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**USE OF ENVIRONMENTAL INDICATORS IN GOVERNMENT REPORTS
ON THE STATE OF THE ENVIRONMENT IN THE COUNTRIES OF
EASTERN EUROPE, THE CAUCASUS AND CENTRAL ASIA**

Presented by the ECE secretariat¹

1. The purpose of this overview is to analyse the present situation relating to the use of indicators in government reports on the state of the environment in the countries of Eastern Europe, the Caucasus and Central Asia. In preparing this overview, use was made of material presented by members of the ECE Working Group on Environmental Monitoring at the workshop on environmental indicators and networking organized by the European Environmental Agency (EEA) and ECE in Geneva on 24 and 25 February 2003, as well as existing literature and material available on the Internet.

I. THE SITUATION AS REGARDS ENVIRONMENTAL REPORTS

2. Government reports on the state of the environment have been prepared in all the countries of Eastern Europe, the Caucasus and Central Asia during the past 10 years. However, they do not all publish such reports regularly. In most countries they are issued in printed form. All the countries have issued at least one state-of-the-environment report in electronic form.

3. Most of the countries of Eastern Europe, the Caucasus and Central Asia publish, in addition to government reports on the state of the environment, other periodic reports relating to the state of the environment and public health; such information on the state of the environment is to be found in national plans of action for the protection of the environment, national plans of action for environmental health, national strategies and programmes of action on biodiversity and other publications. National reports under the United Nations Framework Convention on Climate Change are prepared in almost all the countries of Eastern Europe, the Caucasus and Central Asia. In addition, environmental performance reviews have been drawn up by ECE for Georgia, Belarus (jointly with OECD), the Russian Federation (jointly with OECD), Armenia, Kazakhstan, Kyrgyzstan, the Republic of Moldova, Ukraine and Uzbekistan.

4. It should be pointed out that the aim of the present overview is to analyse only government reports (print and/or electronic), and that the above-mentioned material was not analysed. The state-of-the-environment reports analysed in this overview are listed below in the list of sources.

II. METHODOLOGY OF THE PRESENT ANALYSIS

5. For the purposes of the present analysis, an attempt was made to bring together the indicators used in the countries of Eastern Europe, the Caucasus and Central Asia for a wide range of environmental problems and issues into a unified system of environmental problems and priority issues of environmental policy, based on the systems used by OECD and EEA. The following environmental problems and environmental policy issues were identified:

- (a) Climate change;
- (b) Air quality;
- (c) Water resources;
- (d) Land resources and soils;
- (e) Biodiversity;
- (f) Wastes;
- (g) Forest resources;
- (h) Fishery resources;
- (i) Socio-economic indicators relating to all the problems.

6. The results of the analysis relating to all 12 countries of Eastern Europe, the Caucasus and Central Asia are set out in the annex. A detailed analysis of three countries - Armenia, Belarus and Kazakhstan - appears in section III. The choice of countries for detailed analysis was based on the following factors: full geographical coverage - featuring countries in the west of the grouping, in the Caucasus and in Central Asia; comprehensive consideration given in the reports to environmental problems and environmental policy issues and extensive use of environmental indicators to describe them; availability of both printed and electronic reports.

III. ANALYSIS COVERING THREE COUNTRIES

7. Analysis of the use of environmental indicators in **Armenia** is based on two electronic state-of-the-environment reports [1, 2]. The "Report on the state of the environment in Armenia in 2002" [2] uses the OECD model known as "Pressure - State - Response" (PSR) to present information in the form of a structured system of indicators. It should be pointed out that the report provides comparable data for several indicators relating to neighbouring countries - Azerbaijan and Georgia - and also Latvia, Russia and European averages. For example, data on the breakdown of water use by sector, annual and per capita discharge of waste water. The electronic reports on the state of the environment in Armenia use the following basic indicators:

(a) Climate change:

- CO₂ and CH₄ emissions.

(b) Air quality:

- Total emissions of pollutants, from stationary sources, by economic sector, from mobile sources;
- Emissions of specific pollutants (NO_x, SO₂, CO, volatile organic compounds (VOCs, Pb), total, by sector: manufacturing and energy; transport, households and heat energy generation;
- Emissions of specific pollutants (NO_x, SO₂, CO, VOCs, Pb), per capita and per square kilometre;
- Trends in anthropogenic emissions of specific pollutants (NO_x, SO₂, CO, VOCs, NH₃, Pb and solids) from 1987 to 1998;
- Changes in concentrations of pollutants (solids, CO, NO_x, SO₂) in specific cities between 1987 and 1996;

(c) Water resources:

- Trends in water withdrawal between 1985 and 1998;
- Water losses during transport as a percentage of total water withdrawal between 1985 and 1998;
- Water use, total, by type of use (irrigation, communal and household requirements, industry) between 1985 and 1998;
- Volume of discharge of waste water into surface water bodies, total, by industrial sector;
- Expenditure on protection of water resources in industry;
- Prices (tariffs) for water supply and sewerage.

(d) Land resources and soils:

- Structure of land use;
- Contamination of soils by pesticides and heavy metals (number of samples which do not comply with national standards);
- Land degradation resulting from construction, landslides and salinization;
- Area of land used for storage of industrial and household wastes;
- Area of land polluted as a result of mining.

(e) Biodiversity:

- Change in anthropogenic pressures on the environment between 1920 and 1990;
- Density of the road and rail networks;
- Density of urban areas;
- Population density;
- Extent of protected nature areas in the country as a whole, as a percentage of the area of the country;
- Diversity of flora and fauna;
- Number of species of animals and plants recorded in the Red Book for Armenia;
- Number and extent of specially protected nature areas, by category;
- Proportion of rare and endangered species in the total number of species recorded in the country;
- Plant and animal species which have disappeared.

(f) Wastes:

- Volume of industrial wastes generated, total, by hazard class;
- Volume of household wastes generated;
- Rate of generation of household wastes, kilograms per person per year;
- Use of pesticides;

- Reuse/recycling of industrial wastes;
- Expenditure on processing and storage of wastes.

(g) Forest resources:

- Total area of forest land, as a percentage of the area of the country;
- Total timber stock;
- Trend in logging between 1988 and 1997;
- Ratio between annual average forest clearance and annual average timber growth;
- Number of forest fires;
- Area affected by forest fires;
- Volume of timber damaged and destroyed by forest fires.

8. The following basic indicators are used in reports on the state of the environment in **Belarus** [4, 5]:

(a) Climate change:

- Emissions of CO₂, total, by sector;
- Annual average temperature;
- Trend in volume of deposition.

(b) Air quality:

- Trend in total emissions of pollutants, from stationary sources, from mobile sources, between 1996 and 2000;
- Emissions of NO_x, SO₂, CO, solids, hydrocarbons and volatile organic compounds (VOCs), total, from stationary sources, from mobile sources;
- Trend in deposition of acidifying pollutants and contribution of other countries to pollution in Belarus;
- Air quality in respect of 25 pollutants in 16 major cities;
- Trend in the air pollution index² in 16 major cities between 1995 and 2000;
- Consumption of ozone-depleting substances;
- State of the ozone layer above monitored areas of Belarus between 1998 and 2000.

(c) Water resources:

- Trends in water withdrawal between 1985 and 2000;
- Trends in water consumption, total, by type of water consumption between 1997 and 2000;
- Intensity of use of water from surface and underground sources by economic sector;
- Volume of waste water discharged into surface water bodies, total, by degree of treatment (polluted, clean to applicable standard, purified to applicable standard);
- Quality of surface water in large water bodies as measured using hydrochemical and hydrobiological indicators;
- Comprehensive assessment of water quality in the main rivers in terms of the water body pollution index³ in 1995 and 2000;
- Quality of drinking water in sources used for centralized and decentralized water supply (compliance with health requirements).

(d) Land resources and soils:

- Changes in the breakdown of the stock of land by type of land use between 1997 and 2000;
- Area of land subject to water and wind erosion;
- Breakdown of land by degree of erosion;
- Area of drained land;
- Trend in land reclamation between 1990 and 2000;
- Area of polluted land;
- Area of land contaminated by radionuclides - country as a whole and by administrative region.

(e) Biodiversity:

- Number and extent of specially protected nature areas, by category - country as a whole, by administrative region;
- Diversity of flora and fauna;
- Number of species of animals and plants and their habitats recorded in the Red Book for Belarus;

- Trend in the numbers of the main species of game animals between 1990 and 1999;
- Numbers and offtake of the main species of game animals.

(f) Wastes:

- Composition of industrial wastes generated;
- Trend in the generation and disposal of industrial wastes between 1995 and 2000;
- Volume of toxic wastes generated, treated and disposed of, total, by hazard class;
- Reuse/recycling of industrial wastes.

(g) Forest resources:

- Total area of forest land, as a percentage of the area of the country;
- Change in the area of forest land (as a percentage of the area of the country) since 1750 with forecast to 2015;
- Total stock of timber, average stock per hectare and average age of tree stands;
- Change in the total stock of timber between 1996 and 1999;
- Ratio between average annual forest clearance and average annual growth of timber;
- Number and area of forest fires between 1998 and 2000.

(h) Fishery resources:

- Trend in industrial catches between 1990 and 1999.

9. Analysis of the use of environmental indicators in **Kazakhstan** is based on one printed report [9] and two electronic reports [7, 8] on the state of the environment, which were drafted using the following basic environmental indicators:

(a) Air quality:

- Trend in total emissions of pollutants from stationary sources since 1991;
- Total emissions of pollutants from stationary sources by region and economic sector;
- Trends in total emissions of pollutants from mobile sources, from 1994 onwards;
- Emissions of NO_x, SO₂, CO, solids and benzopyrene;

- Trend in the air pollution index in the major cities between 1991 and 1999;
- Per capita emissions of pollutants into the atmosphere.

(b) Water resources:

- Availability of water resources in Kazakhstan by region (thousands of cubic metres per square kilometre);
- Trend in withdrawal of water from natural sources from 1990 onwards;
- Water supply per square kilometre and per capita;
- Trend in water consumption, total, by type of use (manufacturing, household and drinking water, agriculture, including irrigation and supply to canals and reservoirs);
- Trend in water losses during transport from 1990 onwards;
- Use of underground water reserves in the country as a whole and by administrative and geographical units;
- Operational/consumption index of use of underground water (comparison of reserves and use of underground water);
- Availability of fresh drinking water by administrative and geographical units (cubic metres per year per inhabitant);
- Consumption of fresh drinking water by the population in the major cities (litres per day per inhabitant);
- Trend in the discharge of waste water into surface water bodies from 1990 onwards;
- Trend in the discharge of untreated waste water into surface water bodies from 1991 onwards;
- Discharge of pollutants (suspended matter, ammoniacal nitrogen, nitrate nitrogen, organic compounds on the basis of BOD, petroleum products, phenols, synthetic surfactants, total phosphorus; compounds of iron, copper, zinc, nickel and tin) into surface water bodies;
- Health status of sources used for centralized and decentralized water supply as measured using microbiological and chemical indicators (number of water samples which do not comply with health standards, as a percentage of the total number tested);

- Comprehensive assessment of water quality in the main rivers using the water body pollution index between 1994 and 1996;
- Quality of underground water (concentrations of pollutants as percentages of maximum permissible concentrations).

(c) Land resources and soils:

- Breakdown of the stock of land;
- Changes in land use by category in 1990, 1995 and 1999;
- Area of degraded and depleted land;
- Area of land subject to water and wind erosion.

(d) Biodiversity:

- Extent of protected nature areas in the country as a whole, as a percentage of the country's area;
- Number and extent of specially protected nature areas, by category;
- Number of species of animals and plants recorded in the Red Book for Kazakhstan;
- Proportion of rare and endangered species in the total number of species recorded in the country;
- Plant and animal species which have disappeared;
- Trends in the numbers of game animals and game birds.

(e) Wastes:

- Industrial wastes generated by category;
- Toxic wastes generated by hazard class;
- Accumulation of toxic wastes at enterprises at the end of 1999, total, by type of waste and hazard class;
- Use of pesticides.

(f) Forest resources:

- Total area of forest;
- Total stock of timber;

- Trend in forest restoration;
- Trend in the number of forest fires recorded;
- Area affected by forest fires;
- Volume of timber damaged and destroyed by forest fires.

(g) Fishery resources:

- Volume of fish catch in water bodies in Kazakhstan;
- Changes in fish catch ceilings and actual volume of fish catch in water bodies in Kazakhstan between 1992 and 1997.

(h) Socio-economic indicators:

- Generation of electric power from renewable sources as a percentage of total electricity generation;
- Investment in environmental protection, total, by category of environmental protection;
- Expenditure on environmental protection per capita and per square kilometre;
- Energy consumption per capita and per unit of gross domestic product (GDP) in United States dollars;
- Trends in the production of fuel and energy resources;
- Trends in the consumption of the main energy resources.

IV. FEATURES OF OTHER COUNTRIES

10. In the other countries of Eastern Europe, the Caucasus and Central Asia, government reports on the state of the environment use, in addition to the environmental indicators referred to in the above detailed analysis, a further series of indicators which are worthy of note. In state-of-the-environment reports in **Kyrgyzstan**, for example, [10, 11, 12] the following indicators are used in addition to those mentioned:

(a) Land resources and soils:

- Evolution of the decline of the area of agricultural and arable land, and also planting of perennial crops per capita between 1980 and 1995.

(b) Wastes:

- Waste generation (kilograms per capita);
- Change in the volume of household wastes generated (kilograms per capita) between 1993 and 1997;
- Change in the volume of toxic wastes generated per square kilometre between 1993 and 1997;
- Recycled paper and glass as a percentage of total use;
- Intensity of pesticide use (kilograms per hectare).

(c) Forest resources:

- Annual damage caused by forest fires (in local currency) between 1998 and 2000.

(d) Socio-economic indicators:

- Trends in transport of goods and passengers by mode of transport - road, rail, waterway and air, between 1995 and 1999.

11. In state-of-the-environment reports in **the Republic of Moldova**, [13, 14] the following indicators are used:

(a) Air quality:

- Intensity of SO_x and NO_x emissions (kilograms per capita).

(b) Land resources and soils:

- Area of eroded land and annual erosion-related losses of nutrients from soils;
- Contamination of soils by heavy metals, nitrates and pesticides.

(c) Wastes:

- Number of waste burial sites;
- Use of mineral fertilizers.

(d) Socio-economic indicators:

- Total number of motor vehicles;

- Transport of goods and passengers by mode of transport - road, rail, waterway and air;
- Primary energy supply, total and breakdown.

12. In state-of-the-environment reports in **the Russian Federation**, [15, 16] in addition to the indicators listed above, the following are used:

(a) Air quality:

- Air quality in cities: number and list of cities with the highest levels of air pollution, indicating the highest multiple by which the maximum permissible concentrations were exceeded;
- Size of the population living in cities with an air pollution index higher than 7, by federal area.

(b) Land resources and soils:

- Change in area of arable land between 1990 and 2001;
- Contamination of soils by heavy metals in cities (frequency with which maximum permissible concentrations are exceeded).

13. In electronic reports on the state of the environment in **Tajikistan** [17, 18] and especially in the report for 2000, [17] which was prepared using the OECD "Pressure - State - Response" (PSR) model, a number of environmental indicators are used which are not yet used in other countries of Eastern Europe, the Caucasus and Central Asia:

(a) Climate change:

- Emissions of three main greenhouse gases;
- Emissions of greenhouse gases in CO₂ equivalent between 1990 and 1998, total, by sector: fuel consumption, industrial processes, agriculture and burial of wastes;
- Share of hydropower in electricity generation.

(b) Water resources:

- Water consumption for household and drinking water requirements per capita;
- Centralized water supply and sewerage services to the population.

(c) Land resources and soils:

- Change in area of irrigated land between 1994 and 2000;
- Average yield of the main agricultural crops in 1980, 1990 and 2001.

(d) **Biodiversity:**

- Changes in ecosystems between 1970 and 2002.

14. In the electronic report on the state of the environment in **Ukraine**, [22] in addition to the indicators mentioned above, the following are used:

(a) **Water resources:**

- Use of water in circulating systems and in water reuse;
- Productivity of water treatment stations.

(b) **Land resources and soils:**

- Change in nitrate pollution of the main vegetable crops between 1986 and 1998.

15. In reports on the state of the environment in **Uzbekistan**, [23, 24, 25] the use of the following additional environmental indicators may be seen:

(a) **Air pollution:**

- Change in emissions of air pollutants (in kilograms per capita) between 1991 and 2001;
- Total emission of pollutants associated with generation of 1 kWh of electric power;
- Percentage sulphur content in oil used in energy plants;
- Reduction in consumption of ozone-depleting substances in 2001 compared with 1996.

(b) **Land resources and soils:**

- Change in the pattern of the main agricultural crops sown on irrigated land between 1992 and 2001;
- Change in yields of cotton and wheat between 1994 and 2001;
- Contamination of soils by heavy metals, nitrates, pesticides, DDT and petroleum products.

V. ASSESSMENT OF THE INDICATORS USED

16. The analysis showed that all the national reports on the state of the environment predominantly use descriptive indicators, i.e. indicators which reflect the situation as it is. Commonest are indicators of pressure (P) and state (S), to use the classification from the DPSIR model. Thus, for example, in all the countries of Eastern Europe, the Caucasus and Central Asia loads on the atmosphere are described using such indicators as pollutant emissions with different

degrees of aggregation of the basic data - total emissions, total emissions from stationary and mobile sources, emissions of individual pollutants, emissions by region and emissions by economic sector. As a rule, data are given for the reporting year and compared with the previous year. In many of the reports (Armenia, Belarus, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan) the trend in emissions over various periods of time is indicated.

17. Air quality in cities is evaluated by such indicators as (average daily, maximum single, average annual) near-ground concentrations of pollutants as compared with the maximum permissible concentration. In a few countries (Belarus, Georgia, Kazakhstan, Russia and Uzbekistan), a composite parameter is also used to evaluate air quality in cities - the air pollution index, which takes into account the extent to which the maximum permissible concentration has been exceeded in respect of certain pollutants.

18. Concerning the environmental problem of climate change, the pressure indicator of emissions of the main greenhouse gases is used in the reports of only five countries - Armenia, Belarus, the Republic of Moldova, Tajikistan and Turkmenistan; indicators of state - average annual air temperature and average total depositions - are used in the reports of Belarus, Kyrgyzstan, the Republic of Moldova, Russia, Tajikistan and Turkmenistan. The reports of the remaining countries describe the problem of climate change without using any quantified information. The situation is similar for the problem of ozone layer depletion: the indicator of pressure - consumption of ozone-depleting substances - is used only in the reports of Belarus, Tajikistan and Uzbekistan.

19. The production of environmental indicators in the countries of Eastern Europe, the Caucasus and Central Asia is based on the following information and methodologies:

- Official statistics;
- Information supplied by Ministries;
- Methodological guidance on environmental indicators taken from documents setting out sectoral development strategies;
- Scientific publications and other documents.

20. In producing environmental indicators, the countries of Eastern Europe, the Caucasus and Central Asia encounter substantial problems involving such matters as:

- The quality of available information;
- Incomplete coverage of observations;
- The fact that national methodologies for observation, measurement and collection of primary information are not in keeping with international standards and requirements, hampering comparability of information between countries and their participation in the pan-European process of exchange of environmental information;

- Restricted time series of data;
- The absence of comparable data.

VI. CONCLUSIONS

21. Overall, analysis of the application of environmental indicators in the countries of Eastern Europe, the Caucasus and Central Asia shows that a fairly wide range of environmental indicators are currently being used in government reports on the state of the environment in most of the countries, though some of them constitute more a collection of data than indicators in the correct sense of the word.

22. The purpose of environmental indicators is to provide information on the state of the environment and human activities which affect it in a form which makes it possible to identify emerging problems and evaluate the effectiveness of actions taken. To this end they must evaluate not only the state of the environment but also changes in the state of the environment compared with target indicators, find cause-and-effect relationships between the state of the environment and the pressures on it, and identify interrelationships and interdependences between environmental, economic and social trends.

23. The environmental indicators currently used in the countries of Eastern Europe, the Caucasus and Central Asia essentially only describe the state of the environment and the pressures on it, with very little emphasis on evaluation. There is a perfectly logical explanation for this: (1) in the case of problems for which action is in its initial stages - and for a number of objective reasons most environmental problems in the countries of Eastern Europe, the Caucasus and Central Asia are indeed at the stage of identification - it is these very indicators of the state of the environment and indicators of pressure which play a leading role; (2) in order to evaluate trends, and also to identify cause-and-effect relationships, there is a need for high-quality primary information with full coverage of the items under observation over a lengthy period of time (at least 5-10 years), whereas in most of the countries of Eastern Europe, the Caucasus and Central Asia, for most of the indicators, time series are lacking or hard to compare. This applies in particular to data on economic growth, since the fall in output at the beginning of the 1990s, the change in forms of ownership, structural changes in the economy, the introduction of national currencies and so on mean that comparable data can be obtained at best for the last five years.

24. However, despite the difficulties and problems, the current environmental reporting system, both at the nationwide level and at the departmental level, produces the quantitative information which is needed to calculate a limited number of basic environmental indicators and put them forward as priority key indicators for evaluating the state of the environment at the national level and the environmental impacts of individual enterprises and economic sectors, in order to compare the results of their environmental protection activities and also for comparability between countries. It is necessary to begin by selecting a basic range of indicators linked with the strategic goals that the countries of Eastern Europe, the Caucasus and Central Asia have set themselves in the field of environmental protection and sound use of natural resources, and with international obligations and the need to join the pan-European process as full participants, and then to rank the indicators in terms of priority and to introduce them step by step.

Notes

- ¹ Overview prepared with the assistance of L.Gornaya, ECE consultant.
- ² The air pollution index is calculated as the arithmetic mean of the magnitudes of the shares in maximum permissible concentrations of average annual concentrations of the five pollutants which display the highest concentrations vis-à-vis the norm.
- ³ The water body pollution index is calculated as the arithmetic mean of the magnitudes of the shares in maximum permissible concentrations recorded by six hydrochemical indicators - dissolved oxygen content and biological oxygen demand, plus the four pollutants which display the highest concentrations vis-à-vis the norm.

List of sources

1. State of the Environment Report for Armenia, 2000.
(www.grida.no/htmls/armenia/soe2000/eng/index.htm)
2. State of the Environment - Armenia, 1998.
(www.grida.no/enrin/htmls/armenia/soe_armenia/soeeng.htm)
3. State of the Environment - Azerbaijan, 2002.
(www.grida.no/enrin/htmls/azer/soe/index.html)
4. State of the Environment - Belarus, 1998.
(www.president.gov.by/Minpriroda/english/index.htm)
5. National Report on State of Environment in the Republic of Belarus. Minsk: Ministry for Natural Resources and Environmental Protection of the Republic of Belarus, 2002.
6. State of the Environment - Georgia, 1996. (www.parliament.ge/SOEGEO/hp_soege.htm)
7. State of Environment of the Republic of Kazakhstan, 2000.
(www.grida.no/enrin/htmls/kazahst/soe2/soee/index.htm)
8. State of Environment of the Republic of Kazakhstan, 1999.
(www.grida.no/enrin/htmls/kazahst/soe/soee/index.html)
9. Государственный доклад «Экологическое состояние окружающей среды Республики Казахстан». Алматы: Министерство экологии и природных ресурсов Республики Казахстан, 1997 (Government report on the state of the environment in the Republic of Kazakhstan. Almaty, Ministry of Ecology and Natural Resources, 1997).
10. Национальный доклад о состоянии окружающей среды Кыргызстана - 2000. Бишкек: Министерство экологии и чрезвычайных ситуаций Кыргызской Республики, 2001 (National report on the state of the environment in Kyrgyzstan, 2000. Bishkek, Ministry of Ecology and Emergencies, 2001). (www.grida.no)
11. State of the Environment Report - Kyrgyzstan, 2000.
(www.grida.no/enrin/htmls/kyrgyz/soe2/index)
12. State of the Environment of Kyrgyzstan, 1998.
(www.grida.no/enrin/htmls/kyrgyz/soe/index.htm)
13. Summary on the Environmental State in the Republic of Moldova, 1998.
(www.grida.no/enrin/htmls/moldova/soe/index.html)
14. Cocirta, P. Reporting and Indicators Frameworks in the Republic of Moldova, 2003.
(www.grida.no)

15. Государственный доклад «О состоянии и об охране окружающей среды Российской Федерации в 2001 году». Москва: Министерство природных ресурсов Российской Федерации, 2002 (Government report on the state of the environment and environmental protection in the Russian Federation, 2001. Moscow, Ministry of Natural Resources, 2002).
16. State of the Environment - Russia, 1998. (http://grid.ecoinfo.ru/state_eng/index.htm)
17. Tajikistan, 2002. State of the Environment Report. (www.grida.no/enrin/htmls/tadjik/soe2001/eng/index.htm)
18. State of the Environment Report - Tajikistan, 2000. (www.grida.no/enrin/htmls/tadjik/soe2/index.html)
19. State of the Environment Report - Tajikistan, 1998. (www.grida.no/enrin/htmls/tadjik/soe/index.html)
20. State of the Environment - Turkmenistan, 2000. (www.grida.no/enrin/htmls/turkmen/soe2/index.html)
21. State of the Environment - Turkmenistan, 1998. (www.grida.no/enrin/htmls/turkmen/soe/htmeng)
22. National Report on the State of Environment in Ukraine, 1998. (www.grida.no/enrin/htmls/ukraina/soe98)
23. Национальный доклад “О состоянии окружающей среды и использовании природных ресурсов в Республике Узбекистан в 2001 г.” Ташкент: Государственный комитет Республики Узбекистан по охране природы, 2002 (National report on the state of the environment and the use of natural resources in the Republic of Uzbekistan, 2001. Tashkent, State Committee on Nature Protection, 2002).
24. State of the Environment Uzbekistan Report, 2000. (www.grida.no/htmls/uzbek/soe2/index.html)
25. National Report of Uzbekistan for Nature Protection, 1998. Electronic Report. (www.grida.no/enrin/htmls/uzbek/report/index.htm)

Annex
Overview of the use of environmental indicators in the countries of Eastern Europe, the Caucasus and Central Asia

Environmental problems	Environmental indicators	ARM	AZE	BEL	GEO	KAZ	KYR	MOL	RF	TAJ	TUR	UKR	UZB
Climate change	Emissions of the three main greenhouse gases (CO ₂ , CH ₄ , N ₂ O)	+		+				+		+	+		
	Average annual temperature			+			+	+	+	+	+		
	Average annual volume of deposition			+			+	+	+		+		
<i>Air pollution</i>	Total emissions from stationary sources	+	+	+	+	+	+		+	+	+	+	+
	Emissions of SO ₂ from stationary sources	+		+	+	+	+	+	+		+	+	+
	Emissions of NO _x from stationary sources	+		+	+	+	+	+	+		+	+	+
	Emissions of VOCs from stationary sources	+		+	+		+	+	+		+	+	+
	Emissions of PM10 from stationary sources	+		+	+	+	+	+	+		+	+	+
	Total emissions from mobile sources	+	+	+	+	+	+		+	+	+	+	+
	Emissions of SO ₂ from mobile sources	+		+	+	+		+	+			+	+
	Emissions of PM10 from mobile sources	+		+	+	+	+		+	+		+	+

Annex (continued)

Environmental problems	Environmental indicators	ARM	AZE	BEL	GEO	KAZ	KYR	MOL	RF	TAJ	TUR	UKR	UZB
	Emissions of VOCs from mobile sources	+		+	+			+	+			+	+
	Emissions of heavy metals from mobile sources	+			+			+	+			+	
	Total amount by which air quality standards are exceeded in cities			+	+	+			+				+
	Concentrations of harmful substances in the air which exceed maximum permissible levels	+		+	+		+	+	+	+	+	+	+
	Intensity of discharges of specific harmful substances	+				+	+	+		+			+
	Consumption of the main ozone-depleting substances			+						+			
	Import of the main ozone-depleting substances									+			
Water resources	Water withdrawal	+	+	+	+	+	+	+	+	+	+	+	
	Intensity of water withdrawal (per sq. km. and per capita)					+							

Annex (continued)

Environmental problems	Environmental indicators	ARM	AZE	BEL	GEO	KAZ	KYR	MOL	RF	TAJ	TUR	UKR	UZB
	Water losses during transport	+				+	+		+	+		+	
	Water consumption	+	+	+	+	+	+	+	+	+	+	+	+
	Intensity of water consumption (per capita per day)					+				+			
	Operational/consumption index of water quality			+		+	+	+	+				
	Quality of drinking water (quality of samples exceeding norms)			+									
	Total discharge of waste water	+	+	+	+	+	+	+	+	+	+	+	+
	Discharge of organic compounds on the basis of BOD				+	+	+	+	+	+		+	
	Discharge of total phosphorus (P)				+	+	+	+	+	+		+	
	Discharge of total nitrogen (N)				+	+	+	+		+			
	Discharge of heavy metals				+	+	+	+	+	+			

Annex (continued)

Environmental problems	Environmental indicators	ARM	AZE	BEL	GEO	KAZ	KYR	MOL	RF	TAJ	TUR	UKR	UZB
	Concentrations of main pollutants in water bodies compared with maximum permissible level			+	+	+	+	+	+		+	+	+
	Concentrations of main pollutants in underground water compared with maximum permissible level							+	+				
	Quality of river water under national classification (water pollution index)			+	+	+			+				+
	Cost of water protection	+											
	Water supply and sewerage charges	+											
Wastes	Generation of industrial wastes	+		+	+	+	+	+	+	+	+		
	Generation of toxic wastes	+		+	+	+	+	+	+	+	+	+	+
	Generation of municipal wastes	+					+	+	+		+		+
	Intensity of waste generation (per capita, per sq. km.)	+					+						
	Use of pesticides and mineral fertilizers	+			+	+	+	+		+	+		

Annex (continued)

Environmental problems	Environmental indicators	ARM	AZE	BEL	GEO	KAZ	KYR	MOL	RF	TAJ	TUR	UKR	UZB
	Reuse/recycling of wastes	+		+				+		+			
	Recycling of paper and glass as a percentage of total consumption						+						
<i>Biodiversity</i>	Protected nature areas (total extent, by category, as a percentage of the area of the country)	+	+	+	+	+	+	+	+	+	+	+	+
	Proportion of rare and endangered species in the total number of species recorded in the country	+	+			+		+					
	Population and offtake of the main game birds			+		+			+	+		+	
	Ecosystem diversity, flora and fauna			+			+	+	+	+	+		+
	Number of species of flora and fauna recorded in the Red Book	+	+	+	+	+	+	+	+	+	+	+	+
	Endangered species of plants and animals	+			+	+				+			
	Density of road network	+				+			+	+			

Annex (continued)

Environmental problems	Environmental indicators	ARM	AZE	BEL	GEO	KAZ	KYR	MOL	RF	TAJ	TUR	UKR	UZB
<i>Land resources and soil degradation</i>	Change in the structure of land use in specific categories	+		+	+	+	+	+	+	+	+	+	
	Area of agricultural land subject to water/wind erosion			+	+	+	+	+	+			+	
	Degradation of land as a result of construction, mining, landslides, salinization, storage of wastes	+			+	+		+			+		
	Land reclamation			+							+		
	Contamination of soils by radionuclides, heavy metals, pesticides, etc.	+		+	+			+	+				+
Forest resources	Total forest area	+	+	+	+	+	+	+	+	+		+	+
	Stock of timber (total, per hectare)	+		+	+	+		+	+	+		+	
	Volume of timber cut	+					+	+	+	+			
	Area of afforestation/reafforestation					+	+	+	+	+		+	
	Forest fires (number, area, volume of timber destroyed)	+		+		+	+		+			+	

Annex (continued)

Environ-mental problems	Environmental indicators	ARM	AZE	BEL	GEO	KAZ	KYR	MOL	RF	TAJ	TUR	UKR	UZB
	Damage caused by forest fires (in local currency)						+		+				
	Annual volume of timber cut as a percentage of annual growth			+									
Fishery resources	Fishery stocks, main species							+					
	Fish catch			+		+		+	+			+	
	Fishery quotas					+							
Socio-economic indicators (not linked to a specific problem)	Size and density of population	+											
	Pattern of primary energy supply					+		+					
	Share of renewable energy sources in electric power generation					+				+			
	Energy intensity of the economy (total supply of primary energy in relation to GDP)					+		+					

Annex (continued)

Environ-mental problems	Environmental indicators	ARM	AZE	BEL	GEO	KAZ	KYR	MOL	RF	TAJ	TUR	UKR	UZB
	Total number of motor vehicles							+					
	Evolution of the volume of transport operations by mode of transport						+	+					
	Environmental protection investment and costs	+				+	+	+					

Abbreviations: “ARM” = Armenia; “AZE” = Azerbaijan; “BEL” = Belarus; “GEO” = Georgia; “KAZ” = Kazakhstan; “KYR” = Kyrgyzstan; “MOL” = Republic of Moldova; “RF” = Russian Federation; “TAJ” = Tajikistan; “TUR” = Turkmenistan; “UKR” = Ukraine; “UZB” = Uzbekistan.