EUROPEAN NEIGHBOURHOOD AND PARTNERSHIP INSTRUMENT – SHARED ENVIRONMENTAL INFORMATION SYSTEM

COUNTRY REPORT OF UKRAINE

March, 2012
Kyiv, Ukraine

European Environment Agency

This project is funded by the European Union

This project is implemented by the European Environment Agency

Legal notice:

This project is financed through a service contract ENPI/2009/210/629 managed by DG EuropeAid.

This publication has been produced with the assistance of the European Union. The contents of this publication are the sole responsibility of Zoï Environment Network, sub-contracted by EEA for this work, and can in no way be taken to reflect the views of the European Union.

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EXECUTIVE SUMMARY

The Shared Environmental Information System (SEIS) is a European Union initiative to modernize and simplify the collection, exchange and use of the data and information required for designing and implementing environmental policy. The project was launched to promote the protection of the environment in the European Neighbourhood region through the European Neighbourhood Partnership Instrument (ENPI). There are three priority themes – air, water and waste – identified for ENPI East countries, such as Armenia, Azerbaijan, Belarus, Georgia, Moldova, Russia and Ukraine.

This Country Report was prepared by Zoi environment network in close cooperation with National Focal Points and involvement of the local experts. The Report reflects current state of the environmental monitoring, infrastructure and inter-institutional cooperation on environmental protection within a country, also it provides information on gaps that should be filled and areas where environmental monitoring and data exchange could be improved.

For preparation of the Report the official documents were studied such as national environmental reports, strategies and policies etc. The regional and national environmental monitoring network and links between main monitoring actors for information and data exchange were observed. The Country Report also includes outcomes of the seminar and bilateral meetings with representatives of the executive bodies of Ukraine.

Chapter 1 of the Country Report reflects the national system with the reference to environmental information. The development of national state of the environment reports is ensured by the Ministry of Ecology and Natural Resources of Ukraine according to Article 25 of the Law of Ukraine "On Protection of the Environment". The environmental information is also provided in a series of other reports that are published in Ukraine. They include:

1. National report on the state of technogenic and natural safety in Ukraine;
2. National report on the state of drinking water and water supply,
3. National report on the state and perspectives of implementation of the state policy on energy efficiency;
4. National communication of Ukraine on climate change; and
5. The Statistics books and other information documents.

The statistical observations about the protection of the environment in Ukraine are carried out by the bodies of state statistics as well as other sector ministries and agencies. The statistical information is collected in relation to the natural environments (air, surface waters, soils, etc.) using sector forms, such as form No2-tp (air), form No2-tp (water), form No1-waste etc.
Several groups of environmental indicators are traditionally used in the development of national state of the environment reports. They are an air pollution and depletion of the ozone layer, climate change, water resources, biodiversity, land resources and soils, waste, agriculture, efficiency indicators of the environmental policy implementation. Since 2007, indicators on energy and transport have also been used in the reports. Most of environmental indicators (from the above mentioned groups) are developed according to the Guidelines for the Application of Environmental Indicators in the Countries of Eastern Europe, Caucasus and Central Asia. Not all of the indicators in the Guidelines can be produced in Ukraine due to limited or absent of data (for example, there is no data on the emissions of solid particles of fraction PM10 and PM2,5).

Chapter 2 describes national monitoring system and departmental resources of primary environmental information, as well as the interaction between all environmental monitoring bodies based on information and data collecting, processing, exchange and dissemination. There are 8 actors of environmental monitoring on the national level:

- Ministry of Ecology and Natural Resources;
- Ministry of Emergency Situations;
- Ministry of Health Protection;
- Ministry of Agricultural Policy;
- State Agency of Forestry of Ukraine;
- State Agency of Water of Ukraine;

- State Agency of Land Resources of Ukraine;
- Ministry of Regional Development and Construction of Ukraine.

At the regional level, environmental monitoring is carried out by the oblast departments (including regional environmental inspections) of the listed above organizations.
Bilateral agreements on cooperation in the field of environmental monitoring have been concluded between the Ministry of the Ecology and Natural Resources and bodies of the State System of Environmental Monitoring to regulate the process of information exchange on indicators and terms of environmental information provision. The data received from the regional and national bodies of the State Environmental Monitoring System is passed to the Information Analytical Center of the Ministry of the Environment and Natural Resources and accumulated in the environmental databanks (www.ecobank. org.ua) ensuring information exchange with regional monitoring centers and bodies. The general structure of the current State Environmental Monitoring System and information flows inside this System are presented there.

Chapter 3 refers to multilateral environmental agreements and obligations of Ukraine. Thus, Ukraine is a party to 20 international environmental conventions; two more agreements have been signed but not ratified (http://www.unece.org/env/epr/epr_studies/Ukraine%20II.pdf). Ukraine has joined nine protocols to environmental conventions and signed but not ratified six of them. Ukraine reports to the UN Commission on Sustainable Development and the secretariats of the current multilateral agreements/conventions on a regular basis.

Chapter 4 provides cross-analyses of SEIS components, i.e. legislation, technical capacity, monitoring, reporting. In Ukraine there are many modern software products as well as scientific and technical solutions for provision and analysis of environmental information that could be used in the implementation of the Ukrainian SEIS component. However, there is no single centralized electronic data transfer network that would cover the information resources of all bodies of environmental monitoring. Besides, there is no single methodology of data interpretation and exchange of results of environmental monitoring. This hinders comprehensive assessment of natural environments. Obviously, the country needs to continue further improvement of legislation in the sphere of environment monitoring and improvement of environmental statistics reporting. Also, there is a need to develop methodology to assess the quality of the environment.

On the basis of cross-analysis of the current state of informational provision in the sphere of statistical reporting and environmental monitoring ***Chapter 5*** has identified the priority objectives for the development of information environmental infrastructure of Ukraine and areas of work related to the establishment of a shared European environmental information system SEIS. The table with proposed actions and implementation plan is presented in the Chapter.

I NATIONAL SYSTEM TO REPORT ENVIRONMENTAL INFORMATION

In the outcome of the bilateral meeting between the Ministry of Ecology and Natural Resources of Ukraine and European Environment Agency held on September 22, 2011 at the Seventh Ministerial Conference "Environment for Europe" (Astana, Kazakhstan) the parties have agreed on the importance of implementing ENPI-SEIS project "Towards the Shared Environmental Information System (SEIS) in the European Neighborhood" in Ukraine. The main goal of the project is to assist the protection of the environment in countries that participate in "European Neighborhood and Partnership Instrument" Program.

The first phase of the project included:

- One-day seminar with participation more than 60 people - representatives of the European Environment Agency, UNECE, various executive bodies of Ukraine, scientific institutions, national and international non-governmental organizations;
- Bilateral meetings with the Ministry of Ecology and Natural Resources of Ukraine (with the involvement of the State Environmental Inspection, State Environment Investment Agency, State Agency of Water Resources); State Statistics Services of Ukraine; EU delegation in Ukraine and State Hydrometeorological Centre (with the involvement of the Ukrainian Scientific and Research Hydrometeorological Institute and Central Geophysical Observatory) and
- Preparation of the Country Report of Ukraine focused on assessment of the current state of environmental monitoring and infrastructure, as well as the prospects of its improving, particularly in the framework of the ENPI-SEIS project.

1.1 Development of national state of the environment reports

The development of national state of the environment reports is ensured by the Ministry of Ecology and Natural Resources of Ukraine according to Article 25 of the Law of Ukraine "On Protection of the Environment". The resolution of the Cabinet of Ministers of Ukraine of 07.02.1992 N61 "On provision of the development of the national state of the environment report in Ukraine" envisages establishment of an inter-departmental commission to coordinate development of reports.

Every year an order of the Ministry of Ecology and Natural Resources approves the structure and short guidance on the development of the sections in the national report. Over the last years, the structure of the report has been provisionally discussed with representatives of the public (mainly via the Public Council at the Ministry).

The national report is developed using information materials from more than 50 organizations – ministries, agencies, scientific and public organizations.

The draft report is sent for consideration to the ministries and agencies, whose representatives are members of the inter-departmental commission. Follow-up revision of the report is undertaken on the basis of consideration of results, comments and suggestions from the Ministry of Ecology and Natural Resources.

The developed report is forwarded to the Supreme Council of Ukraine for approval. Following that, the national report is printed publication and is uploaded on the website of the Ministry of Ecology and Natural Resources.

At the time when this Country Report was written, the National state of the environment report of Ukraine for 2010 had been developed and approved by the Supreme Council of Ukraine.

Generalized environmental information is also provided in a series of other reports that are published in Ukraine. They include:

1. National report on the state of technogenic and natural safety in Ukraine;

2. National report on the state of drinking water and water supply,
3. National report on the state and perspectives of implementation of the state policy on energy efficiency;
4. National communication of Ukraine on climate change; and
5. The Statistics books and other information documents.

1.2 Sources of statistical data and environmental information

Statistical observations about the protection of the environment in Ukraine are carried out by the bodies of state statistics as well as sector ministries and agencies. In the first case, the state statistics data is being collected, in the second – administrative data is collected. The main statements and principles of the statistical observations are determined by the Law of Ukraine "On State Statistics". The system to collect information about the state of the environment is presented in Figure 1.

The main tasks of the state statistics bodies in the sphere of environment protection are:

- Collection, analysis, dissemination, storage, protection and usage of environmental information on the basis of statistical methodology;
- Ensuring reliability and objectivity of information;
- Interaction of the information system of the statistics bodies with the information systems of the authorities, international organizations and statistics services of other countries via mutual information exchange;
- Coordination of the activity related to collection and use of administrative data;
- Ensuring availability and openness of statistical information, its sources and compilation methodology.

The laws of Ukraine that regulate statistical observations are:

- On State Statistics;
- On Environmental Protection;
- On Air Protection;
- On Waste;
- On Nature Reserve Fund;
- Forest and Water Codes of Ukraine;

The following international documents are used when conducting statistical observations in Ukraine:

- Recommendations of the UN Statistical Commission on the inventory of air emissions (CORINAIR-99);
- European classification of air emission sources (SNAP);
- European waste classification (EWC-Stat);
- EU Waste framework directive;
- Classification of areas of the nature protection activities and costs (Cepa-2000).

In Ukraine statistical information is collected in relation to the natural environments (air, surface waters, soils, etc.).

Statistical observations on emissions of pollutants into the air are conducted by the statistical bodies according to the form № 2-tp (air), that contains the data on:

- Total emissions of pollutants and greenhouse gases by enterprises;
- Emissions of pollutants and greenhouse gases from production and technological processes, technological equipment (facilities);
- Measures aimed at the reduction of greenhouse gases and pollutants emission into the air;

The database is in electronic form with information on 10 indicators for 130 chemicals and their groups. The frequency of the report is quarterly and annually; the database contains data from more than 9000 enterprises.

The record of emissions from mobile pollution sources is maintained separately. Mobile pollution sources include: aviation, automotive, railway and water transport; industrial, agricultural, construction and other production machinery. The calculations are based on the volume of fuel consumed and specific emissions for 11 pollutants and greenhouse gases.

Statistical and administrative data on water use are collected by the State Agency of Water Resources according to the form № 2-tp (water).
The database includes all water users according to the following list:

- General indicators of water withdrawal and use (8 indicators);
- Use of water for different purposes (13 indicators);
- Use of water by categories and sources (14 indicators);
- Limits and factual withdrawal of water (15 indicators);
- Information on water withdrawal by months: withdrawal, discharge and irrecoverable loss of water (12 indicators);
- General indicators of water discharge and losses (9 indicators);
- Discharge of sewage and other waters (12 indicators);
- Discharge of pollutants in sewage waters (about 70 indicators); and
- Discharge of water by the type of water treatment (15 indicators).

The database is in electronic form; frequency of data collection – once in a quarter. The number of reporting enterprises is over 16 000.

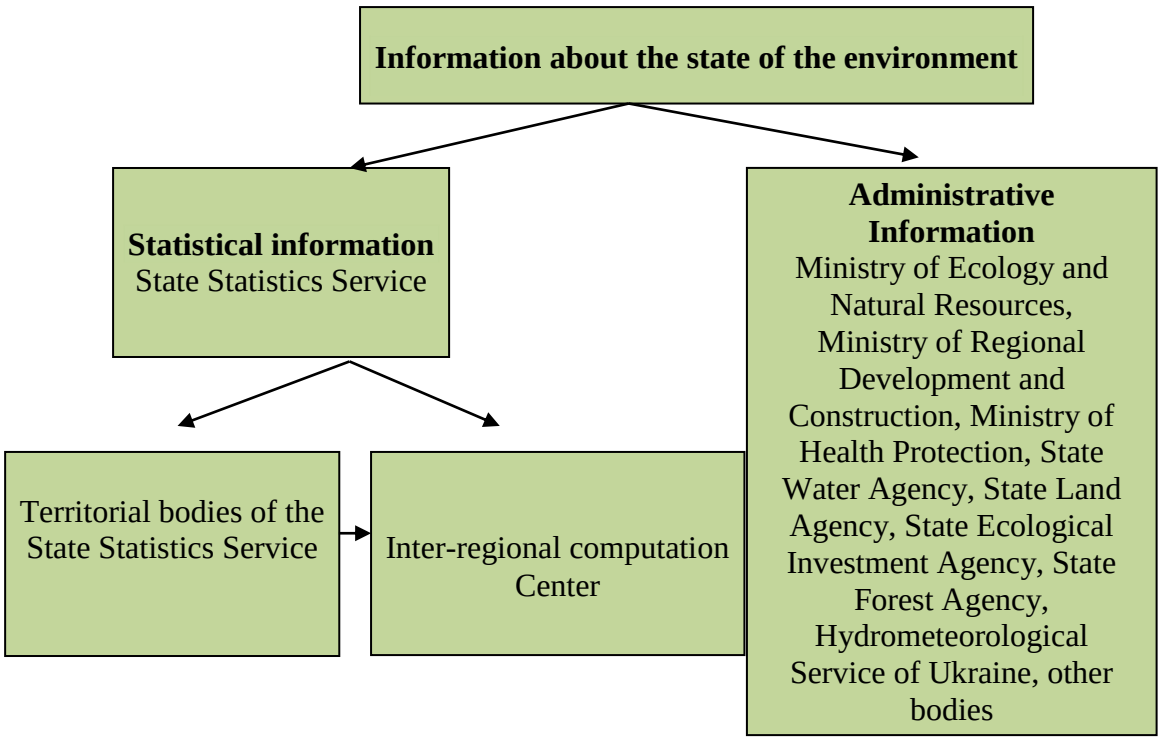

Figure 1.
The system of information collection on the state of the environment in Ukraine

Statistical and administrative data on waste treatment are collected by the statistics bodies according to the form № 1-waste that contains the data on:

- Waste treatment facilities;
- Volume of waste generation and treatment;
- Sediments of industrial effluent in the dry matter.

The database is in electronic format, frequency of data collection – quarterly. All enterprises that generate, dispose of, process and store waste of hazard classes I-IV should report.
In addition, the Ministry of Regional Development and Construction collects data on household waste according to the form № 1-TVP “Report on solid household waste management”.

Furthermore, state statistical observations include current environmental expenditure, forest activity, nature reserve fund, etc. The reports are provided quarterly and annually.

Characteristics of the main statistical and administrative data of the environment statistics system of Ukraine for the three priority SEIS themes are presented in table 1.

Table 1.
Information resources of statistical environmental information

№	Information environmental resources	Organization – owner of data	Level of data	Date of establishment	Data storage type	Internet address or way to access data	Characteristics of data	Possibility to use
1	**2**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.	Data base of state statistical observations over emission of pollutants into the air from stationary sources	State Statistics Service of Ukraine	National	1991	Electronic format	Department of agriculture and environment, director Prokopenko Oleg Nikolaevich, Tel: +38 044-289-72-80, O.Prokopenko@ukrstat.gov.ua	Emissions into the air from stationary sources, all enterprises of Ukraine; quarterly and annual reports on 10 indicators	Possible
2.	Data base of state statistical observations over emission of pollutants into the air from mobile sources	State Statistics Service of Ukraine	National	1991	Electronic format	Same	Emissions into the air from mobile sources on the territory of Ukraine; annual reports on 11 indicators	Possible
3.	Data base of state statistical observations over the use of surface, marine and ground waters	State Statistics Service of Ukraine	National	1991	Electronic format	Same	More than 100 indicators on water use and environmental pollution; quarterly reports on the Ukrainian enterprises	Possible
4.	Data base of state statistical observations over waste management	State Statistics Service of Ukraine	National	1991	Electronic format	Same	More than 20 indicators in the sphere of waste management and pollution of the environment; annual reports on the Ukrainian enterprises	Possible
5.	Statistical collections in the sphere of environment pollution and protection for the regions of Ukraine	State Statistics Service of Ukraine	National	1991	Hardcopy and partially in electronic format	Same	Several hundred indicators in the sphere of environment protection and pollution; annual data for the regions of Ukraine	Possible

Table 1 continued

1	2	3	4	5	6	7	8	9
6.	Information and analytical data base "Environmental passport of the regions of Ukraine"	Ministry of Ecology and Natural Resources	National	2006 – 2009	Electronic format	http://ukrecopass.org.ua/ support of DonNTU averin@donntu.edu.ua	30 forms, more than 1 mln data on all regions of Ukraine	Possible
7.	Bulletins of Ukrainian Hydromet "State of the Air Pollution"	Ukrainian Hydrometeorological Centre	Regional, local	2000-2011	Electronic format and in print format	Laboratories of Ukrainian Hydrometeorological Centre and its regional departments	Reviews on the state of the environment pollution Annual and semi-annual forms	Possible
8.	Bulletin "State of Ground Waters of Ukraine"	State Geological Service	National, regional and local	2000-2011	Electronic format and in print format	"State Informational Geological Fund of Ukraine" http://www.geoinf.kiev.ua/	Annual reviews on the state of ground waters of Ukraine	Possible
9.	Bulletin "Annual Bulletin on the State of Rivers of Ukraine"	Central Geophysical Observatory of Ukrainian Hydrometeorological Centre	National, regional	2000-2011	In print format	http://www.cgo.kiev.ua/	Annual reviews on the state of rivers in Ukraine	Possible
10	Climatic cadastral register of Ukraine	Central Geophysical Gbservatory of Ukrainian Hydrometeorological Centre	National	1997-2011.	In print format	http://www.cgo.kiev.ua/	Annual reviews of climatic data	Possible

1.3 Application of environmental indicators and integrated assessments of the environment

Several groups of environmental indicators are traditionally used in the development of national state of the environment reports. They are:

- Air pollution and depletion of the ozone layer;
- Climate change;
- Water resources;
- Biodiversity,
- Land resources and soils;
- Waste;
- Agriculture;
- Efficiency indicators of the environmental policy implementation.

Since 2007, indicators on energy and transport have also been used in the reports. The main sets of indicators are presented in separate chapters of the national report.

The development of the annual National State of the Environment Report in Ukraine is regulated by the Article 25-1 of the Law of Ukraine "On the Protection of the Natural Environment". The Ministry of Ecology and Natural Resources has been designated as the body of state power responsible for the development, publication of the report and its posting on the Internet.

The majority of environmental indicators (from the above mentioned groups) are developed according to the UNECE Guidelines for the Application of Environmental Indicators in the Countries of Eastern Europe, Caucasus and Central Asia.

As a rule, the indicators are presented as time series data in absolute values for the selected characteristics.

The indicators are broken down according to the types of economic activity, in shares and in calculation of social and economic indicators. Numeric values of indicators are presented in tables and if possible as charts, diagrams and maps.

Not all of the indicators in the Guidelines can be produced in the Ukraine due to limited or lack of data (for example, there is no data on the emissions of solid particles of fraction PM10 and PM2,5).

Description of the indicator's place in the system of DPSIR and SWOT analysis is not available in the presentation of indicators. Scenarios and predictions are hardly used except for climate change indicators.

The Ministry of Ecology and Natural Resources has assessed data availability for the development of environmental indicators according to the Guidelines for the Application of Environmental Indicators in the Countries of EECCA. The basic list of environmental indicators that should be approved by the order of the Ministry of Ecology and Natural Resources has been produced. These actions have been done to reinforce institutional use of environmental indicators in the assessment and provision of information on the state of environment.

The main environmental indicators in the field of ***atmospheric air pollution*** that are recommended according to the Guidelines and can be introduced in Ukraine are the following:
A) Indicators for the impact assessment
A.1. Gross emissions of pollutants into the atmosphere of the region, kt/year: total emissions, emissions from stationary and mobile sources, gross emissions by certain types of pollutants and groups of substances (nitrogen compounds, sulphur compounds, carbon oxide and dioxide,

hydrocarbons, dust, soot, light organic compounds, metals and their compounds, methane, resistant organic matters, compounds of chlorine and fluorine, cyanides and freons);
A.2. Specific share of emissions of pollutants: emissions per capita (kg), emissions per one square kilometer (tonnes);
A.3. Emission of pollutants into the atmosphere (according to cl. A.1) by industry sectors, production processes and technical facilities, by cities and districts of the region;
A.4. Data on the emission trends over the last 10 years (according to cl. A.1-A.3).
B). Indicators for the assessment of quality and hazard of atmospheric air pollution.
B.1. Concentrations of pollutants in the atmospheric air, microgram/m^3: annual average, monthly average, daily average concentrations at control points by the main types of pollutants (nitrogen dioxide and oxide, sulphur dioxide, dust, ammonia, phenol, carbon oxide, hydrogen sulphide, benzpyrene, formaldehyde, heavy metals), average pollutant concentrations on the territory of cities;
B.2. Level of excess pollutant concentration (hazard factor, chronic exposure) against the maximum permissible average daily concentration (MPC_{AD}) by the main types of pollutants (according to B.1), shares of MPC_{AD};
B.3. Level of excess pollutant concentration (hazard factor, acute exposure) against the maximum permissible one-time concentration (MPC_{OT}) by the main types of pollutants (according to B.1), shares of MPC_{OT};
B.4. Frequencyy of pollutant concentration excess beyond MPC_{MD} and MPC_{OT};
B.5. Data on the trends of atmospheric air quality and hazard of atmospheric pollution (according to cl. B.1-B.4) over the last 10 years.

An analysis of atmospheric air quality in urban areas is provided using data collected by State Hydrometeorological Center from its basic monitoring network in 53 cities of Ukraine. A concentration of 32 pollutants, including those that should be monitored according to the Guidelines for the EECCA countries, is measures in atmospheric air.

Most of the environmental indicators in Ukraine are collected by the monitoring bodies, yet collection of information for some indicators requires the development of additional measures from the monitoring bodies. Such indicators include: particulate matter emissions (PM_{10} and $PM_{2.5}$), emissions of dioxins/furans and PAC, percentage of the urban population of the country exposed to the impact of the ground level pollutant concentrations, concentration of tropospheric ozone, concentration of arsenic etc. The list can include concentrations of 35 pollutants according to the WHO Guidelines.

Comprehensive assessment of atmospheric air pollution and reporting on the quality of urban air in Ukraine is made on the basis of pollution index IZA-5 (comprehensive atmospheric pollution index) that makes it possible to register increase of the maximum permissible concentration for the five most hazardous pollutants of special importance for the surveyed region. Average annual concentration for each of these five pollutants is used in the calculation of this index. Air pollution is considered to be ‘increased” if IZA index is from 5 to 6. It is considered to be ‘high’ if IZA index is from 7 to 13 and ‘very high’ when IZA index is above 13. This approach does not provide for the reliable comparison of the air quality between the cities as the list of priority substances used in IZA calculation often varies for different cities.

Improvement of comprehensive assessment should focus on introduction of methodologies to assess risks of impact on people’s health and risks to the environment. In the first case, there is a risk assessment methodology approved by the Ministry of Health of Ukraine; for the environmental risks, there is only a draft of the respective methodology available so far.

As to the extension of the list of indicators in ***water monitoring*** field recommended by UNECE there are international recommendations for the establishment of standardized databases on water resources.

The main environmental indicators in the field of surface water pollution that are recommended by the Guidelines and can be introduced in Ukraine are the following:

A) Indicators for the assessment of water use.
A.1. Long-term renewable resources of fresh water in the region, million m^3.
A.2. Total volume of the river run-off and ground waters, million m^3/year: total run-off volume, volume of run-off by rivers, volumes of surface and ground run-off.
A.3. Intake/use of water from natural water bodies, million m^3/year: intake/use of surface and ground waters, intake/use of water by sectors of economy and by water bodies.
A.4. Discharge of water into natural water bodies, million m^3/year: total discharge of waste water, discharge of waste water by sectors of economy and by water bodies, discharge of purified and polluted (insufficiently purified and non-purified) waste water, share of polluted waste water in the gross waste water disposal (%), share of recurrently and successively used water in industrial water consumption (%).
A.5. Household water consumption per capita (m^3/year) and water losses in transportation (million m^3/year).
1.6. Data on the trends of indicators over the last 10 years (according to cl. A.1–A.5).
B. Indicators for the assessment of water quality.
B.1. Share of samples that do not meet the maximum permissible water pollution standards in the total number of surface and ground water samples, %: by chemical and bacterial pollution parameters.
B.2. Biochemical oxygen demand (BOD_5) and concentration of ammonium nitrogen in river water, mg O_2/l and microgram/l.
B.3. Amount of biogenic matter in fresh water, mg/l, microgram/l: concentrations of nitrates and phosphates in water.
B.4. Water pollution index (hazard index):

$$I = \sum_{i=1}^{n} \frac{C_i}{MPC_i},$$

where C_i is a concentration of ammonium nitrogen, nitrite nitrogen, oil products, phenols, dissolved oxygen, and BOD_5; MPC_i is maximum permissible concentrations of pollutants in water according to the national standards.
B.4. Data on the trends of indicators over the last 10 years (according to cl. B.1–B.5).

Collection and generalization of data on hydrological conditions that are formed on the territory of the country, renewable fresh water sources, is conducted by the departments of State Hydrometeorological Centre and State Water Agency of Ukraine; monitoring over the state of ground waters is conducted by the State Geological Service.

The information is regularly published in a series of specialized editions, including the national report.

The data on the intake and use of fresh water is collected as part of statistical observations according to the corresponding reporting forms by State Hydrometeorological Centre.

The administrative data on the use of fresh water for household consumption is collected by State Water Agency and Ministry of Regional Development and Construction of Ukraine.

Collection of data on water losses during transportation from the intake to the consumption point is carried out by State Water Agency.

As we can see the majority of the enumerated indicators are collected by the monitoring bodies in Ukraine, yet there are indicators that are defined by various agencies and require a special collection system and design of the necessary measures for their collection by the monitoring bodies.

The sections of the national report on “The environmental state of the ***Azov and Black Seas***” contain data on biogenic substances found in coastal marine waters. Statistical indicators of the distribution of biogenic elements in the surface waters of the Azov and Black Seas basin that are presented include: average, maximum and minimum concentrations of phosphate together

with total phosphorous, ammonia nitrogen, nitrogen nitrite, nitrogen nitrate and total nitrogen. These data are provided for coastal zones: the north-western part of the Black Sea, southern coast of Crimea, the Kerch area and the Azov Sea. The following information is presented in graphical form: inter-annual changes in the concentration of biogenic elements of the surface waters of the north-western part of the Black Sea (including for example the trend in phosphate reduction related to an increase in the level of organic nitrogen in the total content of biogenic substances); and inter-annual changes of hydrochemical indicators of water eutrophication and the trophic index in the coast waters of Odessa Bay. In general, the data provided in the national report meet the requirements of the Guidelines.

The main environmental indicators in the field of ***soil contamination*** that are recommended according to the Guidelines and can be introduced in Ukraine are the following:
A). Indicators of the intensity of land resources usage.
A.1. Amount of land resources, thousand hectares: by main types of land areas, by agricultural lands, by types of owners and land users, by disturbed and eroded soils etc.
A.2. Volumes of mineral and organic fertilizers' application: total amount (thousand tonnes), specific amount of applied fertilizers per unit of agricultural land (kg/ha).
A.3. Volume of pesticide application: total amount of pesticides used (thousand tonnes), specific share of applied pesticides per unit of agricultural land (kg/ha).
A.4. Data on the trends of indicators over the last 10 years (according to cl. A.1-A.3).
B. Soil quality indicators.
B.1. Share of samples not meeting the levels of maximum permissible soil contamination in the total number of samples, %: by chemical and bacterial contamination parameters.
B.2. Level of soil contamination with chemical substances, microgram/kg: cobalt, manganese, copper, nitrates, sulphates, mercury, lead, phosphorus, chrome, zinc, pesticides etc. (19 parameters in total).
B.3. Soil contamination index (hazard index):

$$I = \sum_{i=1}^{n} \frac{C_i}{MPC_i},$$

where C_i is a concentration of soil contaminating agents; MPC_i is maximum permissible concentration of contaminating agents in soil according to the national standards.
B.4. Data on the trends of indicators over the last 20 years (according to cl. B.1-B.3).

The majority of the enumerated indicators are collected by the monitoring bodies in Ukraine and can be accumulated in the regional electronic databases.

Taking into account quite large volume of data, information should be accumulated in the electronic database in each region of Ukraine. The monitoring bodies must regularly collect data on recommended environmental indicators and ensure free access to the available information for all interested parties via Internet.

In national reports the group of ***indicators on waste*** is developed in acceptable detail.
The following information is presented: indicators on the volume of waste generation for the country in general and with a breakdown according to the types of economic activity; the dynamics of the most heavy weight waste generation and use over a period of several years; the structure of waste generated according to the hazard classes by the regions; the relation between the volume of recycled and reused waste and the total volume of waste generated in the country and data on the total volume of hazardous waste that has been exported by or imported into the country.

II NATIONAL MONITORING SYSTEM AND DEPARTMENTAL RESOURCES OF PRIMARY ENVIRONMENTAL INFORMATION

2.1 State system of environmental monitoring

Environmental monitoring is an important tool of effective management of environmental quality, timely warning of negative impacts on the natural environment and population, as well as provision of information to the public and decision-makers about the state of the environment.

The Law of Ukraine “On Protection of the Environment” (articles 20 and 22) envisages establishment of the state environment monitoring system (hereinafter – SEMS) and observations over the environment and level of pollution. Implementation of these functions is vested in the Ministry of Ecology and Natural Resources and other central authorities that are parties of the SEMS, as well as in the enterprises, institutions and organizations whose activity leads or may lead to the deterioration of the environment.

The main goals of SEMS are provision of observations, collection, processing, transfer, storage and analysis of information about the state of the environment, prediction of its changes and development of scientifically grounded recommendations for the management decisions in the sphere of environment protection, rational use of natural resources and environmental safety.

The main principles of SEMS operation are defined in the resolution of the Cabinet of Ministers of Ukraine № 391 dated 30.03.1998 “On Approval of Statement on the State Environmental Monitoring System”. Functions and objectives of observations and information provision (in the state system of environmental monitoring) are fulfilled by 8 parties at the national level:

- Ministry of Ecology and Natural Resources (Minprirody);
- Ministry of Emergency Situations (MES);
- Ministry of Health Protection (MOZ);
- Ministry of Agricultural Policy (Minagropolitika);
- State Agency of Forestry of Ukraine (Goslesagenstvo);
- State Agency of Water of Ukraine (Gosvodagenstvo);
- State Agency of Land Resources of Ukraine (Goszemagenstvo);
- Ministry of Regional Development and Construction of Ukraine (Minregionstroy);

At the regional level, environmental monitoring is carried out by the following main organizations:

- State regional environmental inspections (Minprirody);
- Oblast hydrometeorological centres (MES);
- Oblast sanitary and epidemiological stations (MOZ);
- Oblast agencies on melioration and water economy (Minagropolitiki);
- Oblast agencies of forest and hunting (Goslesagenstvo);
- Basin agency of water resources (Gosvodagenstvo);
- Oblast agency of land resouces (Goszemagenstvo);
- Agencies of housing and utilities at the Oblast State Administrations;
- State regional geological enterprises (Minprirody).

Each body of SEMS monitors those objects of the environment that are defined by the Statement on the state system of monitoring and statements on the state monitoring of some natural components of the environment.

The main statutory acts that regulate monitoring of the component of the environment:

- Resolution of the Cabinet of Ministers of Ukraine N343 dated 09.03.1999 “On Approval of the Order of Organization and Conducting of Air Monitoring”;
- Resolution of the Cabinet of Ministers of Ukraine N 815 dated 20.07.1996 “On Approval of the Order of State Water Monitoring”;

- Resolution of the Cabinet of Ministers of Ukraine N 661 dated 20.08.1993 “On Approval of the Order of State Land Monitoring”;
- Resolution of the Cabinet of Ministers of Ukraine N51 dated 26.02.2004 “On Approval of the Order of Soil Monitoring at the Lands of Agricultural Designation”.

The current system of environmental monitoring comprises the sub-systems of state parties of monitoring and is based on the fulfillment of the distributed functions that are defined by the Statement on the state monitoring system. Each sub-system (at the level of separate body of the monitoring system) has its own structural, organizational, scientific, methodological basis. However, each sub-system functions on the basis of single statutory, methodological and metrological provision.

In Ukraine, the work of the monitoring bodies is regulated by the statutory and methodological documents. The only principle that is adopted in these documents is the environmental (different components of environment) approach in the monitoring i.e. monitoring of air, surface waters, ground water, geological environment, etc.

Monitoring of air quality

State Hydrometeorological Service (UkrGMZ – state monitoring body of MES) observes air pollution in 53 cities of Ukraine at 163 stationary sites, 2 observation sites and 2 stations of transboundary transfer. At the stationary sites, observations are made 4 times a day, except for Sunday and national holidays.

The monitoring programe of air quality includes seven main pollutants: dust, nitrogen dioxide, sulphur dioxide, carbon oxide, formaldehyde, lead and benzapyrene. Besides that, some posts monitor pollutants that are relevant for a particular location (for example, ammonia, ozone, phenol, sulphureted hydrogen, heavy metals, etc.). Analysis for the presence of pollutants in precipitation and snow cover is conducted. Hydro meteorological parameters are being observed.

State Environmental Inspection (SEI – state body of Minprirody) undertakes selective sampling at the sources of emissions. More than 65 parameters are being measured at the sources of emissions at enterprises.

Sanitary and Epidemiological Service (SES – state body of MOZ) is responsible for periodical observations on the air quality in the housing and recreational zones, in particular next to main roads, sanitary protection zones and housing areas, on the territory of schools, pre-school and medical institutions. Also, air quality is monitored in residential zone following the complaints of residents. Observations are carried out according to different monitoring programmes on 5-15 air pollutants.

Monitoring of surface waters

State Hydrometeorological Service monitors hydrochemical state of water at 151 water objects and hydrobiological state at 45 water objects. The quantity of stationary sites of hydrochemical observations is 347 units. Hydrobiological observations are conducted at 259 sites. Control measurements are made once a month on 30-40 parameters that assess the chemical state of water, biogenic parameters, presence of suspended particles and organic substances, main pollutants, heavy metals and pesticides. Indicators of radioactive pollution of surface waters are also being identified. Chronic toxicity of water is measured at 8 water objects, transboundary pollution is controlled at 15 sites. The samples are taken manually 4-12 times a year.

State Environmental Inspection takes individual samples at more than 2200 sites and receives data on 60 parameters that are being measured.

State Water Agency monitors the state of rivers, water reservoirs, channels, irrigation systems within multi-purpose water economy systems, water supply systems, transboundary watercourses and reservoirs, in areas affected by nuclear power plants. Water quality is controlled according to physical and chemical parameters at 72 water reservoirs, 164 rivers, 14 irrigation systems, 1 bay and 5 multi-purpose canals. Level of radionuclides in the surface waters is controlled by the water management organisations as part of radiation monitoring. Number of observation sites – 328, quantity of parameters controlled – over 40, frequency of observations – once a month.

Sanitary and Epidemiological Service monitors centralized and de-centralized sources of drinking water supply, recreation areas along rivers and water reservoirs. Observations are of selective seasonal character and reflect the state of water objects in summer period only as it is the most complicated from the environmental point of view. Sanitary and epidemiological service controls chemical composition of ground waters that are designated for drinking purposes.

Enterprises of the State Geological Service monitor the state of ground waters. The depths of ground waters and their natural geochemical composition are assessed twice a year at the monitoring sites. Twenty two parameters, including concentration of heavy metals and pesticides, are being measured.

Monitoring of sea waters

State hydrometeorological Service monitors the state of coastal water at the monitoring stations that are located next to the sites of sewage water discharge, as well as scientific and research centres that are located at the coastal zones of the Azov and Black Seas. The monitoring network consists of 83 monitoring sites and 14 scientific and research stations that measure 16-24 hydrochemical parameters of water and sediments.

State Environmental Inspections of the Azov and Black Seas (Ministry of Ecology and Natural Resources) have their own monitoring network. Every month they take samples and analyze the impact of the sources of pollution that are located along the coast; monitor pollutants discharge from the vessels; pollution coming from exploration and extraction activities for oil, gas and construction materials at the sea shelf; control the use of the sea resources.

State Sanitary and Epidemiological Inspection monitors sea water quality in recreation zones.

Monitoring of soils

State Hydrometeorological Service monitors soil contamination with pesticides and heavy metals in 20 populated areas. Samples are taken once in every five years and sometimes on an annual basis. The control covers 27 soil parameters.

State Environmental Inspections take soil samples at industrial sites of enterprises. The measurements encompass 27 parameters.

State Sanitary and Epidemiological Service monitors the state of soils on the territories with potential adverse impact on people’s health. Monitoring mostly covers cultivated agricultural land, areas where pesticides are applied, soil in residential areas, soil at children's playgrounds and on the territory of public places and social institutions. The state of soils is controlled at enterprises that store toxic waste and outside enterprises in places of toxic waste storage or disposal.

Agency on Melioration and Water Resources monitors agricultural lands. The control covers radiological, agro-chemical and toxicological parameters, residual level of pesticides, agricultural chemicals and heavy metals.

Monitoring of biodiversity
Regional state agencies of the Ministry of Ecology and Natural Resources monitor land and biological resources of the nature reserve fund and are responsible for the set up of an environmental network.

Enterprises of the State Agency of Forest Resources monitor forest vegetation: assess biomass and conduct radiological observations, control damage and loss of forest resources and population of game fauna.

Monitoring of waste management
Parameters monitored in the field of waste management are volumes of waste generation, use (utilization) and disposal (all waste hazard classes), levels of waste hazard (content of highly hazardous compounds, class of hazard), status of industrial and household waste landfills, waste dumps, sludge storage pits, heaps, silt fields, environmental impact of industrial and household waste landfills, storage conditions of expired agricultural chemicals, transportation conditions of waste and agricultural chemicals.

Environmental monitoring in the field of waste management is conducted by the state environmental inspection of the Ministry of Ecology and Natural Resources and local authorities.

Monitoring of radiation
State hydrometeorological service monitors radioactive contamination of atmosphere by measuring levels of exposure to gamma-radiation (GRE), settlement of radioactive particles from atmosphere and content of radioactive aerosol in the air on a daily basis. The Service measures radioactive contamination of surface water at 8 water bodies. Near nuclear power stations, laboratories of the State Hydrometeorological Service of Ukraine measure radioactive contamination of surface water with cesium-137 and assess soil contamination.

Enterprises of the Ministry of Emergency Situations of Ukraine monitor levels of GRE at 10 automated monitoring points near nuclear power stations. Concentration of radionuclides is monitored within 30-kilometer area around Chernobyl nuclear power station.

Enterprises of the Ministry of Agricultural Policy of Ukraine control concentration of radioactive substances in soils and crop products.

2.2. Interaction between the environmental monitoring bodies

The table below briefly describes the interaction between all environmental monitoring bodies due to information and data collecting, processing, exchange and dissemination.

Table 2.
Inter-institutional cooperation in environmental sector

Institution	Component of the environment	Functions and objectives		Inter-institutional cooperation for data exchange
		In the sphere of information provision	In the sphere of environmental monitoring	
Inter-agency commission on the issues of environmental monitoring http://www.menr.gov.ua/	All components	- Coordination of activity of bodies of environmental monitoring; - Consideration of general issues related to monitoring on the national and regional levels;	- Coordination of activity of the bodies of environmental monitoring; - Consideration of general issues of the state and regional level related to monitoring;	Receives information from the Ministry of Ecology of Ukraine, the Ministry of Emergency Situations of Ukraine, the Ministry of Healthcare of Ukraine, the Ministry of Agrarian Policy and Food of Ukraine, State Forest Resources Agency of Ukraine, State Water Resources Agency of Ukraine, State Land Resources Agency of Ukraine, the Ministry of Housing and Utilities of Ukraine, State Service for Geology and Subsoil of Ukraine, State Statistics Service of Ukraine, enterprises and organizations, local authorities.
The Ministry of Ecology and Natural Resources of Ukraine http://www.menr.gov.ua/	Atmospheric air Sources of emissions Surface (including marine water) Sources of discharge Ground waters Soils and landscapes Waste	- Observations, collection and accumulation of data, analysis of the state of natural environments and prediction of changes; - Information and analytical support of a decision-making process related to natural environment protection, use of natural resources and ecological safety; - Informational services to power bodies and provision of environmental information to the population and international organizations; - Management of information systems and databases on the components of the environment; - Development of a regulation on information exchange at local, regional and national levels; These functions are implemented via establishment of information monitoring systems and databases of environmental indicators to support managerial decisions, provision of information to power bodies and	- Control of atmospheric air; - Control of sources of industrial emissions; - Control of surface and marine waters; - Control of sources of sewage water discharge; - Control of water objects in nature protected territories; - State of soils of various designation; - Geochemical state of landscapes; - Control of industrial and household waste dumps. Implementation of these functions is based on long-term systematic observations of the integrated environmental network of monitoring points. The functions are carried out to assess, analyze and predict the state of natural environment to support managerial decisions. This activity is fulfilled via State Environmental Inspection of Ukraine (http://www.dei.gov.ua) and institutions that are managed by the	Receives information from the Ministry of Emergency Situations of Ukraine, the Ministry of Healthcare of Ukraine, the Ministry of Agrarian Policy and Food of Ukraine, State Forest Resources Agency of Ukraine, State Water Resources Agency of Ukraine, State Land Resources Agency of Ukraine, State Services for Geology and Subsoil of Ukraine, State Statistics Services of Ukraine, enterprises and organizations, local authorities.

		the population about the state of natural environment.	Ministry.	
The Ministry of Emergency Situations of Ukraine http://www.mns.gov.ua/	Atmospheric air Surface (including marine) waters Ground waters Soils and landscapes Radioactive waste	- Collection of information for operational actions in case of a crisis or environmental emergency situations; - Informational and analytical support for assessment and analysis of risks related to emergency situations occurrence; - Forecasting possible negative consequences and supporting decision-making on their liquidation; - Operational provision of information to authority bodies and people in case of environmental hazard; - Development of a regulation on information exchange on local, regional and national levels in case of emergency situations; These functions are implemented through the establishment of information channels and systems of crisis monitoring.	- Control of atmospheric air and precipitation; - Control of surface and ground waters; - Monitoring of terrestrial and water ecosystems (bio indicator identification); - Control of soils and landscapes; - Control of the radiation situation, hazardous nature events and disasters; - Monitoring of sites of radioactive waste disposal; Implementation of these functions is based on observations of the integrated environmental network of monitoring points according to special programmes in areas of increased environmental pressure, zones of catastrophes and hazardous nature events. The functions are fulfilled via establishments managed by the Ministry to ensure operational actions in response to crisis and environmental emergencies.	Receives information from establishments managed by the Ministry (including Hydrometcentre), enterprises and organizations, local authorities.
The Ministry of Healthcare of Ukraine http://www.moz.gov.ua/ua/portal/	Atmospheric air Surface waters Drinking water Soils Impact of physical factors	- Receiving and processing of information about pollution of the environment and levels of negative impact on people; - Informational and analytical support to assess and analyse risks for people's health; - Informational and analytical support for decisions related to people's health protection; - Management of information systems and databases on the components of the environment. These functions are implemented through the establishment of information systems and databases of social and hygienic monitoring.	- Control of atmospheric air; - Control of surface and marine waters; - Control of drinking water; - Control of marine, mineral and thermal waters; - Control of soils; - Control of physical factors (noise, radiation, vibration, etc) Implementation of these functions is based on long-term systematic observations of the integrated network of monitoring points in residential and recreational areas, as well as resorts. The functions are fulfilled in order to assess, analyze and predict the level of impact on people to support managerial decisions. The activity is carried out via sanitary and	Receives information from the establishments managed by the Ministry (including sanitary and epidemiological stations), enterprises and organizations, local authorities.

			epidemiological stations and other establishments that are managed by the Ministry.	
The Ministry of Agrarian Policy and Food of Ukraine http://www.minagro.gov.ua/	Surface waters Soils Plants Animals	Receiving, processing and provision of information on the quality of agricultural soils; - Receiving, processing and provision of information on the quality of surface waters; - Collection and provision of monitoring data on agricultural plants and animals; - Participation in the information systems of collective data exchange and provision of information to power bodies and the population; - Management of information systems and databases in the subject area. These functions are implemented through the establishment of information systems and databases that refer to the activity of the Ministry.	- Control of surface waters of agricultural designation; - Control of agricultural soils; - Monitoring of agricultural plants and products produced out of them; - Monitoring of agricultural animals and products produced out of them; Implementation of these functions is based on long-term systematic observations of the integrated network of monitoring points and areas as well as full or selective control of plants and animals in agricultural zones. The functions are fulfilled in order to assess, analyze and predict level of impact on agricultural objects to support managerial decisions. The activity is implemented via establishments that are managed by the Ministry in the regions.	Receives information from the establishments managed by the Ministry, enterprises and organizations, local authorities.
State Forest Resources Agency of Ukraine http://dklg.kmu.gov.ua/forest/control/uk/index	Soils Forest vegetation Game fauna	- Receiving, collection and provision of information on the state of lands of forest fund; - Receiving, processing and provision of information on the state of forest vegetation and game fauna; - Participation in the information systems of collective data exchange and provision of information to authorities and population; - Management of information systems and databases in the subject area; These functions are implemented through establishment of information systems and databases that refer to the activity of the Agency.	- Control of soils and lands of forest fund; - Control of the state of forest vegetation; - Control of the state of game fauna; Implementation of these functions is based on long-term systematic observations of the integrated network of monitoring areas as well as full or selective control of plants and animals in the forest fund areas. The functions are carried out in order to assess, analyze and predict the level of impact on forests and animals to support managerial decisions. The activity is implemented via forestry organizations in the regions.	Receives information from the establishments managed by the Ministry (that are under the Ministry) enterprises and organizations, local authorities.

State Water Resources Agency of Ukraine http://www.scwm.gov.ua/	Water objects and water bodies Surface waters Irrigated and drained lands Submergence area	- Receiving, processing and provision of information on water intake, use of fresh water and discharge of sewage waters; - Receiving, processing and provision of information about the quality of surface waters; - Participation in information systems of collective data exchange and provision of information to power bodies and population; - Management of information systems and databases in the subject area. These functions are implemented through establishment of information systems and databases that refer to the activity of the Agency.	- Control of the state of rivers, water reservoirs, canals, water areas within boundaries of water utilization systems; - Control of the state of water bodies in areas impacted by nuclear power stations; Monitoring of surface waters in border regions; Control of irrigated and drained lands; Implementation of these functions is based on long-term systematic observations of the integrated network of monitoring posts and areas. The functions are carried out in order to assess, analyze and predict a level of impact on water resources to support managerial decisions. The activity is implemented via Basin Agencies of Water Resources and Water Organizations in the regions.	Receives information from the establishments managed by the Ministry, enterprises and organizations, local authorities.
State Land Resources Agency of Ukraine http://www.dazru.gov.ua/terra/control/uk/index	Lands Soils Landscapes	- Receiving, processing and provision of information on the structure of land fund and use of lands; - Participation in information systems of collective data exchange and provision of information to power bodies and the population; - Management of information systems and databases in the subject area; - Development of geo information systems of land resources and vector maps of the territory; These functions are implemented through the establishment of information systems and databases that refer to the activity of the Agency.	- Control of lands, soils and landscapes; - Monitoring of vegetation cover; - Monitoring of coastal lines of the rivers, seas, lakes and water reservoirs; Implementation of these functions is based on long-term systematic observations of integrated network of monitoring area. The functions are carried out in order to assess, analyze and predict a level of impact on land resources to support managerial decisions. This activity is implemented via Agencies of Land Resources in the regions.	Receives information from the establishments managed by the Ministry, enterprises and organizations, local authorities.

The Ministry of Housing and Utilities http://gkh.com.ua/	Drinking water Sewage waters Green plantations Submergence areas	- Receiving, processing and provision of information on the quality of drinking water and sewage waters; - Receiving, processing and provision of information on monitoring results of green plantations; - Participation in the information systems of collective data exchange and provision of information to power bodies and the population; - Management of information systems and databases in the subject area; These functions are implemented through the establishment of information systems and databases that refer to the activity of the Ministry.	- Control of drinking water quality of the centralized water supply system; - Control of sewage waters of the city sewage system and treatment facilities; - Monitoring of green plantations in settlements; - Monitoring of submergence areas in settlements; Implementation of these functions is based on long-term systematic observations of integrated network of monitoring sites and operational control. The functions are carried out in order to assess, analyze and predict a level of impact on objects being controlled to support managerial decisions. The activity is implemented via Agencies of Utilities in the regions.	Receives information from the establishments managed by the Ministry, enterprises and organizations, local authorities.
State Service for Geology and Subsoil of Ukraine http://www.dgs.kiev.ua/	Ground waters Endogenic and exogenic processes Geophysical fields Landscapes	- Receiving, processing and provision of information on water intake, use of ground waters and their quality; - Receiving, processing and provision of information on results of monitoring of geological and geophysical processes; - Participation in the information systems of collective data exchange and provision of information to power bodies and the population; - Management of information systems and databases in the subject area; These functions are implemented through the establishment of information systems and databases that refer to the activity of the Service.	- Monitoring of ground waters; - Monitoring of endogenic and exogenic geological processes; - Control of geophysical fields; - Control of geochemical state of landscapes; - State ecological and geological mapping of the territory of Ukraine; Implementation of these functions is based on long-term systematic observations of integrated network of monitoring sites. These functions are carried out in order to assess, analyze and predict a level of impact on ground waters, areas of land surface and landscape to support management decisions. The activity is implemented via state geological enterprises in the regions.	Receives information from the establishments managed by the Ministry, enterprises and organizations, local authorities.

State Statistics Service of Ukraine http://www.ukrstat.gov.ua/	Atmospheric air Sources of emissions Surface waters Sources of discharge Land resources Forest resources Reserved territories and game areas Waste	Preparation and dissemination of statistical collections of environmental information for regions and Ukraine in total. Accumulation and maintenance of information databases of statistical and administrative reporting.	This Service is not a body of environmental monitoring. Its work is focused on the collection and provision of statistical information related to technogenic impact on the environment.	Receives information from the Ministry of Ecology of Ukraine, the Ministry of Emergency Situations of Ukraine, the Ministry of Healthcare of Ukraine, the Ministry of Agrarian Policy and Food of Ukraine, State Forest Resources Agency of Ukraine, State Land Resources Agency of Ukraine, State Water Resources Agency of Ukraine, the Ministry of Housing and Utilities, State Service for Geology and Subsoil of Ukraine, enterprises and organizations, local authorities.

At the regional level interaction between the environmental monitoring bodies is determined by the Regulation on informational interaction between the monitoring bodies that is adopted and approved at the level of the Regional State Administrations of the country and cities of central subordination. Pursuant to these documents, the monitoring bodies provide the government authorities, State Agencies of Natural Resources and the Environment, Agencies on Emergency Situations, other interested organizations and enterprises with information of several types:

- Operational/updated information on threats or occurrence of natural disasters or extremely high levels of environmental pollution;
- Current information about the state of environment;
- One-time information upon requests from interested enterprises, civil society organizations and population.

The operational information is promptly communicated by the environmental monitoring bodies by means of electronic mail, telephone or fax to the officers on duty of the State Administrations, State Agencies of Natural Resources and the Environment, Agencies on Emergency Situations, as well as employees on duty of other interested organizations and enterprises.

Current information from the environmental monitoring bodies is transferred in electronic format or as hard copy to the State Agencies of Natural Resources and the Environment within the timeframes given in the table. Such information is usually submitted in the form of bulletins, reports, reviews, summaries or descriptions.

If necessary the monitoring bodies may provide the available information upon one-off requests of interested enterprises and institutions, population and civil society organizations. Such information is provided against actual requests received by the environmental monitoring bodies.

The monitoring bodies distribute the main types of information at the regional level as well as vertically to the coordinating organizations of the central level.

The existing system of informational interaction between agency subsystems of environmental monitoring envisages exchange of information at the national level. Organizational integration of the environmental monitoring bodies at all levels is carried out by the Ministry of the Environment and Natural Resources.

Bilateral agreements on cooperation in the field of environmental monitoring have been concluded between the Ministry of the Ecology and Natural Resources and bodies of the State System of Environmental Monitoring to regulate the process of information exchange on indicators and terms of environmental information provision. These agreements contain the relevant regulations designed for exchange of environmental information. The data received are passed to the information and analytical center of the Ministry of the Ecology and Natural Resources and are accumulated in the environmental databanks ensuring information exchange with regional monitoring centers and bodies of the state environmental monitoring system.

Table 3.
Procedure of information provision to the State Agencies of Natural Resources at the regional level

Body of regional environmental monitoring system	Information provided	Frequency of information provision
Regional State Environmental Inspection	- control of surface waters	Monthly
	- control of sources of industrial emissions; - control of sources of waste waters discharge; - control of surface waters;	Quarterly
	- state of soils of various designations;	Annual
Regional Sanitary-Epidemiological Stations	- state of atmospheric air; - state of surface waters; - quality of drinking water;	Quarterly
	- state of soils; - levels of impact from physical factors; - levels of water pollution in the areas of water intake; - assessment of the state of controlled objects;	Annual
Regional Agencies of Land Resources	- state of soils and landscapes; - state of vegetation cover of lands; - state of coastal lines of the rivers, lakes and water reservoirs;	Annual
Agencies of Housing and Utility Services	- fulfillment of greenery planting plans in populated areas - quality and volumes of drinking water consumption; - quality and volumes of waste water from municipal sewage systems and waste water treatment facilities;	Annual
Regional Agencies of Forestry and Hunting	- state of forests and game fauna;	Annual
Regional Hydrometeorology Centers	- state of atmospheric air; - state of precipitations, surface water bodies; - radiation situation;	Monthly
	- levels of soil contamination; - assessment of the state of controlled bodies	Annual
	- natural disasters and natural hazardous phenomena;	Timely warning
Regional Amelioration and Water Agencies	- flooding of agricultural lands and rural populated areas; - state of irrigated and drained lands; - state of coastal areas of the water reservoirs;	Annual
Basin Authorities of Water Resources	- level of surface water pollution in places of its intensive practical use;	Quarterly
	- levels of surface water pollution; - use of water (form 2 TP-water); - state of water in water bodies in areas of water intake;	Annual

Regional Geological Enterprises	- ground water pollution levels;	Quarterly
	- data of the state cadastre on ground waters;	Quarterly
	- dissemination of endogenic and exogenic processes; - geo-chemical state of landscapes;	Annual

2.3. Information resources in the field of environmental monitoring

The existing system of communication between environmental monitoring sub-systems of various agencies and institutions envisages information exchange at the national and regional levels. Organizational integration of environmental monitoring bodies at all levels is ensured by the Ministry of Ecology and Natural Resources and its local agencies.

The Ministry of Ecology and Natural Resources and bodies of SEMS (State Environmental Monitoring System) have concluded bilateral agreements on cooperation in the sphere of environmental monitoring that approve procedures on environmental information exchange. This has been done to regulate information exchange on indicators and deadlines of information provision.

Updated information is transferred by local bodies of SEMS to regional environmental monitoring centres or to state agencies of ecology and natural resources in the regions. The generalized analytical information is provided by the ministries and SEMS bodies directly to the Ministry of Ecology and Natural Resources.

The data received are transferred to the Information Analytical Centre of the State Environmental Monitoring System (IAC of SEMS) and are accumulated in the environmental databanks.

The Ministry of Ecology and Natural Resources uses the data it receives every month and every quarter to prepare informational and analytical digests and reports 'State of the Environment in Ukraine' that are publically available at the IAC web portal (www.ecobank. org.ua).

However, it should be noted that today Ukraine does not have a centralized or interlinked and distributed electronic data transfer network that would embrace information resources of the key environmental monitoring agencies. Absence of a single methodology for interpretation of data and exchange of environmental monitoring results makes it difficult to assess the quality of the environment. The basic list of information that is minimally required for officials making environmental decisions should be a criterion indicating the necessity to use environmental data in national-scale information resources.

The European environmental network Eionet mainly makes use of the following priority data flows:

- Air quality and air pollution (including air emissions);
- Water quality (surface, ground and coastal waters) and water contamination;
- Land resources and soils;
- Nature protection and biodiversity;
- Waste and waste disposal;
- Climate change.

In view of the above and based on the conducted analysis of information resources from environmental monitoring agencies collecting primary data, emphasis (in the framework of setting up the Ukrainian SEIS segment) should be made on consolidation of information for the following environmental themes:

- Atmospheric air (pollution, pollutant emission, meteorological indicators and climate changes);
- Water (surface, ground and coastal waters);
- Waste and
- Soils.

These priority data flows were presented by the seven ENPI East regional centres for the first phase in the establishment of national and regional environmental information systems compliant with principles of SEIS.

Taking into account quite large volumes of environmental data, information should always be stored in electronic database. Monitoring agencies should collect information on a regular basis in line with the recommended priority aspects and ensure free access to the available data for all stakeholders via Internet.

The analysis has shown that the key organization that monitors the state of air is the Hydrometeorological Service of Ukraine. Table 4 contains characteristics of databases maintained by Ukrainian Hydrometeorological Centre (rows 3 and 4 of table 4). These databases can be integrated into a single information system. The formats of data are auto-convertible. In addition, the state environmental inspections have the data on emission of pollutants. Such information can be integrated into the database of the Information Analytical Centre of the State Environmental Monitoring System (row 1 of table 4).

The main organizations in charge of water monitoring are the hydrometeorological service and regional basin authorities of water resources. The databases of these organizations are given in table 4 (rows 5 and 6). Information about contamination of surface and seawater can be used in the single information system. Data formats are suitable for automated conversion. Information about contamination and use of ground water is collected in the ground water database of the State Water Cadastre (row 7 of table 4). In addition, the information from regional databases (crows 8 and 9 of table 4) can be also used.

The key organizations that monitor soil are the hydrometeorological service, geological enterprises and the state soil fertility protection service. As of now, the database of agricultural land can be used (row 10 of table 4). Yet the data about the capabilities of AGRO-MAP and AGRO-NET software systems of the Ministry of Agricultural Policy are insufficient. Nevertheless, these databases contain information in electronic format.

The state environmental inspections and regional agencies of ecology and natural resources have extensive data on disposal, use and recycling of waste. This information can be integrated into the database of the Information Analytical Centre of the State Environmental Monitoring System (row 1 of table 4).

Currently, various cartographic information related to the location of monitoring sites at the national, regional and local levels is also available. Such information is provided in the form of digital vector maps of the territory of Ukraine. Examples of geo-informational systems containing geographical and environmental information are provided in table 4 (row 13).

As a matter of priority, establishment of joint monitoring information systems and environmental databases for collective use presupposes design of standard procedures and regulations for automated exchange of the monitoring data and establishment of a distributed electronic data transfer network.

Table 4.
Information resources with primary environmental monitoring data

No	Information environmental resources	Monitoring body	Organization – owner of data	Level of data	Date of establishment	Data storage type	Internet address or way to access data	Characteristics of data	Possibility to use
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1.	Database of Information Analytical Centre of the State Environmental Monitoring System	Ministry of Ecology and Natural Resources of Ukraine	Ministry of Ecology and Natural Resources of Ukraine	National	2004	Electronic	www.ecobank.org.ua	Atmospheric air, surface water, ground waters, soils	Possible
2.	Regional Environmental Monitoring System – OMOS	Ministry of Ecology and Natural Resources of Ukraine	State Agency of Ecology and Natural Resources in Donetsk Oblast	Regional	2008	Electronic	http://omos.org.ua	Atmospheric air, surface water, waste. Over 2 million of data 15 GIS-levels	Possible
3.	Database of atmospheric air pollution in towns and cities of Ukraine	Ukrainian Hydrometeorological Centre	Main information and computational centre of UkrHMC	National	1970, since 2000 in electronic format	In hard copy before 2000, electronic since 2000	ASOIZA Software System. Files of EXSDAT.TXT format	Atmospheric air, 162 monitoring sites, 11 years, 5 - 8 monitored components/substances, 2 - 4 times a day	Possible
4.	Database of meteorological parameters of atmosphere	Ukrainian Hydrometeorological Centre	Main information and computational centre of UkrHMC	National	1970, since 2000 in electronic format	In hard copy before 2000, electronic since 2000	ASOIZA Software System Files of EXSDAT.TXT format	Atmospheric air, 162 monitoring sites, 11 years, 8 monitored parameters, 4 times a day	Possible

5.	Database of surface water contamination	Ukrainian Hydrometeorological Centre	Central Geo-physical Observatory of UkrHMC	National	1970	In hard copy and in electronic format	AIS Gidrokhimiya Software system. Files of DBF format	Surface water, 374 monitoring sites, 15 years, up to 30 monitored parameters, 7-12 times a year	Possible
6.	Database of surface water contamination	State Water Agency of Ukraine	Basin authorities of water resource	National	1980	Electronic	Software system. Files of DBF format	Surface water, 324 monitoring points, 20 years, up to 40 parameters, 2 times a year	Possible
7.	Database of ground water of the State Water Cadastre	State Geological Service	State Scientific and Production Enterprise 'State Informational Geological Fund of Ukraine'	National	2006	Electronic	Access Database	Ground water 18 types of data	Possible
8.	System of state monitoring of surface water and coastal water of the Azov Sea	Ministry of Ecology and Natural Resources of Ukraine	Scientific and Production Centre 'Ecocenter', Zaporozhye City	Regional	2004	Electronic	MS SQL Server 6.5	Data covering Zaporozhye and Dnepropetrovsk regions	Possible
9.	Information database 'Chemical composition and quality of surface water in the Dnieper River basin'	State Geological Service	Ukrainian Hydrometeorological Institute UHMI of UkrHMC	Regional	2008	Electronic	AquaGuard Information-analytical database http://nature.org/dnipro/AquaGuard.htm	Volume of data on surface water of the Dnieper River basin	Possible
10	Database of agricultural land	Ministry of Agricultural Policy	Ministry of Agricultural Policy	National	2008	Electronic	AGRO-MAP AGRO-NET software systems	Insufficient data	Possible
11	Database of forest eco-systems	State Forest Agency of Ukraine	UkrNIILGA, Kharkov City	National	2009	Electronic	FIELD-MAP software system	Insufficient data	Possible

12	Atlas of Ukraine	--	ISGEO Company	National	2000	Electronic	Digital maps of territories of Ukraine http://isgeo.kiev.ua	Digital vector maps; files of MapInfo format	Possible
13	Digital maps of Ukrainian towns, cities and territories	State Land Agency of Ukraine	Regional Agencies on Land Resources	Local	2000 – 2011	Electronic	Digital maps of Ukrainian towns and cities http://transnavi.com	Digital vector maps, Shp-files	Possible

Respective databases that can be collected by natural protection agencies and monitoring organizations should be supplemented with data collected by the offices of statistics (table 1).

For comprehensive information provision to the public, monitoring organizations must have regional web resources to host environmental monitoring data. In addition, a principle of free access to electronic environmental information for authorized users should be implemented.

Fulfilment of the above objectives and development of the state monitoring system will make it possible to ensure future integration of the currently designed system into the European Environmental Information and Observation Network (Eionet) as well as establish the Ukrainian segment of Shared Environmental Information System (SEIS) in the future.

2.4. Key areas of information infrastructure development

At the moment, the Ministry of Ecology and Natural Resources has identified the following strategic areas for the development of national environmental monitoring system:

- Development of regional automated systems of environmental monitoring;
- Informational integration of local monitoring systems of contaminators into the State monitoring system, development of automated systems to monitor emission of pollutants and discharge sources of enterprises;
- Expansion of the network of stationary and automated points for monitoring of air, surface and ground waters, expansion of the network of background monitoring stations;
- Improved quality and quantity of information on the pollution of the environment via integration of modern measuring and computational technologies in the organizations of monitoring bodies;
- Use of the Earth serving data for monitoring of biodiversity, landscapes, soils, atmospheric air pollution and pollution of surface water bodies;
- Wider application of the list of environmental indicators (that has been recommended by UNECE) in the environmental monitoring and hence increased level of international compatibility of environmental information;
- Improved quality of environmental information, establishment of multiple-access analytical systems and environmental databases structured by the key environmental components for development of state of the environment reports;
- Provision of free access to the integrated environmental information on the basis of modern information technologies.

On the basis of the strategic areas and establishment principles of the Shared Environmental Information System (SEIS) the general structure of the State Environmental Monitoring System can be outlined (figure 2). Additionally, the structure of information flows at the national level is presented in figure 3.

As follows from figure 2, the State Environmental Monitoring System includes monitoring sub-systems of regional level and Information Analytical Center of the Ministry of Ecology that is the national information resource.

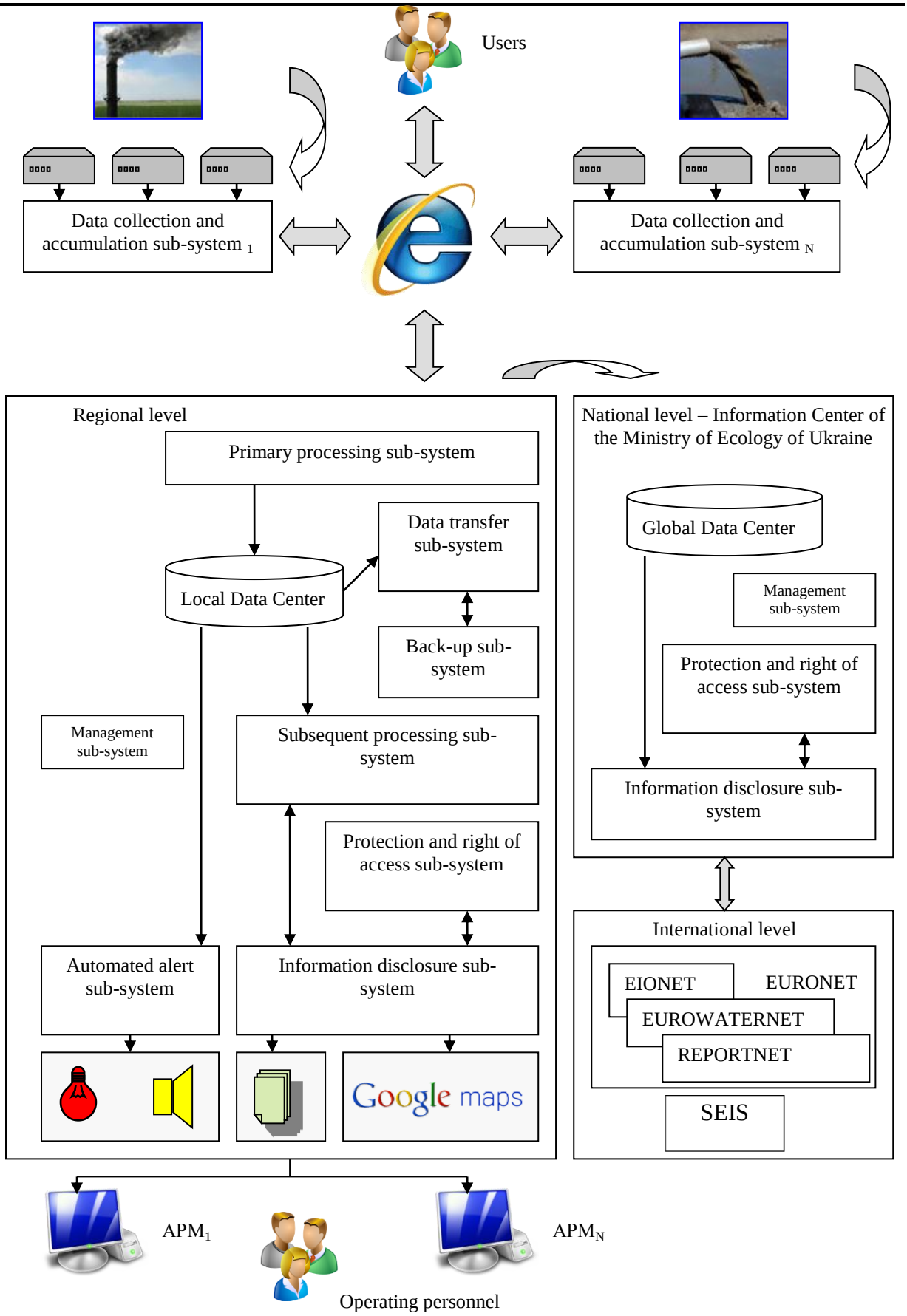

Figure 2.
General structure of the current State Environmental Monitoring System

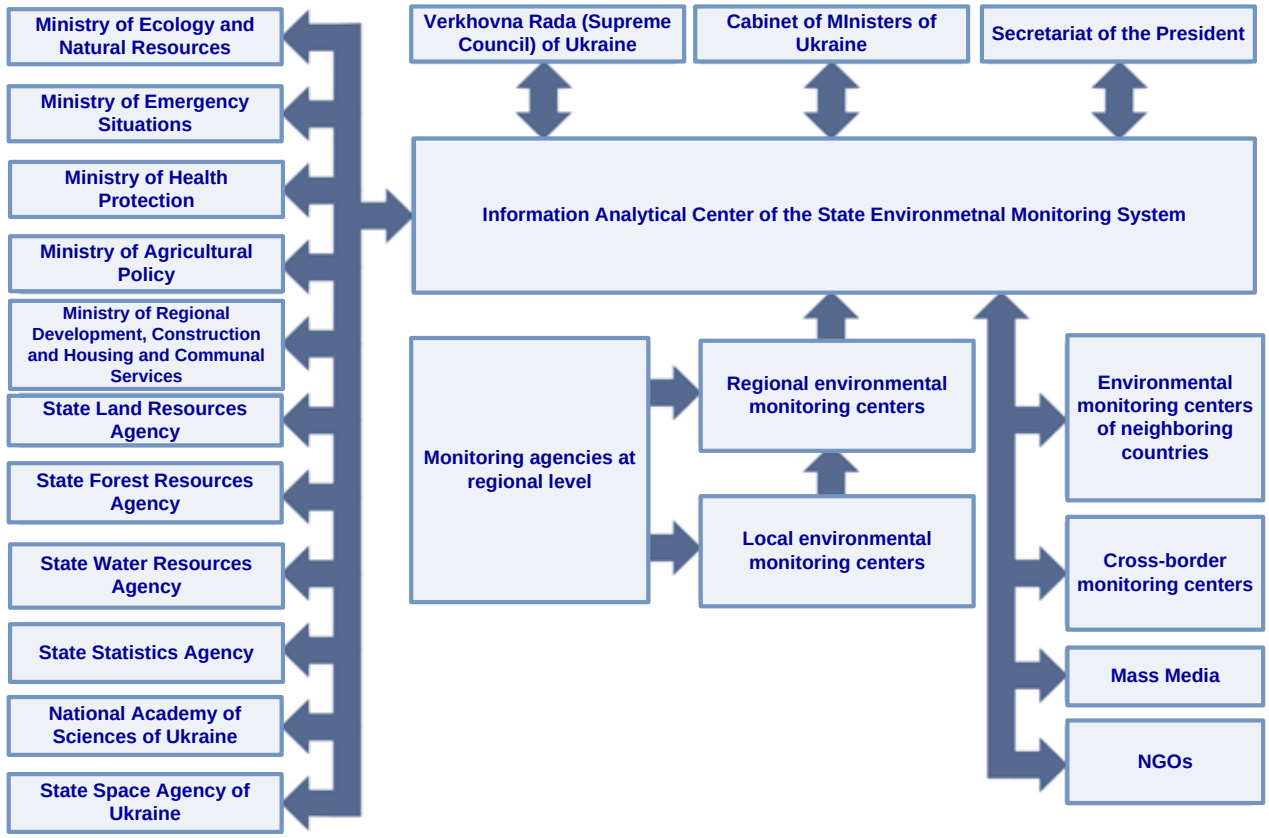

Figure 3.
Structure of information flows of the State Environmental Monitoring System

Regional environmental monitoring systems are developed as open, web-focused resources using component wise approach in the formation of functional monitoring sub-systems (monitoring of air, surface water etc.). An example of such system's development is the information system of environmental monitoring of Donetsk region, which can be found at http://omos.org.ua. Similar systems will be integrated in other regions of Ukraine.

The Information Analytical Centre of the Ministry of Ecology and Natural Resources is a web-resource at the national level. Its structure is shown in figure 2. The Internet address of the Information Analytical Centre of the Ministry of Ecology is: www.ecobank.org.ua. It is intended that in the future there will be a specialized IT service to process large volumes of environmental data on the basis of the Information Analytical Center. This service is capable of reading data in more than 100 formats including any satellite data formats (HDF, GeoTIFF, etc.). This will make it possible to consolidate various information flows and databases of monitoring agencies within the framework of Global Data Centre of the Ministry's Information Analytical Centre. The supported information volume can be from 100 terabyte to one petabyte.

Such an IT service can store statistical information in the sphere of environment protection, environmental pollution data, meteorological information, satellite information, data related to the national infrastructure, social and economic parameters etc. In order to achieve that, databases from tables 1 and 4 should be integrated and satellite data storages should be connected. Resources of such a system are able to service many users simultaneously and ensure their work in the online regime. This enables the users to work with large volumes of data without downloading them onto their PCs. The system also offers interactive visualisation of any piece of data in the form of 3D graphics.

This IT service can operate as the Ukrainian segment of SEIS. Technically, it is a computer-based graphical cluster of 32 sites with total volume of data up to 250 terabytes. A data center is being set up in order to enlarge the volume of the stored information. The maximum number of

simultaneous users is 10,000. The data are processed by means of innovative software specially designed by Donetsk National Technical University (DonNTU, Donetsk City).

As of today, the IT service allows data exchange with European systems in line with the standard protocols. The service contains modules to access regional environmental monitoring systems like OMOS. Modules of air pollution predictions on the basis of EMAP numerical models or other models can be easily built into the system.

Currently, this technology is being tested on the graphical cluster of 8 sites. The software can be accessed at: https://bitbucket.org/Xaliav/cwikience-distrib/downloads/Install.exe.

Today, the IT system developed by DonNTU makes it possible to process and visualize re-analyzed climatic data archives of the Global Climatic Data Centre (data of 6-hour intervals for the planet since 1979 till present day) as well as information about air pollution received from Terra Satellite (NASA) and ground stations (over 600 parameters and characteristics for the Earth).

III MULTILATERAL ENVIRONMENTAL AGREEMENTS AND OBLIGATIONS

Ukraine is a party to 20 international environmental conventions (see Table 5); two more agreements have been signed but not ratified (http://www.unece.org/env/epr/epr_studies/Ukraine%20II.pdf) . Ukraine has joined nine protocols to environmental conventions and signed but not ratified six of them.

Table 5.
Participation of Ukraine in Multilateral Environmental Agreements and Programs

No	*Agreement/Programme*	*Date of ratification (Rt), accession (Ac), approval (Ap), adoption (At) entry into force (EIF)*
	Global	
1.	UN Framework Convention on Climate Change (New-York, 1992)	13.05.1997 (Rt)
	Kyoto Protocol (Kyoto, 1997)	12.04.2004 (Rt)
2.	Convention for the Protection of the Ozone Layer (Vienna, 1985)	18.06.1986 (At)
	Montreal Protocol on Ozone Depleting Substances (Montreal, 1987)	20.09.1988 (At)
3.	Convention on Persistent Organic Pollutants (Stockholm, 2001)	25.09.2007 (Rt)
4.	Convention on Biological Diversity (Rio-de-Janeiro, 1992)	07.02.1995 (Rt)
	Cartagena Protocol on Biosafety, 2000	06.12.2002 (Ac)
5.	Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal (Basel, 1989)	08.10.1999 (Ac)
6.	Convention to Combat Desertification (Paris, 1994)	27.08.2002 (Ac)
7.	Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972)	12.10.1988 (Rt)

8.	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto	25.05.1980 (EIF)
9.	Convention on the Conservation of Antarctic Marine Living Resources (Canberra, 1980)	22.04.1994 (Rt)
10.	Protocol on Environmental Protection to the Antarctic Treaty (Madrid, 1991)	24.06.2001 (EIF)
11.	Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, 1973)	29.03.2000 (EIF)
12.	Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar, 1971)	01.12.1991 (EIF)
13.	Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979)	01.11.1999 (EIF)
	Agreement on the Conservation of Populations of European Bats	30.09.1999
	Agreement on the Conservation of African-Eurasian Migratory Waterbirds	01.01.2003 (EIF)
	Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area	23.10.2003 (Rt)
14.	International Convention for the Regulation of Whaling (Washington, 1946)	
15.	Global Forest Resources Assessment (FAO)	Participates
Regional		
16.	Convention on Long-range Transboundary Air Pollution (Geneva, 1979)	05.06.1980 (Rt)
	Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) - 1984	30.08.1985 (At)
	Protocol on the Reduction of the Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent, 1985	02.10.1986 (At)
	Protocol on Limitation of Emissions of Nitrogen Oxides or their Transboundary Fluxes, 1988	24.07.1989 (At)
	Protocol on Limitation of Emissions of Volatile Organic Compounds or their Transboundary Fluxes, 1991	
	Protocol on Further Reduction of Sulphur Emissions, 1994	

	Protocol on Heavy Metals, 1998	
	Protocol on Persistent Organic Pollutants, 1998	
	Protocol to Control Oxidation, Eutrophication and Ground Ozone, 1999	
	International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests)	Participates
17.	Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki, 1992)	08.10.1999 (Ac)
	Protocol on Water and Health (London, 1999)	26.09.2003 (Rt)
18.	Convention on the Transboundary Effects of Industrial Accidents (Helsinki, 1992)	
19.	Convention on Environmental Impact Assessment in a Transboundary Context (Espoo, 1991)	20.07.1999 (Rt)
	Protocol on Strategic Environmental Assessment (Kiev, 2003)	
20.	Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus, 1998)	18.11.1999 (Rt)
	Protocol on Pollutant Release and Transfer Register (Kiev, 2003)	
21.	Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979)	01.05.1999 (EIF)
Subregional		
22.	Convention on the Protection of the Black Sea Against Pollution (Black Sea Convention) – Bucharest, 1992.	14.04.1994 (Rt)
	Protocol on the Protection of the Marine Environment of the Black Sea from Land-Based Sources and Activities (1992)	14.04.1994 (Rt)
23.	Framework Convention on the Protection and Sustainable Development of the Carpathians	11.05.2004 (Rt)
	Protocol on Conservation and Sustainable Use of Biological and Landscape Diversity	28.04.2010 (EIF)
24.	Convention on Cooperation for the Protection and Sustainable Use of the Danube River	13.03.2003 (EIF)

Ukraine reports to the UN Commission on Sustainable Development and the secretariats of the current multilateral agreements on a regular basis.

In recent years some progress was achieved in implementing the UNFCCC and the Kyoto Protocol, namely, the approval of the National Action Plan on the Kyoto Protocol, the approval of the procedures for development and implementation projects aimed at reducing anthropogenic emissions and on enhanced absorption of greenhouse gases in line with the Kyoto Protocol, approval of the procedures on coordination of measures aimed at meeting the obligations set down in the Kyoto Protocol, founding of the National Agency on Environmental Investments, etc.

The aim of the National Agency of Environmental Investments (NEIA) (http://neia.gov.ua/nature/control/uk/index) is to execute the requirements of the UNFCCC and implement the mechanisms of the Kyoto Protocol including establishing and operating the national system for the assessment of the GHG emissions and absorption.

MoEP has created a special website for public information on the implementation of the Kyoto Protocol in national language, English and Russian (http://www.informkioto.org.ua/main/ua/).
In 2009, the *Third, Fourth and Fifth National Communications on Climate Change* in Ukraine were prepared http://unfccc.int/resource/docs/natc/ukr_nc5rev.pdf). In 2010, the *National Inventory Report on Greenhouse Gas Emissions and Removals in Ukraine for 1990-2008* was submitted. Annual national inventories in standard electronic form in the national language and in Russian are placed on the NEIA website http://www.neia.gov.ua/nature/control/uk/doccatalog/list?currDir=117395. Information on Kyoto units in standard electronic form in the national language and English is found at the National Electronic Registry of Anthropogenic Emissions and Absorption of Greenhouse Gases of Ukraine (Ukrainian Carbon Unit Registry) website: http://www.carbonunitregistry.gov.ua/.

Ukraine submits to the Secretariat of the Convention for the Protection of the Ozone Layer on an annual basis data on the consumption of ozone depleting substances. The last report was submitted for 2009.

At the time of writing of the present Country Report Ukraine has still not submitted to the Convention Secretariat the National Implementation Plan of the Stockholm Convention on Persistent Organic Pollutants, although the deadline for plan submission was 24.12.2009 (http://chm.pops.int/Countries/National%20Implementation/tabid/253/language/en-US/Default.aspx).
In 2007, Ukraine submitted the Third National Report on Biodiversity. The Fourth National Report was prepared in 2010. (http://www.cbd.int/doc/world/md/md-nr-04-en.pdf).
In 2009, the Red and the Green Books of Ukraine were published in the national language; they are available at the MoE website:

- Red Book of Fauna of Ukraine (http://www.menr.gov.ua/media/files/Articles/Red_book/Red_book_animals_2009_031209.rar
- Red Book of Flora of Ukraine (http://www.menr.gov.ua/media/files/Articles/Red_book/Red_book_plants_2009_031209.rar);
- Green Book of Ukraine (http://www.menr.gov.ua/media/files/Articles/Green_book/GreenBook281209.rar).

In 2007, the first national report on the implementation of the Cartagena Protocol was prepared (http://www.cbd.int/doc/world/ua/ua-nr-cpb-01-ru.pdf).
Ukraine regularly submits national reports on the implementation of the Convention on Transboundary Movements of Hazardous Waste and its Disposal. The Cabinet of Ministers approved the Regulations on transboundary movements of hazardous waste and their disposal, as well as the Yellow and Green Registers of hazardous waste. The last report for 2008 was submitted in 2009.

In 2006, Ukraine submitted the first national report on the implementation of the UN Convention to Combat Desertification (http://www.unccd.int/cop/reports/centraleu/national/2006/ukraine-rus.pdf).

In 2009, Ukraine submitted the annual report for 2008 and the Biennial Report 2007/2008 (http://www.cites.org/common/resources/reports/pab/07-08Ukraine.pdf) on the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora.
Ukraine regularly submitted annual reports on implementation of the Agreement on the Conservation of Populations of European Bats for 2001-2006. After a two-year break, in 2009, the *National Implementation Report of Ukraine* was prepared. It is available on the EUROBATS website: http://www.eurobats.org/documents/pdf/National_Reports/nat_rep_Ukr_2009.pdf.

In 2007, Ukraine submitted the first National report on implementation of the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area. The report is available on the ACCOBAMS website: http://www.accobams.org/index.php?option=com_docman&task=doc_download&gid=85&Itemid=50.
Ukraine prepared the Forest Resources Assessment Country Report according for the FAO Global Forest Resources Assessment 2010. The report is available on the FAO website: http://www.fao.org/forestry/20262-1-169.pdf.

Ukraine fulfills obligations under Convention on Long-Range Transboundary Air Pollution and three of its Protocols.
Ukraine participates in the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests). ICP Forest National Focal Point for Ukraine is the Laboratory of Forest Monitoring and Certification of the Ukrainian Research Institute of Forestry and Forest Melioration (http://uriffm.org.ua/).
In order to meet the obligations set down in the Convention on the Protection and Use of Transboundary Watercourses and International Lakes, Ukraine has signed with neighbours a number of bilateral agreements on the protection of transboundary water resources.
Ukraine has not ratified the Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context. Ukraine is violating its obligations of developing a strategy on the implementation of the Convention requirements and reporting (http://epl.org.ua/fileadmin/user_upload/dodatky_do_sprav/ESPO_Lyst_Bychko_07_04_09.pdf).

In 2005 and 2008, the Ministry of Environment prepared reports on the implementation of the Aarhus Convention in Ukraine and presented them at the 2nd and 3rd meetings of parties to the Convention.
(http://www.unece.org/env/documents/2008/pp/mop3/ece_mp_pp_ir_2008_UKR_e.pdf). In December 2008, the Cabinet of Ministers approved the Action Plan for the Implementation of the Aarhus Convention.

In 2003, the Aarhus Information Centre was opened as a step in implementing a Danish project *Assistance to Ukraine in Implementing the Aarhus Convention*. In 2004, MoEP transformed it into the Aarhus Information and Training Centre. The practical side of the Centre activities needs to be improved, especially as far as preparing and publishing on the website of current information is concerned. The information available on http://www.menr.gov.ua/cgi-bin/go?node=Aarhus is outdated and incomplete. Most of the pages are empty.

Ukraine is a party to the Black Sea Convention and reports to the Commission on the Protection of the Black Sea against pollution (Black Sea Commission); it also participates in projects of the Black Sea Information System (BSIS) – http://www.blacksea-commission.org/_bsis-description.asp, and the Black Sea Integrated Monitoring and Assessment Program (BSMAP) – http://www.blacksea-commission.org/_bsimap.asp.

The following organizations perform monitoring and reporting:

- Ukrainian Scientific Centre of Ecology of the Sea (UkrSCES), MoEP (http://www.sea.gov.ua/index.htm.ru). The UkrSCEM database description is given in Annex I.
- State Ecological Inspection of Azov and Black Seas (SABSI), MoEP

- State Ecological Inspection of Environmental Protection of the Black Sea's North-West region (SEINWRBS), MoEP
- Institute of Biology of the Southern Seas (IBSS), NAS of Ukraine – http://www.ibss.org.ua; conducts biological monitoring
- Southern Scientific Research Institute of Marine Fisheries and Oceanography (YugNIRO) – http://yugniro.crimea.com/. Reports data on fishery.

The *'Diagnostic Report' to guide improvements to the regular reporting process on the state of Black Sea Environment* submitted to the EEA by the Permanent Secretariat of the Black Sea Commission states that the monitoring programme is annually supported from the budget and biological investigations are included, all mandatory parameters are observed, bathing water monitoring is properly performed; it also points out the excellent quality of reported data. The following drawbacks in monitoring and reporting are mentioned in report:

- Recommended frequency of observations are not always observed;
- Contaminants in biota and sediments are not included in the monitoring program;
- Research Vessels are not in a good state;
- Coastal and Marine stations are not always observed;
- Ecosystem approach to the monitoring organization is absent; therefore the data can be used only for independent analysis of water quality, biodiversity, fish resources etc.

Main problems include insufficient coordination between responsible organizations, lack of integration and unstable financing assistance.
Several research organizations of Ukraine (UkrSCEM, YugNIRO, the Ukrainian Scientific Research Institute of Ecological Problems, IBSS, the Marine Hydrophisical Institute and others) participate in *the FP7 EU funded project UP-GRADE Black Sea SCENE (2009-2011)* – http://www.blackseascene.net/ and also in the project *BlackseaWeb* (http://www.blackseaweb.net/). The Black Sea Web Project is a joint-project between local partners from the Ukraine, the Russian Federation and Romania and EC-partners from the Netherlands and Denmark. It focuses on strengthening of environmental management in the Black Sea Region. Within the framework of the project, a Demonstrator for a Black Sea Marine Environmental Management Support System, based on Telematics1 will be developed and evaluated. This Demonstrator might provide a model for future expansion of the system among all countries bounded on the Black Sea. Also it will contribute to the further development of the Black Sea Region state-of-the-art on Informatics and Telematics.
1 Telematics – the domain integrating means of telecommunication and integrated data processing.

In December 2007, Ukraine, Moldova and Romania signed a Joint Declaration on cooperation in the field of improving the ecological status of the Danube delta in line with the goals of the Danube Convention and the EU Water Framework Directive.

A strategy on the implementation for the Carpathian Convention was approved by the Ukrainian government as well as a national action plan enacted. Institutions and local administrations have the obligation to implement the Carpathian Convention. Special amendments to the rules of forestry, which limit time and space on the tree cutting in the Carpathians for soil protection have been enacted. The main source for funding for concrete projects is the national environmental fund. Land use is regulated in all parts of the Ukrainian Carpathians and special permits have to be obtained from a respective Ministry, e.g. for building. 300,000 hectares of forests were saved from harvesting due to the Carpathian Convention.

IV CROSS-ANALYSIS OF SEIS COMPONENTS

In Ukraine there are many modern software products as well as scientific and technical solutions for provision and analysis of environmental information that could be used in the implementation of the Ukrainian SEIS component. However, there is no single centralized electronic data transfer network that would cover the information resources of all bodies of environmental monitoring. Besides, there is no single methodology of data interpretation and exchange of results of environmental monitoring. This hinders comprehensive assessment of natural environments.

Obviously, the country needs to continue further improvement of legislation in the sphere of environment monitoring and improvement of environmental statistics reporting, as well as develop methodology to assess the quality of the environment.

Integration of SEIS principles would simplify collection of environmental information for reporting on environmental international conventions.

Table 6 provides on analysis of problems in the current monitoring system in the context of SEIS implementation.

Table 6.
Cross-analysis of SEIS components

No		***Positive aspects***	***Negative aspects***
1.	Legislation	There is a series of legislative documents on monitoring of air, surface waters, lands, etc	Current legislation should be improved Development of new statutory acts, that regulate collection of information on the pollution of the environment by industrial enterprises is required; legislation on statistical reporting should be improved
2.	Technical capability	There are many modern software products as well as scientific and technological solutions to provide and analyse environmental information Monitoring bodies maintain databases of environmental information There are some regional automated systems of environmental monitoring	Software provision of single centralized network of environmental information collection should be improved further Regional automated systems of environmental monitoring should be implemented in all Oblasts of Ukraine (in Donetsk Oblast, for example) Technical improvement of measurement, hardware and software provision of the monitoring bodies
3.	Monitoring	All components of the environment are observed systematically The basic list of indicators of the Guidelines for the application of environmental indicators in the EECCA countries has been developed	Methodology to assess the quality of natural environments should be developed Observation data should be provided for the calculation of all indicators of the Guidelines for the application of environmental indicators in the EECCA countries The basic list of environmental indicators should be approved

			Insufficient use of data from Earth remote sensing for the purposes of environmental monitoring
4.	Reporting	Development of annual national state of the environment reports is provided Submission of reports for the international conventions is provided	It is necessary to ensure agreed automated formation of reports for international conventions using single centralized network of environmental information collection

V AGREED ACTIONS AND IMPLEMENTATION PLAN

Priority objectives for the development of information environmental infrastructure of Ukraine and areas of work related to the establishment of a shared European environmental information system SEIS have been identified (presented in table 7). This has been done on the basis of cross-analysis of the current state of informational provision in the sphere of statistical reporting and environmental monitoring.

Table 7.
List of priority objectives for the development of the national information system within ENPI-SEIS project

No	*List of Activity*	*Terms for implementation*
1.	Development and improvement of statutory acts on environmental monitoring	December 2012. It is included into MoE' Action Plan for 2012.
2.	Improvement and automation of report submission on international conventions using single centralized network of environmental information collection	December 2012. It is included into MoE' Action Plan for 2012.
3.	Use of remote Earth probing data for monitoring of biodiversity, landscapes, soils, pollution of air and surface water objects	December 2012. It is included into MoE' Action Plan for 2012.
4.	Wider application of the list of environmental indicators (that has been recommended by UNECE) in the environmental monitoring and hence increased level of international environmental information compatibility	To be started/initiated within the ENPI-SEIS project
5.	Development of regional automated system of environmental monitoring	To be started/initiated within the ENPI-SEIS project
6.	Informational integration of local systems to monitor enterprises-polluters and regional monitoring systems into the State monitoring systems; development of automated systems to monitor sources of pollution and discharge of enterprises, improvement of hardware and software provision of the Information Analytical Centre of the Ministry of Ecology and Natural Resources	To be started/initiated within the ENPI-SEIS project
7.	Expansion of the network of stationary and automated control sites that monitor the state of air, surface and ground waters; expansion of the network of background monitoring	To be started/initiated within the ENPI-SEIS project
8.	Improved quality and quantity of information on the pollution of environment via integration of modern measuring and computational technologies in the organizations of monitoring subjects	To be started/initiated within the ENPI-SEIS project