

APPROACHES TO DEVELOPMENT OF THE STATE WATER CADASTRE IN THE REPUBLIC OF ARMENIA

Armine Simonyan⁽¹⁾, Aram Abovyan⁽²⁾, Hovhannes Tokmajyan⁽³⁾

- ⁽¹⁾ Dr., Researcher, Water Problems and Hydraulic Engineering Institute, 125 Armenakyan str., Yerevan, 375047, Armenia, phone: +375 91 217731; e-mail: armincka@yahoo.com
- ⁽²⁾ Student, Yerevan State University of Architecture and Construction, 105 Teryan str., Yerevan, 375009, Armenia, phone : +374 10 547425, e-mail: armincka@yahoo.com
- ⁽³⁾ Dr. Prof., Rector, Yerevan State University of Architecture and Construction, 105 Teryan str., Yerevan, 375009, Armenia, phone : +374 10 547425, e-mail: vachetok@yahoo.com

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Republic of Armenia is a landlocked country with an area of 29,800 km². Armenia lies completely in the Kura-Araks River basin. The Araks River marks the border between Turkey and Armenia, and further between Iran and Armenia, before flowing into Azerbaijan, where it flows into the Kura River. The Araks River basin covers 22,790 km² in Armenia and drains 76.6% of the territory. The tributaries flowing directly into the Kura River in the north-east drain less than 23% of the country [Water Quantity and Quality...]. There are 9480 small and medium rivers in Armenia of 23000 km length, including 14 rivers exceeding the length of 35 km, and 379 rivers exceeding the length of 10 km. Total average annual flow is 6250 m³, including 3029 m³ originating from springs and ground water. Renewable surface water resources excluding Lake Sevan amount to 7190 million m³. The Republic of Armenia annually uses 940 million m³ from the trans-boundary rivers of Araks and Akhuryan.

An annual assessment of ground water amounts to 4017 million m³, including 1595 million m³ originated as springs, and 1434 m³ discharged to rivers and lakes. Ground water inflow amounts to 1193 million m³, and outflow – 1068 m³. Total annual flow of mineral waters amounts to 22 million m³, including 8.8 million m³ of high quality. The 15000 m³ is annually used for bottling, and the 25000 m³ – for medical purposes. Actually 0.05% of the total annual flow is being used. There are 74 water storage reservoirs constructed with a total capacity of 988 million m³. 400 million m³ could be additionally stored within existing 10 incomplete water storage reservoirs.

It is known that water resources in the country are limited, and their use should be proportional and efficient. Action planning and implementation in the water sector should be coordinated and combined for all the sectors. Thus it was a priority issue to set up a State Water Cadastre, the basis of its maintenance, as well as creation of a water sector related dynamic database for long-term planning of water resources availability and use as a component of a multi-nature cadastre system. With this respect the relevant order on approval of a procedure for registration of documents in the state cadastre and provision of information was adopted by the Minister of Nature Protection.

During the last several years, Armenia has made good restructuring progress in the sector of water management, supported by a legal framework that has separated the management, regulatory and operational functions in the provision of water services in irrigation, hydropower, and municipal water supply. The 2002 Water Code provides guidelines for water resources and systems management [H. Tokmajyan...]. The Water Code of the Republic of Armenia mandates the collection and storage of a broad range of data related to water resources and requires that these data

be stored in a State Water Cadastre. By regulation, the Cadastre will consist of hydrological, meteorological and water quality data, ground water data, and data on water extraction, water use and water systems [Water Code of the Republic of Armenia; RA Governmental Resolution #1060-N].

The Cadastre will serve as the legal repository for water use permits and registration of water control structures. The Cadastre will include a spatial database and maps. According to the Water Code, Water Resources Management Agency of the Ministry of Nature Protection is the key organization responsible for keeping, maintaining and regularly updating the State Water Cadastre and making up the water balance. In the same time with the Water Resources Management Agency (WRMA) the following organizations within the Ministry of Nature Protection, namely the Armenian State Hydrometeorological and Monitoring Service (ASH) State Non-Commercial Organization (SNCO), Environmental Impact Monitoring Centre SNCO (EIMC), Republican Geological Fund SNCO (RGF), State Environmental Inspectorate (SEI) as well as State Hygiene and Anti-Epidemiological Inspectorate (SHAEI) of the Ministry of Health, and State Committee on Water Systems (SCWS) under the Ministry of Territorial Administration are the key organizations in supporting the State Water Cadastre development through provision of baseline information and regular updates [Cooperation Agreement on Development of State Water Cadastre Information System...]. Each of these state agencies is responsible for provision of a certain portion of data to be incorporated into the State Water Cadastre.

The State Water Cadastre is a comprehensive information system containing both spatial and tabular data [Technical Design of the State Water Cadastre Information System...]. The spatial data consist of information that could be displayed on maps (e.g., watersheds, rivers, water bodies, monitoring stations, and protected zones). These characteristics are usually associated with a geographical information system (GIS) and mapping. According to [H. Tokmajyan...] the following types of spatial information can be included in the Cadastre for water resources:

- Administrative boundaries, such as state and regional borders;
- Communities;
- Major roads;
- Watershed boundaries;
- Water Users Associations boundaries and their service areas;
- Water bodies such as rivers, lakes, springs, groundwater resources, glaciers, etc.;
- Water quantity and quality monitoring stations;
- Wastewater discharge points;
- Forests;
- Wetlands;
- Protected areas;

The cadastre on water systems can be developed on a basis of above database with the following layers added to the initial system (other layers can be added once necessary):

- Type of structure (dam, weir, canal, pump station, tunnel, well, pipeline, drainage system, aqueduct, siphon, etc.);
- Functional use (water supply, irrigation, hydropower generation, flood control, fish-farming recreation, etc.);
- Location;

- Technical parameters;
- Water demand;
- Importance of structure;
- Risk level in case of possible accident;
- Boundaries of at-risk zone;
- Entities responsible for management, operation, maintenance, protection.

The current format for national water cadastre consisting of 35 table forms. According to the relevant governmental regulation in total 7 state agencies are involved in the cadastre development process and are expected to supply data for the system. As for current situation a limited number of existing and operating hydromet stations and water quality laboratories possess modern techniques and equipment to conduct analysis and provide reliable data to meet demand. Meantime, several programs are implemented with support of international and donor organizations to improve water monitoring and information management activities in Armenia. The final version of cadastre will collect, store, analyze and combine data on water resources and systems coming from multiple sources as well as all associated data on legal and administrative aspects of water management as well as institutional responsibilities. The cadastre will serve as the national water resources comprehensive database and will operate through specified protocols providing various responsible units with appropriate access to information. Operational version of the system will provide reliable and timely data to support water management decision-making at various agencies, thus contributing to a higher level decision-making at government.

REFERENCES

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