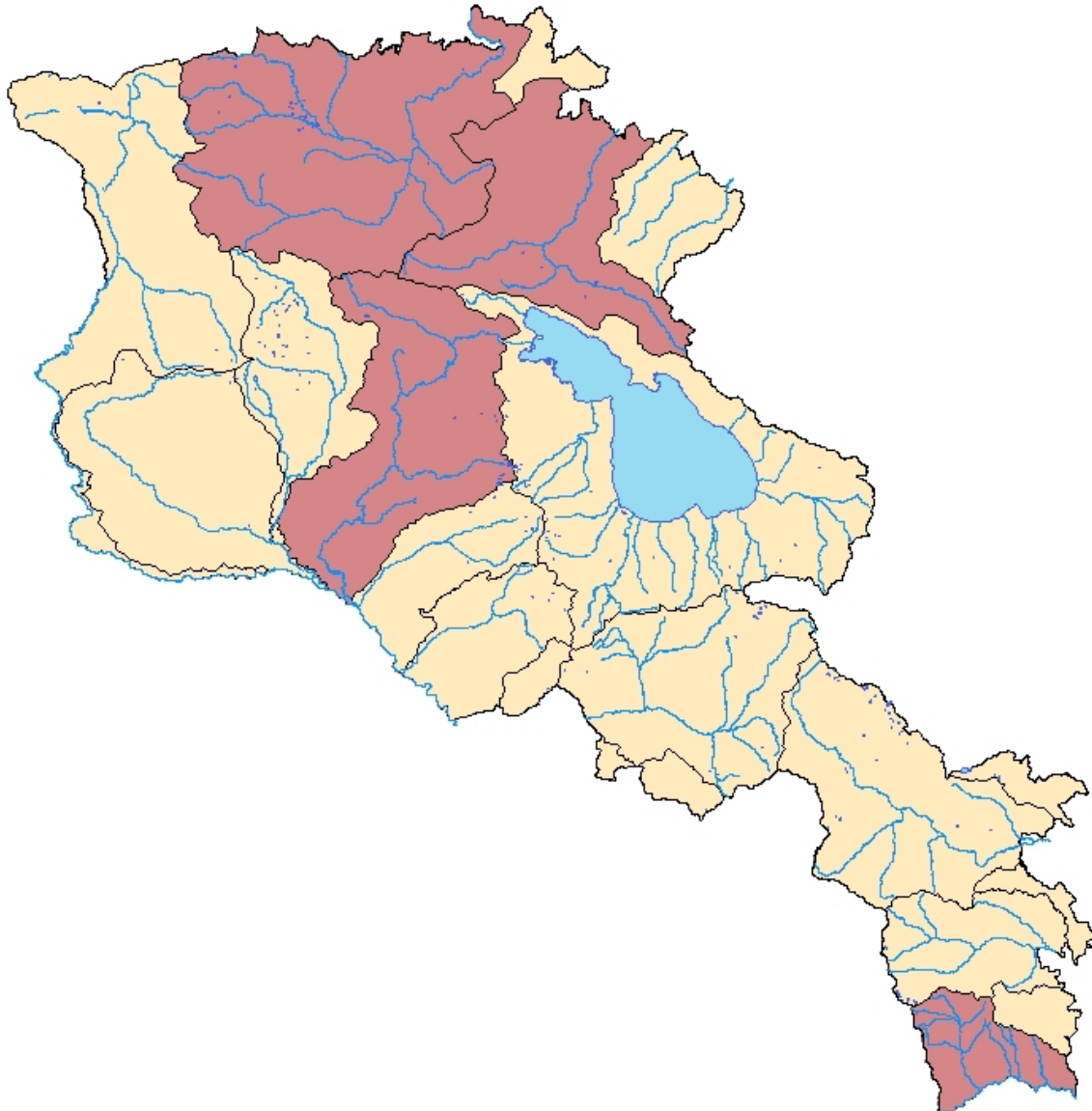


## **POLICY BRIEF**

### **SUMMARY OF RESULTS AND LESSONS LEARNED FROM THE IMPLEMENTATION OF THE ARMENIAN NPD ON IWRM**



**Prepared for:** United Nations Economic Commission for Europe in the framework of the National Policy Dialogue in Armenia

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## LIST OF ACRONYMS

ASH	Armenian State Hydro-meteorological Service
BMO	Basin Management Organization
CIS	Common Implementation Strategy
EAP	Environmental Action Program
EC	European Commission
EECCA	Eastern Europe, Caucasus and Central Asia
EIMC	Environmental Impact Monitoring Center
ENVSEC	Environment and Security Initiative
EU	European Union
EUWI	European Union Water Initiative
GEF	Global Environmental Facility
GIS	Geographic Information Systems
IFI	International financing institution
IPCC	Inter-Governmental Panel on Climate Change
IWRM	Integrated Water Resources Management
MAC	Maximum Allowable Concentrations
MDG	Millennium Development Goals
MWSS	Minimal Water Supply Standard
NATO	North-Atlantic Treaty Organization
NPD	National Policy Dialogue
O&M	Operation and maintenance
OECD	Organization for Economic Cooperation and Development
OSCE	Organization for Security and Cooperation in Europe
POM	Program of Measures
ROA	Republic of Armenia
SC	Steering Committee
SCWS	State Committee of Water System
SEI	State Environmental Inspectorate
SHAEI	State Hygiene and Anti-Epidemiological Inspectorate
SIDA	Swedish International Development Agency
SWC	State Water Cadastre
SWCIS	State Water Cadastre Information System
TACIS	Technical Assistance to the Commonwealth of Independent States
UNDP	United Nations Development Program
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USD	United States Dollars
USSR	Union of Soviet Socialist Republics
WB	World Bank
WBMA	Water Basin Management Authorities
WBR	Water Bodies at Risk
WFD	Water Framework Directive
WRMA	Water Resources Management Agency
WRMCD	Water Resources Monitoring and Cadastre Division
WSS	Water Supply and Sanitation

# INTRODUCTION

During the last ten years the Republic of Armenia has recorded significant legislative and institutional achievements in terms of water resources management and protection, the main direction of which was introduction and application of the principles of integrated water resources management (IWRM) in the country.

The success of the reforms was mainly contingent upon the policy implemented by the Armenian Government in coordination with the missions and initiatives of various international donor organizations, including the World Bank (WB), United State Agency for International Development (USAID), United Nations Development Programme (UNDP), Global Environmental Facility (GEF), European Union (EU) Technical Assistance to Commonwealth of Independent States countries (TACIS), EU Water Initiative (EUWI), United Nations Economic Commission for Europe (UNECE) and others.

Currently the water sector reforms are in the most important stage, which relates to decentralization of the water resources management functions. This will ensure more efficient integrated management of water resources at basin level for the sake of the water users and the country, as the owner of water resources.

For decentralization of the water resources management functions one of the prerequisites relates to development of river basin management plans, which will become the main governing document for the river basin management organizations. Integrated management of water resources at basin level, hence, shall be implemented according to these plans to be developed.

In the process of development of river basin management plans the role of EUWI is very critical, taking into consideration the path of Armenia, directed towards adoption of European values.

Taking into consideration that the river basin management plans are to balance the inter-linked relationship between the water users (including communities and the energy, industry, agriculture and other sectors) and the environment, a special Steering Committee for Armenia has been established under the auspices of the EUWI in order to coordinate the works towards introduction and application of IWRM principles in the country. The committee is chaired by the Water Resources Management Agency of the Ministry of Nature Protection and includes the representatives of all stakeholder ministries and governing bodies.

The Steering Committee members have direct participation in the sessions of the EUWI National Policy Dialogue (NPD), and have actively participated in development of pilot river basin management plan for Marmarik River basin, which has been developed in line with the Armenian legislation and the requirements of the EU Water Framework Directive (WFD) principles.

The role of the EUWI NPD becomes more important given the Armenia's plans to develop 6 river basin management plans in the period of 2011-2013, which afterwards will be submitted to the Government for adoption.



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# **1. ANALYSIS OF IMPLEMENTATION OF THE NPD IN IWRM IN ARMENIA**

## ***1.1. History and Challenges of Introducing IWRM Principles into Water Management in Armenia***

### **1.1.1. "First Generation" Reforms**

The "first generation" reforms in the sector of water resources management of the Republic of Armenia were initiated since 1999-2000, through the World Bank supported project "Integrated Water Resources Management" project. As a result of implementation of the project water resources of Armenia were assessed, structural reforms for water resources management were suggested, and outline of the management of water supply and demand was formulated. In addition to this, the idea of river basin management was proposed through introduction of annual and long-term planning mechanisms of water resources.

Taking into consideration the recommendations of the "Integrated Water Resources Management" project the Government of the Republic of Armenia in 2001 initiated a targeted program for improving water sector in the country, revised the legal and institutional framework in the field. All this was incorporated in Resolution No. 92 on "Concept for Water Sector Reforms in the Republic of Armenia", adopted by the Government.

### **1.1.2. Legal Reforms**

One of the most important steps in water sector reforms is the adoption of the new Water Code of Armenia on June 4, 2002. The Code contains the idea of integrated river basin planning, promotes the allocation of water resources based of supply and not demand, creates basis for establishment of the state water cadastre (SWC), obliges to issue water use permits based on available information, provides opportunities for employing economic mechanisms in the course of management of water resources.

In order to ensure the proper application of the new Water Code of Armenia, since 2002 the Government has prepared over 120 regulations and by-laws, which relate to the procedures of issuing water use permits, river basin management, transparency and public participation in decision-making process, information accessibility, establishment of the SWC, formation of water resources monitoring, management of transboundary water resources and others.

In 2005 Republic of Armenia Law on "Fundamental Provisions of the National Water Policy" was adopted, which presents a long-term development concept for strategic use and protection of water resources and water systems. Since 2005, the principles of river basin management have been applied in Armenia.

In 2006 "Law on the National Water Program of the Republic of Armenia" was adopted. The overall goal of the law is development of measures aimed at satisfying the needs of the population and economy, ensuring of ecological sustainability, formation and use of the strategic water reserve, and protection of the national water reserve.

The objectives of the law are as follows:

- Development of measures aimed at definition of the national water reserve, strategic water reserve, useable water resources and conservation and enhancement of the national water reserve, classification of water systems, development of criteria for defining the state significance water systems and definition of a list of those systems,

- Definition of maximal and minimal amounts of water use payments, including the definition of payment rates for water extraction and return and the rates of environmental fees,
- Assessment of water demand and supply,
- Development of a strategy for storage, distribution and use of water resources,
- Development of measures aimed at adoption and implementation of normative acts that would support the implementation of the National Water Program, enforcement of suggestions for emendation of those acts, and coordination of activity performed by the State government bodies,
- Definition of measures aimed at development of water standards, adjustment of ecological flow volumes and maximum permissible quantities of water withdrawn for consumption, definition of specially protected basin areas or a list of a part of them and zones of ecological emergencies and ecological disasters, prevention of negative impact on water eco-systems, improvement of water resources monitoring and pollution prevention,
- Development of descriptions of measures envisaged by the National Water Program, their scopes, responsible bodies and time frames of implementation thereof,
- Definition of financial requirements and funding sources suggested for the implementation of the National Water Program, and
- Ensuring of public awareness.

Short-term (until 2010), medium-term (2010-2015) and long-term (2015-2021) measures for implementation of the National Water Program objectives are defined in the law as well.

### 1.1.3. Institutional Reforms

Resolution No. 92 on "Concept for Water Sector Reforms in the Republic of Armenia", adopted by the Government in February 2001 clearly presented the strategy of institutional reforms of the Armenian Government in the field of water resources. Institutional framework envisaged by the Water Code of Armenia almost entirely implies from the above-mentioned Concept.

A new institutional system was introduced, according to which management of water sector is implemented by the following authorities:

1. Ministry of Nature Protection of the Republic of Armenia, and its Water Resources Management Agency, which implements management and protection of water resources,
2. State Committee on Water Systems under the Ministry of Territorial Administration of Armenia, which implements the state management of water systems,
3. Public Services Regulatory Commission of Armenia, which implements tariff policy in water sector.

Table 1: Main functions of the agencies involved in water sector management

	Management and Protection of Water Resources	Regulation of Tariffs	Management of Water Systems
Authorized Agency	Water Resources Management Agency	Public Services Regulatory Commission	State Committee on Water Systems
Main Functions	Monitoring and allocation of water resources, Strategic management and protection of water resources	Regulation of tariffs for non-competitive water supply and discharge services in drinking, household and irrigation water sectors, Protection of consumers' rights	Management of water systems under the state ownership, Support to establishment of Water Users' Associations and Unions of Water Users, arrangement of tenders on management of water systems

	Management and Protection of Water Resources	Regulation of Tariffs	Management of Water Systems
Enforcement Tools	Water use permits	Water system use permits	Management contract

In order to promote more efficient, targeted and decentralized management of water resources, 6 territorial divisions (Northern, Akhuryan, Araratian, Sevan, Hrazdan and Southern) have been established under the auspices of the Water Resources Management Agency.

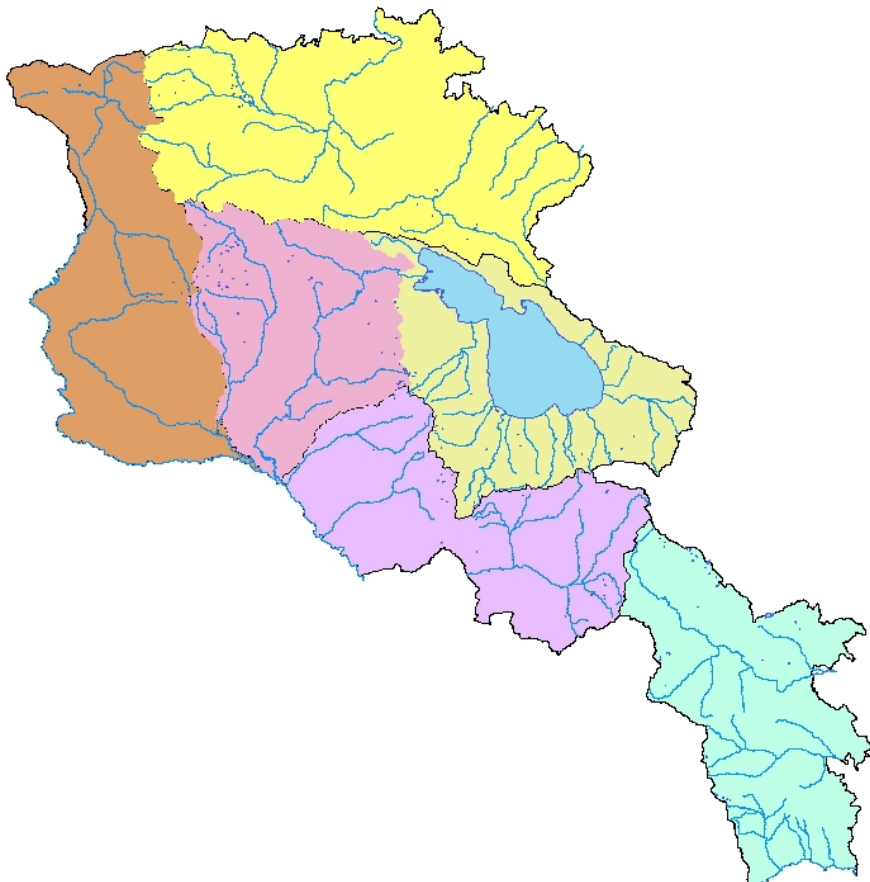


Figure 1: Water Basin Management Authorities of Armenia

Water Basin Management Authorities (WBMA) are responsible for development of river basin management plans, registration of water use permits, protection of water resources, compliance assurance of water use permits, definition of water regime, as well as development of water resources allocation plans for the six water basin management areas.

#### 1.1.4. State Water Cadastre of Armenia

Parallel to the legal and institutional reforms mentioned above the state water cadastre for Armenia has been developed, which is one of the most important supporting tools for introduction of IWRM process in Armenia. 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.



The institute of the SWC nowadays has corresponding supporting legal framework and implements the following tasks:

- Establishment of data warehouse related to water sector,
- Registration of documentations in the cadastre and provision of corresponding information,
- Formation of the tasks for water resources monitoring,
- Planning of the implementation of water resources monitoring, and inclusion of the monitoring results into the management process,
- Inventory of hydro-technical structures related to water resources, in order to increase the efficiency of water use,
- Composition of water resources balance, according to separate river basins and overall.

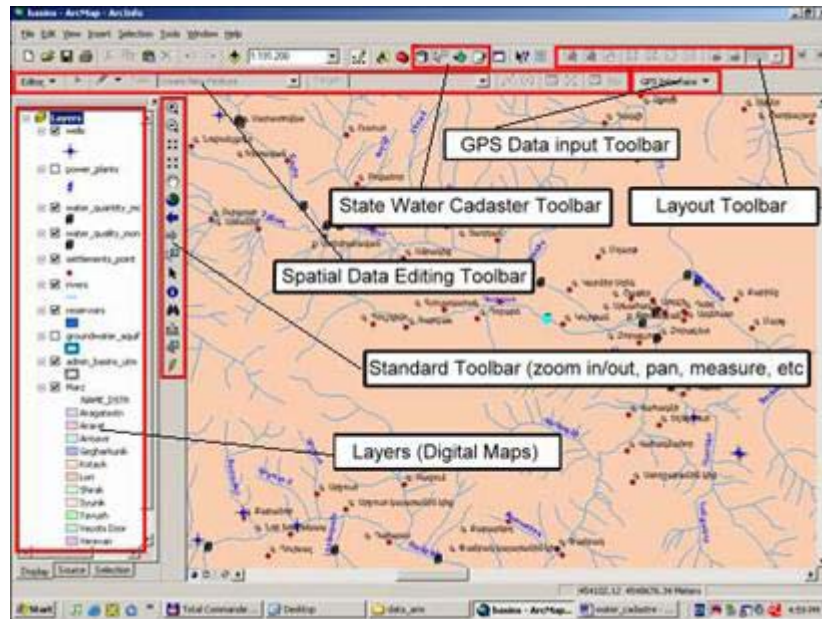


Figure 2: Combination of SWC-GIS Systems in Armenia

The State Water Cadastre Information System (SWCIS) consists of four major components. At the center of the system is the data warehouse that is operated and maintained by the Water Resources Monitoring and Cadastre Division (WRMCD) of the Water Resources Management Agency (WRMA). The Data Warehouse has two interlinked components: a tabular database and a spatial database.

As of January 2010, the following information has been inputted into the SWCIS.

Table 2: Status of Date Inputted into the State Water Cadastre

#	Database	Data populated
1	Water Use Permitting	Water use permit information from 2002 to present
2	Hydrological Databank	Water level and discharge data from 2000 to 2009. The data before 1999 are kept in MS-Excel <sup>®</sup> worksheets
3	Water Quality Monitoring	Water quality data from 1978 to present. The data before 1977 are kept in MS-Excel <sup>®</sup> worksheets
4	Groundwater Resources	Inventory data on 49 springs and 24 wells
5	Water Systems	Summary information on water systems grouped by 52 water user associations
6	Sanitary Violations	Summary information on violation from 2000 to 2009

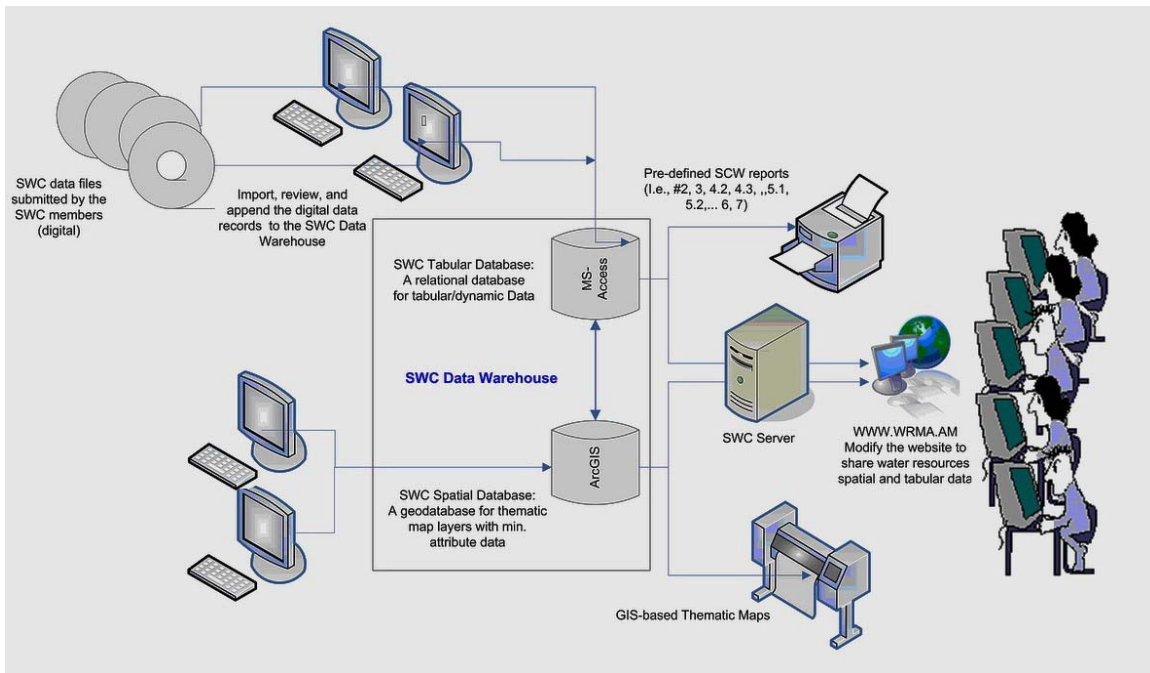


Figure 3: Hierarchy of the State Water Cadastre Information System

## 1.2. The "Second Generation" Reforms

### 1.2.1. General Observations

The development of the National Water Program in 2006 is considered as the terminal step in the "first generation" legal and institutional reforms of water sector in Armenia. Due to the above-mentioned institutional and legal reforms in the field of introduction of IWRM principles, the Republic of Armenia is one of the leaders in the field in the region.

However, implementation of the National Water Program since 2007 shows that there are several issues which the Government of Armenia needs to address in the near future. This leads to a need to implement the "second generation" reforms, based on the knowledge obtained from implementation of the National Water Program since its adoptions. These reforms relate both to legal and institutional aspects of water sector.

The legal framework in the water sector is new and dynamic, which requires significant efforts, and will face challenges as its implementation moves forward. Consistency of several legal documents is one of the areas of concern, which sometimes creates confusion in the institutional framework as well. One of the key obstacles observed is the lack of coherence and consistency among several laws, regulation, by-laws and decrees adopted by the Government or water sector agencies. Also there is a need to develop additional laws in the field of water resources.

Several agencies involved in water resources management need strengthening both in technical and institutional aspects. Agencies that are responsible for monitoring, compliance assurance and enforcement (ArmStateHydromet, Environmental Impact Monitoring Center, State Environmental Inspectorate) need considerable assistance in terms of strengthening and equipment. Several other agencies, directly under the Ministries that are in charge of various aspects of water resources management, need capacity building. Among them are the agencies involved in spatial and environmental protection planning according to IWRM principles, since there is a need for significant cooperation among the water resources, nature protection and land use planning. In addition, in the above-mentioned strengthening efforts, it is critical to mention the need for coordination and cooperation between the agencies, and particularly data and information exchange.

In the long-run, the Water Resources Management Agency and its Water Basin Management Authorities should become the authority responsible for integrated water resources management and planning in Armenia. This requires a continuous process of institutional strengthening and capacity building. WRMA should continue his role of the leading agency in charge of overall management of the water resources. However, in a long-term, some functions and tasks of WRMA should be transferred to WBMA.

### **1.2.2. State Water Cadastre**

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 six databases and SWC Data Warehouse, sharing of data among all institutions and the public has yet to be implemented. At this time, “open access of data” is not a general practice in the Government. As a result, each institute can make up their own rules to share or not to share data.

There is an urgent need to adopt and implement new procedures on data flow and information exchange among the SWC stakeholder institutions. The obligation on data provision and fines and/or disciplinary actions for violations should be clearly stated. The frequency of data exchange should be changed from annually to quarterly, so WRMA can update the SWC information on a more regular basis. The MNP needs to be more aggressive to review legal options and perhaps take statutory action against institutions and their representatives that do not submit data to the WRMCD on time or share data freely with the public.

As for the demand for data and information, a lot of specialists are not yet aware of the full potential of the SCWIS. Now WRMA is mainly using the SWCIS for organizing and printing the 34 tables of the SWC Report annually. Although ArcGIS© and water resources data are available under the SWCIS, the system remains underutilized.

Finally, in order to support decentralized data and information management, the WRMA needs to provide timely data and information from central-level to the six Basin Management Organizations (BMOs). One of the best options is to enhance the SWCIS by providing on-line interactive services so BMOs can perform ad-hoc tabular and spatial queries, and generate customized maps and reports via the WRMA website.

### **1.2.3. Permit Implementation or Administration**

While significant progress is made in Armenia in terms of setting procedures for provision of water use permits, the compliance practices in Armenia are extremely weak and fall far short of many international standards. Sampling and inspection by the State Environmental Inspectorate (SEI) is performed only once a year, for the most part, for prioritized sources and even less often for the non-prioritized sources. Shortage of vehicles, lack of mobile laboratories, lack of periodic quality assurance for the stationary laboratories of both government and industry, shortage of computer equipment, and lack of sufficient science-trained personnel are among the reasons that the inspection and sampling function is so inadequate in the water resources management sector.

With limited resources, SEI may consider closing all the labs in the country and out source the water chemical and biological analyses and to ensure independent and un-bias analysis results. This a practice used by many government agencies in other countries. Under this approach, SEI can: (1) use the Environmental Impact Monitoring Center (EIMC) and/or State Hygiene and Anti-Epidemiological Inspectorate (SHAEI) central lab in Yerevan for advanced lab work and (2) Use the SHAEI labs at each Marz center for the regional lab analyses through a cooperative agreement between the organizations. In this way, the SEI staff can target the limited financial resources toward their main tasks in compliance and enforcement.

An alarming institutional issue for the Republic of Armenia (ROA) is the role the BMOs are to play in the future with respect to permit issuance and administration, among other water management issues. The Law on National Water Program, supported by Article 11 the National Water Code, makes BMOs central actors in its integrated water management plan. While the Water Code gives BMOs fairly broad authority to “plan,” “monitor,” “protect,” “analyze,” and “control”, WRMA oversight is also explicitly provided. BMOs today have little capacity to carry out these functions, so capacity has to be developed. Thus, the question becomes:

- How best to rationalize, reconcile, or integrate the functions that the Water Code says shall be performed by the BMOs with the current authority of the existing national institutions?
- When should this process begin and when should it be in place?

These are difficult institutional questions, with a range of possible solutions. While a solution should be carefully planned, it is likely that it will be phased in stages over time so that institutional disruption can be minimized.

#### **1.2.4. Monitoring**

The performance of surface water quality monitoring has significantly improved during the last 5 years thanks to institutional and legal reforms, as well as strong support from the decision-making authorities. In the past surface water quality monitoring programs in Armenia provided policy and decision makers a large amount of raw data. However, relevant information was rather scarce. Nowadays, as water problems are growing bigger, knowledge is increasing rapidly and water issues become a higher priority on the political agenda, the time has come for a more coherent approach to developing surface water quality monitoring. It is clear, that a sufficient flow of adequate data and information must be created to support both policy and decision makers in their day-to-day activities. In the case of Armenia decision makers have to react to the changes and challenges in water management because of governance reforms, economic development, decentralization, environmental degradation, climate change, and other profound changes in society.

However in many cases, there is a lack of communication between the policy and decision makers on the one side and surface water quality monitoring experts on the other one. One of the main reasons for this is that the surface water quality monitoring program in Armenia does not study water systems at a scale relevant to decision makers. It seems very reasonable to establish a better integration of policy, decision making and monitoring within the frame of broader management systems that would include an integrated language, understandable for both parties.

As for surface water quantity monitoring, one of the major issues with ASH is lack of funding for rehabilitating field facilities and upgrading equipment at most of the observation points. With limited resources as indicated above, the following measurements and analyses have been curtailed:

- Water turbidity and solid substances,
- Snowpack,
- Flood forecast,
- Reservoirs and lakes analysis (sediments, deformations, dam stability, etc.).

Majority of the hydrological and meteorological observation posts are poorly equipped. Data collection, entry, and transfer are being manually recorded in the registers. Several 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. For the short-term, the ASH proposes the following:

- Install one automatic meteorological station at each of the 10 marz centers,
- Repair water measuring devices at the selected water gauging stations,
- Install modern water equipment at critical observation points in the major rivers,
- Measure snowpack perhaps with a modern pressure sensing pillow at 6 high mountain meteorological stations to forecast spring and summer stream flows,
- Improve databases for storing and managing hydrological, meteorological and agrological data,
- Compile, edit and publish annual water reference books in Armenian via the database functions,
- Modernize data/information exchange network to provide better data communications between the regional offices and ASH headquarters,
- Prioritize the condition of the regional/field offices and renovate them when funding made available,
- Train the technical staff on the modern technologies for hydromet services.

In addition, taking into consideration the river basin management approach, as well as recent efforts to delineate the countries' water resources into discrete water bodies, there is a need to redesign the surface water quantity network in line with the above mentioned approaches.

### **1.2.5. Groundwater**

Since the 1950s, regular observations on groundwater wells and springs have been implemented by the Hydrogeological 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 Hydrogeological Expedition, was liquidated in 1993.

The 2006 Law on NWP requires the re-establishment of a groundwater monitoring program within four years after the adoption of the law, as one of the priority measures. The law makes the MNP the responsible body for the establishment and operation of a *national reference monitoring network*, which comprises about 100 groundwater monitoring points. Such a network establishes a baseline (reference) situation to enable the determination of trends caused by human or natural impacts.

With the support of USAID Water Program the assessment of the condition of previously used groundwater monitoring points started in February 2006. In parallel, the hydrogeology of Armenia was studied, described and mapped. Subsequently, an inventory was made of the various previously used monitoring networks and their monitoring points. 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. 69 out of 73 selected springs and wells were rehabilitated with the support of the USAID Water Program in 2007-2008 and handed over to HMC, to comprise the National Reference Groundwater Monitoring Network. However, since then the actual monitoring has not started since the procedures and mechanism for conducting the groundwater monitoring are still unclear.

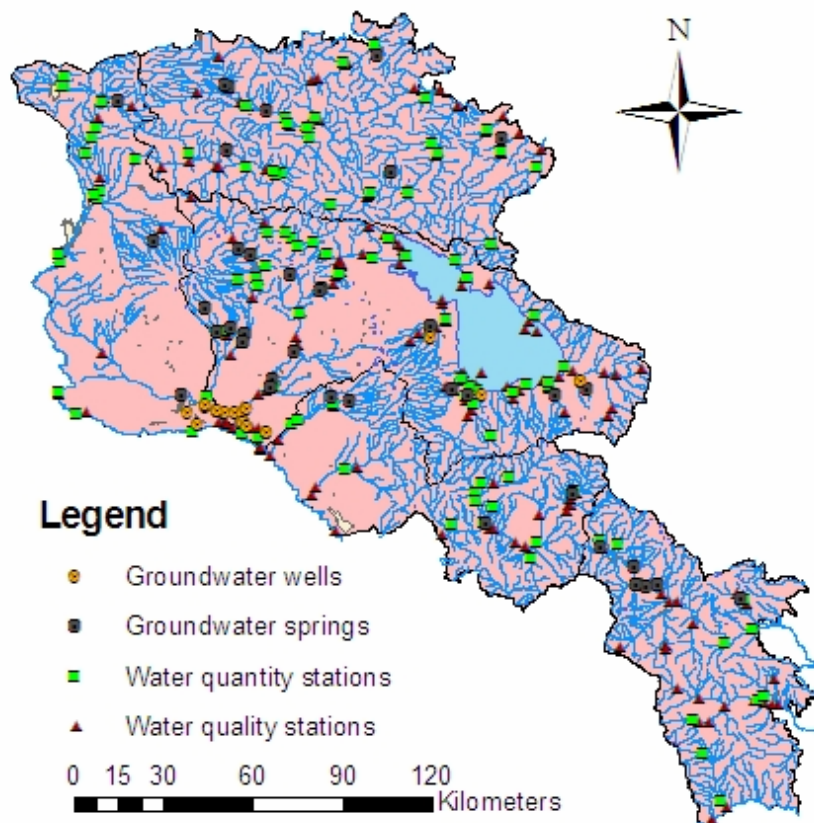


Figure 4: Surface and groundwater quantity and quality monitoring network

### 1.3. UN ECE Pilot Study in Marmarik River Basin

#### 1.3.1. Marmarik River Basin

Marmarik River Basin is located in the northern part of Kotayq Marz of the Republic of Armenia. Marmarik River Basin includes 12 settlements with more than 7,700 total population. 48.8% of total population is men, and 51.2% women.



Figure 5: Location of Marmarik River Basin in Armenia





Particular attention was paid to the analysis of water quantity and quality issues. The analysis shows that despite the fact that on annual basis the water supply satisfies the demand, however, there is a sharp water quantity deficit in irrigation season, mainly due to uneven distribution of water resources throughout the year.

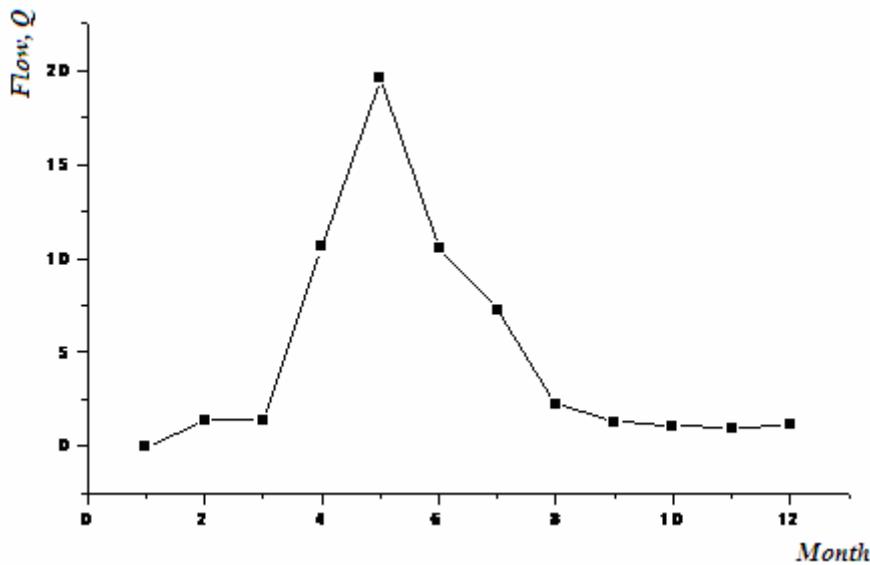


Figure 7: Breakdown of annual flow of Marmarik River in years with flow of 50% of probability of occurrences (m<sup>3</sup>/sec.)

As for water quality, the following approaches were applied in identifying the factors, possible pollution sources and nature of pollution on the chemical quality of waters of Marmarik River.

- Analysis, corresponding to the dynamics and norms of the water quality indicators concentration, was conducted. The indicators that are pollutants (for which the corresponding Maximum Allowable Concentrations (MACs) were exceeded) were separated. An analysis of possible factors of pressures was conducted taking into consideration the nature of the pollutant concentrations.
- A comparison of the chemical quality of the water of river was conducted in the downstream and upstream segments of the river, which made it possible to identify the possible factors of pressure and sources of pollution.
- An analysis was conducted on inter-relationship between the dynamics of pollutant concentrations and hydrological cycle and season, in order to identify the possible sources and nature of pollution.
- An analysis of 20-year long-term series of information (1986-2007) was conducted, in order to identify the main, stable and temporary factors of pollution of chemical quality of the river, their nature and origin.

And finally, based on the water quality analysis and classification according to various indices and coefficients, preferred water uses and functions in Marmarik River basin were identified.

Table 3: Water quality categories according to Combinatorial Index, Canadian Index, Oregon Index and Complexity Coefficient

Categories	Specific Combinatorial Water Quality Index	Canadian Water Quality Index	Oregon Water Quality Index	Complex Water Quality Index
I	<1 Good	(95-100) Excellent	(90-100) Excellent	(0-10] Good
II	(1-2] Slightly polluted	(80-94) Good	(85-89) Good	(10-40] Marginal
III	(2-4] Polluted	(65-79) Fair	(80-84) Fair	(40-100] Poor
IV	(4-11] Poor	(45-64) Marginal	(60-79) Poor	-
V	>11 Very poor	(0-44) Poor	(1-59) Very Poor	-



### 1.3.3. Desired Conditions for Water Uses and Functions in the Marmarik River Basin

As a continuation of the first phase of work and in order to proceed further with identified preferred water uses and functions, the second phase of the works was carried out in 2008 by UNECE on setting desired conditions for water uses and functions in Marmarik River basin, as well as identification of measures to achieve desired conditions.

Water quantity and quality issues identified in the basin were generalized and the inter-relationship between the water abstraction purposes and functions and issues for Marmarik River basin was set.

Table 4: The mutual linkage between the water abstraction purposes and functions and issues/problems characteristic to Marmarik River Basin

Problems*	Health Care and socio-economic situation of population	Natural functioning of ecosystem	Amateur fishing and small-scale fisheries	Tourism and recreation	Drinking-household water	Irrigation	Industry	Hydroenergy	Tendency for the coming years
Seasonal water scarcity	P		P	P		P	P	P	↑
Flooding and mudflows			P	P		P			risk
Erosion	P	P		P	P			P	↑
Origination and collection of sediments	P	P		P	P			P	risk
Salinization		P			P	P	P		risk
Reduction of Forest cover	P	P		P	P				↑
Pollution with organic substances	P	P	P	P	P				↑
Eutrophication	P	P	P	P	P	P	P		risk
Pollution with poisonous substances (metals, poisonous chemicals)	P	P	P	P	P	P			risk
<b>P</b>	<b>Existence of Problems or Risks</b>								
<b>P</b>	<b>Priority Problems</b>								
↑	These problems might become acute, particularly parallel to development of economy, if no preventive measures are taken on time.								

As a next step, 10 target directions (in terms of improvement of quantity and quality) were developed, followed by development of 41 measures (legal, institutional and technical) to achieve those targets. These measures will help to achieve the desired condition for water uses and functions in Marmarik River Basin.

The diagram below presents the logical sequence of the steps undertaken for achieving the desired water uses and water quality in Marmarik River Basin. First, desired conditions based on the detailed analysis of current issues and problems were determined, after which 10 target directions were defined. And finally, corresponding legal, institutional and technical measures were proposed to achieve desired conditions.

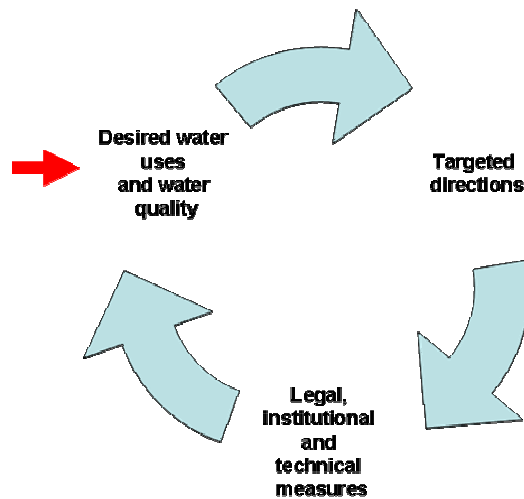


Figure 8: Logical chain of development of the measures

The entire process of setting target directions and development of measures included also public participation component. For that purpose, a questionnaire was developed, which included general information on respondents, as well as their perception on the water sector in the river basin, including suggestions and observations. The main topics covered in the questionnaire related to water-related disasters in Marmarik River Basin, water use, water quantity, water quality, as well as water resources management and public participation in decision making.

200 respondents participated in the field survey, including 170 residents of Marmarik River basin communities (representing all the communities in the basin), as well as 30 major water users, representatives of local self-governance authorities and decision makers in the basin. The results of the field survey were used to fine-tune the proposed legal, institutional and technical measures to achieve desired condition and water use in Marmarik River basin.

**FIELD TRIP QUESTIONNAIRE IN MARMARIK RIVER BASIN FOR LOCAL POPULATION**

**I. CONDITION OF WATER SECTOR IN THE RIVER BASIN**

**A. Disasters related to water resources**

A1. Indicate the main water-related disasters  
 Floods  Mudflows  Snowmelt  None  Other \_\_\_\_\_

A2. Indicate the main damage caused by water-related disasters  
 Infrastructure  Plough-lands  Gardens  Livestock  No damage  Other \_\_\_\_\_

A3. Indicate the frequency of disasters in the recent 5 years  
 Often  Sometimes  Rarely  None  Other \_\_\_\_\_

A4. If water-related disasters in the last 5 years have caused damage to your economy, indicate the approximate magnitude  
 Single damage of \_\_\_\_\_ AMD  Multiple damages of \_\_\_\_\_ AMD  Other \_\_\_\_\_  
 Difficult to answer

A5. Propose methods to cope with the above-mentioned disasters  
 Regulation of water flow  Development of flood-control structures  
 Development of water discharge systems  Other \_\_\_\_\_

**B. Water Use**

B1. Your opinion on the water use in the river basin  
 Rational  Mainly rational  Non-rational  Non-rational at all  Difficult to answer

B2. Propose an approach for rational water use  
 Installation of water-meters  Introduction of water-saving technologies  Regulation of water flow  Other \_\_\_\_\_

B3. Indicate priority water use according to you (indicate only one)  
 Drinking-household  Hydrological reserve  Recreation  Hydroenergy  Irrigation  Industry  Other \_\_\_\_\_

Figure 9: Sample Field Questionnaire

As a next step, for each of the identified legal/regulatory, institutional and technical measures, very rough cost estimate has been prepared. Basically, the cost estimate provides for an approximate level of financial input required for the implementation of the corresponding measure. Preliminary cost estimates are prepared using "expert judgment" method, as well as through consultations with major stakeholders in Marmarik River basin.

According to their preliminary budgets, the projects have been grouped into the following categories:

- I category projects require financing between 0-100,000 USD,
- II category projects require financing between 100,000-300,000 USD,
- III category projects require financing between 300,000-500,000 USD,
- IV category projects require financing between 500,000-1,000,000 USD,
- V category projects require financing of over 1 million USD.

The preliminary estimate of legal, institutional and technical measures, as well as combined description of financial requirements according to targets for achieving desired water quantity and quality conditions in Marmarik River basin is provided below.

*Table 5: Preliminary cost estimates of legal, institutional and technical measures for Marmarik River basin*

Desired conditions	Legal Measures	Institutional Measures	Technical Measures	Total
Quantity	670,000	360,000	7,400,000	8,430,000
Quality	480,000	45,000	2,800,000	3,325,000
Total	1,150,000	405,000	10,200,000	11,755,000

## **1.4. Activities of Other Donors and Projects in Marmarik River Basin**

### **1.4.1. Complex Assessment of Climate Change Impact on Water Resources of Marmarik River Basin**

This study was undertaken within the UNDP Climate Change Impact Assessment Project in 2008, and aimed at undertaking a comprehensive assessment of climate change impact on water resources of Marmarik River basin, including economic assessment of vulnerability and adaptation measures. The scope of the study encompassed the following key areas:

- Assess vulnerability of Marmarik river basin to climate change variability up to 2007,
- Elaborate projections of water sector vulnerability according to Inter-Governmental Panel on Climate Change (IPCC) scenarios for 2030, 2070 and 2100,
- Identify and describe water sector vulnerability of Marmarik river basin to climate change and the impact of vulnerability on the basin's water current users and water use development perspectives, accounting for the major priorities,
- Accounting for the projected vulnerability of water sector, identify possible conflict of interest between major water users (drinking water, melioration, hydro-energy, recreation etc.),
- Assess water users' and financial-economic losses in water sector due to climate change,
- Elaborate recommendations on adaptation to climate change, providing their economic assessment under the following classification: (a) no regret, (b) low cost, (c) economically feasible, and (d) long term prospective measures.

As a result of the study, a comprehensive analytical report was prepared, which among other items, also included a detailed review of existing research and available data on hydrology of the river basin and climate change impact on the water resources, description of the vulnerability assessment methodology, including economic valuation, situation analysis with regard to economic impacts of climate change on priority sectors/users, review of adaptation options costs through

ranging them (no regret, no cost, low cost, etc.) and adaptation measures recommended for inclusion in the policies and business practices of river basin management.

The results of the regression analysis and downscaling of regional models show that the projected climate change (IPCC A2<sup>1</sup> scenario) will result in significant decline of river flow in Marmarik basin.

Table 6: Assessment of annual water flow vulnerability in Marmarik river basin for 2030, 2070 and 2100

River-Observation point	Scenarios	Flow, million m <sup>3</sup>	Change of flow		Timeline
			Million m <sup>3</sup>	%	
Marmarik-Aghavnadzor	Baseline <sup>2</sup>	152.05			2030
	T+1.4, 0.91Q <sup>3</sup>	117.87	-34.18	-22.5	2070
	T+3.2, 0.82Q	77.65	-74.40	-48.9	2100
	T+5.0, 0.75Q	40.35	-113.70	-73.5	
Marmarik-Hanqavan	Baseline	53.43			2030
	T+1.4, 0.91Q	44.94	-8.49	-15.9	2070
	T+3.2, 0.82Q	34.88	-18.54	-34.7	2100
	T+5.0, 0.75Q	25.51	-27.92	-52.3	
Gomur-Meghradzor	Baseline	49.12			2030
	T+1.4, 0.91Q	38.64	-9.48	-19.3	2070
	T+3.2, 0.82Q	28.94	-20.18	-41.1	2100
	T+5.0, 0.75Q	19.29	-29.73	-60.5	

Even until 2030 the river flow is projected to decline more than 20% in various sections of the basin, unless urgent adaptation measures are proposed. Thus, the study proposed several adaptation measures, which include, but are note limited to rational use of water resources, regulation of river flow, introduction of water saving and water efficient technologies and other measures.

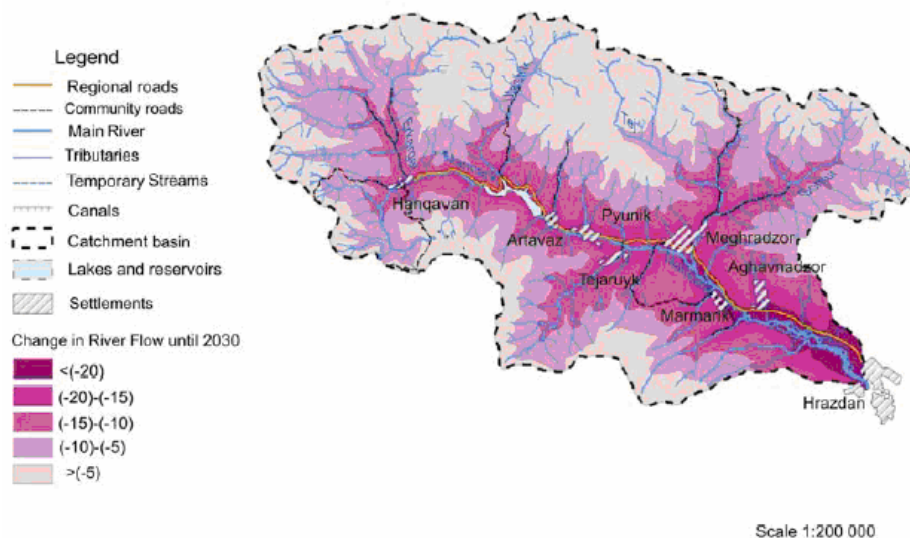


Figure 10: Projected Changes of the Actual Flow of Marmarik River in 2030

### 1.4.2. Financial Dimension of Water Resources Management in the Marmarik River Basin

With the request of WRMA, the Organization for Economic Cooperation and Development (OECD) financed a study to assess the financial dimensions of the water resources management in

1) If business-as-usual greenhouse gas emissions continue worldwide over the next century

2) 1961-1990.

3) Q is the change in average annual precipitation in the relevant river basin or basins. A number less than one preceding Q indicates a decrease in precipitation (e.g., 0.75Q is a 25 percent decrease in precipitation) while a number greater than 1 indicates an increase in precipitation (e.g., 1.25Q is a 25 percent increase in precipitation).

Marmarik River basin given the set of legal, institutional and technical measures, prepared within the UNECE study in the basin in 2008-2009.

The objective of this study was to carry out an analysis of water resources financing based on the technical report prepared for the Marmarik river basin in the framework of the National Policy Dialogue in Armenia and to prepare a report with a focus on improving the role of economic incentives to reduce demand, promote wise water use, enable cost recovery to rehabilitate distribution networks and reduce operation and maintenance costs.

This study focused on the Marmarik River basin in Armenia and looked into some of the measures that can help to generate financial resources required to operate and maintain existing water infrastructure, implement new investments and cover governance costs. The work involved preparation of a report to structure the topic, covering the financial-economic analysis (funding requirement vs. actual funding) and assessment of the financial affordability of measures. The report also identified the needs for further work and ideas for the type of assistance that would be needed to effectively support water authorities in overcoming this problem.

Within the OECD study an assessment of water related costs according to key sectors in Marmarik River basin was conducted: irrigation, domestic water supply and sanitation, industrial water use, hydropower, fisheries, as well as overall governance costs. The assessment included analysis of the baseline scenario, as well as estimation of the costs of operation and maintenance of the existing water infrastructure in all relevant sub-sectors, as well as capital costs of ongoing or planned investments.

The report further analyzed the improvement scenario through implementation of a number of technical, regulatory and institutional measures to improve water availability and quality in Marmarik River basin, and identified the financial gaps in water sector in Marmarik River basin in terms of gaps in capital costs and operation and maintenance (O&M) costs. Possibilities of cash flows from tariffs, state budget expenditures, subsidies and donor financing are discussed, and based on that financial gap in financing water sector was presented in structural form.

Finally, the gap discussion included identification of the gap and the need to close the gap, distribution of costs across economic actors, identification of benefits across economic actors and the potential to increase funding from different sources against the reality of affordability constraints.

OECD study in 2009 showed that there is a huge gap in financing the proposed legal, institutional and technical measures in the basin. Given the extent of the financial gap estimated in the report "Financial Dimension of Water Resources Management in the Marmarik River Basin", it was considered unrealistic to find enough resources from alternative sources to cover the deficit in the Marmarik River basin under the improvement scenario. Thus, the legal/regulatory, institutional and technical measures proposed for implementation in the basin were reviewed, prioritized and reduced to the extent possible, without compromising the possibility to achieve desired water quantity and quality conditions in the basin, set within the EU NPD studies conducted in 2007-2008.

Thus, in 2010 a follow-up study was conducted, within the framework of which a brief analytical note "Development Scenarios in Water Resources Management in Marmarik River Basin" was prepared. The objective of this brief analytical note was to conduct an analysis of the development scenarios regarding water resources management in the Marmarik river basin and describe results of the analysis with a focus on improving the role of economic incentives to reduce water demand and promote wise water use given the forecast of economic growth in the river basin over next 20 years. The analysis identified and collected relevant information on the forecasted economic growth in the basin, produced water demand forecast and identified technical measures needed to promote wise water use in the basin. The work also has set realistic technical targets and identifies potential sources of financing to achieve the targets. Finally, realistic policy measures were developed to bridge the financing gap in development scenarios through integrated of two environmental programs: (i) *the regulation of the use and abstraction of water through the permit system and its corresponding compliance provisions*, and (ii) *the existing assessment of environmental fees on effluents and water use*.

## 2. BOXES - INFORMATION ON OTHER PROJECTS IN ARMENIA THAT CONTRIBUTE TO THE POLICY RECOMMENDATIONS

### 2.1. Model Guidelines for River Basin Management Planning in Armenia - Meghriget River Basin

Within the USAID Program for Institutional and Regulatory Strengthening of Water Management in Armenia model guidelines for river basin management planning were prepared in 2006-2008 and tested for Meghriget River basin.

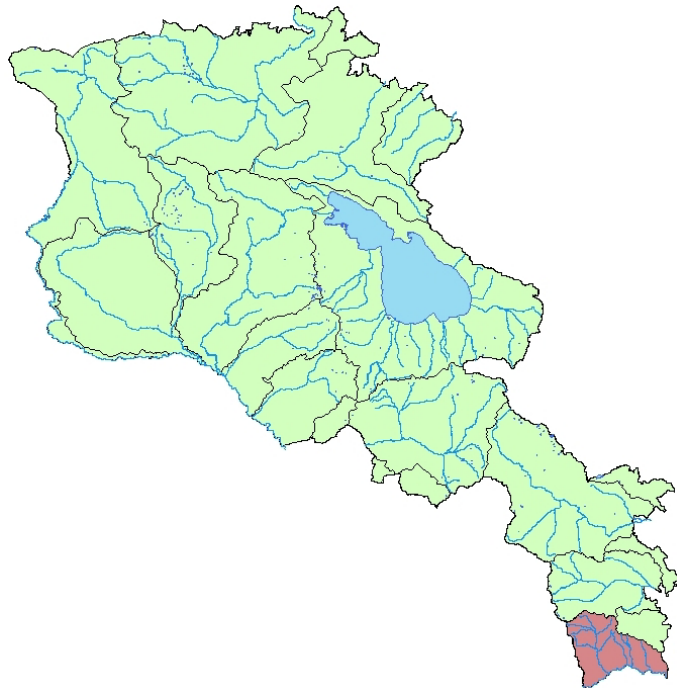


Figure 11: Location of Meghriget River Basin

These guidelines have been prepared to assist Armenia's Water Resources Management Agency in launching a national program of river basin planning in coordination with its Basin Management Organizations. The Water Code of Armenia requires the WRMA to prepare river basin plans to assure the long-term sustainable use of Armenia's water resources. These plans are meant to support adaptive management of water resources; in other words they set certain environmental objectives, but they allow flexibility in the future use of water resources. Their purpose is to assess current conditions of water resources, propose objectives which protect human health and aquatic ecosystems, develop programs to improve waters which do not meet objectives, and allow for the sustainable use of water resources by current users while providing clear guidance for future water use in responsible economic development.

The primary conceptual basis for the approach to river basin planning is the European Communities' Water Framework Directive. Armenia is not a member of the European Community, but it would like to make its water resources management programs compatible with European Community approaches. Therefore, the USAID model guideline is a document drawn heavily on the concepts of the WFD. At the same time it also modifies the European Commission (EC) approach, to be more compatible with Armenian reality.

The approach to river basin planning in these guidelines is based on IWRM concepts. Specifically, this approach integrates water quality and water quantity concerns, integrates surface water planning with ground water planning, integrates all water uses including ecosystem uses, integrates various distinct measures into the range of solutions considered (e.g., policy, education, and infrastructure), and integrates all the stakeholders into the planning process. Stakeholders



include national agencies, local governments, private industry, non-profit groups, water user groups and the general public.

The document visualizes a ten-step process of developing and implementing river basin plans. The first four steps are: 1) characterization of the river basin, 2) classification of water bodies, 3) setting environmental objectives, and 4) development of a pressure/impacts analysis and a proposed set of measures. These four steps are detailed and analytical, with specific techniques proposed, and illustrated with examples from the Meghriget River in southern Armenia. Step 5, evaluation of measures, is detailed but there is no illustration, as the Meghriget river basin work has not reached that stage yet. Steps six through ten are administrative and do not include illustrated examples: 6) Formulation of the river basin plan; 7) development of actions plans; 8) approval of the river basin plan; 9) updating the river basin plan, and 10) implementation schedules. A river basin characterization synthesis report and a draft river basin plan for the Meghriget are included as examples of intermediate products.

## **2.2. Development of Draft River Basin Management Plans for Aghstev and Debed River Basins**

The EU Project "Transboundary River Management Phase II for the Kura River basin - Armenian, Georgia, Azerbaijan" started in 2008 and aims to support development of a common monitoring and information management systems to improve transboundary cooperation in the Kura River basin and enhance capacities of environmental authorities and monitoring establishments engaged in long-term integrated water resources management in the Kura River basin. One of the main components of the project includes preparation of draft river basin management plans, including tentative program of measures, for the selected pilot river basin in each project country using the EU WFD methodology. Two of the selected pilot basins, Debed and Aghstev basins, are located in Armenia.

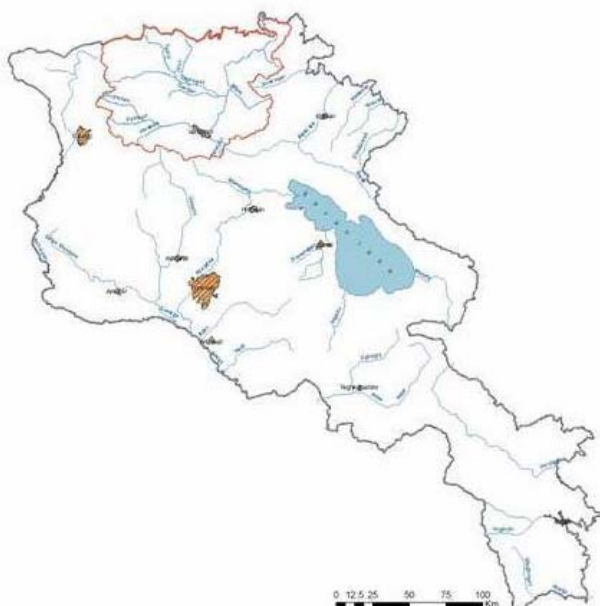


Figure 12: Location of Debed River Basin in Armenia Figure 13: Location of Aghstev River Basin in Armenia

Thus the pilot project on development of river basin management plans is elaborated according to methodology of Water Framework Directive, since in European Union the Water Framework Directive is the main piece of legislation for assessing of water resources based upon the river basin principle and it is mandatory to develop river basin plans in line with the requirements of the Directive for the EU member states.

The core of the pilot river basin management plan is the actions needed to comply with a natural and diverse plant and animal life – “good status” in the WFD terminology. These actions are called the Program of Measures (POM). As a basis for setting up the POM the situation in the basin and the human impact on the rivers has to be analysed.

So the present knowledge on general physical-geographical situation and human activities of Debed and Aghstev River basins, also water, plant, land use, present knowledge of river flow, quality of surface water was collected.

A central step in the work is linking the human activities with their impact on the water ecosystem (the pressure-impact analysis in the WFD terminology). The pressure-impact analysis has to be site specific, resulting in identification of the specific problems and their causes (Water Bodies at Risk – WBR- in the WFD terminology). For each WBR a POM has to be elaborated, meaning that the POM is both site and pressure specific. The information provided in the reports is illustrated with corresponding graphics, maps and schedules.

The aim of these draft pilot basin River Basin Management Plans is to give the authorities responsible for water management, the administration, the politicians of Debed and Aghstev basins and the public in general an understanding of the advantages and disadvantages of the WFD methodology.

As the purpose of the reports is to pilot the WFD approach for setting up River Basin Management Plans, the project has used the advice given by EU water directors in relation to the characterisation of river basins in line with the WFD: “Lack of data is not an excuse, demonstrate that you tried”. Gaps in the present knowledge are identified during the drafting of the report and recommendations made for filling them has been made.

The gaps in the knowledge needed to elaborate river basin management plans in line with the WFD methodology include limited “expertise infrastructure”, a fragmented way of analysing technical issues (where the WFD requires integration), gaps in the knowledge of the human activities impacting water quality and quantity plus a limited number of monitoring stations giving information on the actual water quality and quantity.

### ***2.3. Assessment of Vulnerability of Water Resources of the Republic of Armenia due to Climate Change***

Within the UNDP/GEF "Enabling Activities for the Preparation of Armenia's Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC)" project an analytical study was conducted in 2008-2009, which provided for an assessment of vulnerability of water resources of Armenia due to climate change. The overall objective of the analytical work was to assess the vulnerability of the Armenia's water resources to global climate change up to 2006, as well as forecast the vulnerability of the water sector in 2030, 2070 and 2100 according to the scenarios developed by the IPCC. Based on this a comprehensive report was prepared and submitted to water resources management authorities in Armenia with the purpose to consider the findings of the assessment in preparation of river basin management plans.

Apart from the assessment of vulnerability the report also include proposed adaptation measures for water sector of Armenia. Taking into consideration the expected vulnerability, the possible conflicts between major water users (drinking, irrigation, hydropower, industry and others) is identified as well.

Thus, the assessment included the following components of the Armenian water sector:

- changes in the water sector legislation, institutional framework, strategy and policies in the period of 1991-2006,



- projects and programs implemented by the state budget, international financing institutions and donors in the water sector until 2006,
- criteria and methodology for assessment of vulnerability of water resources due to climate change,
- changes in the river flow, snow cover, and hydrological extremes until 2006,
- vulnerability of Armenia's water sector in 2030, 2070 and 2100 according to different scenarios,
- vulnerability of the Lake Sevan water balance and vulnerability of the river flow,
- areas most vulnerable to water scarcity and uneven seasonal distribution until 2006, as well as forecasts for 2030, 2070 and 2100,
- taking into consideration the results of vulnerability assessment, definition of criteria for development of corresponding adaptation measures, as well as identification of possible conflicts between the various water use sectors (drinking, irrigation, hydropower, industry, recreation and others).

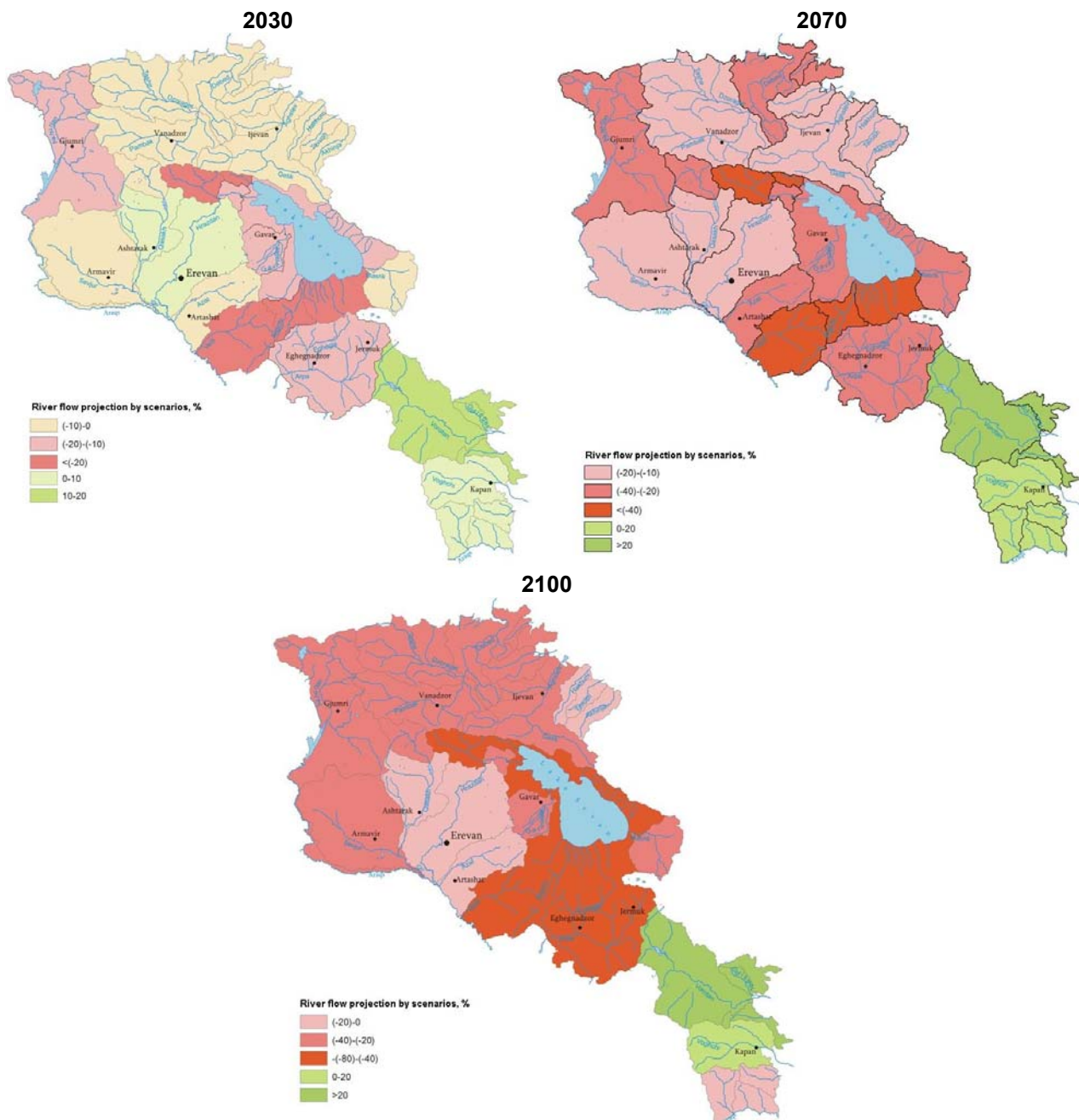


Figure 14: Forecasted Vulnerability of Armenia's River Flow due to Climate Change

Thus, in the Armenia's Second National Communication to UNFCCC the following climate change adaptation measures are proposed for water sector:

#### *Accurate assessment of water reserve*

- Refurbishment of hydrological observation points with modern equipment (preferably automatic recording equipment) in order to improve the reliability of measurement and data management processes;
- Optimizing the network of hydrological observation stations, taking into account the principles of river basin management and the decision makers' need for data;
- Resuming the measurements and monitoring of mudflows, water reserve in the snow and other characteristics of the snow;
- Resume the monitoring of groundwater, in order to obtain up to date data, as well as assess their vulnerability to climate change;
- Preparation of a new reference book for water resources, where the impacts of economic activity and global climate change on water bodies in recent years will be taken into account;
- Preparation of water balance and water-economic balance for individual river basins, and preparation of hydrological maps based on the results, where all the main hydrological characteristics of water bodies in the country will be presented;
- Detailed studies for developing a modern methodology for calculating the natural flows based on the actual flow data, which will allow for accurate assessment of the volume of water return after use for drinking-household, irrigation and industrial purposes.

#### *Legal-organizational measures*

- Developing regulations for long-term planning of water resources use, considering the climate change impact of water demand;
- In order to reduce losses due to leakages in drinking water supply and irrigation systems, develop legal, economic and administrative incentives;
- Initiate legislative changes contributing to the introduction of water saving technologies.

#### *Institutional measures*

- Strengthening monitoring, management and compliance assurance organizations; training of staffs in collection and management of hydro-meteorological data, forecasts, monitoring, compliance assurance and control of permit conditions for water users, building the capacity of water users associations in order to improve irrigation systems and irrigation culture;
- Initiate investigation/studies to identify the relevant methods and tools for mitigating the vulnerability of water resources in Armenia.

#### *Technological measures*

- Regulation of river flows, including enlargement of volumes of current water reservoirs or building new ones;
- Reducing losses due to leakages in drinking and irrigation water supply systems;
- Application of advanced irrigation methods in agriculture (drip-subsurface irrigation, pivot irrigation, sprinkler irrigation, drip pipe irrigation, mole irrigation).

## **2.4. Transboundary Cooperation**

Armenia entirely lies within the Kura-Aras River basin and a number of bilateral treaties with the basin countries bind Armenia with respect to the development and use of international waters.



Figure 15: Location of Armenia in Kura-Aras River Basin

Though most of the treaties were adopted by the former Soviet Union, Armenia, considers itself to be successor state of the Union and is thus bound by them. These treaties are:

- The convention of 1927 between the Union of Soviet Socialist Republics (USSR) and Turkey on the Regulation of the Use of Trans-boundary Waters. Under this convention the waters of the Boundary Rivers are shared 50/50 between the parties.
- The convention between the USSR and Turkey on the Utilization of Trans-boundary Streams signed on April 8, 1927, which included several provisions for the protection of water quality.
- The agreement of 1957 between the USSR and Iran on Establishing the Regime on the Soviet-Iran Border and the Procedure of Settlement of Boundary Disputes and Incidents. Under this agreement the parties would take the responsibility to preserve the boundary waters in due condition of purity, protect the resources against pollution and exchange information on a regular basis.
- The agreement of 1957 between Iran and the USSR on the Joint Utilization of Trans-boundary Waters of the River Araks for Irrigation and Power Generation Purposes. Under this agreement the waters and energy resources of the Araks River are shared 50/50 between the parties.

Before the break-up of the Soviet Union, water issues within the Union were dealt with centrally through decisions adopted amongst ministers of the states. Accordingly, agreements were made between Armenia and Georgia on the use of the Debed River and between Armenia and Azerbaijan on the use of the Arpa, Vorotan, Aghstev and Tavoush rivers. These decisions and agreements have generally been accepted by the former Soviet States and honored in practice.

Since 2000 several donor funded projects have been implemented in Kura-Aras basin in the field of water management. The main purpose of the regional transboundary projects has been extension of cooperation among the riparian states, including increased dialogue at technical level. Such efforts resulted in improved exchange of water quantity and quality information to the extent possible, which in long-term will result in more efficient management of water resources in the Kura-Araks basin. From political perspective, the regional projects aimed at establishing peace and stability in the regional through increased cooperation between the countries.

The total budget of all regional water projects implemented since 2000 amounts to almost over 25 million United States Dollars (USD). Through these projects several hydrological posts and water quality laboratories were rehabilitated, computer and monitoring equipment were provided, numerous training courses were conducted, technical capacities for integrated river basin planning and management were increased, bi-lateral demonstration projects were prepared, and role of public participation in decision-making process was increased.

Of particular importance are the UNDP/GEF Reducing Transboundary Degradation in the Kura-Aras River Basin Project (2005-2007) with the support of which a Protocol on Joint Monitoring of the Quality of River Araks between Armenia and Iran was signed and is being successfully implemented since 2006 and the EU Kura River Phase II Project (2008-2011) within the auspices of which since 2009 joint monitoring of water quality in transboundary rivers in Armenia, Georgia and Azerbaijan is being successfully implemented. As a result, mutual trust between the neighbors was increased, at the same time bringing significant social and economic improvements for local communities. Building on the success of the mentioned two projects, UNDP/ENVSEC "Fostering Dialogue between Riparian States for Development and Establishment of Initial Legal and Institutional Frameworks for Increased Cooperation and Joint Management of the Kura-Aras River Basin" project (2010-2011) is supporting dialogs of the Armenian and Georgian experts in joint monitoring of transboundary rivers, as a result of which, it is expected that by June 2011 an agreement will be signed between the relevant agencies of the two countries on conducting joint monitoring of surface water quality in the transboundary river basin Khrami-Debed.

**Table 7: Summary of Regional Water Projects in the Kura-Aras River Basin**

Project Title	Period	Donor	Main Directions
Water Management in the South Caucasus (Armenia, Azerbaijan, Georgia)	2000-2004	USAID	<ul style="list-style-type: none"> <li>▪ Monitoring, data exchange, training</li> <li>▪ Integrated river basin planning at pilot bi-lateral basins</li> <li>▪ Legal and institutional framework for water sector management</li> </ul>
Joint River Management – Kura Basin (Arm, Az, Geo)	2002-2003	EU TACIS	<ul style="list-style-type: none"> <li>▪ Water quality monitoring network</li> <li>▪ Quality control of analysis</li> <li>▪ Promotion of transboundary cooperation</li> </ul>
Development of Transboundary Cooperation for Hazard Prevention in Kura-Aras Basin	2003-2006	German Ministry of Env.	<ul style="list-style-type: none"> <li>▪ Development of early warning model</li> <li>▪ Development of system for preventing industrial accidents</li> <li>▪ Management of water resources in the South Caucasus</li> </ul>
Joint River Monitoring (Arm, Az, Geo)	2004-2007	NATO/O SCE	<ul style="list-style-type: none"> <li>▪ Transboundary cooperation,</li> <li>▪ Monitoring of water quantity and quality,</li> <li>▪ data exchange</li> </ul>
Reducing Transboundary Degradation in Kura-Aras Basin (Arm, Az, Geo)	2004-2005	SIDA	<ul style="list-style-type: none"> <li>▪ Promotion of sustainable water resources management</li> <li>▪ Assessment of institutional needs</li> <li>▪ Assessment of technical needs of IRBM and planning</li> </ul>
Reducing Transboundary Degradation in Kura-Aras Basin (Arm, Az, Geo, Iran)	2005-2007	GEF	<ul style="list-style-type: none"> <li>▪ Promotion to cooperation</li> <li>▪ Integrated river basin planning</li> <li>▪ Improvements of water quantity/quality at specific river sections</li> <li>▪ Promotion of reforms in economic sectors causing transboundary degradation</li> </ul>
Transboundary Integrated Water Resources Management (Arm, Az, Geo)	2005-2008	USAID	<ul style="list-style-type: none"> <li>▪ Improvement of institutional framework for transboundary basin management</li> <li>▪ Development of scientific potential for data management</li> <li>▪ Increasing the role of public participation</li> <li>▪ Promotion of cooperation</li> </ul>
Water Governance in the Western EECCA Countries (Armenia, Azerbaijan, Georgia, Ukraine, Moldova, Belarus)	2008-2010	EU	<ul style="list-style-type: none"> <li>▪ Inter-state collaboration on IWRM</li> <li>▪ Quality status of water bodies and the emission limit values</li> <li>▪ Practical implementation of the standards and norms</li> <li>▪ Effective operational procedures for water quality and quantity management</li> </ul>

Project Title	Period	Donor	Main Directions
Transboundary River Management Phase II for the Kura River Basin - Armenia, Azerbaijan, Georgia	2008-2011	EU	<ul style="list-style-type: none"> <li>▪ Assessment and surveys</li> <li>▪ Monitoring</li> <li>▪ Information Management</li> <li>▪ Institutional Capacity and Training</li> <li>▪ Public Engagement and Civil Society</li> </ul>
Fostering Dialogue between Riparian States for Development and Establishment of Initial Legal and Institutional Frameworks for Increased Cooperation and Joint Management of the Kura-Aras River Basin	2010-2011	UNDP/ENVSEC	<ul style="list-style-type: none"> <li>▪ Comparative analysis of the EU WFD approaches and RA water sector legislation</li> <li>▪ Analysis of existing transboundary water quality monitoring schemes of Armenia and development of recommendations on possible replication in other basins</li> <li>▪ Support the dialogue between Armenian and Georgian experts on transboundary water management</li> </ul>

## 3. LESSONS LEARNED FROM IMPLEMENTATION OF THE NPD IN ARMENIA

### 3.1. NPD in Armenia

As one of the EECCA country (Eastern Europe, Caucasus and Central Asia), Armenia is included in one of the four regional components of the EUWI. The regional working group for EECCA is:

- Open to representatives from member states, partner countries and other interested organizations,
- Responsible for implementing the EUWI mission objectives,
- Designs work plans and monitoring indicators.

Like in other countries of EECCA region, in Armenia EUWI works for the following:

- *Stronger political commitment*: “to reinforce political commitment towards action and innovation oriented partnership”.
- *Better water governance*: “to promote better water governance, capacity building and awareness”.
- *Better water management*: “to improve efficiency and effectiveness of water management through dialogue and coordination”.
- *More cooperation on river basins*: “to strengthen cooperation through promoting river basin approaches in national & transboundary waters”.
- *More sustainable financing*: “to identify additional financial resources and mechanisms to ensure sustainable financing”.

Thus, in April 2004 Armenia sent a letter to the European Union, stressing its interest in starting a process of the National Policy Dialogue (NPD) in water sector and asked the European Commission to support that initiative. The main purpose of the dialogue is to improve the use of water resources and provide for sustainable investment in implementing the Millennium Development Goals. Particularly, within the framework of the NPD it was envisaged to develop a financing strategy for rural water supply and discharge, taking into consideration the Millennium Development Goals, as well as promote the introduction of the integrated water resources management principles, according to the approach of the EU Water Framework Directive.

Thus, the NPD process in Armenia can be divided into two main directions:

- In 2006-2008 the focus was on financing rural water supply and sanitation,
- In 2008-2010 the focus has been on promoting introduction of IWRM principles in Armenia.

### 3.2. Water Supply and Sanitation

In 2006-2008 the National Policy Dialogue Activities in Armenia focused on financing rural water supply and sanitation. Thus, within the National Policy Dialogue on Financing Rural Water Supply and Sanitation (WSS) in Armenia a comprehensive policy document was prepared. It discussed possible Armenia-specific interpretations of the Millennium Development Goals (MDGs) for rural WSS, integrating the MDGs with so called “*minimal water supply standard*” which is under discussion, and might be eventually introduced in Armenia.

The project was been commissioned by the EC in support to the Working group of the EECCA component of the EUWI, and managed by EC jointly with the OECD/Environmental Action Program (EAP) Task Force. The project was executed in parallel with an OECD/EAP Task Force project to develop methodological guidelines for financing strategies for rural WSS. The State

Committee of Water System (SCWS) was the main beneficiary of the project, aiming at developing a financing strategy for rural WSS (supplementary to the financing strategy for urban WSS, developed a few years ago). The project was executed in the period of January 2006-March 2008.

The objective of the study was to help develop a financing strategy for rural WSS in Armenia by facilitating the NPD on that subject. The key challenges were to set up realistic targets and a policy package that covers both improvement of the rural WSS infrastructure (more reliable supply, renovation of supply, extensions of WSS systems, starting to develop sanitation standards for rural settlements) and the financing thereof (introducing user charges in places where the did not, allocating sufficient budgetary resources, acquiring international loans and grants, creating financial facilities for people that cannot afford to pay).

The National Policy Dialogue on Financing Strategy for rural Water Supply and Sanitation was organized by a Steering Committee (SC) comprising of all key Armenian and international stakeholders and chaired by the SCWS. Regular and extended SC meetings provided a platform for the dialogue, while the OECD/EAP Task Force secretariat and the consultant selected by the EC provided analytical input and facilitated the dialogue.

Armenia is aiming at achieving more ambitious targets than those set up by the official UN definitions of the MDGs on WSS. To establish such targets (more ambitious in all aspects), the SCWS suggested to develop a Minimal Water Supply Standard (MWSS). Several options for/definitions of the MWSS were suggested and simulated by the consultant. The preferred, technically and financially feasible definition of the MWSS, agreed upon by the SC was as follows: at least 50 liter/capity/day, at a distance from the tap to the dwelling of no more than 100 meters, regularity (for piped water supply – at least 8 hours per day) and water quality (biological, chemical, etc.).

The overall conclusion was that although the financial challenges are large, and presently financial resources are short, there is sufficient potential in Armenia to implement one of the two policy scenarios, without much “pain” for the poorest part of the population or a too heavy burden on the public budget. With the safeguarded loans and budget for rural WSS, already a large part of the financing gap can be covered, the affordability analysis showed that even under less favorable economic developments, the POLICY scenario would be affordable. So, overall, the implementation of the financing strategy based on the POLICY scenario would be more an institutional and organizational challenge than a financial challenge.

It is clear from the report that the existing institutional set up of rural WSS does fit to implement the financing strategy for rural WSS. In rural settlements without WSS service, the water utility is a municipal department. In those cases, each municipality needs to take care of all aspects (technical, monitoring, billing, financing, etc.) of the water supply system. While their financial and human resource capacity is often far from to be sufficient to address the challenge. Especially in small rural settlements (with no nearby water source), where costs of supplying water may be two or more times higher than the average costs of rural water supply in Armenia.

Such large cost differences also make it hard to address the affordability of water supply in smaller settlements. Also, the poor fiscal position of rural settlements is presently a concern. Larger water companies or public utilities would be able to apply cross subsidization, and will in general have better access to finance (assuming financial sustainability) and skilled labor needed to properly operate and maintain the systems. Also the scale of operation will create advantages (technical skills, monitoring, administration, fee collection) compared to small, municipal utilities.

So an institutional reform seems inevitable, creating larger water utilities or companies. This will require also legislative action (to clearly define responsibilities of municipalities (to supply drinking water to the population); right of consumers (to have reliable supply of quality drinking water against timely payments); role and legal position of public companies, etc.). Obviously, these legal issues need to be addressed in a broader perspective (defining the role of municipalities in providing water supply to their population; establishing a sustainable framework for municipal finance).

Below the summarized lessons learned from the National Policy Dialogue on financing water supply and sanitation in Armenia are presented:

- Steering Committee - It has proven to be important to have a strong leadership in the SC and that the SC Chair is supported by an efficient (local) secretariat. Involvement of the process of the NPD by an international (donor) organization is also essential in keeping a NPD on the “right track”.
- Data Collection - To achieve a successful NPD, it is needed to collect and interpret reliable relevant data on rural WSS. Such data often is not available at the beneficiary (in ROA: SWSC). The involvement of many stakeholders from different perspectives has proven to be an enormous help in defining what kind of data is relevant and what kind of data is available at what institution (often, different institutions do not know of the existence of information in other institutions).
- Project implementation unit - To monitor and steer the financing strategy implementation progress, it is highly recommended that a professional program and projects implementation unit is created to implement the financing strategy and coordinate various investment programs for WSS, typically supported by donors and international financing institutions (IFIs).
- Administration - A certain administrative flexibility would be needed, as the implementation of a financing strategy and related investment programs involves specific, high valued knowledge and expertise, while the remuneration of appropriate experts cannot be sustained through salaries paid in a 100% public body in a low income or a low-middle income country, as Armenia.

### ***3.3. Integrated Water Resources Management***

On January 12, 2007 a “Common Understanding of the State Water Committee and the Ministry of Nature Protection of Armenia on a National Policy Dialogue on water-related issues in Armenia”, was signed, according to which one of the objectives of the NPD in Armenia is to facilitate the implementation of the principles of IWRM in line with the EU Water Framework Directive and relevant conventions and other international agreements with an emphasis on financial issues.

The “Common Understanding” provided the objectives of the NPD related to the IWRM pillar of the National Policy Dialogue as well as the general composition of the Steering Committee on the entire NPD tasks (water supply and sanitation, integrated water resources management). At the meeting of the Steering Committee on 2 July 2007, proposals for a work plan 2007-2009 have been considered. Based on the outcome of the meeting, a representative of the UNECE secretariat has held consultations with major stakeholders during a mission to Yerevan on 22-24 July 2007 in order to further elaborate the work plan.

It was recognized that despite the fact the Armenia largely had the necessary legislative basis and institutional framework for further introducing IWRM principles, particularly those laid down in the Water Framework Directive and the Water Convention, it could not be achieved in the short term, as the water management institutions were new bodies that still required a long period of capacity building to develop the necessary expertise and capabilities on IWRM. There was also a need for better coordination between key sectors (e.g. those responsible for land use management and those for water management), and the necessity of sharing information among major stakeholders (e.g. Ministry of Agriculture and Ministry of Nature Protection). The National Policy Dialogue, among other things, also aimed to contribute to developing these capacities.

The NPD process in Armenia dealt with the following IWRM pillars:

- Policies and strategies as well as legal and regulatory frameworks to facilitate the implementation of the IWRM principles and compliance with obligations under bilateral and multilateral water agreements,
- Institutional arrangements to facilitate the implementation of IWRM principles,



- Policy support for developing water management instruments needed for the implementation of the IWRM principles,
- Awareness-raising, stakeholder information and consultation, and capacity-building, and
- Financing aspects related to the above pillars of IWRM under the National Policy Dialogue.

Thus, in 2008-2010 the following comprehensive analytical reports and studies were prepared and conducted in Marmarik River basin, which support introduction of IWRM principles in the basin:

- Baseline conditions and pressures on for integrated water resources management in Marmarik River basin in Armenia
- Desired conditions for water uses and functions in the Marmarik River basin, and identification of measures to achieve the desired conditions,
- Financial dimension of water resources management in the Marmarik River basin,
- Development scenarios in water resources management in Marmarik River basin.

In addition, with the request of NPD Chairman the UNDP Armenia conducted a special study in Marmarik River basin on "Complex Assessment of Climate Change Impacts on Water Resources of Marmarik River Basin of Armenia". The findings of the study were taken into account while development of draft Marmarik River basin management plans in the context of forecasted decrease of water resources due to climate change.

Below the summarized lessons learned from the National Policy Dialogue on integrated water resources management in Armenia are presented:

- Adopted policy packages - Recommended practices on establishing baseline conditions, recommended practices on identification of desired conditions for water uses and functions in Marmarik River basin helped in development of draft river basin management plan for the basin, as well as adopt corresponding policy packages for the entire country with the intent to replicate it in other basins.
- Coordination - During the implementation of NPD in Armenia several water-related projects were being implemented in Armenia, including (a) the USAID program on management of transboundary waters in the Caucasus (Armenia, Azerbaijan, Georgia), (b) the USAID program on developing model guidelines (a set of tools based on the water Framework Directive) on integrated planning in the Meghriget River basin, (c) the EU TACIS project on transboundary river management for the Kura River, (d) UNDP program on reducing transboundary degradation in the Kura-Araks basin, (e) UNDP Climate Change Impact Assessment project, including assessment of vulnerability of water resources due to climate change in Marmarik River basin. All these programs address, to a various level of detail (mainly due to the different size of the area covered) IWRM issues. NPD provided forum for coordination of the above mentioned projects and facilitated streamlining of activities of the international bodies involved in implementation of those projects, given that the national coordination of these activities rests with the Water Resources Management Agency, and more specifically its Deputy Head, who is at the same time Chairman of the Steering Committee on the NPD in Armenia.
- Local dimension - One of the peculiarities of the process related to the fact that the National Policy Dialogue on IWRM introduced a "local dimension" with the requirement that the implementation of the principles of IWRM "could include pilot basin activities". In particular, the Steering Committee, which was before composed of "national level" representatives, was adapted to the "local dimension", and the composition of the Steering Committee was extended to put more emphasis on participation of local stakeholders. In this regard Marmarik River basin was selected as pilot river basin, where policy packages were developed to facilitate the implementation of the principles of IWRM in line with the EU WFD and relevant conventions and other international agreements with an emphasis on financial issues.
- Financing of IWRM - There is now an increasing recognition that many IWRM plans may not be financially sustainable because the implied costs exceed what countries' public budgets,

farmers, industries and households can afford. Thus, there is a need to work towards a more profound analysis of the costs of water resources management, the financing sources that are available to cover those costs and the benefits that adequate water resources management can generate. The NPD study carried out in Marmarik River Basin looked into some of the measures that can help to generate financial resources required to operate and maintain existing water infrastructure, implement new investments and cover governance costs. The work involved the financial-economic analysis (funding requirement vs. actual funding) and assessment of the financial affordability of measures for the basin. It has also identified the needs for further work and ideas for the type of assistance that would be needed to effectively support water authorities in overcoming this problem. The findings of the study can be replicated in other river basins of Armenia where corresponding plans are to be developed.

- Information sharing and public participation - Pilot studies in Marmarik River basin also significantly contributed to sharing experience on implementation of IWRM principles among the stakeholders, and particularly the stakeholders from Marmarik River basin. The recognition that there should be balance between setting water quantity and quality desired conditions and financial affordability has been largely accepted by the stakeholders. Shared information has also facilitated to more active public participation in the process of development of draft river basin management plan and discussion of various aspects and elements of the draft plan. The proactive work with the local communities, stakeholder consultations, as well as field surveys through questionnaire proved to be very efficient tool in promoting the feeling of ownership among local stakeholders of the basin.

## **4. POLICY RECOMMENDATIONS**

### ***4.1. General - relevant also to other EECCA countries***

The successful implementation of the NPDs in EECCA countries promote the implementation of the EU Water Initiative and help the countries to meet internationally agreed environmental commitments, including the MDGs. At the same time, the NPDs contribute to strengthening implementation of the principles and approaches set out in the Water Framework Directive, as well as the UNECE Water Convention and its Protocol on Water and Health. Finally, NPDs provide a successful platform for policy and strategy development for the EECCA region countries in line with the EU WFD and other applicable legislation. Thus, implementation of the NPDs in EECCA countries should continue in order to keep the momentum and continue the dialogue process.

On the other hand the awareness on NPD processes in EECCA region countries is still low. In addition, countries do not possess much information about the on-going NPD processes in other countries and improved information dissemination is prerogative. Also, it is worth of thinking about the web based data exchange through discussion forums, which will allow interested stakeholder exchange their views and experience with the Steering Group within the countries and between the countries, thus contributing to and profiting from the National Policy Dialogue.

Financing, as a cross cutting issue, is most likely one of the major challenges of the policy dialogue on integrated water resources management and water supply and sanitation. Obviously, adequate water pricing acts as an incentive for the sustainable use of water resources and thus helps to achieve the environmental objectives under the Water Framework Directive. Countries will be required to ensure that the price charged to water consumers - such as for the abstraction and distribution of fresh water and the collection and treatment of waste water - reflects the true costs. Whereas this principle has a long tradition in some countries, this is currently not the case in others. Thus, it is proposed that NPDs in EECCA region countries put more emphasis of financial issues.

The experience of introducing a "local dimension" in the National Policy Dialogue on IWRM in Armenia seems to be successful example and might be replicated in other EECCA region countries. Implementation of the principles IWRM in the line with the WU WFD and relevant conventions and other international agreements with an emphasis on pilot basin level also requires inclusion of local stakeholders in the Steering Committees. This will ensure development of more practical and targeted policy packages, promotion of decentralization through putting more emphasis on participation of local stakeholders.

### ***4.2. Specific for the Armenian water sector***

During the last decade Armenia has made a significant progress in water sector reforms in terms of adoption of new legislation, policy, strategy and corresponding institutional framework. These "first generation" reforms were largely supporting by international financings institutions, as well as donor organizations. Despite the fact that these reforms were assessed as highly successful by several international organizations and projects, the implementation of the new legislative and institutional framework revealed some discrepancies.

Currently Armenia has started the process of fine-tuning the "first generation reforms" and launching the "second generation" reforms in the water sector which is very critical for the successful management of the sector. The main idea of the "second generation" reforms relates to the support of decentralized water resources management through development of river basin management plans in line with the principles of the EU WFD. This process is planned to carry out in the period 2011-2013 with subsequent assessment of the progress status in 2014. However, it is unrealistic to assume that Armenia will have river basin management plans in place in 2014 which

are fully compliant with the requirements of the EU WFD and the decentralized water resources management will take place by then. There is still a long way to go in terms of strengthening institutional capacities in basins, improvement of permitting and compliance assurance procedures, re-vitalization of surface and groundwater monitoring program, financing of basic water resources management need and making decisions related to water resources management based on reliable information.

It is evident that in the course of support to decentralized management of water resources and development of river basin management plans Armenia needs support in terms of technical assistance and shared experience from the EU countries which, according to the EU WFD requirements, have already prepared draft river basin management plans in 2009. The support is critical in several areas, of which the monitoring seems to priority:

- Development of biological monitoring system - Armenia does not have biological monitoring in place and only few Institutes under the National Academy of Sciences perform some non-systemized studies, including general faunistic analysis of mollusks and aquatic biology, whereas according the Water Framework Directive the main information needed to classify water bodies (in high, good, moderate, poor and bad status) comes from biological monitoring, while chemical and hydro-morphological monitoring supply supporting information. Thus, biological monitoring is a crucial step in the implementation of WFD principles. The Biological Monitoring Program uses their sampling results to inform a variety of management activities, such as: determining if water bodies are attaining environmental goals/objectives, documenting a water body's existing condition and tracking changes over time, identifying and prioritizing water bodies that do not attain their assigned environmental goals and are in need of restoration or remedial action, improving permit and licensing decisions with greater understanding of environmental impacts and evaluating and documenting the success of restoration, conservation methods, and permit and license decisions at protecting and restoring aquatic life. From this perspective, introduction of biological monitoring, despite being considered as complicated and expensive task is priority for Armenia and the country seeks for assistance in taking the first steps towards establishment of biological monitoring system in line with EU WFD principles and requirements.
- Re-vitalization of surface water quality and hydro-morphological monitoring system in line with EU WFD requirements - Despite the significant progress made in physical-chemical monitoring of surface water quality in Armenia during the last few years, there are still significant steps to be undertaken to move towards the principles mentioned in the EU WFD. Since Armenia is planning to develop a new monitoring strategy in 2011, it is a good time to explore the possibility and applicability of introduction of surveillance, operational and investigative monitoring of surface waters in the country. Moreover, the pilot works in identification and delineation of water bodies in Debed and Aghstev River basins in Armenia show that the monitoring requirements depend to a large extent on the pressures and impacts that have been identified for the specific water body. Monitoring requirements can, therefore, change with ongoing assessments and changes in anthropogenic pressures and impacts. In this regards, while developing a new monitoring strategy Armenia will surely need a support in adaptation to national circumstances the following guidance documents of the Common Implementation Strategy for the Water Framework Directive: No. 3 - Analysis of Pressures and Impacts, No. 7 - Monitoring under the Water Framework Directive and No. 19 - Guidance on Surface Water Chemical Monitoring under the Water Framework Directive.
- Performance of groundwater quantity and quality monitoring - Groundwater quantity and quality monitoring does not take place in Armenia since 1993. With the support of USAID Water Program the assessment of the condition of previously used groundwater monitoring points started in 2006. In parallel, the hydrogeology of Armenia was studied, described and mapped. Subsequently, an inventory was made of the various previously used monitoring networks and their monitoring points. 69 selected springs and wells were rehabilitated with the support of the USAID Water Program in 2007-2008 and handed over to HMC, to comprise the National Reference Groundwater Monitoring Network. However, the actual monitoring of groundwater

resources has not started yet, which might have advantages. The thing is that the recommended re-established national reference network is just a selection of monitoring points from the previously existing Soviet network, whereas the WFD requires the establishment of monitoring programs covering groundwater quantitative status, chemical status and the assessment of significant, long-term pollutant trends resulting from human activity. The monitoring programs must provide the information necessary to assess whether the Directive's environmental objectives will be achieved. This means that a clear understanding of the environmental conditions required for the achievement of the objectives, and how these could be affected by human activities, is essential to the design of effective monitoring programs. In this regard, adaptation to national circumstances of the EU WFD Common Implementation Strategy (CIS) Guidance Document No. 3 - Analysis of Pressures and Impacts is very critical, since it provides necessary information on, and understanding of, the groundwater system and the potential effects of human activities on it with which to design the monitoring programs. In addition to this, the EU WFD CIS Guidance Document No. 7 - Monitoring under the Water Framework Directive provides clear instructions on how to ensure the targeted and cost-effective development of the groundwater monitoring programs, which is also very important for Armenia given budgetary limitations. Thus, support in adaptation of the above-mentioned guidance documents to the Armenian circumstances and follow-up inclusion of the key principles in the new monitoring strategy is an area, where Armenia needs support.

Only once decent monitoring system is place, which will support the informed decision-making in the sector, it will be possible to develop vital and long-term river basin management plans. From this aspect the National Policy Dialogue is seen as very important forum and platform, which can coordinate discussions of the above-mentioned topics with participation of the Armenian stakeholders from all interested agencies, international organizations, programs and projects working in water sector, as well as experts and consultants from EU countries, ready to share their experience in development of river basin management plans.

It is also expected that in 2011-2013 the National Policy Dialogue can continue playing coordination role for various water-related programs and projects implemented by the means of the public budget of Armenia and international financing institutions and donor organizations.

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## **5.2. Useful Web links**

### **5.2.1. International Organization and Projects**

European Union Water Initiative <http://www.euwi.net>

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0060:EN:NOT>

United Nations Economic Commission for Europe <http://www.unece.org>

UN ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes <http://www.unece.org/env/water/text/text.htm>

Organization for Economic Co-operation and Development <http://www.oecd.org/redirect>

USAID Armenia <http://armenia.usaid.gov>

The World Bank Armenia <http://www.worldbank.org.am>

Millennium Challenge Account - Armenia Program <http://www.mca.am>

OSCE Office in Yerevan <http://www.osce.org/yerevan>

Delegation of the European Union to Armenia <http://www.delarm.ec.europa.eu>

EU Project "Transboundary River Management Phase II for the Kura River Basin - Armenia, Georgia, Azerbaijan" <http://www.kuraarasbasin.net>

United Nations Development Programme Armenia <http://www.undp.am>

### **5.2.2. Armenian Agencies, Ministries and Information Resources**

Government of the Republic of Armenia <http://www.gov.am>

Ministry of Nature Protection of the Republic of Armenia <http://www.mnp.am>

Ministry of Agriculture of the Republic of Armenia <http://www.minagro.am>

Ministry of Energy and Natural Resources of the Republic of Armenia <http://www.minenergy.am>

Ministry of Finance <http://www.minfin.am>

Ministry of Health Care <http://www.moh.am>

State Committee on Water Systems under the Ministry of Territorial Administration <http://www.scws.am>

Climate Change Information Center of Armenia <http://www.nature-ic.am>

Armenian Water Portal <http://www.awp.am>

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