

EUROPEAN NEIGHBOURHOOD AND PARTNERSHIP INSTRUMENT –  
SHARED ENVIRONMENTAL INFORMATION SYSTEM

ARMENIA COUNTRY REPORT



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**European Environment Agency**

Kongens Nytorv 6  
1050 Copenhagen K  
Denmark

*Reception:*

*Phone:* (+45) 33 36 71 00

*Fax:* (+45) 33 36 71 99

<http://www.eea.europa.eu/>

More information regarding the ENPI-SEIS project: <http://enpi-seis.ew.eea.europa.eu/>



**Zoï Environment Network**

International Environment House

Chemin de Balxert 9

CH-1219 Châtelaine

Geneva, Switzerland

Phone: +41 22 917 83 42

<http://www.zoinet.org/>

**Author:** Dr. Vahagn Tonoyan

**Contributors:** Ms. Julieta Ghlichyan, Mr. Yuri Poghosyan

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## LIST OF ACRONYMS

ADB	Asian Development Bank
AMD	Armenian Dram
ASHMS	Armenian State Hydro-Meteorological Monitoring Service
CEPA	Classification of Environmental Protection Activities
CIS	Commonwealth of Independent States
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EIMC	Environmental Impact Monitoring Centre
ENPI	European Neighbourhood Policy Instrument
EU	European Union
FWUA	Federations of Water Users Associations
GIS	Geographic Information Systems
IAC	Information Analytical Centre
IPCC	Inter-governmental Panel for Climate Change
LAN	Local Area Network
LRTAP	Long-Range Transboundary Air Pollution
MAC	Maximum Allowable Concentrations
MEA	Multi-lateral Environmental Agreements
MNP	Ministry of Nature Protection
NSS	National Statistical Service
NWP	National Water Program
OECD	Organization for Economic Cooperation and Development
POP	Persistent Organic Pollutant
RA	Republic of Armenia
SCWS	State Committee on Water Systems
SEI	State Environmental Inspectorate
SEIS	Shared Environmental Information System
SNCO	State Non-Commercial Organization
SWC	State Water Cadastre
SWCIS	State Water Cadastre Information System
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environmental Program
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
USAID	United States Agency for International Cooperation
WRMA	Water Resources Management Agency
WUA	Water Users Associations

## EXECUTIVE SUMMARY

This report has been prepared to explore the options of introducing European Neighbourhood Partnership Instrument (ENPI)-Shared Environmental Information System (SEIS) project in Armenia. The overall objective of the ENPI-SEIS project is to promote the protection of the environment in the ENPI countries. Specific objectives include identification and further development of environmental indicators; improvement of capacities in the field of monitoring, collection, storage, assessment and reporting of environmental data; promoting setting up national and regional environmental information systems in line with the SEIS principles; establishment of SEIS and tracking progress of the regional initiatives.

The expected short-term outcome of the process includes a clear overview of existing situation as basis for improved national and regional reporting, and the long-term outcome of the process includes improved assessment of the quality of the environment at regional level by using common tools and methodologies; stronger institutional partnership at national level; trained experts in all SEIS components; and improved regional cooperation and partnership with regional and international bodies.

It is expected that SEIS will bring several benefits to the countries, including increased flexibility and greater use of data; simplification and efficiency in data flows; widespread availability of information and more consistent and integrated data and information input.

In the regional meeting held in Brussels in November 2010 the following priorities were agreed for ENPI East region by the representatives of the countries: water resources, atmospheric air protection, and waste management.

However, Armenia, in addition to above-mentioned regional priorities, included also soil management and biodiversity protection as priority directions.

This assessment report describes the existing institutional cooperation in Armenia in the field of water resources, atmospheric air, soil and biodiversity protection, and waste management, assesses current environmental inter-institutional cooperation in these priority fields and identifies the country's capacity for taking SEIS implementation forward.

Chapter 1 of the report describes the inter-institutional cooperation which covers the national governance for environmental information and statistics in the priority sectors, including the links among the different bodies. Chapter 2 on infrastructure describes the current status of environmental monitoring and information systems, including the structure of the monitoring and information systems used in the country and a description of the duties of those responsible for the management of the systems. Chapter 3 of the report presents the reporting obligations of Armenia according to multilateral, regional and sub-regional environmental agreements, and also describes environmental data and indicator availability, including analysis of existing datasets.

Chapter 4 analyzes the strengths and weaknesses for SEIS implementation in Armenia. Among the weaknesses the following factors are mentioned: (1) absence of appropriate legislative framework for introduction and maintenance of integrated environmental information management system; (2) lack of information flow management among stakeholder organizations; and (3) lack of state programs on implementation of integrated monitoring of the state of environment. Among the strengths and opportunities, the following factors are highlighted: (1) appropriate institutional structures; (2) existence of administrative statistical reporting system; and (3) recent positive developments in environmental monitoring sphere.

Chapter 5 proposes follow-up activities for implementation of ENPI-SEIS project in Armenia. Particularly, two potential pilot projects are proposed on development of a shared environmental information system: (1) for Lake Sevan ecosystem; and (2) for Debed River basin based upon the joint information system of Debed-Khrami trans-boundary river basin, developed in 2011 under the EU funded project: "Trans-Boundary River Management Phase II for the Kura River basin - Armenia, Georgia, Azerbaijan".

# 1. Inter-institutional Cooperation

## 1.1. Atmospheric Air

The **Environmental Impact Monitoring Centre (EIMC)** of the Ministry of Nature Protection is a state non-commercial organization in charge of carrying out monitoring of atmospheric air, quality of surface water and soil pollution. Air quality monitoring in Armenia has undergone significant changes during the last two decades. The air quality monitoring network was quite extensive during the Soviet Union, but was significantly impacted by the collapse of the Soviet Union. In 1997-1998 only in 4 cities of Armenia (Yerevan, Vanadzor, Alaverdi and Ararat) the atmospheric air quality was monitored (for 11 parameters). In 1997 the monitoring of carbon monoxide was terminated in Yerevan. In addition, several very important monitoring stations were completely closed.

In 1999 the cities of Gyumri and Hrazdan were added to the monitoring network. In recent years the situation has significantly improved due to provision and exploitation of contemporary equipment of air quality monitoring financed from the state budget sources and donor organizations.

For the purposes of monitoring of transboundary pollution, EIMC actively participates in the European Monitoring and Evaluation Program for monitoring of transboundary pollution under the Convention on Long-Range Transboundary Air Pollution (LRTAP). The air quality monitoring station in Amberd, situated at the altitude of 2070 m above the sea level, fully corresponds to the requirements of such program.

Due to recent developments, a hybrid monitoring network was formed for air quality monitoring. The air quality monitoring network currently consists of 300 passive sampling points for 2 major pollutant substances, providing average weekly data. In 18 points EIMC does active sampling of 4 pollutants (sulphur dioxide, nitrogen dioxide, ozone, and total gas), and in 7 stations, 4 of which are located in Yerevan, automated measurements take place. These automated stations perform monitoring of air quality, and possess about 30 automated analyzers. The number is not sufficient, and in optimal case there should be 3-4 times more. However, these equipments are made in United States of America (USA) and Japan and are very expensive, and the scarce financial resources and often their absence did not provide opportunity to EIMC to complete the technical upgrading and modernization of the monitoring network.

Most of the air quality data is available in Armenian language from the website of the EIMC at <http://www.armmonitoring.am>.

## 1.2. Water Resources

The **Ministry of Nature Protection (MNP)** has a wide scope of authority for natural resources management protection, which is fulfilled through various structural and separated sub-divisions of the Ministry (divisions, agency, including 6 water basin management authorities, state environmental inspectorate). Among other things the Ministry implements strategic management, protection and allocation of water resources with the main enforcement tools being the water use permits. Through its website ([http://www.mnp.am/index\\_eng.htm](http://www.mnp.am/index_eng.htm)), the Ministry of Nature Protection provides information on the water resources of the country.

However, the information is fragmented, not categorized, incomplete and is not comprehensive. Hence, the following information is available from the section on water: water use and discharge in 2008, water use permits issued by the Water Resources Management Agency (WRMA) in 2008 and 2009, monitoring results of the pollution of surface waters of the country, level of the Lake

Sevan, and report from the State Environmental Inspectorate (SEI) on violations of water use and discharge conditions.

The above-mentioned information is being uploaded on the website by the Information Analytical Centre of the Ministry of Nature Protection. The main tasks of the Centre are collection, processing and compilation of a database from statistical information received mainly from the State Environmental Inspectorate, as well as uploading the processed current monitoring information onto the web site of the Ministry. However, only the current (monthly) data concerning levels exceeding the set norms/standards is uploaded on the site. The data is not accumulated at the website, but is substituted each month.

The **Water Resources Management Agency** is responsible for carrying out water resources management and protection responsibilities under the Code of the Republic of Armenia (RA). This entity is charged with estimating water availability and ensuring water use efficiency, through the permitting and planning processes. It is also responsible for management of competing water uses and for ensuring that environmental needs are met. Moreover, the WRMA is charged with the coordination of the National Water Policy and the National Water Program development. It is also responsible for development of the river basin management and planning components described in the Water Code.

WRMA also manages the State Water Cadastre (SWC) and the State Water Cadastre Information System (SWCIS), which are developed to combine the different pieces of water monitoring and compliance assurance information into a sophisticated database management system. The SWC is a continuously functioning system, which registers integrated data on water resources quantity and quality indicators, watersheds, materials extracted from river beds, composition of biological resources, water users, water use permits and water system use permits.

It should be noted that SWCIS is a new approach to data management and sharing in Armenia. Many of the institutions have not fully bought-into the concept of "open" access. Although the water resources data are now available via the seven databases and SWC unified Data Warehouse, sharing of data among all institutions and the public has to be yet improved.

The EIMC of the Ministry of Nature Protection conducts monitoring at 131 sampling points throughout the country, and annually takes 1200 samples from surface water bodies (from each site 6-12 samples are taken per year). For each collected sample analysis of up to 48 parameters is being conducted.

In 2003, a MS Access-based water quality database with 45 water quality parameters was developed with the support of the United States Agency for International Cooperation (USAID). However, currently the monitoring program covers a total of 48 parameters and the database is no longer appropriate due to the increase in the parameters. It became necessary to use a special software package. Therefore the database developed with the assistance of USAID is currently not used. The staff is using spread sheets to manage the data. EIMC database is not linked to any website. In addition to local database, EIMC publishes monthly and annual printed bulletins in Armenian language, which contain data on surface water quality.

On trans-boundary level a joint monitoring of surface water quality and bottom sediments is being implemented in trans-boundary River Araks between Armenia and Iran. In addition, within the framework of the EU project "Trans-boundary Management of Kura River - Phase II, Armenia, Azerbaijan and Georgia" a joint monitoring of surface water quality for trans-boundary river basins of Debed-Khrami between Armenia and Georgia and Alazani, between Azerbaijan and Georgia is underway.

Because of the economic crisis, some activities included in the Action Program for Environmental Monitoring in 2007-2011, according to the "Concept on the State Environmental Monitoring" approved by the Armenian Government, are not implemented. Despite the fact that in 2009-2010 a complex of equipment for biological monitoring of surface water and bottom sediments was



obtained and installed within the framework of EU "Transboundary Management of Kura River - Phase II, Armenia, Azerbaijan and Georgia" project, the efforts of the EIMCs to introduce biological monitoring system in the country's rivers and lakes is still unsuccessful and only physical-chemical monitoring takes place at the moment. With the equipment provided, about 20 biological monitoring parameters can be defined, which would allow calculating the index of biological quality of rivers, as one of the 3 main biological indicators of water. However, the installed equipment is not used due to lack of methodology and properly trained personal.

According to Government of Armenia Decree No 1616-N of September 8, 2005 "Hydro-geological Monitoring Centre" SNCO was established under the Ministry of Nature Protection, which aims to evaluate the main patterns of formation of freshwater underground waters in the territory of Armenia, their quantitative and qualitative properties and regional changes, and serve this information for more efficient use and protection of groundwater resources of the country, as well development of measures to fight against negative impact on groundwater resources. In 2006-2008 the monitoring of groundwater resources conducted by the SNCO was fragmented due to insufficient financial resources, but since 2009 it is being implemented at full range. The implemented hydro-geological monitoring includes measurements at water spring and water discharge, level (pressure), as well as water temperature. The measurements are implemented at 6 water basin management areas: Akhuryan, Northern, Sevan, Hrazdan, Araratian and Southern. In 2009-2010 the number of national reference monitoring network sampling points was 63, whereas in 2011 additional 7 sampling points were operated, of which 4 in the Northern, and 3 in the Araratian water basin management areas. Thus, currently the national reference hydrogeological monitoring network consists of 70 sampling points. As basis for the monitoring network, the hydro-geological circulation of water was taken, which takes into consideration the natural-climate and geological-hydrogeological conditions and the factors impacting the formation of groundwater resources regime. Table 1 below provides the list of sampling points in the 2011 national reference monitoring network according to types and water basin management areas.

**Table 1: Monitoring points of the groundwater resources of the Republic of Armenia**

No	Water basin management area	Type of sapling point			Total
		Well		Spring	
		Gravity	Negative level		
1.	Sevan	5	-	6	11
2.	Hrazdan	10	1	16	27
3.	Akhuryan	7	1	-	8
4.	Araratian	-	-	9	9
5.	Northern	-	-	6	6
6.	Southern	-	-	9	9
	Total	22	2	46	70

Complex hydrogeological conditions of the RA territory, based on which the hydrogeological circulation of groundwater resources is taking place makes it necessary to extend the groundwater monitoring network by 2014 and include 58 additional sampling points, if enough financial allocation is secured.

Pursuant to the requirements of the Government of Armenia Decree No 1224-N of 01.10.2009 a special observation network is developed for monitoring the groundwater resources formed under impact of man-caused factors, where monitoring of water discharge, temperature and chemical composition of groundwater resources is implemented. As a result of monitoring works conducted in 2010-2011 a schematic map of distribution of underground freshwater resources and freshwater fountained resources in the Araratian Artesian basin, where compared to monitoring results of 1980s a decline of underground freshwater reserves is evidently observed.

The results of activities of the SNCO are summarized in the annual summary reports, which are presented to the Ministry of Nature Protection, but are not published.

The **Armenian State Hydro-Meteorological Monitoring Service** (ASHMS) (<http://www.meteo.am>) of the Ministry of Emergency Situations is the only authorized body for surface water quantity monitoring among other hydro-meteorological services in the country. ASHMS currently operates 7 river basin hydrological stations with 94 hydrological observation posts.

The data is collected at each point twice a day. At a lesser frequency (about 30 observations annually) a river discharge measurement is made at each post. The monitoring activities of ASHMS consist of water level, flow, water temperature, air temperature, and precipitation. With the data collected from all observation posts, the ASHMS headquarters in Yerevan processes the obtained data and prepares annual reference books. All data is being stored in an electronic database which is not available on-line.

With limited resources the following measurements and analyses have been curtailed in ASHMS: observations of water turbidity and solid substances; semi-annual survey of cross-section at each observation point; and observation and analysis of sediments, deformations and dam stability in reservoirs and lakes, mudflows; route snowpack measurement and snowpack aero-observations.

The **State Committee on Water Systems** (SCWS) (<http://www.scws.am>) under the Ministry of Territorial Administration is a state authorized body for water systems management and is responsible for the management and operation of state owned drinking water supply, irrigation water supply, drainage structures and wastewater collection, treatment and disposal facilities. It is also responsible for operation of Vorotan-Arpa-Sevan tunnel, issuance of contracts and agreements for third party management, operation and maintenance of water systems, as well as for transferring authorities for exploitation of irrigation systems to Water Users Associations (WUA) and Federations of Water Users Associations (FWUA).

On its website, the SCWS uploads numerous assessment reports, including the annual report on the activities in the fields of drinking water supply, wastewater treatment, irrigation water supply and management of water infrastructure (reservoirs, other hydro-technical structures). Information on the performance indicators of the 5 drinking water supply, 3 irrigation intake and 1 drainage structures operating companies, as well as Water Users Associations in the country is provided, including financial-economic analysis. Finally, the website contains detailed information on Lake Sevan.

The **National Statistical Service** (<http://www.armstat.am>), providing statistical data including water data, is not included in governmental structure, but is subordinate to the President of Armenia directly. In Armenia there is also the State Statistical Council which consists of six persons appointed by the President. The main functions of this body include development of the state policy in the field of statistics, adoption of legal and other normative documents and coordination of different statistical sectors. The National Statistical Service regularly produces various monthly and annual statistical reports and collections on environment of Armenia. In relation to water the National Statistical Service produces the following publications:

- Monthly reports in Armenian and Russian languages on the social and economic state of the country with a chapter "Monitoring of the Environment Pollution" (including surface water quality). Number of copies printed: 50-75;
- Various statistical yearbooks and collections in Armenian, Russian and English languages, which also have chapters related to the state of the natural resources and environmental protection, including water, underground, forests and etc. Number of copies printed: 500;
- Annual statistical collection "The Environment and Natural Resources of the Republic of Armenia" in Armenian and English languages. It includes sections on quality of water bodies, water protection, financial resources and funding of water activities, emergency situations of natural and technogenic characters which impact the environment. The document contains lots of tables and illustrative material, dynamic range of data for the period of more than 20 years with changing trends in some parameters;

- Statistical collection "Housing and Municipal Services in the Republic of Armenia", which contains statistical data on municipal water supply and sewage (for some parameters - the data for a 20-year period).

### **1.3. Waste Management**

The Ministry of Nature Protection of the Republic of Armenia is in charge of development and implementation of waste policy in the country through its structural and separated subdivisions (Division of Hazardous Waste Substances, Waste and Atmospheric Emissions Management Agency) and the "Waste Research Centre" State Non-Commercial Organization. The activities performed by the Centre are aimed at providing assistance in preparing and implementing the state policy and strategy in the area of waste management.

Armenia has ratified the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal in 1999. A key milestone in Armenia in the area of management of hazardous and other types of wastes was the elaboration and adoption of the "Law on Waste" in November 2004. The Law defines the state policy in the area of waste use, aimed at preventing the harmful impact of waste on the environment and human health, while maximizing its use as a secondary raw material. In order to ensure the enforcement of that Law, more than 40 sub-legislative acts have also been adopted.

The list of hazardous wastes in Armenia has been made compatible to Basel Convention and the Organization for Economic Cooperation and Development (OECD) lists. Furthermore, Armenia has adopted a list of prohibited wastes for import, and has 4 classes of classification of hazardous waste, and non-hazardous waste. Regarding inventory a corresponding by-law has been adopted, according to which all enterprises which due to their activities generate waste have to submit an annual report on the quantity of waste generated, sent to burial site, and payments made according to class of hazards. Thus, enterprises submit annual reports to the Ministry of Nature Protection and are obliged to prepare and after agreeing with the Ministry of Nature Protection approve passports on waste, which will include information on the quantity, class, sources of origin and other items, as well as special comments and observations.

At the moment, there are no landfills in Armenia corresponding to sanitary requirements and norms, and the existing landfills are rather burial sites, where open-air low temperature burning takes place. In the Republic there are numerous non-licensed landfills, which in reality are dump sites. In addition, there are no designated landfills for industrial, production and construction waste, and all such waste is dumped together with other waste in the landfills. Currently the European Bank for Reconstruction and Development (EBRD) implements a pilot project for construction of landfill in Kotayq marz, and the Asian Development Bank (ADB) implements a pilot project on development of a landfill in Ararat marz.

Despite some of the important steps that have been taken in Armenia in the sector, certain areas are in need of further work, including: (1) creation of an ecologically safe waste management system, including the improvement of appropriate legal framework; (2) creation of registers for the waste generation, processing and utilization objects and their disposal locations; (3) ensuring waste reduction, maximum use, including the expansion of secondary use of waste; (4) establishment of specialized waste disposal polygons and landfills; (5) development of norms for disposal of waste; and (6) making adjustments in the list of production and consumption waste, particularly in the list of names and codes of waste generated during the metal mines processing.

### **1.4. Soil Protection**

The monitoring of the condition of soils in Armenia is within the functions of the Ministry of Nature Protection of RA and the EIMC SNCO operating under the Ministry.

However, at the moment the monitoring of soil does not take place due to absence of corresponding capacities.

### **1.5. Biodiversity Conservation**

The protection and management of the sustainable use of fauna and flora, specially protection areas, including forests, is being implemented by the structural and separated subdivisions (Biodiversity Policy Division, Bioresources Management Agency) Republic of Armenia Ministry of Nature Protection, as well as 8 SNCOs in charge of protection of specially protected areas. The protection and use of forests, not included in the RA specialist protected areas, are under the jurisdiction of the Ministry of Agriculture of RA, which performs such functions through its Afforestation Department and "ArmForest" State Non-Commercial Organization. The state compliance assurance against the protection and use of the above-mentioned sectors is being implemented by the State Environmental Inspectorate under the Ministry of Nature Protection of Armenia. These structures provide for the procedures for monitoring of fauna and flora, as well as collection, analysis, evaluation, summarizing of the obtained information and ensuring data exchange. All this is being implement in compliance with the Republic of Armenia laws "On Flora", "On Fauna", "On Specially Protected Areas" and the Forest Code, as well as corresponding regulations and by-laws.

Despite the fact that the requirements and procedures for implementation of monitoring and information exchange, including inter-agency cooperation, are not completely incorporated in the above-mentioned legal acts, the flora and fauna cadastres developed within the above-mentioned laws and the information included in those cadastres can be included in the shared environmental information system, becoming its inseparable part.

In order to include complete and reliable information on fauna and flora in a shared environmental information system, as a first step, it is necessary to improve the procedures for exchange of information between the agencies and public.

### **1.6. Summary**

Despite the fact that the institutions in charge of providing information on air, water and waste have made a significant progress in recent years in provision of corresponding sectoral data, the cooperation at inter-agency level is still weak, which is essential for the above-mentioned agencies to perform their environmental functions effectively.

Thus, there is a need to improve coordination and cooperation between the agencies involved in provision of air, water and waste information through strengthening the culture of cooperation and coordination, including data and information exchange.

In this regard, the ENPI-SEIS project is seen as potential opportunity to improve also the in-house cooperation between the participating agencies in Armenia.

## **2. INFRASTRUCTURE**

### ***2.1. Water Resources and Atmospheric Air Quality Monitoring***

Surface water quality monitoring provides data for assessing the quality of water to protect it for drinking, fishing, boating, irrigation, stock watering, and supporting aquatic wildlife. Analyzed data/information is compared against State water quality standards to determine beneficial use support. Reports are written and disseminated to local and state officials, government and private entities and the public to expand the awareness of the need to protect and enhance the water quality of groundwater, river, streams, lakes and reservoirs. In addition, water quality data are used to identify impaired water bodies and define water resources quality for implementing projects or measures to restore or protect water quality.

The agency in charge of surface water resources quality monitoring in Armenia is the EIMC. Water resources quality monitoring system in Armenia was established in 1964. About 111 observation posts on 50 water objects were included in the system until 1990s. In 1994, 131 observation posts on 54 water objects were approved by the Government.

After 1992, water quality activities were drastically reduced. From 1994 water quality monitoring in Armenia was stopped. Therefore, time series of water resources quality data were interrupted which make impossible to see the dynamics of water quality parameters. In 1998, only 55 water samples were taken, which did not meet even the Soviet standards. From 1988 to 2004, only 55 to 275 samples per year were taken for analysis from 82 to 79 specified monitoring points throughout the country. However, the situation significantly improved since 2003-2004. The state funding increased dramatically since 2004 (the funding from the State budget was \$32,000 in 2004 and increased up to \$250,000 in 2007). In addition to internal resources, various USAID projects provided modern laboratory equipment (i.e., Mass Spectrometer, Chromatograph, mobile water resources quality control equipment for the field), and the number of water quality sampling points has increased up to 131 since 2005. For 2006, the Ministry of Nature Protection of the Republic of Armenia requested EIMC to collect and analyze 900 water samples. In 2007, EIMC was in full operation with 1,200 samples from all 131 observation posts (6-12 samples per year).

At present, EIMC has 2 complex (air, water, and soil) and 1 air laboratories with 52 staff members and 10 volunteers. The central office in Yerevan is equipped with 12 computers. The EIMC has two regional centres in Vanadzor (Northern Basin) and Kapan (Southern Basin), and two more regional offices in Gyumri (Akhuryan Basin) and Sevan (Lake Sevan Basin) are planned for the near future. Each regional office will have a complex laboratory to carry out the chemical analyses.

Air quality monitoring is conducted in the settlements of six air basins: Alaverdi, Ararat, Gyumri, Hrazdan, Vanadzor and Yerevan. In total there are 13 operational air quality monitoring stations in the country, including 2 in Alaverdi, 1 in Ararat, 1 in Gyumri, 1 in Hrazdan, 3 in Vanadzor and 5 in Yerevan.

In addition to this EIMC conducts atmospheric air quality observations in various cities of the country through passive samplers. Particularly, it has about 300 passive samplers in the country, including 16 in Echmiadzin, 12 in Abovyan, 10 in Sevan, 14 in Tsaghkaddzor, 15 in Kapan and 8 in Kajaran. In these passive samplers sulphur dioxide and nitrogen dioxide are determined.

In addition to this, recently an automated monitoring station was installed in the northern part of Tsaghkadzor city, which conducts air quality monitoring according to European standards. Another automated station was installed in Amberd, at the altitude of 2200 m above the sea-level, which fully corresponds to the requirements of transboundary pollution monitoring under the Convention on Long-Range Transboundary Air Pollution. The map below presents the surface water and atmospheric air quality monitoring network in Armenia.



**Figure 1: Surface water and air quality monitoring network of Armenia**

## 2.2. Hydro-meteorological Monitoring

The Armenian State Hydrometeorological Monitoring Service (ASHMS) of the Ministry of Emergency Situations of the Republic of Armenia is the only authorized body for surface water quantity monitoring. ASHMS currently operates and maintains 47 meteorological stations (including 6 high-mountainous and 3 specialized stations), 2 agro-meteorological stations, 7 hydrological stations, and 92 hydrological observation posts. Staff consists of a total of 640 staff members.

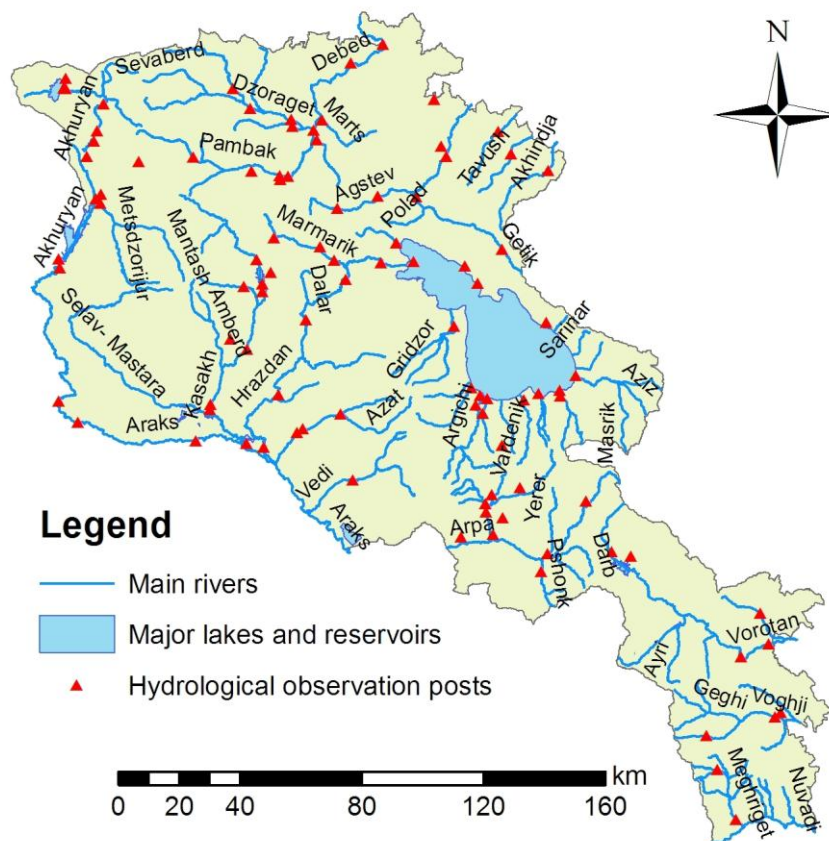
One of the major issues hindering the work of the ASHMS is low salaries of employees and insufficient funding for rehabilitating hydrological observation points, due to which young specialists leave the agency. With limited resources as indicated above, the following measurements and analyses have been curtailed:

- Water turbidity and solid substances in the water,
- Semi-annual survey of cross-section at each observation point,

- Analysis of sediments in the reservoirs and lakes,
- Snowpack route observations,
- Snowpack research,
- Mudflows studies.

The majority of hydrological and meteorological observation posts are poorly equipped. Data collection, entry, and transfer are being done manually in the registers. A handful of gauging stations have been modernized with computerized equipment in the Northern and Southern basins. In order to strengthen the surface monitoring activities, it is essential for the government to modernize the regional offices and field stations with appropriate modern equipment.

The majority of the hydrological and meteorological stations are not equipped with contemporary equipment. Several hydrological observation posts are rehabilitated in the Northern and Southern basins of Armenia. In order to strengthen the surface water quantity monitoring it is important that the Government equips the hydro-meteorological observation network of ASHMS with contemporary equipment.



**Figure 2: Surface water quantity monitoring posts in Armenia**

### 2.3. Groundwater Monitoring

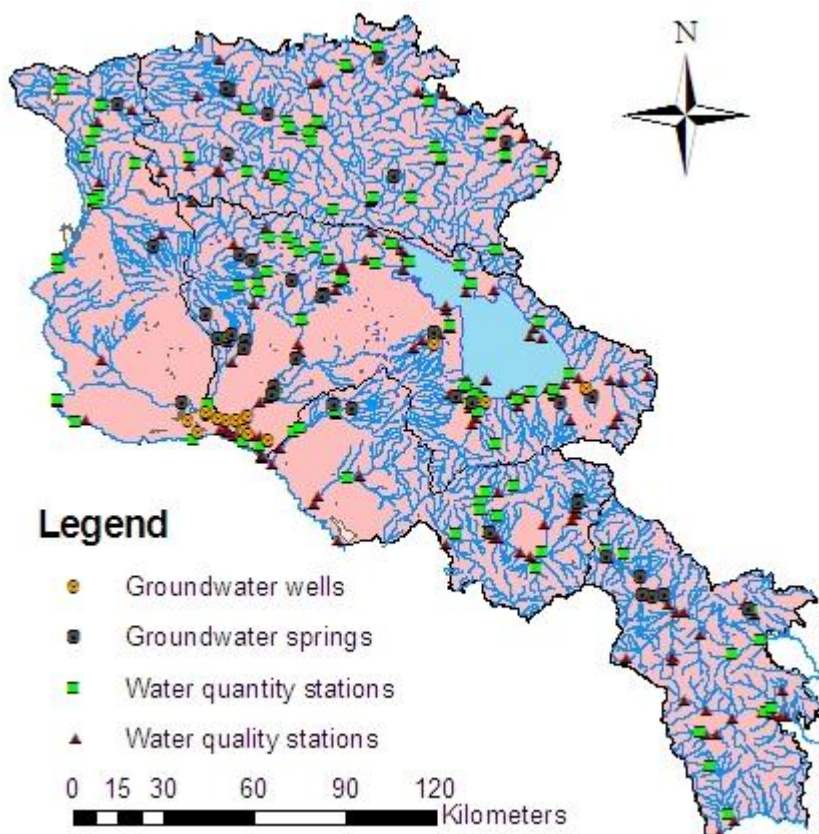
Since the 1950s, regular observations on groundwater wells and springs have been implemented by the Hydro-geological Expedition of the Geological Department. The last summary report was published in 1994, based on the 1990-1993 monitoring data. During the last 15 years, the status of Armenia's groundwater resources has not been monitored, despite the fact that groundwater resources provide 96% of the country's drinking water supply. The organization that conducted groundwater monitoring under the Soviet Union Government control, the Hydro-geological Expedition, was closed in 1993.

The 2006 Republic of Armenia Law "On National Water Program (NWP)" requires re-establishment of a groundwater monitoring program within four years after the adoption of the law, as one of the priority measures. According to this law it shall be implemented by the MNP which is the responsible body for the establishment and operation of a *national reference monitoring network*. The monitoring network shall comprise about 100 groundwater monitoring points. Such network will establish a baseline (reference) situation to enable the determination of trends caused by human or natural impacts.

With the support of USAID Water Program assessment of the condition of previously used groundwater monitoring points was conducted in February 2006. For rehabilitation and use in the re-established national reference network, 73 monitoring points were recommended, comprised of 49 natural springs, 22 wells (boreholes), and 2 groundwater (sub-surface) wells. Sixty-nine out of 73 selected springs and wells were rehabilitated with the support of the USAID Water Program in 2007-2008 and handed over to "Hydrogeological Monitoring Centre" SNCO under the Ministry of Nature Protection, to comprise the National Reference Groundwater Monitoring Network.

**Table 2: Summary Information on Surface and Groundwater Monitoring Points**

Basin	Area (km <sup>2</sup> )	Surface water quantity gauging stations		Surface water quality sampling points		Groundwater springs and wells
		no.	km <sup>2</sup> for 1 station	no.	km <sup>2</sup> for 1 station	
Akhuryan	5,044	17	297	14	360	14
Ararat	4,460	13	319	16	279	8
Northern	7,068	23	307	25	283	39
Sevan	4,806	14	339	22	216	3
Hrazdan	3,881	16	243	33	118	1
Southern	4,484	9	498	21	213	8
Total	29,743	92	323	131	227	73



**Figure 3: Surface and groundwater quantity and quality monitoring network**



## **2.4. Waste Monitoring**

There is no waste monitoring network in Armenia as such. According to 2004 law "On Waste" and subsequent by-laws and regulations, all enterprises which generate waste due to their operation, have to submit annual reports on the quantity of waste generated and transported to burial sites according to hazard class and payments made according to hazards class.

The report form is approved by the Decree No 451-N of the Minister of Nature Protection of Armenia from December 16, 2008. One copy of the report is submitted to the corresponding territorial division of the State Environmental Inspectorate (SEI) of the Ministry of Nature Protection of Armenia. Together with the experts of the Division of Hazardous Substances and Waste Policy, SEI checks the accuracy of the submitted reports and classifications after which the reports are submitted to the Republic of Armenia National Statistical Service (NSS). As for municipal waste management, it is a function delegated to communities, but in this case also no appropriate monitoring of waste takes place.

Detailed information on the forms, according to which the companies submit the annual reporting information/data, is presented in Section 3.2.3 of this report.

## **2.5. National Academy of Sciences of Armenia**

"Ecological-Noospheric Studies Centre" SNCO (Eco-centre) is a scientific-research organization which since 1989 implemented applied and fundamental research in the fields of ecology and environmental protection.

The research implemented by the Eco-centre is targeted towards complex assessment of ecological situation and optimization of natural resources management process.

Within its structure the Eco-centre includes problem-oriented laboratories and scientific groups, which implement research in the following areas:

- environmental geo-chemistry,
- bio-geochemical cycles,
- biomonitoring,
- radioecology (periodical collection of primary information since 1958),
- bioenergetics,
- landscape and natural resources evaluation and mapping,
- geo-pathogen zones,
- computer technologies and databases in the nature protection field.

The Eco-centre implements 5 scientific projects financed by the state budget: "Issues of geological and ecological safety of the environment", "Development of scientific-methodological fundamentals of the food quality and safety", "Research of the geochemical flow elements in the atmospheric air of Yerevan city", and "Development of methods for evaluation of soil pollution with heavy metals".

## **2.6. Data Flows**

According to set procedures all the data collected from air, water and waste monitoring shall be available to "Information-Analytical Centre" SNCO of the Ministry of Nature Protection of Armenia, which shall develop and form a computerized database on environment and separate components of natural resources. However, there are no clear mechanisms set through which the data flow can

be organized. And in reality, the "Information-Analytical Centre" is only involved in providing a maintenance service for the internal network in the Ministry.

A resolution No 1060-N "On Approving the Order for Registration of Documents in the State Water Cadastre and Provision of Information" of the Government of Armenia had been adopted in 2004, which authorizes the WRMA to consolidate and maintain all water resources and water system related information in an official repository. Thus, all agencies involved in the SWCIS annually provide data to WRMA in the required digital format, which is being inputted into the centralized data warehouse. Many experts underline a need to increase the frequency of data flows from annually to quarterly.

Table below provides the list of stakeholder institutions involved in the SWCIS and available data on water resources.

**Table 3: Stakeholder Institutions of the SWCIS**

Stakeholder institution	Available Data
Water Resources Management Agency, MNP (authorized agency for SWC)	Water use and wastewater discharge data
Armenian State Hydro-meteorological and Monitoring Service, MEA	Surface water quantity data
Environmental Impact Monitoring Centre, MNP	Surface water quality data
State Environmental Inspectorate, MNP	Actual water use and wastewater discharge data
Republican Geological Fund of the Geological Agency, Ministry of Energy and Natural Resources	Inventory of groundwater resources
Hydro-geological Monitoring Centre, MNP	Groundwater quality and quantity data
State Committee on Water Systems under the Ministry of Territorial Administration	Water systems used by the drinking water supply, irrigation water intake, drainage structures operating organizations and Water Users' Associations
State Hygiene and Anti-Epidemiological Inspectorate, Ministry of Health (MH)	Drinking water quality monitoring, water monitoring of open reservoirs, violations of sanitary norms

## 3. CONTENT

### 3.1. Country Reporting Obligations

#### 3.1.1. Reporting under the Global MEAs

Armenia is a party to 9 global conventions and three protocols to them. Related to the air, water and waste sectors, the country is a party to the following global multi-lateral environmental agreements (MEA):

- UN Framework Convention on Climate Change and its Kyoto Protocol,
- Convention for the Protection of the Ozone Layer and its Montreal Protocol on Ozone Depleting Substances and subsequent amendments (London, Copenhagen, Montreal, Beijing),
- Stockholm Convention on Persistent Organic Pollutants (POP),
- Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal,
- Convention on Biological Diversity and its Cartagena Protocol on Biosafety,
- Convention to Combat Desertification and Convention on Wetlands of International Importance.

In 2010 the "Second National Communication on Climate Change to United Nations Framework Convention on Climate Change (UNFCCC)" was published and sent to the Secretariat in the Armenian and English languages ([www.nature-ic.am](http://www.nature-ic.am); [www.mnp.am](http://www.mnp.am) ). The First national report on climate change was distributed in the Armenian and Russian languages in 1998.

Within the framework of the Convention for the Protection of the Ozone Layer, Armenia ratified London and Copenhagen Amendments in 2003, and in 2009 – Montréal and Peking Amendments. The data on consumption of ozone depleting substances is submitted to the Convention Secretariat annually. The data is on the sites: <http://www.ozone.nature-ic.am>; <http://www.UNEP.org/ozone> in national, English and partially in Russian languages.

As a party to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Armenia submits national reports to the Secretariat of the Convention. The latest report for 2006 is published online in English at the Convention's site (<http://www.basel.int/natreporting>).

In line with the provisions of the Convention on Persistent Organic Pollutants Armenia presented in 2007 the National report, which cover the time period from 2003 through 2006. The text of the report in English and Russian is available at the Convention's site: <http://www.pops.int>.

Pursuant to the requirements of the Convention on Biological Diversity, Armenia regularly submits national reports on status of implementation of the requirements of the Convention. The last national report was presented to the secretariat of the convention in 2009, in English language, and is located in the website of the Convention: <http://www.cbd.int>.

According to Article 26 of the UN Convention to Combat Desertification, each member-country is obliged to present information/reports on the measures implemented in the country, in a format and timeline defined by the Conference of Parties of the Convention. Armenia has presented to the secretariat of the convention information/reports on the 1st phase in 2000, on the 2nd phase in 2002, on the 3rd phase in 2006 and on the first part of the 4th phase in 2010. It is envisaged that the report for the second part of the 4th phase including 2010-2011 will be submitted in 2012. The format and timeline will be defined in October 2011 during the 10th session of the Conference of Parties. The action plan to combat desertification is adopted by the Government of Armenia on March 28, 2002. It is envisaged to review the action plan before 2013 and make it compliant to the requirements of the 10-year strategy of the Convention.

Under the Ramsar Convention on Wetlands of International Significance, the country regularly provides national reports on the implementation of the Convention requirements. The most recent national report is for 2008 submitted to the secretariat of the convention in English and available online at the Convention's site: <http://www.ramsar.org>.

Other environmental reporting to the international community (United Nations Environmental Program (UNEP), United Nations Economic Commission for Europe (UNECE), OECD, and etc.) is provided in the form of questionnaires, reports, reviews and communications according to the required formats and content.

All the above-mentioned reports are developed and presented with the direct participation of the National Statistical Service of Armenia.

### **3.1.2. Reporting under the Regional MEAs**

Armenia is a party to five regional European conventions and 1 protocol. The ones that Armenia is party to and that relate to the air and waste sectors include:

- Convention on Long-Range Transboundary Air Pollution;
- Convention on the Transboundary Effects of Industrial Accidents;
- Convention on Access to Information,
- Public Participation in Decision-Making and Access to Justice in Environmental Matters;
- Convention on Environmental Impact Assessment in a Transboundary Context and its Protocol on Strategic Environmental Assessment.

Implementing requirements of the Convention on Long-Range Transboundary Air Pollution, Armenia submitted data on emissions in the air of polluting substances to the Norway Chemical Coordination Centre in Oslo on an annual basis from 1980 to 2003. Information on data presentation is available online at the Convention's website: <http://www.unece.org/env/lrtap/>. After transfer of these functions to Vienna Centre and complication of a calculation method, the data for 2007 was submitted to this Centre. At present the data on emissions for the period of 2004-2006 and 2008 is under processing. The Protocol on a Long-Term Financing under the Convention is at the stage of ratification. Other Protocols are not yet ratified, as their implementation by the country is impossible at present for technical and financial reasons.

As a party to the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, Armenia regularly reports on the work done to the secretariat of the Convention, as well as participates in the meetings of its working groups. The latest report for 2010 is available online at the Convention's secretariat website: <http://www.unece.org/env/pp/>.

Under the Espoo Convention on Environmental Impact Assessment in a Transboundary Context, Armenia is providing reports on this activity on a regular basis. The latest report for the period 2006-2009 was presented in Russian in August 2010 and is available online at the Convention's website: <http://www.unece.org/env/eia.htm>.

In 2004 Armenia prepared the National Report on the role of ecosystems as the source of water within the framework of the Convention on the Protection and Use of Transboundary Watercourses and International Lakes, being not a Party to this Convention.

In April 2010 Armenia presented a summary report in Russian to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes in line with the Protocol on Water and Health. The report is available at the Convention's website: <http://www.unece.org/env/water>.

### 3.1.3. Reporting under the Sub-regional MEAs

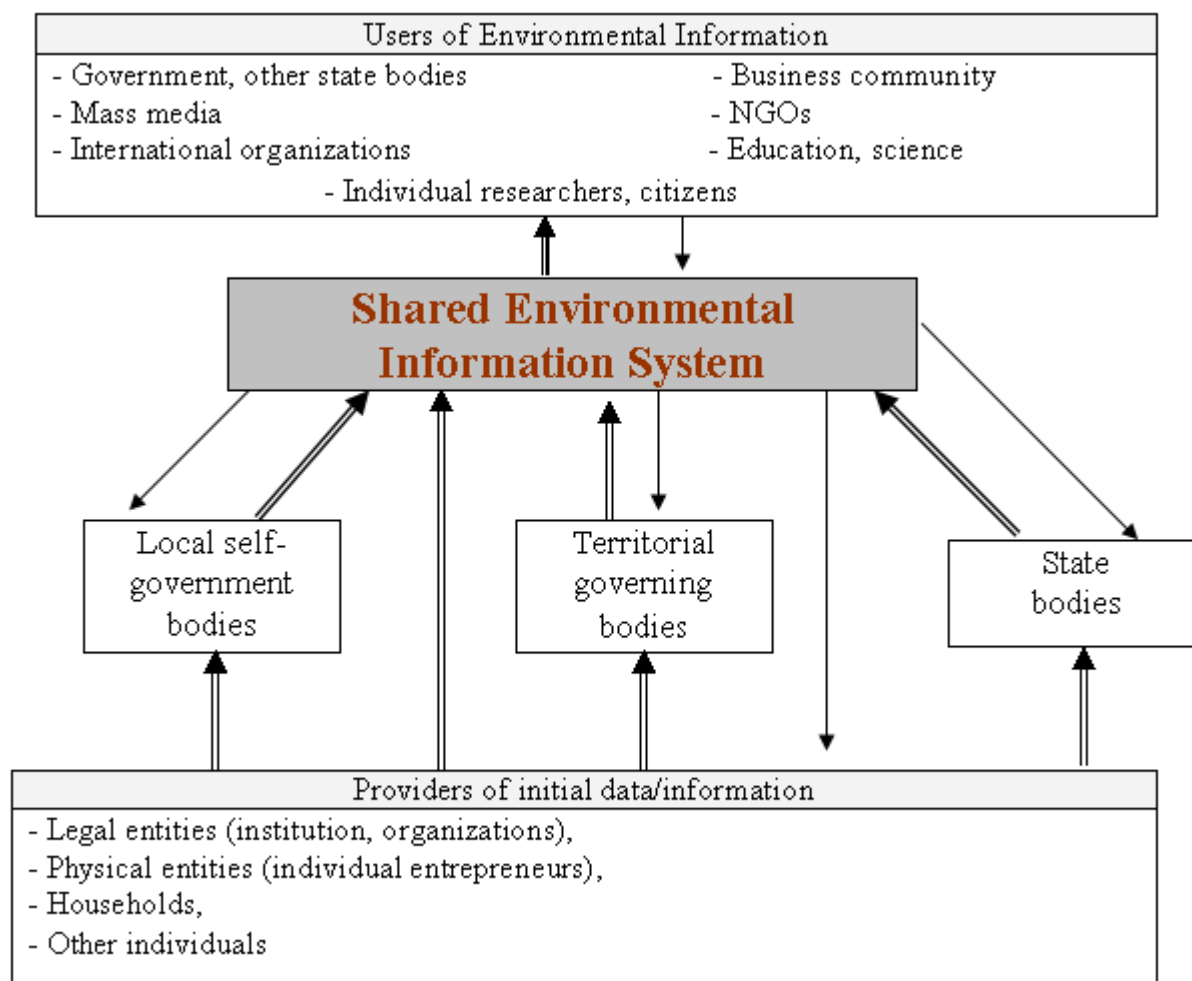
Pursuant to the requirements of the regional agreement on Reporting to the Inter-state Statistical Committee of the Commonwealth of Independent States (CIS), each year the Interstate Statistical Committee of the CIS (CIS STAT) provides data on environmental protection, which are placed in the annual statistical compilations issued in Russian and English languages. Information about the publications of the CIS-STAT is available at <http://www.cisstat.com>.

### 3.1.4. National Reporting Obligations

At present Armenia lacks an obligatory legally-binding system for environmental information flow management. No procedures for environmental data sharing and information exchange among state agencies exist in the country. The UNDP/GEF "Developing Institutional and Legal Capacity to Optimize Information and Monitoring System for Global Environmental Management in Armenia" project envisages to propose principles for development of a legal act regulating environmental information flow management, which can be then formulated and adopted as a GoA Resolution to become a mandatory mechanism for environmental data sharing and information exchange by relevant governmental bodies in Armenia. The procedures will also specify an authorized state body responsible for enforcement of the proposed mechanism. This can be a major complementary activity to ENPI-SEIS project and shall be given appropriate consideration.

Figure below demonstrates information flow from/to the proposed SEIS in Armenia.

*Proposed Information Flow Scheme under the Shared Environmental Information System*



## 3.2. Description of Environmental Data Availability

### 3.2.1. Air

Air quality monitoring data is recorded in the electronic database of EIMC. The database includes monitoring data from 6 air basins of Armenia (Yerevan, Gyumri, Vanadzor, Alaverdi, Hrazdan and Ararat), data obtained from the passive samplers installed throughout the country, and indicators determined in precipitations.

Table 4 below provides the parameters that are monitored through the air quality automated monitoring stations, non-automated stations, as well as passive samplers.

**Table 4: Air quality parameters and measurement methods**

Not-automated method	Automated method	Passive sampling method
Dust	Carbon monoxide	Sulphur dioxide
Sulphur dioxide	Sulphur dioxide	Nitrogen dioxide
Nitrogen dioxide	Nitrogen oxides (monoxide, dioxide, total oxides)	
Nitrogen oxide	Ground layer ozone	
Ground layer ozone		
Aromatic hydrocarbons		

Table 5 below provides the list of indicators determined in precipitation.

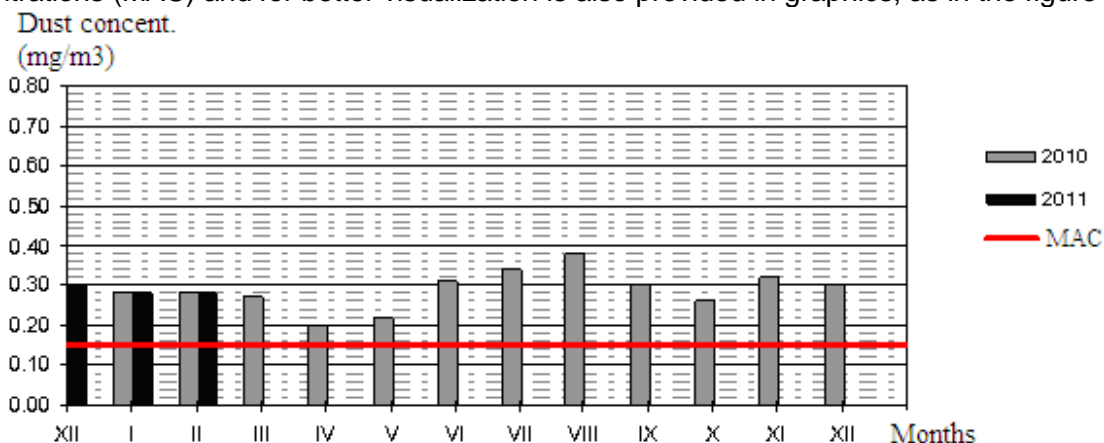
**Table 5: List of parameters determined in precipitations**

Indicators			
Hydrocarbon index	Weighted electroconductivity	Magnesium	Copper
Nitrate ion	Total phosphorous	Calcium	Zinc
Sulphate ion	Sodium	Iron	Chromium
Chloride ion	Potassium	Lead	Arsenic
Ammonium ion	Ammonium	Cadmium	Nickel

Thus, the electronic and paper-based databases of EIMC contain air quality information according to the above-mentioned parameters since 1986. It should be noted that until 2009 for most of the parameters the measurements were made 3 times a day, and since 2010 the daily average is obtained. The database correspondingly contains all the measurements.

In addition to the electronic database, the website of the EIMC (<http://www.armmonitoring.am>) provides monthly summarized information from passive samplers, as well as detailed information from the air quality monitoring stations.

The on-line data provided, is measured against the corresponding Maximum Allowable Concentrations (MAC) and for better visualization is also provided in graphics, as in the figure below.



**Figure 4: Graph of the average annual concentrations of dust in a station measured against the MACs**

The website also contains maps of the air quality monitoring stations and passive samplers, including their breakdown according to air basins (refer to a sample map on Figure 5).



**Figure 5: Sample map of the air quality monitoring of Gyumri air basin**

### 3.2.2. Water

Detailed information on different primary water related databases is presented in Section 1.2 of this report. From all primary databases annual summary information is sent to the SWCIS, which is summarizing all water-related databases from different agencies in a single Data Warehouse.

The SWCIS consists of four major components. At the centre of the system is the Data Warehouse that is operated and maintained by the Water Resources Monitoring and Cadastre Division of

WRMA. The Data Warehouse has two interlinked components: a tabular database and a spatial database. As of March 2011, the following information has been inputted into the SWCIS.

**Table 6: Status of Data Population in the SWCIS**

#	Database	Data populated
1	Water Use Permitting	Water use permit information from 2003 to 2010
2	Hydrological Databank	Water level and discharge data from 2003 to 2010. The data before 1999 are kept in MS-Excel® worksheets
3	Water Quality Monitoring	Water quality data from 1978 to 2010. The data before 1977 are kept in MS-Excel® worksheets
4	Groundwater Resources	Inventory data on 49 springs and 24 wells
5	Water Systems	Summary information on water systems grouped by 44 water user associations and 3 irrigation water intake companies
6	Sanitary Violations	Summary information on sanitary violations from 2003 to 2010
7	Man-made disasters as a result of negative impact of waters	Summary information on the man-made disasters as a result of negative impact of waters in terms of water quantity and distribution for the period of 2003-2010

Despite the fact that all the databases included in the SWCIS are in GIS-compatible electronic form, the system is not available on-line. However, if someone desires to obtain information from the SWCIS, he/she fills in corresponding application to the Water Resources Monitoring and Cadastre Division of WRMA, which is obliged to provide the information within 10 working days.

### 3.2.3. Waste

There exist corresponding databases according to the statistical reporting forms filled in by the organizations dealing with waste. This database is available in the NSS in electronic format, and includes information for the years 2009 and 2010, and summary data since 1999. Tables 5-7 below provide detailed information on the type of information included in the annual report forms and thus in the electronic database.

**Table 7: Origination and movement of waste, tons**

Row number		Total quantity of waste in the beginning of the year	Waste received from other organizations	Waste generated	Given to other organizations	Annihilated or destructed by the organization	Transported to waste collection sited through the organization	Used waste	Total quantity of waste at the end of the year (1 + 2 + 3 - 4 - 5 - 6 - 7)
A	B	1	2	3	4	5	6	7	8
101	Total (102+103+104 +105 +106)								
102	including hazardous of I class								
103	II class								
104	III class								
105	IV class								
106	Non-hazardous waste								



**Table 8: Summarized financial indicators**

Row number	Description	Total, thousand AMD	including, for hazardous waste
201	Monetary expenditures, total (202+203+204+205+206)		
202	including for annihilation and destruction of waste		
203	for preparation to use		
204	for transportation and location in waste collection sites		
205	payments to other organizations for given waste		
206	payments from other organizations for received waste		
207	Monetary profits, total (208+209+210)		
208	including from other organizations for receiving their waste		
209	from other organizations forgiving them waste		
210	from realization of the product or semi-manufactures articles due to waste recycling		
211	including from the waste obtained from other organizations		

**Table 9: Origination of waste according to types, groups, quantity and transportation**

Row number	Name of the waste	Code of the waste	Class of danger/hazard	Technological process of production, which originated waste	Physical-chemical characteristics of the waste (aggregate conditions, concentration of the main component)	Type of production grounds, and occupied territory in m <sup>2</sup>	Quantity of existing waste in the organization in the beginning of the year	Waste generated in the organization	Waste received from other organizations	Used waste		Destructed and annihilated waste		Transferred to other organizations	Transferred to waste collection locations	Quantity of waste at the end of the year
										total	including received from other organizations	total	including received from other organizations			
A	B	C	D	E	F	1	2	3	4	5	6	7	8	9	10	11
301																
302																
303																
304																
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### **3.3. Description of Availability of Environmental Indicators**

Within the frameworks of the "Concept for Development of the Environmental Monitoring in Armenia and Action Plan for 2007-2011" work on development of a comprehensive list of environmental monitoring and reporting indicators in Armenia is actually being implemented. The list will include the indicators defined by the requirements of international structures, global conventions and other agreements, recommended by international organizations, incorporated in the reporting systems of the country, as well as required at national level. After approval by the Government of Armenia the list will become obligatory for everybody.

The list is accompanied by a methodology on its use and serves as a main starting methodological point for relevant state bodies to prepare annual reports to National Statistical Service of Armenia.

The list of indicators contains about 400 records. The tables below present the environmental indicators associated to the three ENPI-SEIS priority themes for Armenia, namely (1) water: fresh water; (2) waste; and (3) air (emissions + climate change).

The main organizations, responsible for producing environmental indicators on water are the Ministry of Nature Protection, State Committee on Water System under the Ministry of Territorial Administration and the Armenian State Hydro-Meteorological Service under the Ministry of Emergency Situations.

Indicators produced by the Ministry of Nature Protection include water abstraction from surface and groundwater sources;

- **water use from surface and groundwater sources (CSI 18);**
- losses in water transport/transit and total losses;
- abstraction and use of water of drinking quality;
- double and cycled use of fresh water;
- **wastewater discharge and treatment (CSI 24);**
- content of pollutants in returned water;
- organic pollution of returned water;
- technical capacities of wastewater treatment plants;
- removal/utilization of the pollutants eliminated/trapped as a result of wastewater treatment, and surface water quality.

Indicators produced by ASHMS include the river flow (average, maximum and minimum river flows, flow module, flow layer);

- total evaporation from water surface;
- water level of Lake Sevan and corresponding water volume of Lake Sevan;
- water balance of the lake; and
- levels and volumes of the 4 large reservoirs.

Indicators produced by the SCWS include water abstraction for irrigation; losses in irrigation water transport/transit and total losses;

- actual irrigation water supply to consumers;
- water abstraction of drinking water;
- water losses in drinking water supply system;
- **actual use of drinking water in drinking and household purposes (CSI 18);**
- **actual use of drinking water in communal purposes (CSI 18); and**
- **actual use of drinking water in industrial purposes (CSI 18).**

All of the environmental indicators on waste generated due to operation of enterprises are produced by the Ministry of Nature Protection of Armenia. These indicators relate to generation of industrial wastes, their composition and transport; volume and contents of solid household wastes,

their removal; trans-boundary transport of hazardous wastes; waste recycle and ultimate removal; waste disposal sites.

The environmental indicators on air are produced by the Ministry of Nature Protection and the Armenian State Hydro-Meteorological Service.

Indicators produced by the Ministry of Nature Protection relate to atmospheric air pollution, climate change and ozone layer depletion, and include release of polluter into atmosphere from static sources;

- release of polluter into atmosphere from mobile sources;
- quality of urban atmospheric air; and
- trans-boundary transport of air pollutants.

Indicators produced by ASHMS include indicators relating to meteorological observations, actinometrical observations and ozonometric observations.

The above-presented environmental indicators are calculated based on summary information generated by the National Statistical Service, which performs the sectoral (including water, air and wastes) analysis of primary environmental data received from the physical entities. According to the "Law on State Statistics of the Republic of Armenia" and its appropriate by-laws and regulations, all legal and physical entities, which utilize natural resources, are obliged to submit annual reports on use of natural resources.

The forms and instruction on filling in the forms of the mentioned annual administrative statistical reports are agreed with the RA State Statistical Council and afterwards are registered by the Ministry of Justice of Armenia. The annual administrative statistical reports on water use, wastes and air pollution for a given year are to be presented both to the Ministry of Nature Protection, which in its turn presents those reports to the National Statistical Service within the timeline approved by the annual statistical program. The reporting forms are available from the NSS website.

Several internationally accepted methodologies, indices and standards were used to define the list of environmental indicators in Armenia. As an initial step, the "Armenian classification of territorial units for statistics" was developed based on the approaches and recommendations of the European Commission (EC) Regulation # 1059/2003 of the European Parliament and of the Council of 26 May 2003 "On the establishment of a common classification of territorial units for statistics (NUTS)" and methodological guidance of National Statistical Service of Denmark.

A number of international standards and methodologies are currently in use for data collection and environmental indicator calculation. In particular, it is worth to mention the following documents and reports:

- "Classification of Environmental Protection Activities (CEPA), 2000; "Экологические показатели и основанные на них оценочные доклады" R. ЕЭК ООН, Нью-Йорк и Женева, 2007г.
- "Guideline principles on presentation of emission data. UNECE. New York and Geneva, 2003".
- Inter-governmental Panel for Climate Change (IPCC) Guidelines for National Green-house Gas Inventories. Reporting Instructions. IPCC. 1996. Volumes 1-3.
- Index of economic activity types and others.

Calculation of emissions from mobile sources is carried out in accordance with OECD methodological document.

The guidance document on "Technical Implementation of State Water Cadastre", prepared in 2008 by the Ministry on Nature Protection is used for the calculation of indicators on water resources.

The guidance document on “Industrial and Domestic Wastes Generated in Armenia” prepared by the Ministry on Nature Protection in 2007 is used for calculation of indicators on wastes.

The water quality ecological norms and MACs are defined according to Government of Armenia Decision No 75 of January 27, 2011. Drinking water quality norms are defined according to the Republic of Armenia law "On Provision of Sanitary-Epidemiological Safety of Population" and Ministry of Health of the Republic of Armenia Decree No 876 of December 25, 2002 on "Drinking Water. Hygiene requirements and quality control related to centralized water supply systems". In addition, the following classification of water quality is used for reporting:

**Table 10: Classification of surface waters**

<b>Code</b>	<b>Water Quality Class</b>
110	Water suitable for drinking
111	Water not suitable for drinking
112	Drinking water received from centralized water supply system
113	Drinking water received from other water user
120	Technical water received from natural water resource
121	Technical water received from other water use
130	Water for irrigation received from natural water resource
131	Water for irrigation received from other water use
140	Wastewater flowing into open reservoir
141	Wastewater received from centralized water supply system
142	Wastewater received from other water user
150	Communal water
160	Water received during fossil extraction
170	Transitional waters (without use, treatment and discharge)

## 4. ANALYSIS OF STRENGTHS AND WEAKNESSES FOR SEIS IMPLEMENTATION

There are three factors that can facilitate introduction of SEIS in Armenia, namely (1) appropriate institutional structures; (2) existence of administrative statistical system; and (3) recent positive developments in environmental monitoring sphere.

The existence of appropriate institutional structures within the Ministry of Nature Protection of Armenia is one of the main strengths for SEIS implementation within the country. The "Information Analytical Centre" (IAC) State Non-Commercial Organization acts as a separate legal entity under the Ministry of Nature Protection and, inter alia, is responsible for development and maintenance of electronic databases and computer data warehouses on separate components of environment and natural resources. Unfortunately, at present the actual operation of IAC is limited to maintenance of the internal local area network (LAN) of the Ministry of Nature Protection.

Increase of the IAC's role in environmental information management and dissemination is a key priority for successful introduction of SEIS in Armenia. The main data warehouse of the SEIS-Armenia can be installed at the Centre's server with provision of various level of access to different stakeholders and public. If officially recognized as the main institutional unit for SEIS-Armenia, the IAC has enough technical capabilities for maintaining the huge volume of environmental information in the country, including monitoring data from the national priority areas (water, air, wastes). The establishment of an integrated data warehouse for environmental information will become the first big challenge for this organization.

Another positive development in the recent year is adoption and use of a comprehensive administrative statistical reporting system in Armenia. This also includes development of a complete list of main environmental indicators, which is consistent to one defined by UN ECE (refer to Section 3.3 of the report). The current system of administrative statistical reporting uses international standards and classification schemes, as well as ensures accessibility and inter-compatibility of national and international methodologies used in Armenia.

During the recent 5 years (2006-2010) considerable progress is made in introduction of a contemporary environmental monitoring system in Armenia. The Government of Armenia adopted the "Concept Paper on Development of State Environmental Monitoring in Armenia and 2007-2011 Action Plan". This action plan includes activities on capacity building and technical equipping of organizations involved in state monitoring of various components of the environment. Annual allocations from the state budget to the "Environmental Impact Monitoring Centre" State Non-Commercial Organization (SNCO) under the Ministry of Nature Protection are gradually increasing. However, unfortunately no biological monitoring and waste monitoring is currently being conducted by this organization.

There are a number of constraints of general nature for implementation of coordinated SEIS in Armenia, namely:

- absence of appropriate legislative framework for introduction and maintenance of shared environmental information management system (although the requirement on information collecting and provision is defined in environmental sectoral legislations, nevertheless it refers to annual administrative statistical reporting only);
- lack of information flow management among stakeholder organizations;
- lack of state programs on implementation of integrated monitoring of the state of environment.

In regards to legislative improvements, during 2011-2012 the Ministry of Nature Protection envisages drafting Framework Law on Environmental Conservation, which should also include provisions on aims, concepts, requirements and regulations for integrated environmental

monitoring and introduction of shared environmental information systems. In addition, some institutional reforms are also needed for the processes of:

- collection, analysis, assessment and provision of information on the state of environment,
- preparation and dissemination of reports and yearbooks on the state of environment,
- ensuring access to environmental information,
- sharing environmental information both within the country and at international level.

The table below summarizes advantages and shortcomings in the field of environmental information management in Armenia.

**Table 11: Summary of positive and negative aspects in the field of information management**

<i>Field</i>	<i>Positive aspects</i>	<i>Negative aspects</i>
Legislation and institutional framework	<ul style="list-style-type: none"> <li>• existence of appropriate institutional structures to host and maintain the SEIS</li> </ul>	<ul style="list-style-type: none"> <li>• not defined concepts and contents of integrated database on the state of environment;</li> <li>• not regulated mechanisms for dissemination on environmental information;</li> <li>• gaps in sectoral legislative frameworks for environmental information management</li> <li>• absence of regulations on sharing and exchange of environmental information between stakeholder organizations</li> </ul>
Technical capacities	<ul style="list-style-type: none"> <li>• capacity building and technical equipping of organizations involved in state monitoring of various components of the environment</li> </ul>	<ul style="list-style-type: none"> <li>• absence of integrated data warehouse for environmental data,</li> <li>• absence of information network between stakeholders in environmental field,</li> <li>• lack of electronic databases and digitized environmental data ,</li> <li>• lack of monitoring devices and equipment,</li> <li>• lack of permanent technical service and calibration of available monitoring equipment</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• introduction of a contemporary environmental monitoring system in Armenia</li> <li>• development of a complete list of national environmental indicators</li> </ul>	<ul style="list-style-type: none"> <li>• absence of bio-monitoring,</li> <li>• absence of a system for permanent monitoring of wastes,</li> <li>• absence of self-control by organizations (during industrial processes),</li> <li>• absence of permanent monitoring of biodiversity including forests,</li> <li>• absence of permanent monitoring of soil pollution</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>• existence of administrative statistical reporting system, which uses international standards and classification schemes</li> </ul>	<ul style="list-style-type: none"> <li>• fragmented reporting systems,</li> <li>• absence of annual reports on the state of environment including the national priority areas defined by SEIS (water, air, wastes)</li> </ul>

## 5. NEXT STEPS

For introduction and efficient management of complex environmental monitoring and shared environmental information systems in Armenia, the following assistance is recommended in the framework of ENPI–SEIS Project:

- Development and provision of a guidance/methodological document on introduction of complex environmental monitoring and shared environmental information systems, as well as on ensuring data sharing and information exchange for efficient management,
- Assistance for further development of environmental indicators for Armenia,
- Training of staff and capacity building in the field of monitoring, collection, storage, assessment, and reporting of environmental data,
- Assistance for improvement of electronic reporting system, particularly provision of methodological guidance required for development and maintenance of databases for separate components of the shared environmental information system, such as energy balance, water and water-economic balance, land and forest registries, etc.,
- Introduction and application of modelling program packages for environmental information, including collection, combination and processing of monitoring data.

Implementation of pilot projects on introduction of shared environmental information systems for particular areas in Armenia can be considered another area of potential assistance by ENPI–SEIS Project. In this regard, two areas of interest in the country are proposed, namely (1) Lake Sevan basin and (2) Debed River basin.

**(1)** Development of a shared environmental information system for Lake Sevan ecosystem will enhance decision-making capabilities regarding the largest fresh water reservoir of the Caucasus eco-region. The establishment of an integrated database will serve as a main information source for “Sevan” National Park authorities and public. The system can be developed on the basis of existing electronic database on plant and animal species. At present the database contains information on inventory of separate components of the ecosystem as well as data on distribution and status (endemic, rare, endangered, and extinct) of plants and animals recorded within the Lake Sevan basin. The database can be enhanced by adding (1) monitoring data on Lake Sevan water level and water quality; (2) atmospheric air monitoring data from meteorological stations within the basin; (3) data on waste generated within the basin; (4) spatial data and maps on distribution of rare, endemic and endangered species within the basin; and (5) annual administrative statistical summary reports on water use and discharge, air pollution, and waste available for Lake Sevan basin.

The resulting electronic tool will facilitate data exchange and data sharing within the Lake Sevan basin stakeholders and serve for more efficient decision-making process in consistency with the requirements of recently adopted “Sevan” National Park Management Plan.

**(2)** Construction of a shared environmental information system for Debed River basin can be implemented on the basis of a joint information system of Debed-Khrami trans-boundary river basin, developed in 2011 under the EU funded project “Trans-Boundary River Management Phase II for the Kura River basin - Armenia, Georgia, Azerbaijan”. The system has been constructed to accommodate all available data on water resources of Debed River basin in Armenia and Khrami River Basin in Georgia. It includes both tabular and spatial datasets. Information has been collected during preparation of river basin management plans in accordance to the methodology of EU Water Framework Directive. The system can be enhanced by incorporation of (1) atmospheric air monitoring data from meteorological stations located at Debed River the basin; (2) data on waste generated within the basin; and (3) annual administrative statistical summary reports on water use and discharge, air pollution, and wastes available for Debed River basin.



It is also important to streamline and coordinate this activity with existing SEIS developments in Georgia. The resulting information system will serve for more efficient decision-making process and will promote increased trust and regional cooperation between Armenia and Georgia.