity notes that the following animals have been poached: snow leopard, urial, birds of prey, argali, Siberian ibex and Tajik markhor – many for export.

Poaching is a threat to biodiversity. Tajikistan has not ratified the Convention on International Trade in Endangered Species of Wild Fauna and Flora

(CITES), although it has the legislation and other services in place to do so. Given the widespread poaching on its territory, Tajikistan would benefit from acceding to CITES. CITES does not forbid hunting of red-listed species but ensures that the country organizes such hunting in a way that protects the animals for the future. Such a move would make the illegal trade more difficult and increase the possibilities for Tajikistan to capitalize on its assets. Improving conditions for the soldiers who patrol the borders could be one easy way to prevent the hunting of threatened species for food.

Fines for poaching and the hunting of rare animals are set in the Annexes on Calculation of Fines for Violations of Animal Protection Legislation to the Resolution On Hunting and Hunting Enterprises, adopted by the Government in 1997. The fines depend on the degree to which the species is threatened and the number of species. There are also charges on the legal use of biodiversity resources. (For more information, see chapter 3, Economic instruments, environmental expenditures and privatization.)

The State Animals and Plants Inspectorate is responsible for controlling legal hunting, for following up the payment of penalties on a monthly basis and for checking the need for sanctions for illegal hunting or fishing annually. Failure to pay results in court action and the confiscation of any equipment that is used illegally, including cars and boats.

Other types of animals, such as rare and endemic insects, are also caught for collections, thus rapidly reducing their populations.

It is possible to get a licence to shoot, catch and gather animals and to export animals, their parts, trophies and other wild animal products. Such a licence can be issued, for a charge, for red-listed species for scientific or other purposes, including hunting. About 0.5%, or some 60 licences, are reported to target red-listed species.

### *Fishing*

The conservation and rational use of fish is also an important challenge for managing biodiversity. To improve fish stocks there is a need to protect fish, to develop quotas and norms for fisheries and to raise public awareness. Poaching is thought to significantly reduce endangered fish species. As with illegal hunting, it is necessary to apply penalties effectively. The State Animals and Plants

Inspectorate controls legal fishing and follows up sanctions for illegal fishing yearly.

It is permitted to catch up to 3 kg a day of red-listed species and up to 5 kg a day for other species. The most important objective is to reduce the catch of red-listed species. The pressure from a variety of introduced species on endemic species is huge.

A promising option for fish conservation is artificial fish-breeding. The first fish-breeding farm was built in Khatlon region in 1951. By the 1990s, there were 10 fisheries; they reared more than 80% of total fish production. In 1991, fish production totalled 3,944 tons, of which 3,298 tons were produced by fisheries. It is necessary to restore the network of fisheries and to prevent their fish from escaping into lakes and rivers.

There is an important fishery in the Kayrakkum reservoir. The catch of 100 tons in 1998 was, however, only one third of what it was in 1990. The water of the reservoir is polluted by nearby agricultural farms. Water from the reservoir is used for irrigation, and the reservoir itself is used, to some extent, for growing rice. Pesticides are forbidden. Old pumping stations have no shelters to protect the fish, and therefore the young fish are being killed. Rebuilding the old pumps would help. Erosion from upstream brings silt into the reservoir, where its sedimentation creates a need to dredge. This need should be observed. Fishing is not allowed from 1 April to 15 June, when the fish are spawning.

## 9.7 Policy objectives and management

### *The policy framework*

In September 2003, the Government adopted its comprehensive National Strategy and Action Plan on the Conservation and Sustainable Use of Biodiversity to provide both in-situ and ex-situ conservation. It includes a general action plan on biodiversity conservation and 15 individual actions plans, one each for the nine ecosystems, and the remaining six for: species conservation in natural habitats (in situ); biodiversity conservation outside natural habitats (ex situ); creating a national ecological network; biodiversity conservation at the geosystem level; urban ecosystems; and agro-ecosystems. It is a long-term programme with activities for the short term (five years), medium term (ten years) and long term, at a cost of US$ 27 million.

The National Strategy and Action Plan sets the following main strategic priorities:

- Developing regulations and standards for biodiversity conservation and sustainable management, and economic measures for stimulating this work;
- Improving the legislative base for implementing State policy on biodiversity;
- Improving the work of NGOs; involving the public in the biodiversity decision-making process; and providing environmental education;
- Improving regional interaction and international cooperation on biodiversity;
- Establishing a joint centre for biodiversity management within the framework of general State policy;
- Organizing a biological monitoring system and creating an electronic database and databank on biodiversity;
- Providing scientific information and developing a personnel training system;
- Improving the scientific research base of biodiversity conservation and biosafety;
- Improving the management of the existing protected areas and establishing new ones;
- Biodiversity conservation in situ and ex situ;
- Restoring the structures and functions of degraded ecosystems;
- Providing sustainable management of biological resources (pastures, forests, wild animals);
- Reducing the negative human impact on urban ecosystems and biodiversity; and
- Using indigenous traditional methods of biodiversity conservation and sustainable management;

The National Focal Point for the Convention on Biological Diversity reports annually on the implementation of the Strategy and Action Plan to the Government. The First National Report on Biodiversity Conservation came out in 2003. Taking all the measures in the National Strategy and Action Plan alone is estimated to cost over US$ 30 million, of which the Government would provide 10 to 15% in kind plus an additional US$ 25 to 30 million in cash, of which approximately one third is labour costs. At present US$ 4 million is available for three years from the World Bank, GEF and UNEP.

The main challenges appear to be developing a detailed plan, step by step, to implement all the necessary measures. Not much time has passed since the National Strategy and Action Plan was adopted, and an important step has already been achieved with the creation of the National Biodiversity and Biosafety Centre. Also ongoing are information and education activities. In this field NGOs, for example the Pamir Ecological Group, are very active.

Through the National Strategy and Action Plan, the Government asks ministries and departments, regional and city administrations to take action to improve the local environmental situation particularly by increasing public awareness and promoting education on biodiversity conservation for sustainable development. The work of NGOs may constitute a particularly important contribution to this approach.

*The legislative framework*

Tajikistan acceded to the Convention on Biological Diversity on 29 October 1997 and to its Cartagena Protocol on Biosafety on 12 May 2004. Other conventions of importance to biodiversity that Tajikistan has ratified include:

- The Convention for the Protection of the World Cultural and Natural Heritage (1992);
- The United Nations Convention to Combat Desertification (1997);
- The United Nations Framework Convention on Climate Change (1998);
- The Ramsar Convention (2000); and
- The Convention on the Conservation of Migratory Species of Wild Animals (2001).

All these initiatives are positive for the conservation of ecosystems in Tajikistan and Central Asia.

Tajikistan has not, however, acceded to the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), and it is important that it should do so.

The principal legislation regulating biodiversity preservation is the Law on Nature Protection, which also includes landscape conservation. The Law defines protected territories and objects and public participation in environmental protection.

Other laws relating to natural resource conservation and protection include:

- The Land Code, which includes protection for historical or cultural reasons;
- The Law on Ecological Expertise;
- The Water Code;
- The Forestry Code;
- The Law on Specially Protected Territories;
- The Law on the Protection and Use of Animals;
- Law on the Protection and Use of Plants;
- The Code of Administrative Violations; and
- The Criminal Code.

According to the National Strategy and Action Plan, laws to regulate the conservation of wild plant and animal genetic resources, management of genetically modified organisms and the economic tools to manage plant and animal resources are still lacking.

There are some important government resolutions and documents: the Red Data Book (1988), Regulation on Taxes on Illegal Fishing or Killing Valuable Fish Species (1995), on Calculation of Fines for Violation of Forestry Legislation (1996), and on Hunting and Hunting Enterprises (1997) with Annexes on Calculation of Fines for Violations of Animal Protection Legislation. The regulations are listed in the First National Report on Biodiversity Conservation.

The system of laws and regulations is comprehensive and, with few exceptions, should meet the needs of biodiversity conservation, including with respect to EU legislation and directives. The main challenge is to implement the legislation and to raise public awareness of the need to comply with the laws. It is particularly important to keep the long-term commitment to protected areas. The Law on Specially Protected Territories should therefore grant species management areas the same long-term protection as the nature reserves and furthermore allow changes in land use only if compensatory measures are taken.

### The institutional framework

The State Committee for Environmental Protection and Forestry is responsible for scientific ecological research, biodiversity protection and the issuing of permits for the use of natural resources. Ensuring compliance with environmental legislation at a local level is the responsibility of the local authorities. Within the State Committee, the most important units for biodiversity and forests are the Forestry Department, the Forestry Inspectorate, the forestry production enterprises and the State Animals and Plants Inspectorate, including nature reserves and tourism. Forest districts report to the Forestry Department and the local administration of nature reserves and national parks report to the State Directorate of Protected Areas.

Institutionally, the functions of ecosystem conservation are the responsibility of the State Committee for Environmental Protection and Forestry and its local committees. The State Committee for Land Administration and the local authorities are also involved.

The State Committee for Environmental Protection and Forestry has been responsible for forests since it was established in 2004, following the transformation of the Ministry of Nature Protection. (See also chapter 2, Policy, legal and institutional framework.) Its Forestry Department is responsible for forest management activities, including harvesting and planting. Forestry production enterprises carry out a range of forest resource management functions, including sanitary cuttings, forest amelioration, growing nuts and fruits, and collecting medicinal herbs. They also manage the network of species management areas. Forest protection measures include preventing pest attacks, combating illegal loggers, fire fighting, and control over cattle grazing, haymaking and other operations in State-owned forests. About 2,000 persons work in these enterprises. Because these are new functions for the State Committee, the Forestry Department has not yet been well integrated into its overall structure. Considerable attention needs to be given to this issue.

Recently Tajikistan established the National Biodiversity and Biosafety Centre. Its main task is to monitor the application of the National Strategy and Action Plan on the Conservation and Sustainable Use of Biodiversity.

## 9.8    Conclusions and recommendations

The pressures on biodiversity in Tajikistan are many, and the situation of some flora and fauna species is quite unstable. Tajikistan's environmental authorities and NGOs are certainly aware of the severe situation, and they are working hard to provide for the sustainable use and protection of biodiversity.

In fact Tajikistan has created a solid base for future success. Biodiversity protection and nature resource management are well developed in the legislation. The National Strategy and Action Plan on the Conservation and Use of Biodiversity provides an effective species and ecosystem approach in the context of response measures and includes 16 action plans for the conservation of natural and anthropogenic ecosystems, species habitats and geosystems. One aims to create a national ecological network.

The main challenge is to implement the Strategy, which is likely to require a carefully considered, step-by-step approach. Not much time has passed since September 2003, when the National Strategy and Action Plan was adopted. The recommendations below represent one approach to focus on some important priorities.

The anthropogenic pressures on biological diversity, including forests, are, unfortunately, increasing and many natural landscapes are rapidly degrading. Therefore, measures to improve living standards is a priority; 73% of the population lives in rural areas, and they very much depend on agriculture and the use of flora and fauna. The loss of forest in particular regions may exceed the natural increment and forest renewal by a factor of 1.5-3. The need for reforestation is large, even if the human impact is reduced.

*Recommendation 9.1:*
*The State Committee for Environmental Protection and Forestry should prepare a plan for reforestation. The ongoing reforestation should make use mainly of endemic species and should be increased to cover the deficit between the loss of forest and the current rate of reforestation.*

The landscape is highly fragmented by nature and by humans. This fact underlines the need for further measures to protect natural assets outside protected areas and to develop ecological networks. It is important to maintain and rehabilitate the existing nature protection network and to establish new protected areas. Tajikistan recognizes that a broad species and ecosystem approach is needed. The most urgent priorities are protecting endangered species and their vulnerable habitats and developing the ecological network to secure protected areas and support ecosystem fragments in all landscapes.

The action plan on species conservation in natural habitats includes measures for the conservation of

species. A systematic approach to the conservation of endangered species and vulnerable habitats is the best way to focus on the most vulnerable species and habitats. Programmes for single species or groups of species or habitats should be prepared to secure their survival. The main basis for establishing such programmes is the Red Data Book. The Red Data Book of Tajikistan needs to be revised. Species programmes on measures for protection offer a good opportunity to identify all of the ministries and other organizations that should be involved.

*Recommendation 9.2:*
*(a) The State Committee for Environmental Protection and Forestry, with the support of the Academy of Sciences, should revise the Red Data Book in line with IUCN recommendations.*
*(b) For the most endangered species and habitats, the State Committee for Environmental Protection and Forestry should develop and implement protection and conservation programmes.*

Tajikistan has not yet acceded to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Ratification of CITES would support the survival of endangered species. Tajikistan has the legislation and other services in place to ratify the Convention. Ratification would also make the illegal trade from hunting more difficult and increase the possibilities for Tajikistan to capitalize on its assets.

*Recommendation 9.3:*
*The Government of Tajikistan should accede to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).*

Tajikistan has developed a systematic approach to the conservation of ecosystems and foreseen an impressive number of measures – 155 in all regarding natural ecosystems alone – in its National Strategy and Action Plan on the Conservation and Sustainable Use of Biodiversity. Some of these measures directly address species conservation.

This is certainly an impressive undertaking. It is fundamental to secure and develop the protected area network, design micro reserves, including micro *zakazniks* (key habitats), and create an ecological network. The umbrella for this is the action plan on creating the national ecological network. At present it is estimated that nearly 80% of the unique ecosystems with specific biodiversity

of valuable communities are outside the protected areas and reserved zones. Only 2 to 5% of unique biodiversity is found in the existing nature reserves, species management areas and national parks. The above-mentioned action plan stipulates the basic prerequisites for a national ecological network also with respect to neighbouring countries. The plan is scheduled for ten years; most of the measures should be taken in the next five years.

In the preparation of an ecological network it is important to protect micro reserves or even objects like valuable trees and to plan for their future protection to support the network and provide for conservation and sustainable use of biodiversity. At this point public awareness about biodiversity may not be strong enough to secure such small-scale protection. Many small areas are very difficult to control if the population does not understand and cooperate.

There is pressure to use existing protected areas. Even if the boundaries of the protected areas may be revised later, it is important now to secure and consolidate the protection of the existing nature reserves and species management areas. They are large, few in number and have dedicated staff. The inspectors do an essential but not very popular job. Better communication equipment will assist them in their control functions. A good way of better guarding and controlling the protected areas is to introduce mobile communication systems.

Later, when there is more public awareness as a result of the combined efforts of the authorities, communities, schools and NGOs, the micro reserves should be widely introduced. This might need to be done step by step due to regional or local differences.

The Ramsar sites could further contribute to increasing the protected area network. However, there is no reporting of data on the sites at present. There is nevertheless information available, so it should not be too time-consuming for the State Directorate of Protected Areas to complete the reports on the sites. There is also a need to better conserve the biodiversity of lakes and rivers.

*Recommendation 9.4:*
*The State Committee for Environmental Protection and Forestry should increase the protected area network and better protect the existing protected areas, particularly nature reserves and species management areas. Micro reserves should be widely introduced whenever appropriate sites are identified.*

Hunting and fishing provide livelihoods. The Society of Hunters and Fishermen works on a voluntary basis to improve nature and thus also to improve conditions for hunting. To ensure sustainable hunting Tajikistan needs population estimates as a basis for setting maximum hunting limits and statistics on bagged game. There is much information in the National Strategy and Action Plan on the Conservation and Sustainable Use of Biodiversity and the First National Report on Biodiversity Conservation. However, data are seldom comprehensive for a specific game species. In addition, red-listed species are hunted and fished. The day catch of red-listed fish should be revised. A better follow-up on the catch of red-listed fish species is needed.

*Recommendation 9.5:*
*The State Committee for Environmental Protection and Forestry, in cooperation with the National Biodiversity and Biosafety Centre, should collect and make publicly available data on fish and game stocks and establish reasonable quotas for hunting and fishing. The number of bagged game should also be provided.*

# PART III: ECONOMIC AND SECTORAL INTEGRATION

# Chapter 10

# AGRICULTURE AND LAND MANAGEMENT

## 10.1  Introduction

### Geographical areas and climate

Mountains and hills cover as much as 93% of Tajik territory. The climate is continental, and the country features a wide range of ecosystems. The four main vegetative zones are desert and steppe in the west, and alpine and meadows in the east. Both the population and agricultural production are concentrated in the valleys in the west of the country.

As in all countries dominated by mountains, Tajikistan has a broad range of agricultural regions. Khatlon *oblast* in the south is characterized by irrigated lowland and has a certain focus on cereal production. Citrus fruits can also be grown successfully. The intensive cotton production in the Fergana valley is an important feature of Sughd *oblast*. In the regions Under Republican Subordination, the Hisor valley is a particularly well-developed agricultural region. In this central region access to urban markets is good, land reform is making good progress and the irrigation network is in a comparatively good state. The sparsely populated Gorno-Badakshan Autonomous *Oblast* in Pamir has very little arable land. Due to the steep slopes, this arable land is frequently terraced. The abandoned highland steppe of Eastern Pamir, where the occasional sheep and yaks graze, is a huge contrast to the intensive, irrigated agriculture in the populated valleys of Sughd and Khatlon *oblasts*, and the regions "under republican subordination."

### Organization of production, general trends

The agricultural sector is very important in terms of its contribution to GDP - 24.4% in 2002. The sector employs 65% of the labour force (132% of 1991 levels) and generates 11% of export revenues. Almost three quarters of the population live in the countryside and the importance of agriculture for their survival cannot be overestimated.

About 4.1 million ha is agricultural land; the bulk of this land is pasture (table 10.1). The acreage of arable and irrigated land per capita is lower in Tajikistan than in other Central Asian countries. This is a bottleneck in the development of the country's economy, in particular in view of the rapid increase of the population. Of Tajikistan's total 851,000 ha of arable land, 719,000 ha are irrigated. Irrigated land generates more than 80% of agricultural production, and 85% of water use is for irrigation (see also chapter 8, on Water management). Most of the irrigated land, 83%, is found in the Khatlon and Sughd *oblasts*.

There are government plans to increase the irrigated acreage to 1,060,000 ha by 2010 and to 1,200,000 by 2025. However, funding restrictions will make it difficult if not impossible to reach these objectives. The geography and the topography make the development of irrigation more expensive in Tajikistan than in other countries of Central Asia.

For different reasons some of the arable land is not used, including 20-30% of irrigated land. Expensive inputs and deteriorating irrigation systems are important reasons. Agricultural production relies mainly on manual labour, since the material and technical bases for production have deteriorated significantly since the beginning of the 1990s and are not being renewed.

Until the dissolution of the Soviet Union in 1991, Tajikistan was an important supplier of products such as vegetables and citrus and other fruits to other Soviet republics. The crops were grown on State or collective farms using industrial farming techniques, but farm workers also grew products for export on private plots.

Following independence in 1991, Tajikistan's links with other Soviet republics were abruptly cut. Production of all major products fell drastically, and production is still below 50% of its 1991 level. Basic food such as wheat was no longer delivered from other parts of the former Soviet Union. These changes affected the economy of the country and the living conditions of its population negatively. With the civil war as an additional negative factor, hunger became a recurring problem. Consumption of meat and vegetables has fallen drastically, while consumption of cheaper food such as potato and

grain has increased. Food dominates household expenditure. (See also chapter 1, on Poverty, environment and economy.)

A series of droughts in 1999-2001 has contributed to the domestic food shortage, denting a trend of increasing production over the past few years. The country has a 20% food deficit, and even though grain production has increased, the need for imports was above 600,000 tons in 2002. Some of these quantities are supplied in food aid. Chronic malnutrition is still common among children.

**Table 10.1: Agriculture and land**

| | | |
|---|---:|:---:|
| **Total land (ha, 2001)** | 14,255,400 | ***** |
| Agricultural land (ha, 2001) | 4,574,900 | ***** |
| of which arable land (ha, 2001) | 739,100 | ***** |
| of which perennial crops (ha, 2001) | 102,200 | ***** |
| of which pasture (ha, 2001) | 3,689,700 | ***** |
| of which irrigated agricultural land (ha, 2001) | 718,900 | ***** |
| Winter pasture (ha, 2001) | 1,396,900 | **** |
| Summer pasture (ha, 2001) | 1,807,100 | **** |
| **Eroded land of total land resources (%)** | 82.3 | **** |
| of which water erosion (%) | 58.8 | **** |
| of which wind erosion (%) | 23.5 | **** |
| **Irrigated land affected by salinization** | 132,007 | * |
| of which weak salinization | 93,920 | * |
| of which moderate salinization | 21,737 | * |
| of which severe and very severe salinization | 16,350 | * |
| **Sown area (ha, 2001)** | 851,900 | ***** |
| Cereals (ha, 2002) | 389,000 | ***** |
| of which wheat (ha, 2002) | 326,000 | ***** |
| Cotton (ha, 2002) | 257,400 | ***** |
| Potatoes (ha, 2001) | 24,000 | ***** |
| Vegetables (ha, 2001) | 30,500 | ***** |
| Fodder crops (1000 ha, 2000) | 109,500 | ***** |
| **Animal production** | | |
| Beef cattle (1000 head, 2002) | 538 | * |
| Dairy cattle (1000 head, 2002) | 560 | * |
| Sheep (1000 head 2002) | 1,504 | * |
| Goats (1000 head, 2002) | 800 | * |
| Pigs (1000 head, 2002) | 1 | * |
| Poultry (1000 head, 1999) | 777 | * |
| **Private farms** (25 March 2004) | | |
| Private ("dekhkan") farms | 20,743 | ** |
| Arable land under private farms (%) | 53.0 | ** |
| Arable land per shareholder/farmer (ha) | 0.5 | ** |
| **Rural population of total  (%), 2001** | 73.5 | ***** |

*Sources* :

\*   World Food Programme.

\*\*  State Committee for Land Administration.

\*\*\*  UNDP. Tapping the potential, Improving water management in Tajikistan.
      National Human Development Report. 2003.

\*\*\*\*  National Action Programme to Combat Desertification in Tajikistan.
       Dushanbe, 2000.

\*\*\*\*\*  State Committee for Statistics. Statistical Yearbook 2002. Dushanbe, 2002.

The rural population relies on subsistence production on household plots, providing an estimated 50% of total household income in kind and in cash. Nearly all households have access to a small plot (0.1-0.3 ha). In 1996-1998, 75,000 ha were distributed in small plots according to a presidential decree. Total acreage of household plots is 125,000 ha, 60% of which are being irrigated. Most of the households own livestock.

The structure of production changed considerably after independence, as the share of production devoted to basic foodstuffs such as grain and potatoes has increased. However, cotton remains the dominating cash crop. There are still some marginal exports of tobacco, silk, fruits and vegetables to the Russian Federation and other countries. The domestic market is small, and can absorb only restricted amounts, in particular of fruits and vegetables.

The process of handing over to farmers the right to use agricultural land is ongoing, and private farmers now cultivate much of the agricultural land including pasture. In March 2004 there were 20,743 private, *dekhkan* farms with 923,000 shareholders covering 53% of the land. Some State farms (for research, seed production, and animal breeding) are excluded from privatization, but otherwise the aim is to privatize agricultural production before the end of 2005.

There are three kinds of private farms: farms of individual entrepreneurs, family farms and cooperative ("company") farms, this last category being in some cases only cosmetic transformations of former kolkhozes and sovkhozes. Central and local authorities tend to favour larger farms in an effort to promote cotton production. The "individual farms" and "family farms" are generally very small and may in the longer term be difficult to run efficiently. A typical family farm is 1-4 ha.

As the right to land use is being privatized, leasing of land is becoming more common. The leasing of land can be either formal or, as is often the case, on the basis of an informal agreement. There are, however, restrictions on the leasing of land.

Land privatization seems to be having a positive effect on production, but the new farmers are facing a number of difficulties. They do not seem to sufficiently understand their legal rights. Land privatization has not been coordinated with the privatization of livestock, machinery and other

means for production. The new family farms lack capital and machinery. Few can afford to buy a tractor. There is a need to develop cooperation among the new family farms on practical aspects such as the cooperative use of machinery, transport, processing and sale of products, and maintenance of irrigation systems. Some of the previous machine stations are now in private hands and can supply services to the farmers that have the means to pay for help with harvesting and other activities. Water user associations are being established, but this process will take some time.

Markets for agricultural outputs and inputs are liberalized but are developing slowly. With the exception of cotton, the processing of agricultural products is a serious hurdle. The availability of inputs and the further development of markets differ significantly between different parts of the country. Loan agreements often stipulate disadvantageous prices of inputs ahead of the growing season.

Restricted access to reasonable credits is also a problem. Cotton farmers can indeed get loans or input deliveries against futures contracts for their crop, but these loans are often expensive.

The development of extension services is an obligatory response to the greatly broadened scope of responsibilities of the new private farmer. Some steps have been taken, but the activities do not respond fully to the needs.

Finally, to reach sustainable development, the rural sector requires a road network and communication infrastructure. Transporting products and inputs, even within the country, is today difficult and expensive.

Several, mostly small-scale, donor programmes aim at overcoming different obstacles in agricultural production such as supplying microcredit, developing extension services, delivering inputs, establishing associations, rehabilitating the irrigation infrastructure, and seed multiplication.

## 10.2 Production

*Cotton*

Cotton is at the core of Tajikistan's agricultural production and policy. It brings in much-needed export and tax revenue for the State, and is important as a source of income beyond the farming population. A third of employees in the

farming sector depend on cotton. Tajikistan has a tradition and the natural conditions (water, climate) for producing high-quality cotton. Considering the distance from Tajikistan to export markets and the undeveloped transport infrastructure, cotton is among the few possible export products from agriculture in the short to medium term. Cotton is easy to transport and the contacts with buyers on the world market are well developed. It is the second largest export earner for Tajikistan after aluminium, generating about 10% of total earnings. Cotton is cultivated on about 45% of the irrigated land. During the past years annual production has been 350,000-450,000 tons, with a yield generally lower than during Soviet times.

The interest of the State and other stakeholders in cotton is reflected in the continuing top-down, Soviet-style control even if the private farmer is in principle free to decide what to grow. There is still a detailed plan for cotton deliveries and acreages, for the timing of sowing and harvesting, for all suppliers, down to individual farmers. The local administration applies strong pressure to achieve the objectives set higher up. Credits may be conditional on cotton planting.

The profitability of cotton cultivation is low. Successful cotton cultivation depends on the application of substantial quantities of inputs, and an expensive credit system has led to a widely distributed rolling-over debt of farmers. Local monopolies of the privatized cotton processing plants and export monopolies have kept the prices paid to the farmers for raw cotton down. Low world market prices and droughts in recent years have added to these problems.

It is difficult to predict the future opportunities and profitability of cotton production in Tajikistan. There are good opportunities for increasing the yield, but world market prices are volatile. An important condition for the sound development of cotton production is that farmers should receive a higher proportion of the world market prices and that the improved profits generated should be used to develop production, and in particular the infrastructure for irrigation.

Monoculture of cotton has negative environmental consequences, and lowers soil fertility. The pesticide and fertilizer use on cotton is high and its cultivation is negative for the humus content of the soil. It is important to improve crop rotation.

*Other crops*

With a favourable climate and diverse regions, there is a potential for the production of a wide range of crops. Cereals – mainly wheat and barley – are the dominating group of crops besides cotton. The acreage for cereals in 2002 was 364,000 ha (table 10.1). Production increased significantly between 1995 and 1997 but has since stagnated. About half of the wheat acreage is irrigated, and half rain-fed. Crop production on rain-fed arable land has increased considerably during the past years, and the unregulated use of frequently steeply sloping pasture as arable land is increasing erosion. Where the fields are difficult to drain, small-scale rice production is an alternative. There is a great need for animal feed, but the cultivation of forage crops has decreased since Soviet times.

Potato is becoming more important for subsistence and as a cash crop. Production almost trebled from 108,000 tons in 1996 to 318,000 tons in 2001.

During Soviet times Tajikistan was renowned for its production of fruits including citrus fruits in the Khatlon *oblast*. There is considerable scope to develop fruit and vegetable production, but it is not possible to do that beyond production for the local market without considerable investments in, among other things, transport and storage systems. Exports to or via neighbouring countries are difficult due to tariffs and other barriers.

Despite the problems, there is a trend towards higher-value products. Onions, potatoes, tomatoes, carrots and strawberries are widely cultivated on household plots, but are mainly sold on local markets. In some regions known for certain products, such as tomatoes and apricots in northern Tajikistan, there is some larger-scale production.

A low level of technology, low levels of inputs and low-quality seed material are negative factors for crop production. For example, cereals are often not sown into the sow bed, but instead spread and harrowed into the soil.

*Animal production*

With the collapse of the previous economic system and the livestock-processing facilities, production and consumption of meat and dairy products has changed significantly. Overall animal production decreased by as much as 85% between 1990 and 1997. During those very difficult times, animal

stocks were frequently sold for cash or slaughtered. Cows are particularly important, and if a family does not have a cow it is seen as a sign of poverty.

In the highlands of Eastern Pamir, sheep, horse and also yak are the key domestic animals in the difficult struggle to make a living.

After 1997 production recovered somewhat, and the stocks are increasing (table 10.1). Production, however, is still only at 30% compared to the 1980s. Pork production has been almost wiped out in response to national traditions and religious practices today. About 85% of the livestock is now in private hands, and most of the remaining State-owned herds will also be privatized. The large production complexes, or production units such as yak kolkhozes in the Pamir, that were typical in the Soviet period, no longer exist. The herds have in most cases been distributed to individual farmers.

Animal production is inefficient. Insufficient quantities of feed, little emphasis on genetic improvement and low quality of veterinary services are some of the reasons. Brucellosis is an example of a widespread livestock disease which can also affect humans.

About 3.7 million ha are used as pasture, most of which are summer pasture at high altitude (table 10.1). Summer pasture is not very intensively used, as the private owners of livestock cannot afford or make the effort to move their small herds. Before the dissolution of the Soviet Union, Tajik farms used summer pastures in Kyrgyzstan. This pasture is not available at present. From the time of the civil war until a couple of years ago, high-altitude summer pasture was not used. As a result much of the winter pasture has been overused with negative consequences for production and land degradation (see below). State-owned livestock is now sometimes moved to higher altitudes in the summer.

## 10.3 Environmental concerns in agriculture

### *Erosion and desertification*

Soil erosion and landslides are significant problems. Erosion is a widespread natural phenomenon due to the relief and climate of the country, but it is accelerated by poor land management practices, such as the cultivation of land on steep slopes; excessive cuttings of forests, shrubs and bushes including wind shelters (chapter 9); overgrazing; and improper irrigation. It is estimated that 82.3% of all land and 97.9% of agricultural land suffers some level of erosion.

A new and potentially very difficult erosion problem is caused by the unregulated ploughing of up to 100,000 ha of steeply sloping pasture as a way for farmers to increase the restricted acreages of arable land. For example, such fields are common on the hills surrounding the Hisor valley.

In the highlands of Eastern Pamir, one of the few adapted species, the shrub *Eurotia ceratoides* plays an important role for soil stabilization and also for grazing animals. The plant is used increasingly as firewood, leading to erosion and desertification, but also decreasing feeding opportunities for livestock and wild animals.

Erosion affects 60% of the irrigated land. One extreme example is the Yavan valley irrigation scheme. One fifth of this 6,000-ha irrigation scheme that was developed in the 1960s cannot be used because of erosion. Obikiik and Dangara valleys, Urtaboz, Karaul-Tyube and Garauty are other examples of places where irrigated land is eroded.

Increased pressure on the remaining forests (see also chapter 9, on Biodiversity and forest management) by the rural population, compounded by overgrazing close to the villages, is a particularly negative factor with regard to erosion. The available winter and summer pasture can feed the livestock, but the farmers cannot transport cattle and sheep to summer pastures. Overgrazing is most widespread in Khatlon *oblast*, but also takes place in Sughd *oblast* close to villages in the valleys. There are norms for the minimum acreage per grazing animal, but these norms do not seem to be followed. With an increasing animal stock, there is a risk that overgrazing will become a more serious problem.

About half the Tajik territory is desert or semi-desert. Deserts are found on the lowland as well as at high altitudes. Erosion and overgrazing are two of the factors accelerating desertification. Some others are deforestation, the development of transport and other infrastructure, and mining. It is sometimes claimed that high temperatures and low precipitation during individual years, which contribute to desertification, could be an effect of climate change.

Soil protection activities to decrease erosion and desertification have declined significantly since the

1980s. Similarly, no special measures have been taken in recent years to combat desertification. Planting of forests and other efforts are made mainly at the initiative of the local administration. This is positive, but increased efforts from central authorities would make a difference. Over the past decade only marginal resources have been devoted to monitoring erosion and desertification. The development of monitoring is included in the National Action Programme to Combat Desertification prepared in accordance with the requirements of the UN Convention to Combat Desertification.

### Biodiversity of crop plants and domestic animals

Central Asia is the place of origin for many cultivated plants, and Tajikistan is home to a rich spectrum of wild relatives of crop plants. There are also surviving landraces of domestic animals. During the Soviet period many of the crop landraces were exchanged for a few introduced varieties, but recent expeditions have shown that interesting landraces are still available. Much of what has been collected in terms of agro-biodiversity in Tajikistan is now in Russian research institutes. Fruit genotype collections set up during the Soviet period are deteriorating.

During the past few years, expeditions have been organized to collect landraces as well as wild close relatives of agricultural crops such as cereals, fruits and vegetables. The objective is to safeguard important genetic material for future generations. It is somewhat surprising that such expeditions have not taken place since the famous Russian geneticist N. Vavilov undertook them before the Russian revolution.

A small plant genetic resources unit has been established and a modest seed storage facility is being constructed with donor money. A gene bank for landraces of domestic animals has been established with the support of FAO.

### Irrigation and drainage

Irrigation and drainage are important for an efficient agriculture, but can also have negative effects on the environment and soil fertility. The link between irrigation and erosion was highlighted in a previous section.

During the 1990s the infrastructure for irrigation and drainage deteriorated seriously as the funding for maintenance dwindled from US$ 72 million in 1991 to US$ 6.5 million in 2002. Pumping is an important feature of Tajik irrigation and drainage, and failing pumps and increasing electricity costs are causing problems. As much as a sixth of irrigated land – 130,000 ha – cannot be used.

The deterioration of the irrigation infrastructure is slowing down, but significant resources are needed to make real progress. UNDP has calculated that it would cost US$ 106.2 million to rehabilitate the irrigated land that is not included in ongoing World Bank projects. Operating and management costs after rehabilitation are estimated at US$ 21.6 million annually.

Tajikistan has a soil salinization problem that is related to irrigation, even if this problem is less acute than in the downstream countries of Central Asia. More than 15% of irrigated land is salinized and 2,500 ha are lost annually, mostly in Khatlon *oblast*. Low-quality management, non-existent or non-working drainage systems, and a deteriorating infrastructure are the main causes of salinization as well as waterlogging. It is claimed that the salt transported by the wind from the dry bottom of the Aral Sea also contributes to salinization.

Salinization and waterlogging are most frequent in Sughd and Khatlon *oblasts*. According to estimates by the World Food Programme, almost 40,000 ha of arable land is severely or moderately salinized (table 10.1). More than 40,000 ha are waterlogged. These figures may not give a full picture of the situation, as the resources available for monitoring are restricted, but it is obvious that economic and environmental consequences are significant. The Ministry of Land Reclamation and Water Resources estimates that salinization depresses cotton production by 100,000 tons a year.

### Use of fertilizers and pesticides

Pesticide use was high in the 1970s and 1980s, especially for cotton production. In 1985, pesticide deliveries exceeded 18,800 tons. Organochlorinated compounds could at that time be detected on a considerable proportion of the acreage, and it is claimed that traces of these compounds are still found in the environment. It is unlikely that these traces have significant environmental and health effects, but this cannot be stated with certainty without closer investigation.

In the 1990s pesticide use declined dramatically, and during the civil war, restricted access to

pesticides led to significant pest and weed problems. The use of pesticides increased after the civil war, but, because farmers are poor, it has stabilized at a low level, less than 2,000 tons per year. The lack both of training and of information for farmers hampers the good selection and proper use of pesticides. Cheap but inefficient pesticides are often applied. Moreover, pesticide sprayers are outdated and, if at all available, do not lend themselves to an even distribution of the active substance. The same applies to fertilizers. The farmers spraying pesticides do not use any protective equipment.

It is noteworthy that, already during the Soviet period, Tajikistan was well advanced in the use of biological and integrated methods to fight crop pests. Air spraying was abandoned early. This helped decrease the use of pesticides in comparison with other parts of the Soviet Union. Today it is the official policy to develop integrated and biological pest management, but the necessary information service and production of biological agents for pest management are not in place.

As with pesticides, the application of fertilizers is very low. Over 600,000 tons were applied annually during the last years of the Soviet period, in comparison with 100,000 tons at present. The use of fertilizers on cereals is estimated to be 10-15% of recommended levels.

Most inputs are used on the cotton crop and in the cotton contracts there are provisions for deliveries of pesticides and fertilizers.

Fertilizer and pesticide run-off from the fields should be significantly lower, even if increased erosion in irrigated and non-irrigated agriculture is a negative factor. The conditions for the storage, transport and application of the chemicals, however, are inadequate and may cause pollution.

Nitrate contamination in the Syr Darya from the cotton-growing districts is still considerable. This problem seems to be less pronounced in the south of the country. For pesticides as well as fertilizers, the lack of monitoring makes it difficult to define the magnitude of the problem.

*Pollution from animal production*

Most of the large animal production units have been dismantled, leading to a decrease in pollution from manure in some districts. However, manure handling in smaller-scale animal production also

pollutes water with nutrients and organic substances, probably with significant negative effects on drinking water (see chapter 8, on Water resources management and chapter 12, on Health and environment). Producers tend to store manure in the villages or in the field for a considerable time before spreading it, which increases the risk of run-off of nutrients and other substances.

*Soil contamination and destruction*

The state of the waste management facilities causes local soil contamination and problems for agriculture. For example, it is claimed that buffer zones around radioactive waste dumps in Faizabad *raion* are used by the local population for livestock grazing. (See chapter 7, on Waste management.)

Deposition of air pollutants may also cause contamination. The soil is contaminated with fluorine in the vicinity of the aluminium smelter of Tursunzade – on both sides of the border with Uzbekistan - and this is reportedly making livestock ill.

## 10.4 Decision-making framework

*The policy framework*

The State Environment Programme for 1998-2008 highlights the importance of land recultivation, anti-erosion activities and improved drainage. Land use is among the priorities of the State Committee for Environmental Protection and Forestry.

The central policy document for the agricultural sector, the Mid-term Programme to Overcome the Crisis in the Agricultural Sector and Priority Directions for its Strategic Development until 2005, was adopted in 2000. One of its top priorities is to increase productivity to the levels of the early 1990s, and thus to improve food security for the population. It also aims to improve the quality of Tajikistan's food products and develop markets for them. Privatization of agricultural production before the end of 2005 is a main component of the Programme.

The Programme for the Development of the Cotton Sector for 2002-2005, adopted in 2002, reflects the efforts of the authorities, by using directives and orders in a Soviet tradition, to increase cotton production. This Programme focuses on new technologies, improved and increased deliveries of inputs, the organization of machine stations and new, improved cultivars. From an environmental

and land management perspective, it is positive that the Programme includes efforts to improve the irrigation infrastructure, crop rotation, integrated pest control, and control over the import and use of pesticides. Its implementation, however, is weak.

Land improvement and land stabilization are important parts of official policy, but there is very little funding available from the national budget. There are no broad programmes for land improvement, even if smaller-scale efforts are made, for example, to plant trees on the *raion* and local levels. The funding for this comes from different sources, including local budgets.

Tajikistan is a Party to the United Nations Convention to Combat Desertification. The National Action Programme to Combat Desertification was adopted in 2001, but implementation has not yet begun. A GEF project to support its implementation is under preparation.

The National Strategy and Action Plan on the Conservation and Sustainable Use of Biodiversity includes a number of actions on plant and animal genetic resources in agriculture, but the lack of funding has been holding back implementation. (See chapter 9, on Biodiversity and forest management.)

The Ministry of Land Reclamation and Water Resources aims to improve the efficiency of water use, and one of the tools to reach that objective is the introduction of payments for water. Such payments are important both as an incentive to use water efficiently and as a source of funding for water infrastructure maintenance. Agricultural water users pay for water supply to the Ministry of Land Reclamation and Water Resources. The intention is to set up water user associations (WUA) to represent individual farmers and farms. Some WUAs have been set up within the framework of different projects. They agree with the regional office of the Ministry on their water needs for irrigation, and the individual farmer or farm pays via the WUAs for the water according to acreage and planned crops. This is a good starting point for encouraging more efficient water use, but the system needs to be developed further. So far water prices are the same throughout the country, but there are plans to introduce differentiated tariffs. Collection rates are about 40%, but, even if all charges were collected in full, they would cover only about 10% of maintenance costs, minus energy costs. (See also chapters 3, on Economic instruments, environmental expenditures and

privatization and 8, on Water resources management.)

The lack of funding hampers the active pursuit of agricultural and other policies. International projects are important for the further development and implementation of land, water, environmental and agricultural policies.

Two World Bank projects,[5] with total lending worth US$ 40 million, are supporting land privatization, rehabilitation of water infrastructure, drinking-water supply, establishment of water user associations, training and extension for farmers, and credits to farmers in pilot districts. One of the projects has an environmental component that includes monitoring. The project aims to increase water supply and efficiency on 130,000 ha.

A US$ 35-million loan from ADB to fund an agriculture rehabilitation project will be used to rehabilitate another 85,000 ha of irrigated land. A project funded by the Swiss Agency for Development Cooperation in the three countries sharing the Fergana valley is focusing on the organization of agricultural production and opportunities for improving productivity and water use efficiency.

As has been stated in other chapters of this review (e.g. chapter 4, on Information, public participation and education), the lack of monitoring data and of recent inventories makes it difficult to develop cost-efficient policies and action programmes. This is a matter of concern also for the authorities in the land management, water and agricultural sectors.

*The legal framework*

The Law on Nature Protection has several articles related to agriculture. They regulate, for instance, the use of fertilizers and pesticides, the use of biological and chemical substances and protection against such contamination in food, soil protection and the rational use of land, and protection against pollution from livestock farms.

According to the Constitution, all land is State-owned and cannot be sold. The Land Code is the main law regulating land use, including its administration and taxation. A land user can lease land, receive land for use for an unlimited time or (for physical persons) for life with the right to

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[5] Farm and Privatization Support Project and Rural Infrastructure Rehabilitation Project.

bequeath it. According to the Land Code, each homestead has the right to a plot of 0.15-0.40 ha.

The Land Code includes mechanisms that make it possible to take the land-use permit away from farmers, including in situations where land use causes land degradation. This decision is taken by the *raion* administration. "Proper" use of land includes sowing and harvesting crops: a farmer without the means to buy seeds and other inputs during one year risks losing his right to use the land. In practice, land is "expropriated" only if it has not been used during two consecutive years, and this procedure is most common with State farms. For lesser violations, fines may have to be paid by the land user. Fines from land users totalled 100,000 somoni in 2003.

The 2001 Law on Land Administration obliges the authorities to map and monitor the quality of land, including soil contamination, erosion and waterlogging. The Ministry of Agriculture is preparing a new law on soil fertility.

The 2002 Law on *Dekhkan* (Farmers') Farms (private farms) defines the process of privatization in agriculture. It also defines three different forms of private farms: farms managed by individual entrepreneurs, family farms and cooperatives or "company" farms. The shareholders of a former State farm decide, at a joint meeting, on which kind of private farm is to be created. This decision is approved by the local administration.

It is sometimes claimed that the privatization decisions are not fully transparent, and are guided by the "cotton interest" of the State and other stakeholders. Larger farming units are obviously easier to control and to be persuaded to cultivate cotton than are a large number of smaller farms. The fact that irrigation systems cover greater acreages and need to be maintained as one system is another reason for keeping larger farming units together.

The administrative cost for private farmers to receive a land certificate varies from US$ 40 to US$ 200, which is a constraint. Each land user is further obliged to pay land tax, depending on the category and quality of land, and as much as 85% of this tax should be used for land improvement. However, the tax is used also for other purposes. In 2003 it generated 12.5 million somoni.

Due to the dependence on irrigation, the Water Code (2000) is of significance for agriculture and land management. The Water Code provides, among other things, the basis for the establishment of water user associations. The Water Code is discussed in chapter 8.

The Law on Ecological Expertise (2003) and the Resolution on the Establishment of the Commission for Chemical Safety (2003) set up a rudimentary legal framework for the registration and use of pesticides and other chemicals. The Commission for Chemical Safety manages the system of registration, testing and control of pesticides. It is chaired by a deputy Prime Minister and includes representatives of, among others: the State Committee for Environmental Protection and Forestry, the Ministry of Health and the Ministry of Agriculture. A working group prepares the meetings of the Commission. The Commission approves a list of pesticides upon application from producers or distributors. A new list of chemicals is being prepared.

*The institutional framework*

The Ministry of Agriculture has the primary responsibility for agricultural policies, but with the ongoing privatization of production its role is diminishing. Its staff has dwindled drastically over the past few years. The Department for Land Use, with a staff of only three, is responsible for issues related to the sustainable use of agricultural land.

The involvement of the State Committee for Environment Protection and Forestry in land management and agriculture is restricted. The State Land and Waste Inspectorate is responsible for controlling land use and guiding the work of environmental inspectors in *oblasts* and *raions.* Control is mainly directed toward soil pollution, drainage, land use, humus level, weed infestation and crop rotation. The resources of the Inspectorate are very meagre.

The State Committee for Land Administration with its *oblast*, city and *raion* offices[6] is responsible for land policy, land reform and the control of land use. It is the key authority responsible for the implementation of the Land Code. Its Main Department for State Land Control also controls land use in collaboration with the State Land and Waste Inspectorate. The Chair of the State Committee for Land Administration is in charge of

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[6] In the village administration (*jamoat*), the State Committee for Land Administration also has a local employee, a land surveyor.

the work related to the United Nations Convention to Combat Desertification. Two of the State Committee's institutes are responsible for much of the practical work related to land reform, including the land cadastre and the drawing of maps.

The Ministry of Land Reclamation and Water Resources is responsible for managing water resources and the water infrastructure (Chapter 8).

The Commission for Chemical Safety is responsible for the registration and use of pesticides and fertilizers (see previous section).

Cooperation and coordination among the different authorities is not always smooth. In this context, the cooperation between the Ministry of Agriculture, the State Committee for Land Administration and the State Committee for Environmental Protection and Forestry could be improved. For example, the flow of information among the authorities is limited. There is also considerable scope for improving cooperation and the division of labour between the inspectorates of the two State Committees.

Various institutes of the Academy of Sciences and Academy of Agricultural Sciences have a considerable capacity for research. As in other former Soviet republics, the system for research and education is under severe pressure due to a lack of funding. The Soil Science Research Institute and the Institute of Hydraulic Engineering and Land Reclamation, for example, are key research institutes for important issues such as the management of soils and irrigation. The research organizations are in some cases involved in information and training activities for the new private farms.

The Agrarian University in Dushanbe educates students in the whole range of agricultural specialties. It enrols 700 day students each year. A new specialty, agro-ecology, was started this year. There is an obligatory course in environmental protection. The Agribusiness Faculty trains future farmers.

The two above-mentioned World Bank projects on the privatization and rehabilitation of the water infrastructure for irrigation include a component on extension services. A centre for extension services has been set up. It organizes training courses for farmers, local administrators and specialists. In 2004 the plans are to train 7,000 people.

Environmental issues are raised in the Centre's 1- to 2-week courses.

The national Association of Farmers was established in 1997 and is developing dynamically. The Association has some 20,000 members using about half of the arable land in 245 local associations. Its main objective is to support the rights of the newly established farmers.

*Environmental awareness of farmers and organic farming*

The social and economic crisis that ensued after independence and as a result of the civil war can explain why farmers pay little attention to environmental issues, even though, for example, erosion is a direct threat to future production and farmers' incomes. Because of the difficult day-to-day situation, farmers may not even apply their knowledge and experience. If there are no affordable energy sources other than firewood, even forests planted to protect against erosion are likely to be cut down.

In addition to the difficult economic conditions, the lack of extension services and of information to farmers seriously hampers the development of agricultural practices that use inputs efficiently and safely, and land and soil in a sustainable way. Few of the new farmers have any agricultural education or access to advisory services even if the Government and different organizations are making serious efforts. Projects implemented by FAO, other international organizations and bilateral donors also focus on improving the supply of information and training to farmers.

In the present situation, the development of organic agriculture with certification of production cannot be among the first priorities and it is not likely that an internal market for organic products can be developed. However, there is experience in the biological treatment of pests and integrated pest management, and this could be a basis to build on for the longer term. Low labour costs are also a positive factor for minimizing the use of herbicides. Organic cotton production, which is developing in the United States of America, might be an option in the longer term.

## 10.5 Conclusions and recommendations

Agricultural production in Tajikistan is in a difficult situation, and the sector has to adapt to a dramatically changed structure of production, and,

with the exception of cotton, new markets. At the same time there are only marginal resources available to adapt to the new situation. It is understandable why environmental issues have not been a primary focus of this battered sector. In the current situation, it is very difficult to introduce elaborate environmental protection schemes in the agricultural sector. New or changed practices are likely to be introduced successfully only if they also improve production and living standards in the countryside. (See also Recommendation 1.2).

It is important to support the general development of the agricultural sector. The skills and financial situation of the new farmers and farm managers need to be improved, and markets for inputs and produce developed. Significant efforts are being made, with the loan-financed projects to rehabilitate irrigation infrastructure probably being the most important. A more efficient agriculture with an improved economy is likely to have a positive impact on soil and land management, on the efficiency of the use of inputs, and on the status of the water infrastructure.

Extension services and training are key instruments in the development of private agriculture. An important task for the extension services is to promote agricultural practices that decrease erosion, and ensure the safe and efficient use of pesticides and fertilizers. The attempts to develop extension services are commendable, but the lack of funding and a general mistrust towards the authorities are drawbacks. The scientific basis for extension services is important. Agricultural science is reasonably well developed, but its funding is very limited.

*Recommendation 10.1:*
*The Ministry of Agriculture should, as a priority, support the development of extension services by continuing and expanding existing efforts. For example, the Centre for Extension Services and the Association of Water Users established within an ongoing World Bank project should be given the opportunity to continue its work after the conclusion of the project in 2006. Official support and some basic State funding are necessary and would also make it possible to attract additional donor funding. The support for extension and training should furthermore focus not only on official structures but also on organizations outside the State sector.*

Land degradation, mainly erosion, salinization and desertification, are currently the most serious environmental problems related to agricultural production. The situation seems to be under better control than immediately after the civil war, but since these processes are in many cases irreversible and the available arable land is so restricted, these problems cannot be overlooked. It is particularly important to follow the development of overgrazing on winter pasture after privatization, and the development of non-regulated ploughing on steep slopes. Salinization caused by improper irrigation is probably the most acute problem.

The Government adopted its National Programme to Combat Desertification at the end of 2001. The Programme calls for a number of actions, including improving anti-erosion methods, increased public participation and the development of social and economic instruments for action against desertification. It is important for Tajikistan to fully implement this Programme.

Tajikistan's scientists, agricultural experts and State, *oblast* and *raion* authorities have significant experience and a high level of awareness with regard to land management and protection. Some *oblasts* and *raions* are also making efforts to protect land. Two obstacles in the fight against erosion and desertification are the lack of funding and a lack of awareness that the restructuring of agriculture and the changes in society call for new approaches. No single institution is able to take measures to combat desertification and land degradation successfully. Only joint and integrated efforts, based on good information, can promote cost-efficient measures and achieve their targets.

*Recommendation 10.2:*
*The State Committee for Environmental Protection and Forestry, the Ministry of Agriculture and the State Committee for Land Administration should work jointly to implement the National Programme to Combat Desertification, inter alia, by developing specific pilot projects to counteract erosion and desertification. Even if initial funding is low, it is important to establish and develop regular activities. Assistance from the international community would also be important for implementation of these projects.*

Cotton production is at the core of environmental concerns in Tajikistan's agriculture. Pesticide contamination, erosion and run-off of nutrients from fields, decreased humus content and soil fertility are just some of the problems linked to this crop. Important activities are included in the

Programme for the Development of the Cotton Sector for 2002-2005, but implementation is weak.

The production of organic cotton could be an objective in a longer-term process towards a sustainable agricultural production, but does not seem an option at present. Nevertheless, there are some basic conditions in place for the development of work in this direction. The effort of Tajikistan to apply integrated and biological approaches to pest management is one; the low cost for manual labour is another.

*Recommendation 10.3:*
*The Ministry of Agriculture should establish a programme to promote environmentally safe cotton production in collaboration with the State Committee for Environmental Protection and Forestry. This programme should include selected activities in applied research, support to the development of integrated pest management, targeted advice and pilot application of environmentally friendly production practices. International institutions should be involved in an*

*effort to transfer experiences from other countries. This, in turn, may attract co-funding from donors.*

Tajikistan is situated in one of the world's cradles of agro-biodiversity, which is also reflected in the wide range of landraces of crop plants and domestic animals that have been selected during the long history of agriculture in the region. Attempts are under way to support the conservation of important genetic material, but unless more is done, there is a risk that important biodiversity will be lost forever.

*Recommendation 10.4:*
*The Ministry of Agriculture, together with the State Committee for Environmental Protection and Forestry, should initiate a genetic resources conservation programme based on the National Strategy and Action Plan on the Conservation and Sustainable Use of Biodiversity to safeguard the genetic resources of crop plants and domestic animals. As this is of worldwide interest, discussions should be held with donors and international organizations on the funding of different activities.*

*Chapter 11*

# ECOTOURISM, MOUNTAINS AND NATIONAL PARKS

## 11.1 Introduction

Tourism has many faces. For the authorities, tour operators and NGOs in Tajikistan, tourism includes ecotourism and nature observation; mountaineering, skiing and rafting; hunting; tourism related to history, archaeology and ethnology; tourism for medical purposes, spas and convalescence; pilgrimages; congress and business tourism; and shopping expeditions

This chapter is concerned only with that part of tourism known as "ecotourism." The concept of "ecotourism" is nowhere defined. According to the World Tourism Organization and the United Nations Environment Programme (UNEP), ecotourism includes all nature-based forms of tourism in which the main motivation of the tourists is the observation and appreciation of nature as well as the traditional cultures prevailing in natural areas. In addition, ecotourism should:

- Contain educational and interpretation features;
- Generally be organized for small groups;
- Minimize any negative impact on the natural and socio-cultural environment; and
- Support the protection of natural areas.

Not all forms of nature-based tourism meet the criteria of ecotourism. In particular, commercial hunting of Red-List species in national parks is not ecotourism (although hunting based on ecologically sound data may contribute to the conservation of endangered species). Alpine tourism and related forms of adventure tourism often do not meet these criteria either. However, if thoughtfully carried out, they may not harm the environment and they may contribute to the economy of the country.

## 11.2 Present situation

### Tourist assets

Tajik National Park is the largest nature protection area in Central Asia, with a wide spectrum of mountain and high-mountain ecosystems. Established in 2002, the park contains 2.6 million ha and includes numerous species of flora and fauna, including the Marco Polo mountain sheep and ibex and snow leopard. The park also contains a number of glaciers, including the largest in the country, as well as hot mineral springs. There are two other natural parks, Shirkent and Medvejya Roscha, and one natural-historical park, Sary-Khosor.

They are all open to the public together with the nature refuges. The exceptions are the four State reserves, which are used primarily for scientific purposes and therefore have very restricted access. (See chapter 9, Biodiversity and forest management.)

According to the park's director and tour operators, the park has little or no infrastructure. There are only very few guesthouses in the southern villages. There are 15 trekking routes, but many other areas within the park have no access suitable for tourism at all. Other difficulties are the lack of well-trained tourist guides and the fact that the park is not well known; tour operators, tourists and the general public do not know much about Tajik National Park. These problems, together with the fact that the Fan Mountains are better developed, may explain why only 10% of all ecotourists in Tajikistan visit Tajik National Park and why there are hardly any commercial tours on offer in the park.

At present there is no hunting in Tajik National Park because of the reorganization of the State Committee. However, there are plans to resume hunting tourism. One of the intentions is to allow hunting of ibex, Marco Polo mountain sheep and bear, even though some of them are on the Red List of endangered species.

Mountaineers are mainly attracted by the highest peaks of the Pamir in the east (e.g. Pik Lenina or Pik Ismael Somoni) and the Fan Mountains in the west of Tajikistan. Trekking and hiking have developed basically in the vicinity of Dushanbe (e.g. Varzob and Romit Valley, Hisor) and in the Fan Mountains between Dushanbe and Panjakent (e.g. Lake Iskanderkul, Lake Sevan). Trekking is also recommended in the Wakhan corridor (Panj

and Pamir River). The Pamir Highway between Osh (Kyrgyzstan) and Khorugh is very spectacular.

Very few tour operators offer trekking or hiking in Tajik National Park, and no other protected sites are part of any tours (see below).

Some tours on offer, in particular those in the Fan Mountains or on Pamir Highway, are often combined with visits to Samarkand or Tashkent, both in Uzbekistan. Tajikistan also has historical and archaeological sites to offer (e.g. Sarazam, Surkh, Hisor, Istravshan, Panjakent), but they are of minor importance compared to those in the neighbouring countries.

### Number of tourists

According to the national tourism company, *Sayoh*, tourist statistics are in preparation but not yet available. In 2003 approximately 1500 persons visited Tajikistan for trekking or mountaineering, mainly from Western countries. Most tourists travelled in small groups, individual tourists being very rare. Roughly 10% visited Tajik National Park (100 for trekking and 80 for mountaineering).

According to tour operators, the *Sayoh* figures include a significant number of tourists only travelling from Uzbekistan to Panjakent and back. Hence, the number of tourists actually travelling around Tajikistan could be much smaller.

As noted in the State Programme for the Development of Tourism for the period 2004-2009, the number of Tajiks leaving the country for tourism exceeds the number of foreign tourists entering Tajikistan by more than 30%.

### Infrastructure

The constraints on tourism and ecotourism in Tajikistan include a lack of trained support staff and of information on ecotourism; poor accommodation facilities, road and air transport; and difficulty in securing visas and entry permits. Also lacking are rescue and medical services.

According to Sayoh and the tour operators, there are not enough well-trained people working in tourism. In addition, many NGOs criticize tour operators for their lack of ecological interest. At present there is hardly any collaboration between NGOs and tour operators.

The lack of accommodation outside the major cities is a serious restriction on tourism. In most cases, there is no alternative to camping, although there are a few guesthouses, yurta, or Soviet-style camps in trekking areas (belonging to trade unions). Whereas camping may not put off mountaineers or tough trekkers, the absence of other accommodation deters more demanding ecotourists.

There are 125 accommodation facilities in Tajikistan, including 51 hostels (18 in Dushanbe), 70 small and medium-size hotels and four larger hotels. In 2003 the total accommodation capacity was 1116. Hotels and hostels are often not up to Western standards. Most are in poor condition as a result of the need for major renovation, combined with a very high average vacancy rate (more than 80% according to the State Development Programme).

The road network comprises 29,000 km of roads, including eight highways leading into the country. Nevertheless, only 15% of entries are by car. The balance of 85% is by air, to three international airports. The roads are unevenly distributed. In particular, the trekking and mountaineering regions are not always well developed due to their remote location. During wintertime and after heavy rainfalls many roads are closed. About 30% of State roads have an asphalt surface.

Sayoh and tour operators consider the poor air connections to and from Tajikistan to be an obstacle to the development of tourism. At present there is only one direct flight from Western Europe to Tajikistan (from Munich (Germany), via Istanbul (Turkey)). The situation may get even worse after 2005, when Tajikistan Airline has to replace a significant part of its fleet, owing to the fleet's age. Other connections are via Moscow, Almaty (Kazakhstan), Delhi or Istanbul to Dushanbe. It is largely for these reasons that some tour operators use Tashkent instead of Dushanbe as their starting point.

The procedures to get visas for non-CIS residents or permits to border areas are still complicated, expensive and time-consuming and can make travelling less attractive.

**Figure 11.1: Map of Tourist assets**
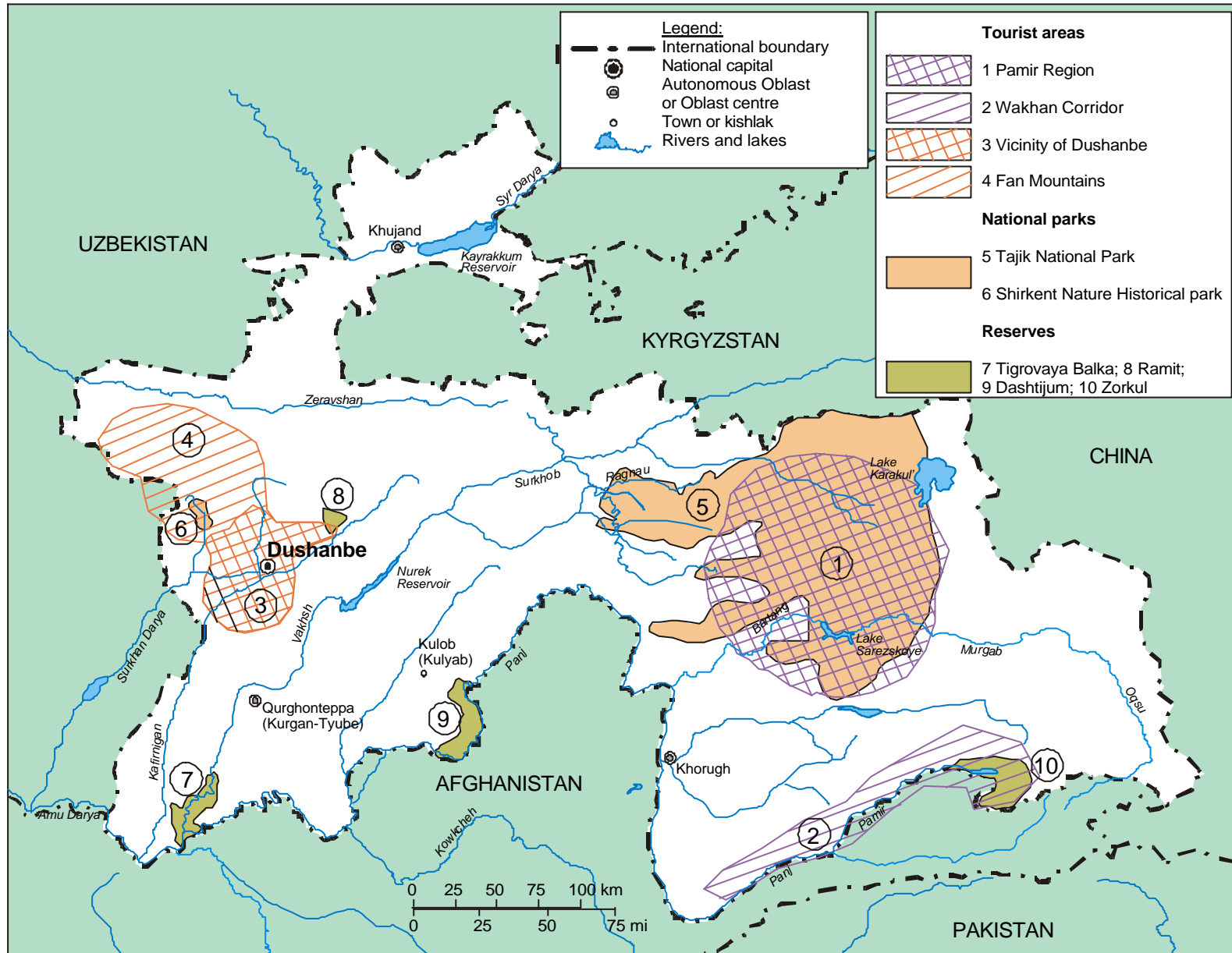


*The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.*

*Pressure from tourism on the environment*

Apart from the well known pressures such as air traffic, there are at present no specific pressures on the environment caused by ecotourists, not least because of their very small number. However, the impact of hunting on Red-List species such as Marco Polo mountain sheep must be considered carefully.

By definition, ecotourism should not harm the environment. However, nature-based forms of tourism can affect nature as well as local communities. New roads may disturb areas until now untouched and threaten flora and fauna. New accommodation facilities may spoil the landscape or compete with local guesthouses or agro-tourism. Waste, sewage and a higher demand for drinking water may also cause serious problems. Therefore, as a precondition to developing tourism in protected areas, careful plans must first be made and implemented to guarantee continued protection, through, for example, the designation of protection zones or zones for development.

Hunting is a critical issue in national parks, especially the hunting of endangered species. Only if based on sound data, managed sustainably and rigorously monitored, may hunting actually contribute to the long-term survival of endangered species.

## 11.3   Prospects of ecotourism

*Tourism in Tajikistan*

The Government considers tourism as a priority sector in the economy (State Programme for the Development of Tourism and Poverty Reduction Strategy). However, in an interview, a representative of the World Bank suggested that, for the near future, tourism is likely to contribute less than 1% to GNP (equivalent to US$ 10 million). If the average visitor spends US$ 1,000 on a two-week trekking tour, 10,000 visitors would be needed to generate US$ 10 million.

*Potential of ecotourism*

As shown above the assets to develop ecotourism in Tajikistan exist: high mountains, natural landscapes, attractive lakes, rich flora and fauna. However, considering the poor infrastructure and poorly developed tourist industry, there is for the near future probably a potential only for ecotourists

with very modest expectations with regard to comfort. Most people will still travel in small groups. They come mainly for trekking or hiking, or for the sake of nature. With the continuation of peaceful conditions and with development of new infrastructure, the number of individual tourist may slowly improve. However, for at least the next 5 to 10 years, ecotourism in Tajikistan is likely to remain a niche product only.

A country may be attractive to tourists just because it is still underdeveloped as a tourist area. Tajikistan is now in this stage, as were neighbouring countries 5 or 10 years ago. However, in the long term Tajikistan will have to compete with Kazakhstan, Kyrgyzstan and Uzbekistan, all of which have a more developed tourist industry and an established market.

Ecotourism may contribute substantially to the protection of valuable sites. It generates revenue based on eco-fees and income to hosts and local people if they are able to provide services. The directorate of Tajik National Park would like to see a major increase in the number of tourists from 180 in 2003 to 3,000-5,000 in 2007. Such a rapid increase in tourism seems unlikely at present.

## 11.4   Policy objectives and management

*The policy framework*

The State Programme for the Development of Tourism in Tajikistan for the period 2004-2009, adopted by the Government in December 2003, summarizes the present situation, defines the objectives, resources and financing and lists priority actions. The main purpose of the Programme is to create a competitive tourism industry. Some of its many priorities are:
- To support the development of the private sector and small business;
- To reform the normative legal base for the development of tourism;
- To develop the tourism infrastructure;
- To improve the quality of services by means of standards, certification and licensing;
- To improve the professional skills of people working in tourism;
- To design a "national tourist product" and to promote advertising;
- To improve conditions for investment, credits and joint ventures;
- To undertake market analysis and to provide statistics;

- To strengthen cooperation with the World Tourism Organization and neighbouring countries; and
- To attend regularly international tourist fairs.

In total 39 actions are listed, including:
- To give tourism a high priority within the State investment plan;
- To specify actions to improve the infrastructure in tourism areas;
- To simplify procedures to get visas or admission to border areas or to travel to neighbouring countries;
- To set up a Tajik association of tourist agencies;
- To attract investment in tourism infrastructure;
- To take measures to improve health and rescue services;
- To undertake market analysis;
- To design a framework for statistics and for monitoring tourist entries to and departures from Tajikistan;
- To outline a project to design a "national tourist product";
- To ensure the protection of all historical and cultural monuments;
- To draw up an inventory of all tourist assets as a basis for development projects;
- To conduct regular seminars on the development of tourism;
- To educate people working in tourism at home and abroad and to create an international training centre for tourism and mountaineering;
- To explore avenues to promote tourism in Tajikistan and the Tajik National Park or monuments in particular;
- To hold annual tourist fairs in Dushanbe and to take part in international tourist fairs; and
- To join the World Tourism Organization and participate in its work.

The cost for 2004-2009 totals 1.3 million somoni (US$ 468,700). No information was available on whether or not any of these funds would be made available through the State budget or through bilateral and multilateral assistance. In addition, there is no step-by-step plan for implementing the 39 measures, so achieving them all within five years is likely to be difficult.

On an international level, there are numerous conventions, charters and guidelines with respect to ecotourism, notably the Quebec Declaration on Ecotourism, the World Conservation Union (IUCN) Recommendations on "Developing Approaches and Practices for Sustainable Use of Biological Resources — Tourism" and Guidelines on Tourism in Vulnerable Ecosystems within the framework of the Convention on Biological Diversity. The most relevant recommendations of the Quebec Declaration regarding Tajikistan are to formulate ecotourism policies and development strategies, to develop certification schemes or eco-labels and to define appropriate policies to protect natural areas. At the moment, Tajikistan does not use any of these guidelines and it is not apparent that the authorities are conversant with them.

*The legislative framework*

Several governmental regulations are relevant to tourism. Among them is the 1999 Law on Tourism, which is also the basis for licensing tour operators. The 2002 Regulation on the Procedure for Effecting State Control over the Status, Use, Restoration, Safeguarding and Protection of Forests defines the licensing procedures and tariffs. The 2000 Regulation on the State Cadastre of Tourism Resources requires a register of sites of tourist interest to be set up.

Tajik National Park and the other protected areas are based on the Law on Nature Protection and the Law on Specially Protected Territories.

*Economic instruments*

According to the Regulation on Procedure for Effecting State Control over Status, Use, Restoration, Safeguarding and Protection of Forests, two kinds of fees are imposed on nature-based tourism. Depending on whether trekking or climbing takes place below or above 6000 m above sea level, the fee is US$ 50 or 100 per person. In addition, each person has to pay an eco-fee of US$ 1 per day. The first fee is shared as follows: 50% to the local budget, parts of it to the former State Forestry Enterprise *Tajikles* (now incorporated in the State Committee for Environmental Protection and Forestry); 25% to the State budget; 10% to a special fund of the State Committee for infrastructure in those places where tourism takes place; and 15% to *Sayoh* for the promotion of tourism. The second fee is for the use of nature and goes partly to the State Committee and partly to the municipality. It has to be used in tourist zones for activities such as nature protection and recovery of damage. No figures are available on the total amounts. However, based on *Sayoh*'s rough tourist numbers for 2003, the revenues from both fees may add up to some US$ 150,000.

Based on the same Regulation, tour operators need a licence, issued by the Licensing Commission of the Ministry of Economy and Trade. Depending on whether they apply for licence A or B, the licence fee is US$ 1,000 or 500 (the difference between the two licences is irrelevant with respect to ecotourism).

In addition, tour operators working in Tajik National Park sign a contract with the park's directorate. According to the terms of the contract, the park receives 30% of the net profit of the tour operators, of which 3% is used within the directorate. The remaining 27% may be used for development projects within the park.

Hunting is permitted only for licensed hunters (approximately 14,000-15,000 in 2002). In addition, there are licences to hunt selected species like Marco Polo mountain sheep or bear. These licences are given by the State for free to tour operators, who sell them to their clients. Net profit is shared between the tour operator and the local institutions responsible for the protection of those species. Even though information on the price of licences was not available, total revenues may well exceed that generated by the fees mentioned above, given an average number of 30-60 licences per year between 1989 und 2003.

*The institutional framework*

By law the Ministry of Economy and Trade is responsible for defining the policy on tourism.

The Ministry has delegated certain responsibilities to *Sayoh*, including the coordination of tourist activities, monitoring, data collection and marketing. At the same time, *Sayoh* is also active as a tour operator. It is considered to be a private company and therefore gets no public funds, but it does receive a share of tourist fees (see above). Other tour operators criticize the dual role of *Sayoh* as both State institution and competitor.

At present, 27 tour operators are licensed, all of them Tajik. Among them are private companies, some of which are joint-stock companies. They offer tours in Tajikistan to foreign and domestic clients and cooperate with foreign travel agencies. Some of the tour operators are public entities or have at least some responsibilities given to them by the Government, e.g. *Sayoh* or the directorate of Tajik National Park.

Trade unions contribute to tourism since they continue to own many accommodation facilities given to them in Soviet times. The Tajik Consultancy for Tourism is a licensed tour operator that belongs to the trade unions. Their clients are mainly local people or people from other countries of the former Soviet Union. Finally, there are organizations like the Federation of Alpinism in Tajikistan, responsible for the training of mountain instructors as well as for the coordination of mountaineering.

The State Animals and Plants Inspectorate within the State Committee and the Department of Specially Protected Areas (Tajik National Park) are responsible for managing and controlling protected areas. The Department has a staff of 240, including 22 working in four departments, one of which is responsible for tourism in Tajik National Park. About 218 local staff care for the protected areas. The total budget is about US$ 60,000.

The Commission on Issuing Permits for Taking Migratory, Rare and Endangered Animal Species, established in July 2003, is responsible for approving licence applications. Such licences are supposed to be issued only in exceptional cases, such as for scientific and research purposes, to preserve and breed animals in captivity, to benefit from the products derived from these animals, to protect human health and human lives. The Commission is chaired by a Deputy Prime Minister and includes high officials from the State Committee, other ministries, the Academy of Sciences and the Public Environmental Council.

Dozens of NGOs are involved in a wide range of tourism, ecotourism or mountaineering activities. The society *Zumrad* may serve to illustrate some of their activities. Its main objective is ecotourism, which it understands as basically educating pupils (including orphaned and homeless children) in their spare time. It also organizes field visits, treks and expeditions to remote areas. *Zumrad* educates guides and manufactures field equipment (jackets, sleeping bags, rucksacks) for its own requirements. *Zumrad* also advises local people on tourism and agriculture. Representatives of *Zumrad*, which is not a licensed tour operator, seem to be ambivalent about their approach to ecotourism. On the one hand they have about 50 tours in their programme and would like to organize treks for both foreign and domestic tourists. On the other, they are not willing to cooperate with tour operators or to

become a commercial tour operator themselves. In addition, they have a poor understanding of current practices in tourism.

### *Education and capacity-building*

Several NGOs train their staff in ecological matters for their own purposes. The Federation of Alpinism in Tajikistan is responsible for educating mountain instructors. The State offers training to guides at the K. Juraeva College of Education in Dushanbe. In Khorugh a new International University for Tourism is under construction (supported by the Aga Khan Foundation). It is supposed to teach languages and hotel management to people working in tourism. Although many parties are involved in education and capacity-building, there seems to be no coordination and no allocation of responsibilities. There are no regulations to set standards. This has been criticized by tour operators.

## 11.5   Conclusions and recommendations

Tourism is considered to be a potentially important sector of the economy in Tajikistan. The State Programme for the Development of Tourism for 2004-2009 includes very valuable information and proposes important actions. However, it is neither a comprehensive strategy nor an action plan. It does not address a number of urgent questions.

While the focus here is on ecotourism, it is important for ecotourism to be seen as part of an overall strategy on tourism. In developing this, aspects related to ecotourism should be in accordance with the recommendations from UNEP, IUCN and the World Tourism Organization and, in particular, with the Quebec Declaration.

The Ministry of Economy and Trade should take the lead in developing a national tourism strategy, but it is essential to involve all relevant parties in this process, including the State Committee for Environmental Protection and Forestry, the Department of Specially Protected Areas, the National Tourist Company *Sayoh*, tour operators and NGOs involved in ecotourism. Among the issues to be addressed by the stakeholders and decided in the strategy are the distribution of responsibilities for tourism and their relationship, the use of eco-fees, investment priorities, access to loans and investment, marketing and advertising, and appropriate education. Europe, the United

States and Asia may be the most promising markets for ecotourism in Tajikistan. Given the lack of ecotourism funding in Tajikistan, any marketing effort should be directed at the travel trade, rather than at the final consumer.

The strategy must clearly show the potential of tourism (and ecotourism in particular) based on market analysis and tourist assets, give priority to sectors with high potential, set objectives for the next 5 to 10 years and define actions. An action plan based on the strategy should then be drawn up, indicating what needs to be done, by whom, by when and at what cost. It must also specify sources of financing.

*Recommendation 11.1:*
*The Ministry of Economy and Trade, in cooperation with the State Committee for Environmental Protection and Forestry and in consultation with the National Tourist Company* Sayoh*, tour operators and non-governmental organizations involved in tourism, should develop and implement a national strategy and action plan for tourism, consistent with the State Programme for the Development of Tourism. The action plan should clearly set priorities and identify sources of financing.*

International market analyses show that there is a considerable and growing potential for ecotourism, but the market will also become increasingly competitive. Therefore, it is important that suppliers have very distinct products to offer. Some of the priorities of the State Programme for the Development of Tourism for 2004-2009 are designing a national tourist product, improving service quality through standards, certification and licensing, and strengthening cooperation with the World Tourism Organization.

The standards that would underpin certification need to be defined, but could include proof of well-trained (certified) staff and knowledge of good practice in ecotourism, reliable and efficient services, restrictions on means of transport or access to vulnerable sites, codes on the use of local products or cooperation with local communities.

A rigorous certification scheme approved by the World Tourism Organization and following the recommendations of the Quebec Declaration could well be used as a strong argument exploiting the distinct tourist product of Tajikistan abroad.

*Recommendation 11. 2:*
*The Ministry of Economy and Trade, in cooperation with the State Committee for Environmental Protection and Forestry, and in consultation with the National Tourist Company* Sayoh, *tour operators and non-governmental organizations involved in tourism, should:*

- *Adopt a set of standards for certification based on international standards;*
- *Develop and apply a certification scheme for ecotourism;*
- *Develop a special licence for those in the tourist industry who receive ecotourism certification.*

*In implementing this recommendation, Tajikistan may wish to seek the support of the World Tourism Organization.*

For several reasons most ecotourism in Tajikistan takes place outside Tajik National Park and other protected areas. The Tajik National Park has a large potential for ecotourism (and especially for mountaineering). The State Committee is very enthusiastic about this potential and expects a significant increase in the number of visitors. However, no management plan for the park has been prepared, and such a plan is a precondition for any significant development. The management plan also has to elaborate on financing the proposed measures. Finally, the State Committee has to decide on whether commercial hunting should be allowed or not and, if allowed, what regulations apply. It should well consider the possible damage from commercial hunting to the image of Tajik National Park.

*Recommendation 11.3:*
*The State Committee for Environmental Protection and Forestry should accelerate the process of defining zones in the Tajik National Park and prepare, adopt and implement a comprehensive management plan to develop Tajik National Park (and other protected areas if used for tourist purposes). The plan should include designated zones for protection and development, requirements for any construction that may affect the environment (e.g. environmental impact assessment), restrictions concerning waste disposal or sewage and a monitoring scheme*

Eco-fees are paid for the use of nature. This is acceptable if the money is spent efficiently and effectively for nature protection purposes, for the support of local communities or for the development of ecotourism. However, this is not yet the case. Despite the regulatory framework, it is

not clear who gets how much money and for what purpose. Besides, the amounts to be spent are very small, because the money is shared among too many entities.

Another issue concerns the amount of the fee. On the one hand, fees related to nature-based tourism are moderate compared to the total cost of a trekking tour or mountaineering. On the other, there are several other fees imposed on tourists for visas, access to border areas or crossing the border to neighbouring countries. They may well exceed the eco-fees.

For that reason, the system should be revised. At a minimum, the eco-fees should be increased and revenues from all tourism-related fees should be deposited into a special ecotourism account earmarked only for projects and programmes that support ecotourism. As with other environmental funds, the account should be managed by the Ministry of Finance, but proposals for its use should be the responsibility of a board with representatives of the Ministry of Economy and Trade, the State Committee for Environmental Protection and Forestry, *Sayoh*, local governments, tour operators and NGOs. Information on projects, expenditures and revenue should be published annually to increase transparency.

*Recommendation 11.4:*
(a) *The Government should establish a special subprogramme for ecotourism under the existing environmental fund.*
(b) *The Ministry of Finance, in coordination with the State Committee for Environmental Protection and Forestry, should increase the fees related to nature-based tourism and ensure that they are used for this purpose.*

One of the most important elements of an effective tourism industry is well-trained staff to provide all the necessary services. The State currently offers training for guides at the College of Education named after K. Suraev, and a new international university for tourism is under construction with support from the Aga Khan Foundation.

There is as yet, however, no strategic approach to providing a comprehensive curriculum for professionals working in the tourism industry, and there are no established standards to help inform tourist education. In order to use resources efficiently and effectively, there should be a joint effort to define the needs for education and to offer the much-needed training. Such joint effort would

also make good use of the experience of non-governmental organizations in training guides, mountain instructors and tour operators.

Standards need to be defined and monitored by a State authority. It would be useful to define curricula for managers, guides and other trades that can be awarded with various kinds of approved degrees.

*Recommendation 11.5:*
*(a) The Ministry of Education should develop a comprehensive curriculum, leading to a degree, for managers, guides and other trades working in tourism consistent with the State Programme for the Development of Tourism for 2004-2009.*
*(b) In developing this curricula, the Ministry of Education should set up an advisory body made up, inter alia, of representatives from the Ministry of Economy and Trade, the State Committee for Environmental Protection and Forestry, the National Tourist Company* Sayoh*, tour operators and non-governmental organizations involved in tourism.*

*Chapter 12*

# HUMAN HEALTH AND ENVIRONMENT

## 12.1  Introduction

*Population development*

In 2002, the population of Tajikistan was 6,506,489,[7] of whom 27% lived in urban areas. Women account for 49.1% and men for 50.9%; 42.5% were younger than 14 years of age. The population has increased more than 20% over the past 11 years. Over 80% of the population lives below the national poverty line (approximately 50 somoni or US$ 18 per month). (See chapter 1, Poverty, environment and economy.)

Life expectancy dropped from 70 years in 1990 to 61.9 in 1993, but then rose again to 72 in 2002. The sharp variation was due to the civil war. Life expectancy in Tajikistan is now higher than in the other Central Asian republics, and higher than in the other countries of Eastern Europe, the Caucasus and Central Asia (EECCA) on average, but lower than that in the European Union (EU). In 1999, life expectancy was 72 years in Tajikistan, 68.6 in Central Asia, 67.4 in EECCA and 78.7 in EU.

Infant mortality significantly decreased from 40.9 per 1,000 live births in 1990 to 17.2 in 2002. The highest rate in 2002 was 21.9/1000 in Gorno-Badakhshan Autonomous *Oblast* and the lowest was 12.0/1000 in Dushanbe, so there are large variations within the country. Until 1997, Tajikistan's infant mortality rate was higher than that of other Central Asian and EECCA countries, respectively 30.7/1000, 26.4/1000 and 20.2/1000. Since then it has been lower, but still much higher than that of the EU. In 2000 infant mortality was 15.5 in Tajikistan, 20.1 in Central Asia, 16.3 in EECCA and 4.7/1000 in the EU.

*Development of selected causes of death*

The leading causes of death in Tajikistan, Central Asia, EECCA, and EU in the year 2000 are summarized in table 12.2.

In Tajikistan the leading cause of death is diseases of the circulatory system, which account for 53.1% of all deaths in the country. In 2000 the standardized death rate (SDR) of these diseases was 569.6/100,000, which is below the Central Asian and EECCA averages of 750.9/100,000 and 771.5/100,000, but higher than the EU average of 245.9/100,000.

The next leading causes of death in Tajikistan are diseases of the respiratory system, 122.5/100,000; malignant neoplasms, 70.8/100,000; diseases of the digestive system, 48.4/100,000; external causes, 38.5/100,000; and infectious and parasitic diseases, 35.9/100,000. It should be noted that SDR of malignant neoplasms is lower than in EU, Central Asia and EECCA, and that deaths of infectious and parasitic diseases in Tajikistan account for 3.3 % of all deaths. (See also section 12.2 on the associated environmental conditions.)

The structure of the leading causes of death in Tajikistan is similar to that of the other Central Asian and EECCA countries, but differs from that in EU countries.

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[7] The population, according to the UNECE statistical database was 6,438,000, as noted in the Introduction. The data in this chapter are from the WHO database and differ slightly because they express the mid-year population, rather than the end-of-year population. In addition, as discussed in chapter 4 (on Information, public participation and education), monitoring and data collection are severely hampered by poor infrastructure, and almost all data are estimates and approximate at best.

**Table 12.1: Demographic indicators**

| Indicators | 1991 | 1995 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|
| Mid-year population | 5,433,302 | 5,667,645 | 5,938,609 | 6,064,049 | 6,188,367 | 6,312,757 | 6,506,489 |
| % of population aged 0-14 years | 43.4 | 44.2 | 43.5 | 43.0 | 42.2 | 41.3 | 42.5 |
| Birth rate (per 1000 population) | 39.1 | 34.1 | 31.3 | 29.8 | 27.0 | 27.2 | 27.3 |
| Crude death rate (per 1000 population) | 6.1 | 6.1 | 4.8 | 4.2 | 4.7 | 5.1 | 4.8 |
| Life expectancy (in years) | 70.3 | 68.0 | .. | 72.0 | 72.0 | 72.0 | 72.0 |
| Life expectancy of women (in years) | 72.9 | 70.6 | .. | 74.0 | 73.9 | 73.9 | .. |
| Life expectancy of men (in years) | 67.6 | 65.4 | .. | 70.0 | 70.3 | 70.2 | .. |
| % of urban population | .. | 32.0 | 27.6 | 27.6 | 27.6 | 27.6 | .. |
| Average population density per square km | 38.0 | 39.6 | 41.5 | 42.2 | 43.3 | 44.1 | 43.2 |

*Sources:* WHO Regional Office for Europe. Health For All Database, January 2004; Ministry of Health. Centre of medical statistics and informatics. Health and health care in the Republic in Tajikistan.

Although childhood (under 5 years of age) mortality from diarrhoeal diseases in Tajikistan is declining (from 588.7/100,000 in 1993 to 88.5/100,000 in 2001), it is still the highest in Central Asia. The rate is much higher than the EECCA average (21.6/100,000 in 2001). The EU average was 0.5/100,000 in 2001.

*Trends in morbidity*

Approximately one quarter (23-25%) of all diseases in Tajikistan are respiratory.

Tuberculosis is one of the main problems. The incidence of tuberculosis in 2002 was 62.9 per 100,000 population, more than double that of 1992, when it was 30.2/100,000 (fig. 12.2). These rates are, however, below the EECCA and Central Asian averages, of 84.5/100,000 and 92.4/100,000 respectively in 2002, but above the EU average of 10.8/100,000. An increase in tuberculosis is traditionally associated with poverty and poor environmental conditions.
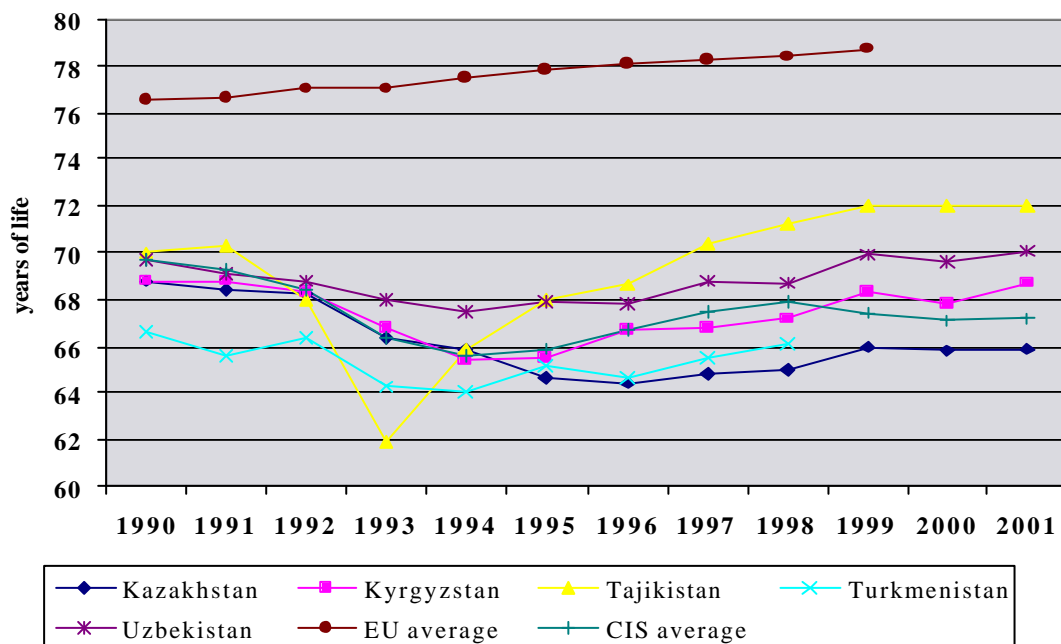
**Figure 12.1: Life expectancy at birth, 1990-2001**

**Table 12.2: Standardized death rates (SDR) per 100,000 by cause of death, 2000**

| | Tajikistan | | CAR* average | | EECCA* average | | EU average | |
|---|---|---|---|---|---|---|---|---|
| | **SDR** | **%** | **SDR** | **%** | **SDR** | **%** | **SDR** | **%** |
| All causes | 1,071.8 | | 1,265.5 | | 1,372.3 | | 658.0 | |
| Disease of circulatory aystems | 569.6 | 53.1 | 750.9 | 59.3 | 771.5 | 56.2 | 245.9 | 37.4 |
| Disease of respiratory systems | 122.5 | 11.4 | 106.0 | 8.4 | 75.1 | 5.5 | 57.0 | 8.7 |
| Malignant neoplasms | 70.8 | 6.6 | 115.6 | 9.1 | 169.0 | 12.3 | 183.2 | 27.8 |
| Disease of digestive systems | 48.4 | 4.5 | 59.0 | 4.7 | 46.5 | 3.4 | 31.3 | 4.8 |
| External causes | 38.5 | 3.6 | 83.8 | 6.6 | 162.7 | 11.9 | 39.5 | 6.0 |
| Infectious and parasitic diseases | 35.9 | 3.3 | 35.1 | 2.8 | 26.2 | 1.9 | 7.3 | 1.1 |

*Source:* WHO Regional Office for Europe. Health For All Database, January 2004.
*Note:* * CAR = Central Asian Republics
* EECCA= Eastern Europe, the Caucasus and Central Asia

Communicable diseases are making a comeback in Tajikistan as a result of frequent breakdowns in the clean water supply and sewage infrastructure, and inadequate public health measures.

The incidence of hepatitis A in Tajikistan fell from 349.2/100,000 in 1995 to 145.8/100,000 in 2001 (fig. 12.3). This incidence is in line with that in Central Asia, where it was 142.7/100,000 in 2001, but higher than in EECCA (86.2/100,000) and much higher than in EU (4.8/100,000).

The incidence of acute intestinal infections rose until 2001, when it peaked at 1944.2/100,000. A

significant decrease to 1044.2/100,000 followed in 2002. The 2002 rate is even lower than that in 2000 and 1999 (fig. 12.4). It is not clear, however, if such a sharp drop reflects a significant improvement in the health status or underreporting of cases.

During the period 1996-1998, there was an outbreak of typhoid fever, which peaked in 1997, when 30,000 people were affected (487.8/100,000). The incidence has since decreased, to 51.1/100,000 in 2002. The incidence of dysentery is also decreasing, from 147.6/100,000 to 35.4/100,000 in 2002 (fig. 12.4).

**Figure 12.2: Tuberculosis, 1991-2002**
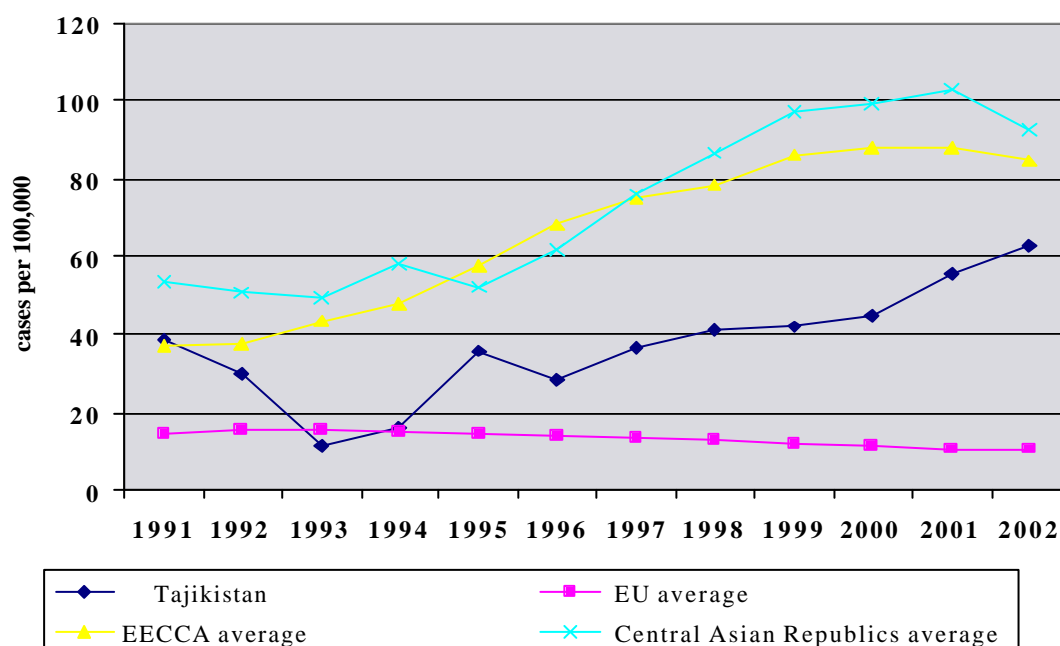
**Figure 12.3: Viral hepatitis A, 1991-2001**
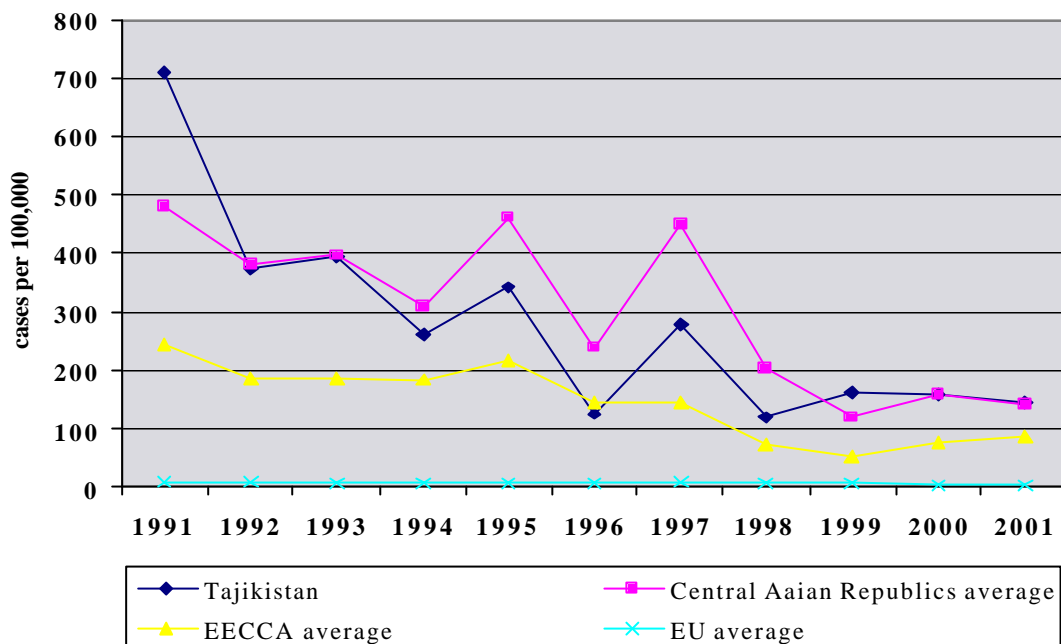


The incidence of malaria peaked in 1997 at 511.7/100,000, but then declined to 95.6/100,000 in 2002. There were cholera outbreaks during the 1993-1995 period and in 1998, when it was brought to Tajikistan by refugees from Afghanistan.

A particular problem in Tajikistan is iodine deficiency and the conditions associated with it. The prevalence of goitre rose during the 1990s, but since 2001 it has gone down (table 12.3).

**Figure 12.4: Selected infectious diseases, 1995-2002**
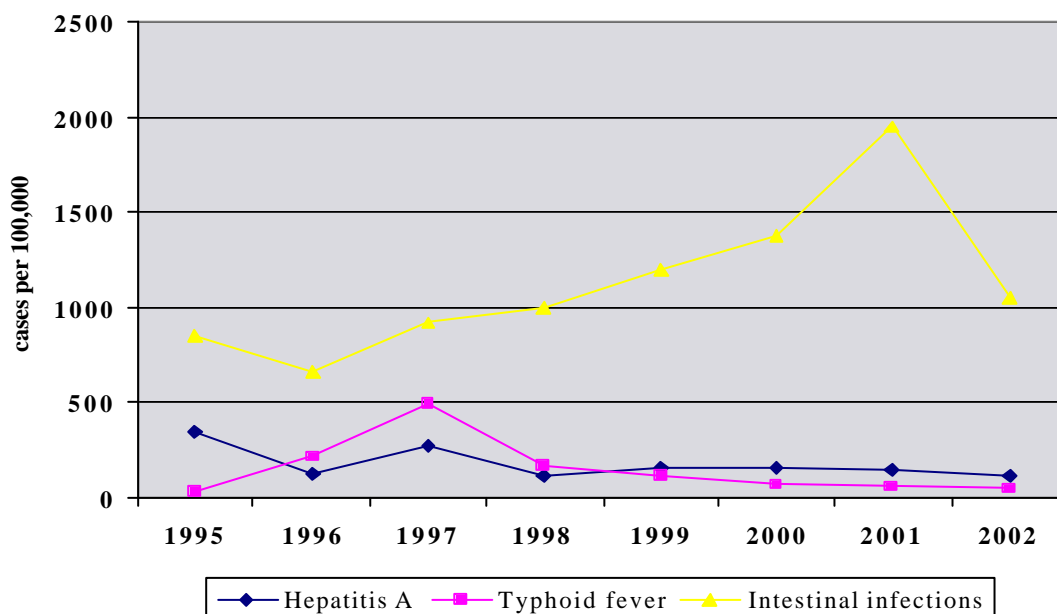
**Table 12.3: Endemic goitre**

per 100,000 population

| Year | Prevalence | | Incidence | |
|------|-------|-------------------|-------|-------------------|
|      | Total | Children under 14 | Total | Children under 14 |
| 2001 | 6,078 | 8,519 | 877   | 1,229 |
| 2002 | 4,728 | 5,035 | 927   | 1,118 |
| 2003 | 4,160 | 5,713 | 1,616 | 2,254 |

*Source:* Asian Development Bank. Project "Improving nutrition for poor mothers and children". 2001.

## 12.2 Environmental conditions associated with health risks

### Ambient and indoor air pollution

Because of reduced industrial activity in recent years, there has been a decrease in air pollution in Tajikistan. In 2002, air emissions from stationary sources in the air fell to 30,800 tons, compared with 100,500 tons in 1991. In the early 1990s, transport was responsible for 77,000 tons or 40% of total air pollution; in 2002 transport was responsible for more than 70%. The main pollutants of atmospheric air are carbon monoxide, hydrocarbon, nitrogen oxide, hydrogen sulphide and fluorine compounds.

Air pollution in all regions, especially in urban areas, is exacerbated by the open-air burning of waste. (See table 6.2 in chapter 6, Air quality management.)

The main sources of air pollution are the Tajik aluminium plant in Tursunzade, Tajik cement plant in Dushanbe, the nitrogen fertilizer plant in Sarband city and the Chemical complex in Yavan. The most contaminated air as a result of a high concentration of industry is in Dushanbe, Tursunzade, Sughd *oblast*, and the Vakhsh and Hisor valleys. Average contamination in Dushanbe and Tursunzade is twice the maximum allowable concentration (MAC), and in the city centres it is seven to eight times the MAC. The Tajik aluminium plant pollutes the environment with 20,000 to 25,000 tons of harmful substances per year (suspended particles, sulphur dioxide, soluble sulphates, carbon monoxide, nitrogen oxide, nitrogen dioxide, benzopyrene, solid fluorides and hydrogen fluoride), and contaminates the air to 3-4 times the MAC. (See also chapter 6, Air quality management.)

A study conducted around the plant has shown that there is a correlation between high fluoride concentration and diseases of the cardiovascular, respiratory, digestive and musculoskeletal systems. Another study has found a correlation between fluorine hydrogen in air and cardiovascular diseases, sulphurous anhydride and respiratory diseases, high incidence of musculoskeletal diseases and fluorine concentration in the environment. Around the plant there is a high incidence of respiratory diseases, particularly in children, increased child morbidity, double the normal rates of miscarriages and a high incidence of skin cancer.

An analysis of the prevalence of allergic conditions in Tajikistan indicates an increase in bronchial asthma. The number of patients with bronchial asthma increased from 21.0/100,000 in 1994 to 28.0/100,000 in 1998, i.e. by 30%. Data suggest that the incidence of asthma is twice as high in the valleys than in the mountains.

### Drinking water

Inadequate drinking water quality and drinking water supply is one of the main environmental health problems.

In 2003, about 50% of the population had access to piped drinking water, down from 56.3% (96% in urban areas and 40% in rural areas) in 2000, 58.2% in 1999, 61% in 1998 and 63% in 1997. The situation in Gorno-Badakhshan Autonomous *Oblast* is considerably worse than in other regions; only 28% of the population has access to drinking water from a safe source. More than 40% of the population, predominantly in rural areas, uses untreated, hazardous drinking water from rivers, channels, irrigation ditches and wells. A third of the water-supply system has completely broken down. The sanitary protection zones around water intakes are littered with municipal, agricultural and industrial waste.

In Tajikistan, 60-80% of all water-supply networks have reached the end of their service life and should

be replaced. Worn-out piping leads to corrosion and leaks from sewage pipes. Water and sewage pipes are often very close to each other and the risk of water contamination is therefore high. Inadequate purification systems, insufficient equipment and a shortage of chlorine reagents and coagulators to disinfect water also contribute to the poor quality of drinking water. Purification is only 30-40% effective. Thousands of breakdowns of water-supply systems are registered each year but they are neither repaired nor replaced.

There were 699 water-supply systems in 2003, but 41.4% do not meet sanitary standards and norms, and 39.7% do not treat the water through disinfection, chlorination and coagulation. There has been a 50% decrease in treatment capacity, from 245 million $m^3$ per year in 1990 to 120 million $m^3$ in 2000. Less than 10% of the water in the main supply networks is adequately treated. Laboratory testing of drinking water in 2000 revealed that 28.1% and 37.9% of water samples investigated failed to satisfy chemical and bacteriological standards, respectively; pathogenic microflora was detected in 10 samples (0.2%). In 2003, the Sanitary Epidemiological Services took 9645 samples to analyse bacterial contamination. Only 2487 samples (28.8%) met the standards. In 62 samples pathogenic micro-organisms were detected. Of 5987 water samples taken to analyse chemical contamination, only 3002 (50.1%) met the standards. The proportion of samples that fail to meet sanitary-chemical standards has increased sharply, but the situation for bacteriological contamination has remained essentially the same.

In Tajikistan 45-60% of intestinal infections are transmitted by water (61-67% in villages and 32-41% in towns), mainly as a result of limited access to clean drinking water and working sewage systems (accessible to 37.4% of the urban population, but almost completely absent in rural areas). Ninety-one sewage systems are available for 23% of population, mainly in urban areas (89% in urban areas and 11% in rural areas). During 2000, purification capacity was 120 billion $m^3$, down from 191.9 billion $m^3$ in 1998 and 245 billion $m^3$ in 1990. The efficacy of purification in 2000 did not exceed 40%.

**Table 12.4: Analyses of drinking water**

per cent

| Year | Samples meeting bacteriological standards | Samples meeting sanitary-chemical standards |
|------|-------------------------------------------|---------------------------------------------|
| 1998 | 6.0 | 23.0 |
| 2000 | 37.9 | 28.1 |
| 2001 | 32.9 | 29.2 |
| 2002 | 29.2 | 17.8 |
| 2003 | 28.8 | 50.0 |

*Source:* Republican Sanitary-Epidemiological Service. Analysis of the Activity of the Republican Sanitary Epidemiological Services in 2000 (also in 2001, 2002 and 2003).

All of these concerns – poor drainage systems, inadequate purification, unsatisfactory sanitary-technical conditions of the water-supply systems, limited access to safe drinking water and poor condition of the sewage system – cause an increase of acute intestinal infections.

*Food safety and nutrition*

The Sanitary Epidemiological Service is responsible for controlling the quality of food. However, without sufficient laboratory staff, equipment and reagents, control is ineffective. In recent years, there has been a rise in the number of enterprises processing food without proper basic hygiene and sanitary requirements and control. Street vendors are increasing in number, but there is no control over the quality of their food. Another problem is the growing trade in home-made alcoholic and other beverages.

The major cause of gastrointestinal diseases is contaminated food. This is shown by the increasing rates of gastrointestinal infectious diseases (fig. 12.4). Chemical contamination of food is widespread, especially in areas where soil is contaminated with heavy metals and pesticides. It should be noted that the population is better informed about the hazards of chemicals than the risk of microbially contaminated food.

The laboratory analyses of food quality conducted by the Sanitary Epidemiological Station in recent years show an increase in contaminated food samples and in food poisoning (table 12.5).

**Table 12.5: Food monitoring and food poisoning**

| Year | Food analyses | | Food poisoning | | |
|------|----------------|----------------|----------|-------------|--------|
| | **Bacteriological analyses failed to meet standard** | **Chemical analyses failed to meet standard** | **Outbreaks** | **No. affected** | **Deaths** |
| 2001 | 11,079/1504 - 13.6% | 4,525/713 – 15.8% | 6 | 43 | 2 |
| 2002 | 12,177/823 - 6.7% | 5,703/219 – 3.8% | 7 | 81 | 11 |
| 2003 | 9,927/1,607 - 16.1% | 6,172/898 – 14.5% | 11 | 136 | 17 |

*Source:* Republican Sanitary-Epidemiological Service. Analysis of the Activity of the Republican Sanitary Epidemiological Services in 2000 (also in 2001, 2002 and 2003).

The incidence of salmonellosis has not changed significantly: 3.2/100,000 in 1991 against 4.5/100,000 in 1999. This is lower than in the other EECCA countries, where, in 1997 and 1998, the average was 37.2 and 36.8/100,000 respectively, and in the EU, where it was 58.1 and 52.1 respectively. However, this might be due to an underestimation and hypodiagnosis of salmonellosis cases, as a result of the poor conditions of the laboratories and a lack of sufficient reagents for diagnostics. Underreporting and underdiagnosis of food-borne disease is a big problem.

Tajikistan is an endemic region for iodine-deficiency diseases; therefore one of the main nutritional problems is iodine deficiency disorders. About 35% of the population is iodine-deficient. The main causes for this are insufficient salt iodization, worsening socio-economic and socio-hygiene conditions, decrease in preventive health care, insufficient diagnostic equipment and drugs for the prophylaxis and treatment of iodine deficiency disorders, and a lack of qualification of primary medical care doctors.

To ease this problem, Tajikistan drew up and adopted a national programme on iodine deficiency diseases control in 1997. In addition, in 2001 the Asian Development Bank funded a project to improve the nutrition for poor mothers and children. One of the project's aims was to build capacity for salt iodization. As a result, all three salt-producing plants now have tools for salt iodization and laboratories for control. By 2003, the situation had markedly improved: 74.9% of samples taken from households and 81.1% of samples taken from stores were positive for iodine content. A study of pregnant women found that only 2.67% suffered heavy ioduria (0-20 µg/24 hours). In 2002 the Law on Salt Iodization was adopted.

The National Nutrition and Water and Sanitation Survey 2003 in Tajikistan, funded by the European Commission's Humanitarian Aid Office (ECHO) and implemented with both State and non-governmental organizations, found that 36.2% of the population suffered from global chronic malnutrition, 4.7% from global acute malnutrition, and 0.64% from severe acute malnutrition. In Tajikistan between 2.9% and 11% of children exhibit retarded physical development due to malnutrition. In some regions, up to 53% of children are chronically malnourished. Seven per cent of infants are born with low birth weight.

It should be noted that Tajikistan does not participate in the Codex Alimentarius and has no national food safety agency.

*Waste and soil contamination. Pesticides*

Population growth, urbanization and industrial production have led to waste accumulation and soil contamination. Enterprises have accumulated and stored waste on their premises because of the country's lack of special depositories and equipment for processing industrial waste. Landfills do not meet sanitary requirements, and there is no sorting or separation of municipal waste anywhere. (See chapter 7, on Waste management.) Medical waste is not separated from other waste, and there is no incinerator for medical and toxic waste.

Before independence, Tajikistan used pesticides intensively, with a mean annual application of 24.1 kg per hectare, mostly in the cotton plantations. Accordingly, the highest index of pesticide concentrations is now found in those areas, e.g. in Vakhsh Valley pesticides use reached up to 48 kg per hectare. The list of pesticides applied during the past 18 years includes 74 brands, 25% of which are highly toxic and 38% with medium toxicity. The highly toxic pesticides include butifos, nitrofen, tiodan and fosalon. (See also chapter 10, on Agriculture and land management.)

Over the past several years the use of chemical fertilizers and pesticides has been greatly reduced, to approximately 6 to 10% of the level before

independence, mainly due to the reduction in chemical production. However, the earlier uncontrolled application of pesticides in agriculture has led to significant contamination of soil, water and other environmental media. The concentration of pesticides in food products during the 1970s and 1980s was 7 to 10 times the MAC. There are still stockpiles of many highly toxic pesticides in agricultural enterprises. They represent an immediate threat to the environment. Currently there are only two depositories for toxafen, DDT, endrin and other pesticides, in Sogdyiskaja *oblast* and in Hotlonskaja *oblast*. Some studies on pesticides exposure have shown an increased incidence of respiratory diseases, rheumatic diseases, malignant neoplasms of the digestive system, nephritis, gastric ulcers and nervous diseases in areas with high pesticide concentrations.

### *Ionizing radiation*

In Tajikistan, uranium ore has been mined and processed since the late 1940s, leading to the accumulation in the Sogdiy region of low-level radioactive waste (about $1*10$ Ci/kg). During the Soviet period, the mining industry processed only 5-10% of the large amount of raw materials taken from the mines. The bulk of the remaining materials accumulated in tailing dumps and waste tips, which are now in a critical state. So far 210 million tons has accumulated. Some of the tailing dumps are more than 1000 hectares. Few are properly covered and they are a danger to the environment. Tailings have been destroyed by the population, and the layer of soil covering the tailings is often washed away during rainy periods. In the dwellings situated near repositories, the ionizing radiation levels reach $600 – 1000$ µR/h.

In Tajikistan, ionizing radiation sources are used for various purposes, such as laboratories for gamma- and X-ray defectoscopy, equipment for technological surveillance, radioisotope smoke detectors, scientific research institutions, medical-prophylaxis institutions for treatment and disease diagnostics. There are more than 700 X-ray machines, 99 fluorography devices, 24 dental X-ray machines, 28 radioisotope devices, more than 1730 sealed sources of Cs137, Co60, Pu238, Sr90 and Y90, and 2 devices for ionizing radiation therapy of

oncological diseases. Their technical control is the responsibility of the Ministry of Health. A radiation laboratory within the State Sanitary

Epidemiological Service used to be responsible for the radiation control of air, water, food and soil. Four years ago, the laboratory was closed. Dushanbe's Sanitary Epidemiological Service has a department of radiation hygiene that performs radiation control of air, water, food and soil. It should be noted that the Sanitary-Epidemiological Service does not have the necessary equipment to measure the quantity and activity of radon and its by-products.

The long-term control of exposure of personnel working with ionizing radiation sources has shown that the high-risk groups do not receive doses above the average individual doses recommended by the International Commission on Radiological Protection.

Since 2001, Tajikistan has been a member of the International Atomic Energy Agency. The 2003 Law on Radiation Safety established the Nuclear and Radiation Safety Agency, within the Academy of Sciences. It functions as a State regulatory body on radiation safety and protection.

### *Occupational health*

As a result of the civil war, the migration of skilled workers and the economic depression, only 15-20% of industrial enterprises are still working. Currently, priority is given to the mining industry, the chemical industry, food production and light industries. Analyses of the working environment in those enterprises have shown that the levels of dust, toxic substances, noise and vibration are above the permissible levels. This creates a high risk of injury, acute poisoning and occupational diseases. The system of occupational health services (control of occupational hazards and regular monitoring of health of personnel) does not function because of financial difficulties and the lack of skilled professionals. The medical-sanitary departments at industrial enterprises have been dismantled.

Between 1990 and 1999, 402 occupational diseases and cases of poisoning were registered: 43.5% were cochlear neuritis, 16.6% osteochondrosis, 10.4% chronic bronchitis, 9.8% silicosis and 7.2% fluorosis. Occupational morbidity is mainly registered in Dushanbe, Tursunzade and Sughd *Oblast*.

### 12.3 The decision-making framework for environmental health

### *Policy framework*

In May 2002 the Government approved the Poverty Reduction Strategy Paper (PRSP) (see Chapter 1). The National Environmental Health Action Plan (NEHAP) was developed jointly by the Ministry of Health and by the then Ministry of Nature Protection (now the State Committee for Environmental Protection and Forestry) and adopted in 2000. Among its priorities are: assessing the effect of various environmental media (e.g. water, air, food, waste, soil, radiation) on public health; improving environmental health services; and establishing intersectoral cooperation. NEHAP outlines intersectoral action, the division of competencies, and the role of State, public and non-governmental organizations in its implementation. It has two main objectives: ensuring the safety, health and well-being of the population, and protecting the environment.

NEHAP is directed towards joint actions with other national and State programmes and projects in environmental health. For this purpose, a coordinator, secretariat and executive group were set up. However, implementation is so far insufficient.

The environmental health policy framework in Tajikistan is also defined by other national programmes, strategies and plans, for example:

- Poverty Reduction Strategy Paper
- National Programme on Immune Prophylaxis;
- National Programme for Tropical Diseases
- Programme to Facilitate a Healthy Lifestyle in Tajikistan until 2010. The Programme intends to establish an environmental health database and monitoring system;
- State Environment Programme for 1998-2008;
- Regional strategy of rational and effective use of water and energy resources;
- Concept on Rational Use and Protection of Water;
- National Programme on Phasing-out the Use of Ozone-depleting Substances and Measures to Implement the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer
- National Action Programme to Combat Desertification;
- National Programme on improving and stabilizing the social and ecological situation in the Aral Sea Basin; and

- Agreement on cooperation [with other Central Asian countries] on joint management and protection of water resources and Agreement of mutual action on ecological improvement and social economic development in Aral region.

*Legal framework*

The State policy on environmental health is conducted in accordance with the Constitution, which states: "All persons have the right to health care. This right is to be secured through free medical assistance in State health care institutions, as well as through measures aimed at, inter alia, improving environmental conditions and promoting physical fitness." The most important laws on environment and health are:

- The Law on Health Protection of the Population (1997) regulates the relations between public health institutions and health institutions in general. It also determines and regulates the relations between the authorities, officials, citizens, public organizations and enterprises in public health care in accordance with the Constitution;

- The Law on Ensuring the Sanitary and Epidemiological Safety of the Population (2003) regulates legal, organizational and economic measures for ensuring the sanitary-epidemiological safety of the population. It also regulates public information on the sanitary-epidemiological well-being of the population and radiation safety, and it confirms the right of everyone to a safe environment;

- The Regulation on the State Sanitary Epidemiological Service, along with the Law on Ensuring the Sanitary and Epidemiological Safety of the Population, regulates the functions, responsibility and activity of the State Sanitary Epidemiological Service;

- The Law on Radiation Safety (2003) establishes the Nuclear and Radiation Safety Agency, and develops norms for the population and occupational ionizing radiation exposure in accordance with International Atomic Energy Agency requirements; and

- The Law on Salt Iodization (2003) regulates and establishes measures connected with iodized salt use to prevent iodine deficiency disorders.

Other laws relevant to environmental health are:

- The Law on Nature Protection
- The Law on Air Protection
- The Water Code

In 2003, a draft law on drinking water and drinking water supply was prepared. If adopted, it would regulate relations in drinking water and drinking water supply and establish State guarantees on the provision of drinking water to the population.

Tajikistan's drinking-water quality standards date from 1983.

### Institutional framework

According to the Law on Health Protection of the Population, the Ministry of Health is responsible for, among other things, the provision of sanitary and epidemiological services to the population. The Ministry of Health establishes State sanitary-epidemiological control, carries out activities on ecological and radiation safety, environmental protection and sanitary supervision, and develops and approves State and sectoral sanitary norms, rules and hygiene standards.

In the Ministry of Health, a leading authority is the Main State Sanitary Physician, who is the Deputy Minister of Health. The Ministry of Health's Sanitary-Epidemiological Department develops and implements State policy on the sanitary well-being of the population, establishes standards and norms, and coordinates the activities of all sanitary-epidemiological services.

The Sanitary Epidemiological Service carries out sanitary-hygienic control, which is divided into two main functions: sanitary and hygiene, and epidemiology. Its main tasks are State control of the sanitary-hygienic and sanitary-epidemic measurements to prevent and clean up environmental contamination, improving living conditions, and disease prevention and reduction. Its main responsibilities are sanitary control of water, food, air and radiation safety, and developing and improving national norms and regulations. It should be noted that its equipment and reagents are inadequate to meet its responsibilities fully.

The Service's main problems are its lack of funding and human resources (staff cut from 2806 to 1168, i.e. by 58.4%, between 1990 and 2000), its inadequate vehicles, and the general shortage of equipment and other material. These problems undermine its work and make it difficult for it to carry out its functions, especially on water-borne infection control.

**Table 12.6: National standards for drinking water quality (GOST 2874-82) compared to WHO Water Quality Guidelines**

| Indicator | Tajikistan maximum allowable concentration | WHO Guidelines |
|---|---|---|
| Total coliforms | 100 | 0 |
| Faecal coliforms | 3 | 0 |
| Boron | .. | 0.3 mg/l |
| Cadmium | .. | 0.003 mg/l |
| Molubdenum | 0.25 mg/l | 0.07 mg/l |
| Arsenic | 0.05 mg/l | 0.005 mg/l |
| Nickel | .. | 0.02 mg/l |
| $NO_3$ | 45.0 mg/l | 50.0 mg/l |
| $NO_2$ | .. | 3.0 mg/l |
| Mercury | .. | 0.001 mg/l |
| Lead | 0.03 mg/l | 0.01 mg/l |
| Selenium | 0.001 mg/l | 0.01 mg/l |
| Fluoride | 1.5 mg/l | 1.5 mg/l |
| Chromium | .. | 0.05 mg/l |
| Manganese | 0.1 mg/l | 0.5 mg/l |
| Cu | 1.0 mg/l | 2.0 mg/l |
| Chlorine | 350.0 mg/l | .. |
| Zinc | 5.0 mg/l | 3.0 mg/l |

*Source:* State standard of Soviet Union. Drinking water. Hygiene requirements and quality control. GOST 2874-82, 1982.

The main scientific institution for environmental health is the Tajik Scientific Research Institute of Preventive Medicine. It provides scientific and methodological support to sanitary epidemiological

services. Its researchers have carried out several studies on the influence of environmental contamination on human health, especially around "hot spots" (Tajik aluminium plant, Vakhsh nitrogen fertilizer plant, Yavan electrochemical plant, Tajik cement plant in Dushanbe).

Abuali Sino State Medical University also has various environmental health activities. Its Department of Hygiene, Environment and Occupational Medicine is responsible for education and training in environmental health, and for studies dealing with various environmental health issues.

### Environmental health information systems

In Tajikistan, the monitoring system is a State system of surveillance, analysis, assessment and prognosis of human health and the living environment, and determining causal relationships between environmental influence and human health. It is under the responsibility of the Ministry of Health and the State Committee for Environmental Protection and Forestry.

The indicators on the state of health and environment are evaluated insufficiently. There are no complete information systems on environment and health. The degree of risk and the role of environmental factors in various social conditions influencing human health are inadequately assessed.

Due to financial difficulties, monitoring, as a complex approach and system, is not functioning. Research investigations, risk analysis, analysis of contamination of the environment and analyses of the living environment are not adequate. One of the main causes of the low efficacy of the monitoring system is the lack of specialized transport.

The Sanitary Epidemiological Service monitors environmental factors nationally and locally. Its local laboratories determine and analyse biological and chemical risk factors in water, air, soil and food products. Only water quality is monitored regularly. Food quality is controlled regularly only in children's institutions and hospitals; otherwise it is investigated only if there is an outbreak or a specific request.

The State Committee for Environmental Protection and Forestry has special inspectorates for air, water, land and waste, animals and plants, and forestry, as well as a radiation control and analytical control service. The inspectorates also operate locally. (See also chapter 2, on Policy, legal and institutional framework.) The State Committee also has monitoring responsibilities. (See also chapter 4, on Information, public participation and education.)

**Figure 12.5: Structure of Sanitary-Epidemiological Department**
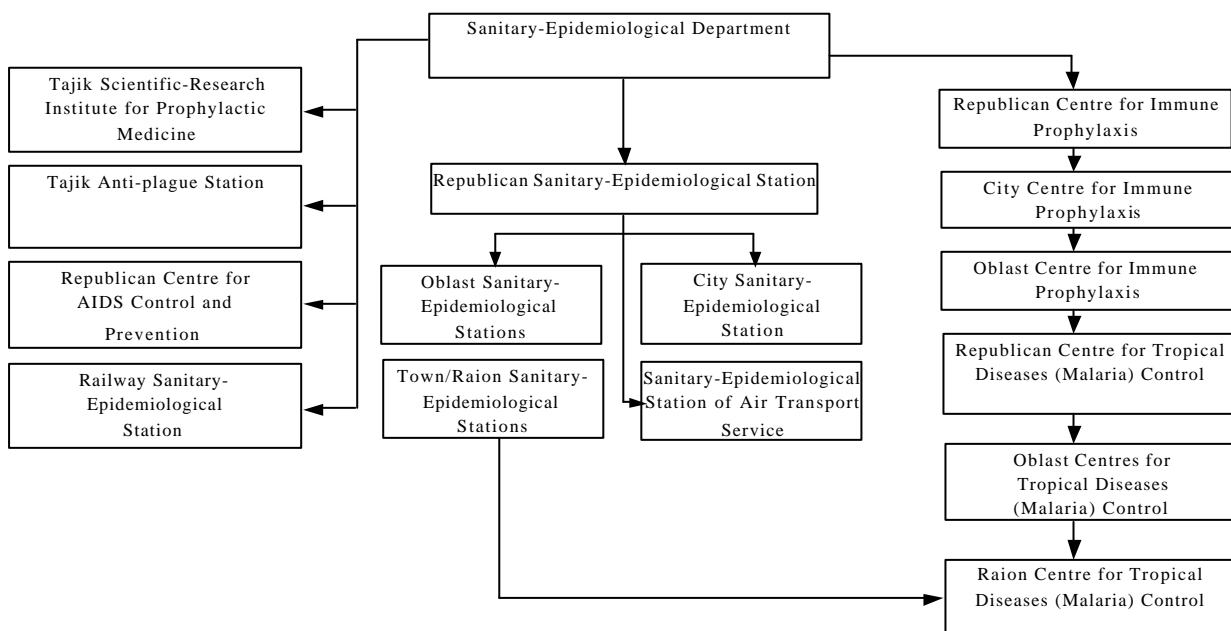


## 12.4  Conclusions and recommendations

During the past decade, funding for the State Epidemiological Service has been reduced, leading

to a decrease in staff monitoring environmental health. Insufficient financial resources have resulted also in equipment becoming outdated and a consequent decline in laboratory inspection standards. Modernization with new laboratory equipment is proceeding slowly.

This has a negative impact on the system of environmental monitoring; only a limited number of environmental pollutants can be determined and observed. Monitoring of water quality is more or less regular, but air contamination is controlled only in major industrial sites. In most cases, the quality of air, drinking water and food is assessed upon request. Monitoring also presents methodological problems with respect to sampling and measuring methods. It is necessary to develop a system to assess and control risk, through epidemiological analysis to establish a connection between the health of the general population and environmental pollution.

*Recommendation 12.1:*
*(a) The Ministry of Health should review and re-establish the disease surveillance system;*
*(b) The Ministry of Health should work closely with the State Committee for Environmental Protection and Forestry to re-establish and further develop comprehensive monitoring systems for air quality, drinking water quality, waste and hazardous waste disposal, ionizing radiation sources, and food safety, with a clear division of responsibilities. The monitoring data and health statistics should be the foundation for an integrated and coherent environmental health information system.*

The problem of access to safe drinking water and water supply to the population is one of the urgent problems in Tajikistan. Approximately half of the population has access to piped drinking water; more than 40%, predominantly in rural areas, uses epidemiologically hazardous water from open sources. The quality of drinking water and the conditions of the water-supply system are deteriorating systematically. Water treatment and distribution systems do not ensure that the drinking water delivered to a large part of population is safe. Water chlorination is not systematic and not sufficient. In many cases, water is bacteriologically contaminated.

Access to safe drinking water is decreasing. The deterioration of the water supply is a major problem, which is directly linked to worn-out water-supply networks and the unsatisfactory state

of repair of pipes. A third of the water-supply system has completely broken down. Drinking-water pipes are often laid in close proximity to sewage pipes, increasing the risk of drinking water pollution in the event of bursts. Secondary contamination in the poorly maintained distribution system together with insufficient disinfection are also a threat to public health.

The national water standards date from 1983.

*Recommendation 12.2:*
*(a) The Government should modernize water treatment and distribution systems with the help of adequate investments in order to improve drinking-water quality and extend the drinking water supply system to the rural areas in order to ensure access to safe drinking water to the vast majority of the population;*
*(b) The Ministry of Health should take all necessary measures to reduce the health risks from the microbiological contamination of drinking water;*
*(c) The Ministry of Health should revise national drinking water quality standards according to WHO guidelines.*

Significant levels of microbial contamination of food represent a serious problem. The primary cause is contamination by pathogenic micro-organisms, especially in the context of an uncontrolled market and ineffective monitoring of food imports. The magnitude and severity of the biological and chemical contamination of food is not completely clear, partly due to the lack of appropriate monitoring facilities available to the Sanitary Epidemiological Service in many districts and regions. There is no national body responsible for food safety and Tajikistan does not participate in the Codex Alimentarius.

*Recommendation 12.3:*
*The Ministry of Health, together with other institutions that have responsibility for food safety, should:*
*(a) Develop a national food strategy within the framework of the organization of the Ministerial Conference on Food and Nutrition in 2006;*
*(b) Establish a State body responsible for food safety;*
*(c) Designate a national body for participation in the Codex Alimentarius;*
*(d) Implement the Hazard Analysis and Critical Control Point (HACCP) system. Food handlers*

*should be trained in the principles of food safety and hygienic handling of food;*

*(e) Prepare and distribute a code of hygiene practices to all food industries and local authorities.*

In Tajikistan ionizing radiation sources are used widely. There are many radiological departments and units in the country. Uranium mining and processing were developed decades ago, and this has led to a significant accumulation of high- and low-level radioactive waste. It is stored improperly, sometimes in close proximity to human settlements. The amount and the total activity of this waste are not clear.

In 2003, with the adoption of the Law on Radiation Safety, the Nuclear and Radiation Safety Agency was established. The Agency is the State authority that establishes rules, norms and limits in radiation protection and radiation safety. The Ministry of Health, through its Sanitary Epidemiological Service, controls radiation in the environment. However, there is a lack of studies on the influence of ionizing radiation sources on human health, especially around radioactive waste depositories.

*Recommendation 12.4:*
*(a) The Ministry of Health should establish a centre of radiation safety and protection with responsibility not only for radiation control of the environment, but also for monitoring and controlling the population's exposure and occupational exposure.*

*(b) The Ministry of Health should monitor the health status of the population around radioactive waste depositories and in the areas with elevated background radiation.*

The National Environmental Health Action Plan (NEHAP), developed jointly by the Ministry of Health and the then Ministry of Nature Protection, sets Tajikistan's environmental health priorities. It describes intersectoral actions and the division of competencies and defines the role of State, public and non-governmental organizations in its implementation. However, since its adoption in 2000, little has been done to implement it. This is due not only to a shortage of financial resources, but also to a lack of coordination and cooperation with the other institutions that have responsibilities in NEHAP implementation. The Ministry of Health established an intersectoral working group to assist in coordination, but it has been largely dormant.

*Recommendation 12.5:*
*The Ministry of Health should reactivate the working group in order to improve intersectoral cooperation and coordination in the implementation of the National Environmental Health Action Plan.*

There is no sorting and separation of municipal waste anywhere. Medical waste is not collected separately but dumped together with other waste, potentially causing microbiological and chemical contamination. There is no incinerator for medical and toxic waste.

*Recommendation 12.6:*
*The Ministry of Health should implement measures for the safe disposal of hospital waste, and for the separation of medical waste from municipal and industrial waste.*

# ANNEXES

# ANNEX I

# SELECTED REGIONAL AND GLOBAL ENVIRONMENTAL AGREEMENTS

| Worldwide agreements | | Tajikistan | |
|---|---|---|---|
| **Year** | | **Year** | **Status** |
| 1971 | (RAMSAR) Convention on Wetlands of International Importance especially as Waterfowl Habitat | **2001** | **Ac** |
| 1972 | (PARIS) Convention Concerning the Protection of the World Cultural and Natural Heritage | **1992** | **Ac** |
| 1979 | (BONN) Convention on the Conservation of Migratory Species of Wild Animals | **2001** | **Ac** |
| 1985 | (VIENNA) Convention for the Protection of the Ozone Layer | **1996** | **Ac** |
| | 1987 (MONTREAL) Protocol on Substances that Deplete the Ozone Layer | **1998** | **Ac** |
| | 1990 (LONDON) Amendment to Protocol | **1998** | **Ac** |
| 1992 | (RIO) Convention on Biological Diversity | **1997** | **Ac** |
| | 2000 (CARTAGENA) Protocol on Biosafety | **2004** | **Ac** |
| 1992 | (NEW YORK) Framework Convention on Climate Change | **1998** | **Ac** |
| | 1997 (KYOTO) Protocol | | |
| 1994 | (PARIS) Convention to Combat Desertification | **1997** | **Ac** |

Ac = Accession;  Ad = Adherence;  De = denounced;  Si = Signed;  Su = Succession;  Ra = Ratified.

| Regional and subregional agreements | | Tajikistan | |
|---|---|---|---|
| **Year** | | **Year** | **Status** |
| 1998 | (AARHUS) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters | **2001** | **Ac** |

Ac = Accession;  Ad = Adherence;  De = denounced;  Si = Signed;  Su = Succession;  Ra = Ratified.

# ANNEX II

# SELECTED ECONOMIC AND ENVIRONMENTAL DATA

**Tajikistan: Selected economic data**

| | 1995 | 2002 |
|---|---|---|
| **TOTAL AREA** (1,000 km$^2$) | 143.1 | 143.1 |
| **POPULATION** | | |
| Total population, (1,000 inh.) | 5,834.6 | 6,437.5 |
|   % change (1995-2002) | .. | 10.3 |
|   Population density, (inh./km$^2$) | 40.8 | 45.0 |
| **GROSS DOMESTIC PRODUCT** | | |
| GDP, (million US$) | 648.7 | 1,217.9 |
|   % change (1995-2002) | .. | 87.7 |
|   per capita, (US$ 1,000/cap.) | 111.2 | 189.2 |
| **INDUSTRY** | | |
| Value added in industry (% of GDP) | .. | .. |
| **AGRICULTURE** | | |
| Value added in agriculture (% of GDP) | .. | .. |
| **ENERGY SUPPLY** | | |
| Total supply, (Mtoe) | .. | .. |
|   % change (1995-2000) | .. | .. |
| Energy intensity, (Toe/US$ 1000) | .. | .. |
|   % change (1995-2000) | .. | .. |
| Structure of energy supply, (%) | .. | .. |
| Solid fuels | .. | .. |
| Oil | .. | .. |
| Gas | .. | .. |
| Nuclear | .. | .. |
| Hydro,etc. | .. | .. |
| **ROAD TRANSPORT** | | |
| Road traffic volumes | .. | .. |
|   billion veh.-km | .. | .. |
|   % change (1995-2000) | .. | .. |
|   per capita (1,000 veh.-km/cap.) | .. | .. |
| Road vehicle stock (1,000 vehicles) | 184.9* | 261.1 |
|   % change (1999-2002) | .. | 41.2 |
|   per capita (veh./100 inh.) | 3.0* | 4.1 |

*Source:* UNECE and National Statistics
.. = not available.      - = nil or negligible.

Note:
* =1999 data

**Tajikistan: Selected environmental data**

|  | 1995 | 2002 |
|---|---|---|
| **LAND** | | |
| Total area (1 000 km$^2$) | 143.1 | 143.1 |
| Protected areas (% of total area) | 2.7 | 20.6 |
| Nitrogenous fertilizer use (thousand tons) | 53.7 * | 51.5 |
| **FOREST** | | |
| Forest area (% of land area) | 2.8 | 2.8 |
| Use of forest resources (harvest/growth) | .. | .. |
| Tropical wood imports (US$/cap.) | .. | .. |
| **THREATENED SPECIES** | | |
| Mammals (% of species known) | .. | .. |
| Birds (% of species known) | .. | .. |
| Fish (% of species known) | .. | .. |
| **WATER** | | |
| Water withdrawal (million m$^3$/year) | 11,900 | 10,700 |
| Public waste water treatment | .. | .. |
| (% of population served) | .. | .. |
| **AIR** | | |
| Emissions stationary sources | .. | .. |
| Emissions of sulphur dioxide (kg/cap.) | 0.5 | 0.2 |
| "        (kg/US$ 1000 GDP) | .. | .. |
| Emissions of nitrogen dioxide (kg/cap.) | 0.2 | 0.1 |
| "        (kg/US$ 1000 GDP) | .. | .. |
| Emissions of carbon monoxide (kg/cap.) | 4.8 | 3.4 |
| "        (ton/US$ 1000 GDP) | .. | .. |
| **WASTE GENERATED** | | |
| Industrial waste (kg/US$ 1000 GDP) | .. | .. |
| Municipal waste (million m$^3$) | 3.5 ** | 4.0 |
| Radioactive waste accumulated (million tons) | .. | 164.3 |
| **NOISE** | | |
| Population exposed to leq > 65 dB (A) | | |
| (million inh.) | .. | .. |

*Source:* UNECE and National Statistics
.. = not available.          - = nil or negligible.

Note:
* = 1994 data
** = 1997 data

# ANNEX III

# THE LIST OF ENVIRONMENT-RELATED LEGISLATION IN TAJIKISTAN

Constitution of the Republic of Tajikistan, 6 November 1994 with amendments of 26 September 1999 and 22 June 2003

**Laws (in alphabetical order)**

Code of Administrative Violations, No. 378, 31 August 1998

On Air Protection, No. 228, 1 February 1996 with additions and amendments No. 498, 12 December 1997

On Certification of Goods and Services, No. 314, 13 December 1996

Criminal Code

On Customs Tariffs, No. 744, 14 May 1999

On *Dekhkan* (Farmers') Farms (On Private Farms), No. 48, 10 May 2002

On Ecological Expertise, No. 20, 22 April 2003

On Economic Liability of Enterprises, Institutions and Organizations for Violations in the Area of Construction and Construction Materials Industry, No. 498, 12 December 1997

On Energy, No. 123, 10 November 2000

On Establishment of Coefficients for Indexation of Land Tax Rates, No. 902, 11 December 1999

Forestry Code, No. 769, 24 June 1993

On Health Protection of Population, No. 419, 15 May 1997, with additions and amendments No. 485, 12 February 2004

On Hydrometeorological Activity, No. 86, 2 December 2002

On Industrial Safety of Hazardous Industrial Objects, No. 14, 28 February 2004

On Informatization, No. 40, 6 August 2001

Land Code, No. 23, 13 December 1996, with additions and amendments No. 498, 12 December 1997, No. 746, 14 May 1999, No. 15, 12 May 2001, and No. 23, 29 February 2004

On Land Administration, No. 20, 12 May 2001

On Land Reform, No. 1005, 21 July 1994, with additions and amendments No. 134, 4 November 1995 and 5 May 1997

On Land Valuation, No. 18, 12 May 2001

On Local Self-Governance and Local Economy in the Republic of Tajikistan, No. 267, 23 February 1991

On Minerals, No. 983, 20 July 1994 with additions and amendments No. 120, 4 November 1995

On Natural Monopolies, No. 525, 12 May 2001

On Nature Protection, No. 905, 27 December 1993, with additions and amendments No. 223, 1 February 1996, No. 30, 10 May 2002, and No. 75, 2 December 2002

On Payments for Land, No. 547, 6 March 1992 ????

On Plants Quarantine, No. 25, 12 May 2001

On Privatisation of State Property, No. 464, 16 May 1997

On Production and Safe Handling of Pesticides and Agrochemicals, No. 1, 22 April 2003

On Protection and Use of Animals No. 989, 20 July 1994, with additions and amendments No. 223, 1 February 1996 and No. 488, 12 December 1997

On Protection and Use of Plants, passed by *Majlisi Namoyandagon* on 2 April 2004

On Protection of Consumers' Rights, No. 439, 15 May 1997

On Public Organisations, No. 644, 23 May 1998

On Public Petitions, No. 343, 14 December 1996

On Quality and Safety of Food, No. 54, 10 May 2002

On Radiation Safety, No. 42, 1 August 2003

On Salt Iodization, No. 85, 2 December 2002

On Ensuring Sanitary and Epidemiological Safety of the Population, No. 49, 8 December 2003

On Specially Protected Territories, No. 39, 10 May 2002

On Standardization, No. 333, 14 December 1996

On State Sanitary Control, No. 87, 20 July 1994

On State Secrets, No. 4, 22 April 2003

Tax Code, No. 664, 12 November 1998, with additions and amendments No. 810, 30 June 1999, No. 904, 11 December 1999, No. 27, 10 May 2002, No. 3, 22 April 2003, and No. 31, 1 August 2003

On Tourism, No. 824, 3 September 1999

On Transport, No. 124, 10 November 2000

On Veterinary Medicine, No. 73, 8 December 2003

On Waste of Production and Consumption, No. 44, 10 May 2002

Water Code, No. 34, 29 November 2000

**Presidential Decrees (in alphabetical order)**

On Certain Measures on Improvement of the System of State Governance, No. 1249, 19 January 2004

On System of Central Executive Bodies of the Republic of Tajikistan, No. 853, 4 July 2003

**Resolutions of the *Majlis*i Oli (Parliament)**

On Approval of Poverty Reduction Strategy Paper, No. 666, 19 June 2002

**Resolutions of the Government (in alphabetical order)**

On Approval of Concept on Rational Use and Protection of Water, No. 551, 1 December 2001

On Approval of Economic Development Programme of the Republic of Tajikistan for the period until 2015, No. 86, 1 March 2004

On Approval of National Action Programme to Combat Desertification in the Republic of Tajikistan, No. 598, 30 December 2001

On Approval of National Environmental Health Action Plan (NEHAP), No. 217, 10 May 2000

National Programme on Phasing-out the Use of Ozone Depleting Substances (On Measures for Compliance with Vienna Convention on Protection of Ozone Layer and Montreal Protocol on Ozone-Depleting Substances), No. 477, 3 December 2002

On Approval of Procedure for Determining Payments and Payment Limits for Environmental Pollution and Waste Disposal, No. 619, 23 December 1993

On Approval of Procedure for Issuing of Permits for Taking Migratory, Rare and Endangered Animal Species, No. 301, 3 July 2003

On Approval of Procedure for Licensing of Activities in Handling of Hazardous Waste, No. 252, 6 June 2003

On Approval of Procedure for Licensing of Extracting Mineral Resources, No. 92, 4 March 2002

On Approval of Procedure for Registration and Issuing of Permits for Special Water Use, No. 485, 3 December 2002

On Approval of Procedure for State Control over Environmental Protection and Use of Natural Resources in the Republic of Tajikistan, No. 21, 24 January 1994

On Approval of Procedure for Use of Ground Waters that are not Designated as Drinking or Medicinal Water, No. 421, 4 November 2002

On Approval of Rates for Calculating the Amount of Fines for Violation of Forestry Legislation, No. 410, 3 September 1996

On Approval of Regulation on Amount, Procedure and Conditions of Applying Charges for the Right of Extraction of Mineral Resources, No. 418, 5 September 1996

On Approval of Regulation on Procedure for Effecting State Control over Status, Use, Restoration, Safeguarding and Protection of Forests in the Republic of Tajikistan, No. 388, 21 September 2000

On Approval of Regulation on State Cadastre of Tourism Resources of the Republic of Tajikistan, No. 199, 4 May 2000, with amendments No. 151, 31 March 2003

On Approval of Regulation on State Ecological Expertise in the Republic of Tajikistan, No. 156, 7 April 1994

On Approval of Regulation on State Forestry Guard of the Republic of Tajikistan, No. 134, 7 April 1999

On Approval of Regulation on State Sanitary Epidemiological Service of the Republic of Tajikistan, No. 575, 29 December 2003

On Approval of State Programme for Development of Tourism in Tajikistan for the period of 2004-2009, No. 582, 29 December 2003

On Approval of the Republic of Tajikistan National Action Plan for Mitigation of Climate Change, No. 259, 6 June 2003

On Calculation of Fines for Violation of Forestry Legislation, No. 410, 3 September 1996

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