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EU4GREEN
RECOVERY
EAST

REVISION OF THE HYDROLOGY/ WATER CURRICULA IN UNIVERSITIES OF ARMENIA



EU4Green Recovery East – Recovery through a Circular Economy and Pollution
Reduction in the Eastern Partnership countries

(700002623)

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EU4Green Recovery East (700002623)
Recovery through a Circular Economy and Pollution Reduction in the Eastern Partnership countries

ABOUT THIS REPORT

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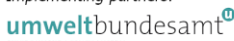
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ABOUT EU4GREEN RECOVERY EAST

The EU4Green Recovery East programme is a regional programme supporting the EU's Eastern Partnership countries on their path towards a greener, more resilient, and competitive economy.

With an EU-contribution of EUR 21.3 million (2025-2028), it builds on the results of a decade of EU support for better water management and green economy adoption and focuses on five key components: (1) promoting a circular economy, (2) ensuring water is managed as a critical resource, (3) advancing legal approximation with EU environmental legislation, (4) strengthening integration into EU-wide environmental cooperation and data exchange, and (5) fostering cross-border environmental cooperation.

The programme is implemented by five partners: Expertise France with the French International Office for Water (OiEau), OECD, UNECE, UNIDO, and the Environment Agency Austria (UBA), as the consortium coordinator.

<https://www.eu4greenrecoveryeast.eu>

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1 Identification of National Higher Education Establishments and Analysis of Existing Curricula in the Water Sector

This report provides an overview of higher education institutions in Armenia that offer or partially cover water-related education, as well as an analysis of existing curricula in the water sector. The assessment is based on available program descriptions, course structures, and institutional focus areas, complemented by insights gathered through meetings and discussions with lecturers from several institutions and faculties, including Yerevan State University (including its Ijevan Branch), the Institute of Geological Sciences and the Center for Ecological-Noosphere Studies of the NAS RA, Brusov State University, Gavar State University, Armenian National Agrarian University, and National University of Architecture and Construction of Armenia.

The objective of the assessment is to identify key findings and existing gaps, and opportunities for strengthening water-related education in Armenia. Particular attention is given to the extent to which current programs reflect the evolving needs of the water sector, including interdisciplinary integration, governance aspects, and applied competencies.

Overall, educational programs from 12 higher education institutions across Armenia were reviewed for the purposes of this study.

1.1 Universities with Strong Water-Related Curricula

1.1.1 Yerevan State University (YSU), www.ysu.am

Yerevan State University was founded in 1919 and is considered the oldest, largest and most multidisciplinary university in Armenia. The university has up to 14,000 students, including bachelor's, master's and PhD students. It is often referred to as the "mother university" of Armenia. YSU consists of 19 faculties and several research centers. Estimated annual graduates are about 4,000–5,000 students/annually.



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YSU has a long-standing tradition of academic excellence and international collaboration, ensuring strong expertise in designing innovative educational initiatives aligned with European standards and the Bologna Process. Also, YSU involved in the number of ERASMUS programmes.

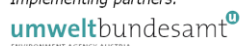
Water-related curriculum coverage: YSU does not currently have a separate department specifically dedicated to training "water specialists". However, water-related topics are integrated into educational programs within disciplines such as law, chemistry, geology, geography and biology.

YSU offered water related curriculum and cover water topics across Geography, Geology, Hydrometeorology, and Environmental Sciences educational modules. Courses include hydrology, hydrogeology, hydrometry, water ecology/general overview, water resources management, hydrological forecasting, and environmental/water law.

These educational programs are taught in **five faculties** of the university:

Faculties of Biology, Geography and Geology, Chemistry, Law, Institute of Pharmacy

Implementing partners:



Educational programs and relevant water courses provided at the YSU are presented in the Table 1.

Table 1. List of educational programs which provides water-related course at the YSU

Water-related educational programmes and courses	Code	Credits	Semester
"Geology" educational program, BSc (Faculty of Geography and Geology)			
<i>Main subjects</i>			
Geoecology and Fundamentals of Environmental Protection	0905	2	IV
General Hydrogeology	0905	6	IV
<i>Elective subjects</i>			
Groundwater dynamics	0905	6	VII
"Geography" educational program, BSc (Faculty of Geography and Geology)			
<i>Main subjects</i>			
Fundamentals of Ecology and Environmental Protection	0906	2	IV
Hydrology	0906	6	IV
<i>Elective subjects</i>			
Methods for statistical processing and analysis of hydrometeorological observations	0906	6	VII
Integrated use of water resources and hydrological forecasts	0906	6	VII
Hydrometry	0906	6	VI
Water ecology	0906	6	V
The main issues of nature use and environmental protection in the Republic of Armenia—passing on the environmental legislative issues of the Republic of Armenia	0906	6	V
"Geophysics, Hydrogeology and Engineering Geology", MSc (Faculty of Geography and Geology)			
<i>Main subjects</i>			
Ecological hydrogeology	0905	6	II
<i>Elective subjects</i>			
Ecological hydrogeochemistry	0905	3	III
Hydrogeology of the Republic of Armenia	0905	6	III
"Hydrometeorology", MSc (Faculty of Geography and Geology)			
<i>Main subjects</i>			
Hydrometeorological expertise and monitoring	0906	6	I

Mathematical modeling of hydrometeorological phenomena	0906	3	II
Water resources management*	0906	3	II
The problem of using and preserving water resources of the Republic of Armenia	0906	6	II
Hazardous hydrometeorological phenomena and their risk assessment	0906	6	II
<i>Elective subjects</i>			
Water Resources Cadastre and Monitoring	0906	6	III
Hydrological Calculations	0906	6	III
Water Management and River Flow Regulation	0906	3	III
Hydrometeorological Information Systems	0906	3	III
Climatic Resources and Sustainable Development of Armenia	0906	3	III
Hydroecological Security	0906	3	IV
"Biology", BSc (Faculty of Biology)			
Fundamentals of Ecology	0708	2	IV
"Ecology and Bioresource Management", MSc (Faculty of Biology)			
<i>Main subjects</i>			
Environmental Issues of the Republic of Armenia and Biodiversity Research and Conservation	0703	6	I
Ecological Risk Assessment and Management	0708	6	II
Environmental Impact Assessment and Expertise	0708	3	III
<i>Elective subjects</i>			
Hydrology and Water Resources Management*	0708	3	III
Environmental Law	0708	3	IV
"Pharmaceutical Chemistry", BSc (Institute of Pharmacy)			
Fundamentals of Ecology and Environmental Protection*	0608	2	IV
"Law", BSc (Faculty of Law)			
Environmental law of the Republic of Armenia	1907	3	VIII
Food Safety, BSc (Faculty of Chemistry)			
Fundamentals of Ecology and Environmental Protection	0608	2	IV

* Courses also cover topics of the main principles, steps and logic of water resources monitoring and management, institutional foundations of water resources management: water code, national water program, water framework directive.

Assessment: YSU provides theoretical and analytical knowledge, particularly in general water science, monitoring, and policy-related aspects. However, the proposed curricula provide limited coverage of water resources management approaches, water legislation, international experience, the Water Framework Directive, other international or national regulations, and SDG 6, etc.

In addition, while the programs lack applied engineering depth, they compensate through interdisciplinary and research-oriented education. The courses primarily reflect fundamental knowledge, including the water cycle and existing environmental challenges, but offer limited discussion of innovative solutions and regulatory approaches aimed at water resource conservation and management.

Previously, however, the university trained specialized environmental professionals, and the first schools of hydrochemistry and hydrology in Armenia were established here.

In 1983, the Department of Ecology and Nature Protection was established at the Faculty of Biology. It was formed on the basis of the Department of Agrochemistry and Soil Science, which had been operating since 1957. Although the department had a strong soil science orientation, it also trained hydrobiologists, and PhD students on the hydrobiological studies of Lake Sevan. Despite the presence of this department, students graduated with the qualification of “Biologist”, within which they could choose research directions related to water resources.

In 1988, in the Faculty of Chemistry the new specialization, called “Nature Protection and Chemistry” was established. This foster to establishment such a “school of hydrochemistry” in Armenia, which have been focused the researches on natural water chemistry problems.

During the 2000s, following the Bologna reforms, it makes possible to transfer this educational program from a five-year education system to Bachelor’s and Master’s degree programs.

Thus in 2007, under the leadership of Professor Gevorg Piryumyan, the educational program further developed and was renamed as the Ecological Chemistry specialization. In the same year, a department with the same name was established, and in 2009 the Center for Ecological Safety was founded.

The Department of Ecological Chemistry was mainly focused on preparing specialists in water resources management and monitoring. Within this specialization, students studied topics such as:

- integrated water resources management
- ecological risks
- water quality assessment
- monitoring and standardization
- water systems modeling
- climate change
- sustainable development goals

However, in 2015 this department and specialization, unfortunately, were closed, due to the following main reasons.

- The firstly the “Ecological chemistry” educational program was relatively new, and the number of enrolled students was small, the usually class has 8–15 students, no more.

- The name of the specialization was not widely understood and was not particularly attractive to prospective students. In those years, school curricula did not include the discussion of ecological topics, and this field did not seem very attractive and interesting as future profession for schoolchildren.
- The program lost its separate admission status during the restructuring of academic programs at YSU. Between 2012 and 2014, Armenian universities faced a significant decline in student enrollment due to social factors. Students entering universities during those years were born in the 1990s, a period when Armenia experienced severe economic and energy crises and high levels of migration. As a result, the number of young people was smaller across the country, and universities had to begin merging or restructuring smaller programs. Maintaining programs with small student groups became organizationally and financially challenging for universities. Thus, it was decided to merge and integrated this educational program and specialization into broader field, such as the general Chemistry program.
- Another factor was limited demand in the labor market. Many students preferred more popular and broadly recognized fields such as economics, law, international relations or IT sector, which were perceived as offering better employment opportunities.

Despite its closure, the “Ecological chemistry” educational program had several positive aspects. The teaching staff were actively involved in the state environmental governance system, working in the same time at the Ministry of Environment, the Water Committee, the ArmHydromet service in Armenia.

Students were involved internships directly in these water governmental institutions, which allowed them to gain practical experience and better understand the professional field. At the same time, this system enabled government institutions to identify and recruit future specialists from among the students.

Overall, the department graduated around 200 specialists (Bachelor’s and Master’s) and 15 PhD researchers. Many of the alumni of this program currently work in the Ministry of Environment, the Water Committee, and the Hydrometeorology and Monitoring Center, VeoliaDjur company as well as involved in the donor funded projects.

The Center for Ecological Safety continues to operate at YSU, and the research focuses only on:

- forecasting of water resources quality under climate change,
- study of natural self-purification processes of water bodies,
- development of wastewater treatment methods.

However, the center conducts only researches and work with diploma tesises and PhD students.

Training of water specialists at YSU is currently mainly conducted at the Faculty of Geography and Geology within the Geography specialization. Departments such as Geophysics, Hydrogeology and Engineering Geology and Hydrometeorology prepare specialists including hydrogeologists, hydrologists, meteorologists.

Despite the relatively small number of students, the faculty continues to maintain these specializations through research projects, including international collaborations, and through cooperation with the water resources management state bodies.

Currently, graduates from various faculties of YSU are actively engaged in water resources management, protection, and supply in Armenia. They contribute to key sectoral processes,

including the alignment of Armenia's water management system with the EU Water Framework Directive, the introduction of the five-class ecological status assessment system, the development of water quality standards, the preparation of river basin management plans, and the improvement of the national water monitoring network.

YSU alumni are employed across a wide range of institutions, including the Ministry of Environment, the Hydrometeorological and Monitoring Center SNCO, the Water Committee, Veolia Djur company, other water sector institutions, and international water-related projects, among others.

The experience of Yerevan State University shows that close cooperation with the government sector (agreements for the implementation of internships with the Hydrometeorology and Monitoring Center (HMC) SNCO in 2004-2014) is essential for sustaining water-related educational programs (implementation of diploma and PhD research projects, with some students subsequently becoming employees of the HMC). It is especially important for students to have opportunities for internships, study visits and practical engagement with future employers. Such experiences make the specialization more attractive and allow students to become familiar with the professional working environment.

1.1.2 National University of Architecture and Construction of Armenia (NUACA), www.nuaca.am

This is the most comprehensive institution in Armenia in terms of water-related technical education. The university was established in 1921, and its estimated annual number of graduates is approximately 800–1,200 students.



Water-related curriculum coverage: NUACA offers Bachelor's degree programs in Civil Engineering (with a hydrotechnical focus) and Engineering Systems Modeling and Management, as well as a Master's program in Hydrotechnical and Hydropower Structures. Strengths of the educational programs include a comprehensive and well-structured curriculum across both Bachelor's and Master's levels, a strong engineering and applied focus, and the inclusion of practical training components, such as internships in hydrotechnical construction.

Educational programs and relevant water courses provided at the NUACA are presented in the Table 2.

Table 2. List of educational programs which provides water-related course at the NUACA

Water-related educational programmes and courses	Code	Credits	Semester
Degree in Modeling, Design, and Construction of Buildings and Structures, BSc Educational program			
Hydraulics	6.22ՀԻԴ001	5	IV
Hydraulics	6.22ՀԻԴ002	4	V
Hydraulics	6.22ՀԻԴ005	4	VI
Hydraulics	6.22ՀՋՅ012	3	VI

Hydrology, hydrometry	6.22ՀՁՐ030 6.22ՀՁՐ030Ն	5	VI
Hydraulic structures	6.22ՀՁՐ042	3	VI
Practice: production (operation of hydraulic structures and construction processes)	6.22ՀՁՐ027 6.22ՀՁՐ027Ա	2	VII
Technology and organization of construction and installation work of hydraulic structures	6.22ՀՁՐ031 6.22ՀՁՐ031Ա	5	VII
Hydraulic structures	6.22ՀՁՐ032 6.22ՀՁՐ032Ա	4	VII
Underground structures	6.22ՀՁՐ034	2	VII
Hydroelectric power plants	6.22ՀՁՐ037	4	VII
Study, operation and reconstruction of hydraulic structures	6.22ՀՁՐ040 6.22ՀՁՐ040Ա	3	VII
Water supply and drainage	6.22ՀՁՐ028 6.22ՀՁՐ028Ա	4	VIII
Technology and organization of construction and installation work of hydraulic structures	6.22ՀՁՐ035 6.22ՀՁՐ035Ն	3	VIII
Hydraulic power plants	6.22ՀՁՐ039	3	VIII
Engineering melioration	6.22ՀՁՐ041 6.22ՀՁՐ041Ա	4	VIII
Engineering Systems Modeling, Design, and Management (ՋՋՀՆՀԿ), BSc Educational program			
Construction engineering support, a) Engineering geodesy	6.22ԳԴ2003	4	I
Construction engineering support, b) Engineering geology	6.22ԳԷԿ002	4	II
Applied geodesy	6.22ԳԴ2080	2	III
Hydraulics	6.22ՀԻԴ001	5	IV
Hydraulics	6.22ՀԻԴ002	4	V
Water supply and water treatment	6.22ՀՁՐ006 6.22ՀՁՐ006Ն	4	V
Drainage and wastewater treatment	6.22ՀՁՐ009 6.22ՀՁՐ009Ա	4	V
Water supply and water treatment	6.22ՀՁՐ007 6.22ՀՁՐ007Ա	5	VI
Drainage and wastewater treatment	6.22ՀՁՐ010 6.22ՀՁՐ010Ն	4	VI
Water chemistry and microbiology	6.22ԲԻՄ002	4	VI

Hydrology, hydrometry	6.22ՀՁՐ012	3	VI
Water supply and water treatment	6.22ՀՁՐ008 6.22ՀՁՐ008Լ	6	VII
Drainage and wastewater treatment	6.22ՀՁՐ011 6.22ՀՁՐ011Ա	6	VII
Hydrotechnical structures	6.22ՀՁՐ013	4	VII
Construction technology of water supply and wastewater systems	6.22ՀՁՐ019	4	VII
Water supply of industrial enterprises/Water drainage of industrial enterprises	6.22ՀՁՐ023/ 6.22ՀՁՐ024	3	VII
Hydrotechnical structures	6.22ՀՁՐ014 6.22ՀՁՐ014Ա	4	VIII
Operation and reconstruction of water supply and wastewater systems	6.22ՀՁՐ017	2	VIII
Technological equipment of water supply, wastewater systems and their operation	6.22ՀՁՐ021	2	VIII
Automation of water supply and wastewater systems	6.22ՀՁՐ022	3	VIII
Engineering Systems Modeling, Design, and Management, BSc Educational Program (Department of Heating, Ventilation, and Air Conditioning)			
Water supply and drainage	6.22ՀՁՐ047	3	I
Hydraulics	6.22ՀԻԴ008	5	IV
Theoretical principles of microclimate creation	6.22ՁԳՄ005	2	IV
Water supply and drainage	6.22ՀՁՐ047	3	VIII
Environmental impact assessment (EIA)	6.25ԳԷԿ002	3	VIII
Modeling, Design, and Construction of Buildings and Structures (ԱՔՇԿՆ), BSs Educational Program			
Hydraulics	6.22ՀԻԴ008	5	IV
Hydraulic and Hydropower Structures, MSc Educational Program			
Special course in hydraulics	7.20ՀԻԴ002	3	I
Modern land reclamation and irrigation systems	7.20ՀՁՐ038	3	I
Water resource exploitation and conflicts	7.24ՀՁՐ002	2	I
Water system exploitation and reliability	7.20ՀՁՐ010	2	I
Water resources management	7.20ՀՁՐ011	3	I
Special structures of water systems	7.20ՀՁՐ042	2	II
Groundwater dynamics	7.20ՀՁՐ023	2	II

Latest technologies and mechanization methods for the construction of water structures	7.203ԶՐ014, 7.203ԶՐ014Ա	4	II
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Assessment: The university provides the most comprehensive and practice-oriented training in the country, producing the majority of engineering specialists in water infrastructure. However, the curriculum remains predominantly technical, with limited integration of governance, policy, and stakeholder engagement aspects. The proposed curricula provide limited coverage of water resources management approaches, water legislation, international experience, the Water Framework Directive, other international and national regulations, and SDG 6. Overall, the focus is primarily on technical and engineering aspects, with insufficient emphasis on governance, policy, and community-based water management.

1.1.3 American University of Armenia (AUA), www.aua.am

AUA is relatively new, established in 1991 and offers a modern, interdisciplinary environmental program. Its estimated annual number of graduates is approximately 300–500 students.



Water-related curriculum coverage: Primarily through the “Environmental and Sustainability Sciences” educational program, including the dedicated “Water” course and supporting subjects such as environmental monitoring, GIS, and environmental assessment tools.

Under “*Environmental and Sustainability Sciences*” program the *Water (ESS244)* (3 credits) course covers:

- Water supply and use across sectors
- Water quality and pollution
- Monitoring and testing methods
- Wastewater treatment
- Water resource management tools
- Legal and policy frameworks

Supporting courses, where the water topic is also covered are:

- Environmental Monitoring
- GIS and Remote Sensing
- Environmental Assessment Tools

Assessment: AUA provides an interdisciplinary approach with strong links to policy, sustainability, and decision-making tools, incorporating international practices and case studies, and integrating water-related issues into broader sustainability frameworks. However, the number of dedicated water-specific courses remains limited, with primarily one core course available.

1.2 Universities with Partial or Limited Water-Related Content

1.2.1 Armenian National Agrarian University (ANAU), www.anau.am

ANAU was established in 1930 and has an estimated annual graduation of approximately 1,500–2,000 students.

Water-related topics are not offered as standalone courses but are indirectly addressed within environmental and agricultural contexts. Given the importance of irrigation and agricultural water use in Armenia, the absence of dedicated water management courses represents a significant gap.

The primary educational program that addresses water-related topics is the “**Agroecology**” BSc program, within which the following relevant courses are offered:

- Fundamentals of Ecology (5 credits),
- Environmental Impact Assessment (7 credits).



1.2.2 Armenian State Pedagogical University, www.aspu.am

The University was established in 1922 and has an estimated annual graduation of approximately 1,000–1,500 students.

Water-related topics are not offered as standalone courses. They are covered within only one educational program — **Environmental Sciences (BSc and MSc)** — which is primarily designed for future educators. Within this program, water-related issues are addressed at a general level, without opportunities for specialization. Within this program, water-related issues are addressed at a general level, without opportunities for specialization. This is not a significant limitation, as Armenian State Pedagogical University primarily prepares future school teachers and is not intended to train narrowly specialized sectoral professionals.



1.2.3 Brusov State University, www.brusov.am

The University was established in 1935 and has an estimated annual graduation of approximately 600–900 students.

Although the University primarily focuses on training specialists in linguistics, service, tourism, and translation, the “**Tourism**” (BSc and MSc) programs have indirect relevance to water-related topics through environmental awareness in tourism.



1.2.4 Gavar State University, www.gsu.am

The University was established in 1993 and has an estimated annual graduation of approximately 300–500 students. It is one of the regional universities in Armenia. Located in the Gavar city of the Gegharkunik Marz. Despite the importance of the Sevan Lake ecological use in this region, the university provides only one water-related program - Environmental Protection and Nature Use, in which water topic and Sevan Lake issue are slightly covered.



1.2.5 Goris State University, www.gorsu.am

The University is also a regional institution located in Goris, Syunik Marz, Armenia. It was established in 1967 and has an estimated annual graduation of approximately 200–400 students.

Despite the development of the mining sector in the region, the University does not offer water engineering programs. Water-related topics are only partially covered within the “Tourism Management” Bachelor’s degree program, primarily through general ecology courses.



1.2.6 SIN-NEC Erasmus+ CBHE-KA2 Program, www.sin-nec.eu

Sustainability and Internationalization Capacities to Promote Modernisation of Newcomers Higher Education in Neighbourhood East Countries (SIN-NEC) is an Erasmus+ CBHE-KA2 Project, co-funded by the EU, with the general objective of enhancing the sustainability and internationalization competences of less-experienced, newcomer Armenian (AM) and Ukrainian (UA) Higher Education Institutions (HEIs) to support sustainable growth in both countries. This aligns with the overarching priority of the Neighbourhood East countries, namely sustainable growth and jobs.

The program, based on a comprehensive self-assessment, will build capacities of academics, managers and administrative staff on planning and development of strategies and action plans towards internationalization and sustainability. Training of the teachers will focus on innovative pedagogics and digital tools in virtual environments to enhance their internationalization potential, sustainability and sustainable entrepreneurship.

The project partner universities are:

- University of Teramo, Italy
- Carinthia University of Applied Sciences, Austria
- SUMO Technologies, Austria
- Armenian State Institute of Physical Culture and Sport, Armenia
- Eurasia International University, Armenia
- Yerevan Haybusak University, Armenia
- Northern University, Armenia
- Alfred Nobel University, Ukraine

- Kharkiv National University of Internal Affairs, Ukraine
- Kharkiv National University of Radio Electronics, Ukraine
- Institute for Digitalisation of Education of the National Academy of Educational Sciences of Ukraine, Ukraine

The program does not offer specialized academic degree for a water sector, however, it supports environmental initiatives, which also includes topics related to water resources management, through the organization of forums, conferences, seminars, and training activities sponsored by SIN-NEC or co-organized in collaboration with other institutions.

These kind of programs such as Erasmus+ can provide an important platform beyond formal academic curricula by offering students additional knowledge, encouraging their engagement in the field, and facilitating the exchange of experience in water education among national and international universities.

1.3 Research and Specialized Institutions (PhD-Level Focus)

At the highest academic level, water-related research, also PhD students, is primarily concentrated in specialized institutions:

- **Institute of Water Problems and Hydrotechnics after I.V. Yeghiazaryan** (established in 1996), whose main focus is advanced research in hydrotechnics, water systems, and engineering solutions. www.jhhi.am



Assessment: It has strong technical and research-oriented capacity, but limited integration with undergraduate education and applied training systems. The Institute hosts the Hydrology Scientific Council N 055 and is authorized by the Committee on Higher Education and Science of Armenia to organize the defense of candidate and doctoral dissertations in the following specialty of the Armenian scientific degree classification: *E.23.05 – Water Management Systems and Their Operation (Technical Sciences)*.

- **Institute of Hydroecology and Ichthyology NAS RA** (established in 1943), whose main focus is aquatic ecosystems, hydroecology, fisheries, including Sevan Lake ecology. www.sczhe.sci.am. In 2006, by a decision of the Government of the Republic of Armenia, it was merged with the Institute of Zoology of the National Academy of Sciences of Armenia and renamed the Scientific Center of Zoology and Hydroecology.



Assessment: It contributes to scientific knowledge but has limited structured coursework for broader student groups.

- **Geological Sciences Institute NAS RA** (established in 1935), whose main focus is on geology and geophysics, with only marginal inclusion of water-related topics. www.geology.am



Assessment: Institute offers Master's program on Geology; however, it does not include dedicated water-related courses. The Institute hosts the Geology Scientific Council N 054 and is authorized by the Committee on Higher Education and Science of Armenia to organize the

defense of candidate and doctoral dissertations in the following specialty of the Armenian scientific degree classification: Geology *Sciences*.

- **Geological Sciences Institute, the Center for Ecological-Noosphere Studies NAS RA (CENS)** founded in 1989 through the merging of several core laboratories. CENS has grown into a comprehensive institution implementing a wide spectrum of fundamental and applied investigations in ecology, environmental protection and food safety. Interdisciplinary studies CENS has been dealing with include the assessment of ecological status of territories, development of scientific and methodological fundamentals of risk analysis, optimization of natural resource management processes, solution of problems in the area of human ecology. www.cens.am



Assessment: CENS offers Master's programs in environmental protection; however, these programs do not include dedicated water-related courses.

1.4 Key Findings and Gaps

The analysis indicates that, although Armenia hosts a number of higher education institutions offering water-related courses, the overall coverage remains uneven, fragmented, and insufficiently coordinated. Existing educational provision is largely concentrated within technically oriented programs, where strong engineering expertise is evident, particularly in the design, construction, and operation of water infrastructure systems. In contrast, interdisciplinary approaches and policy-oriented education related to water governance, integrated resource management, and sustainability remain comparatively underdeveloped.

Research institutions in the field are generally highly specialized and research-driven, with a strong focus on advanced scientific and technical outputs. However, their engagement with undergraduate and master's-level education is limited, which restricts knowledge transfer to broader student populations and reduces opportunities for early-stage capacity building.

A further critical issue relates to the content and structure of existing water-related courses. In many cases, curricula remain predominantly theoretical and overly general, with insufficient reflection of current developments in the water sector. Key contemporary dimensions—such as integrated water resources management (IWRM) principles, the impacts of climate change on water systems, the regulatory framework of the EU Water Framework Directive, and the Sustainable Development Goal 6 (SDG 6) targets—are either minimally addressed or entirely absent. In addition, there is limited coverage of national and international legal and institutional frameworks governing the water sector, as well as a lack of structured discussion on existing sectoral gaps, challenges, and reform needs. This situation is further exacerbated by the very limited allocation of instructional hours and credits, which constrains the ability of lecturers to meaningfully incorporate these advanced and policy-relevant topics even when there is willingness to do so.

The assessment highlights several key structural and thematic gaps:

- Water-related education is dispersed across multiple institutions and academic disciplines, resulting in a lack of coherence and systemic integration.
- There is no unified or dedicated national degree program in water resources management or integrated water governance.

- National University of Architecture and Construction of Armenia provides strong, practice-oriented engineering training, particularly in water infrastructure and hydraulic systems.
- Yerevan State University and American University of Armenia contribute to environmental sciences and policy-related education; however, water governance is not yet developed as a fully integrated academic track.
- Interdisciplinary integration across engineering, environmental science, economics, and governance remains limited and fragmented.
- Practical learning components such as internships, fieldwork, and applied project-based learning are primarily embedded in engineering curricula, while remaining limited in environmental and policy-oriented programs.
- Structured experiential learning formats such as summer schools, interdisciplinary field academies, or short-term applied training programs are largely absent.
- Social, institutional, and governance dimensions of water management are insufficiently represented in applied academic training.
- Regional universities, including those in Gavar and Goris, offer minimal or no dedicated water-related courses, contributing to significant geographic disparities in capacity development and access to specialized education.

Overall, despite the identified limitations, there remains clear room for improvement. Priority areas include the development of comprehensive water management degree programs, expansion of interdisciplinary curricula, systematic incorporation of applied and community-based learning components, and targeted strengthening of regional academic capacity. Strengthening alignment with contemporary international frameworks, regulatory standards, and sustainability agendas would significantly enhance the relevance and quality of water-related higher education in Armenia.

The study indicates that, in Armenia, professionals working in public institutions responsible for water resources management and protection are predominantly graduates of Yerevan State University, whereas the water infrastructure design, construction, and operational management system is largely staffed by graduates of the National University of Architecture and Construction of Armenia. This established educational–professional distribution reflects the historical development trajectory of the sector; however, it is no longer sufficient in the context of current and emerging sectoral needs.

Despite a significant shortage of qualified specialists in the water sector, particularly in water economics, water law, hydrochemistry, and hydrology, attention to these disciplines within higher education institutions has been limited and shows a gradual declining trend. There is a serious risk of further reduction or consolidation of these specialized academic tracks, which could exacerbate the existing human resource gap in the long term.

This situation is further influenced by the insufficient integration of emerging and interdisciplinary fields into curricula, as well as the limited reflection of contemporary water sector requirements, including governance, economic, legal, and scientific dimensions, within higher education programs.

2 International comparative assessment of curricula and their applicability for improving water sector education in Armenia

2.1 International best practice in water education

International experience demonstrates that contemporary water-related higher education has increasingly moved beyond narrow technical specialization toward integrated, interdisciplinary, and competency-based models. In leading European and international academic systems, water education is commonly structured around the interconnection of engineering, environmental sciences, economics, governance, law, climate resilience, and sustainability. Programmes increasingly emphasize not only technical problem-solving, but also institutional analysis, policy implementation, stakeholder engagement, and adaptive management capacities.

Compared with these international trends, the Armenian higher education landscape remains predominantly fragmented and technically oriented. For example, the National University of Architecture and Construction of Armenia provides valuable engineering foundations, particularly in water infrastructure design, construction, operation, but does not have courses and/or not included in the existed ones the topics related to water policy, integrated water resources management, water standards, SDG 6 targets and indicators, which are essential for regulating and guiding water infrastructure development and improvement.

Meanwhile, the Yerevan State University and the American University of Armenia offer water-related courses that focus mainly on water policy, regulation, and general water issues, but does not provide coverage of the technical needs and capacities required for water infrastructure planning, design, and operation.

In international universities, water-related curricula are:

- i) commonly include integrated water resources management (IWRM) as a core conceptual framework. This approach links hydrological processes with ecological sustainability, economic efficiency, institutional coordination, and social equity;
- ii) leading universities increasingly incorporate climate change adaptation, water security, drought and flood risk management, ecosystem-based approaches, and resilience planning into both undergraduate and graduate training. In Armenia, these emerging thematic areas remain insufficiently represented despite their growing strategic importance for national water resource management;
- iii) international benchmarking shows that contemporary water curricula place strong emphasis on regulatory and governance dimensions, particularly legal and institutional frameworks, public policy instruments, and implementation of international standards such as the EU Water Framework Directive and Sustainable Development Goal 6 (SDG 6). Armenian programmes currently provide only limited exposure to these policy-oriented dimensions, which reduces graduates' preparedness for modern governance-related responsibilities in the sector.

A further important distinction concerns teaching methodology. Internationally competitive programmes increasingly rely on experiential and problem-based learning formats, including field schools, internships, applied laboratories, interdisciplinary projects, stakeholder simulations, and partnerships with public agencies or utilities. In Armenia, practical learning remains concentrated

mainly within engineering programmes, while structured experiential formats remain limited or absent in environmental, governance, and policy-oriented tracks.

Benchmarking also highlights the importance of institutional coherence and academic specialization. In many countries, dedicated degree programmes in water resources management, water governance, hydroinformatics, or environmental water policy provide students with clearly defined academic pathways. By contrast, Armenia currently lacks a unified and comprehensive degree programme specifically devoted to integrated water management, resulting in dispersed and uneven capacity development across institutions.

2.1.1 International examples of water related programmes/curricula

Centre for International Postgraduate Studies of Environmental Management at TU Dresden, Germany¹

Operating under the joint framework of UNEP, UNESCO, and the German government, Centre for International Postgraduate Studies of Environmental Management (CIPSEM) at TU Dresden delivers postgraduate and short-term professional training programmes for specialists, environmental professionals and decision-makers from developing and emerging countries, with the objective of strengthening capacities in sustainable environmental governance and resource management.

CIPSEM is a facility within the Faculty of Environmental Sciences at TUD Dresden University of Technology since 1977. The target group of the program are young environmental specialists and leaders from developing countries including emerging market economies. Each year, a six-month long-course with a comprehensive range of topics: UNEP/UNESCO/BMUV International Postgraduate Course on Environmental Management for Developing Countries.

In addition, CIPSEM offers two to three short-term courses (about 4 weeks) that focus on annually changing thematic priorities aligned with current global environmental challenges. This included water topic in each two years, such as:

- 93rd UNEP/UNESCO/BMUKN International Short Course - Navigating Water Challenges: Climate Change and Resource Management (SC93) in 2025 (https://tu-dresden.de/bu/umwelt/cipsem/unep-unesco-bmukn/kurse/sc93?set_language=en)
- 88th UNEP/UNESCO/BMUV International Short Course on Nature-based Solutions to Global Water Challenges in 2023 (https://tu-dresden.de/internationales/news/innovative-loesungsansaeetze-rueckschau-auf-den-88-internationalen-kurzkurs-zu-naturbasierten-loesungen-fuer-wasserprobleme?set_language=en)

CIPSEM's educational model goes beyond conventional academic instruction by integrating environmental governance, resource management, institutional capacity building, policy implementation, and international environmental frameworks. This model demonstrates how postgraduate education can serve not only as a source of academic specialization but also as a

¹ https://tu-dresden.de/bu/umwelt/cipsem?set_language=en

mechanism for strengthening institutional and administrative capacities in strategic sectors such as water management.

IHE Delft Institute for Water Education in the Netherlands²

the IHE Delft Institute for Water Education in the Netherlands operates under the auspices of UNESCO and is recognized globally as the largest international graduate-level institution dedicated exclusively to water education. Graduate education at IHE Delft is science based and highly relevant for those interested in water and sustainable development. The institute offers highly interdisciplinary education in water and sustainable development, combining engineering, hydrology, hydroinformatics, sanitation, governance, water diplomacy, climate adaptation, and institutional analysis. Its programmes are specifically designed to connect technical knowledge with social, economic, legal, and policy dimensions of water management.

IHE Delft offers two accredited Master of Science programmes: the MSc in Water and Sustainable Development and the Research MSc in Water and Sustainable Development.

The PhD programme is at the core of research at IHE Delft. PhD candidates undertake scientific research structured around themes addressing key societal challenges: research that is problem-focused, solution-orientated and often directly related to water challenges in the candidate's own country or region. Each PhD study is linked to a partner university in the Netherlands and the SENSE Research School (www.sense.nl), which further enriches the PhD experience and expands the available resources.

Beyond formal degree programmes, IHE Delft also provides short professional courses³, including online courses, customized training, and international capacity development initiatives, serving professionals from more than 190 countries. Its educational philosophy strongly reflects the principles of integrated water resources management, multi-level governance, and sustainability-oriented decision-making.

The IHE Delft Institute for Water Education experience also shows that effective contemporary water education increasingly depends on several common features: interdisciplinary curriculum design, strong integration of governance and policy dimensions, close linkage between academic learning and practical sectoral needs, and flexible capacity-building formats that address both university students and mid-career professionals.

Hague Academy for Local Governance, Netherlands⁴

The is a non-profit, non-governmental organisation that aims to strengthen local democracy worldwide. They offer practice-oriented training in The Netherlands and abroad, one of which related to water governance: Multilevel Water Governance.

The course is intended for policy makers and technical staff of organisations responsible for water governance and management working for national, regional and local governments, water authorities, service companies, NGOs and donor and development organisations. Particularly relevant for

² <https://www.un-ihe.org/node/118>

³ <https://www.un-ihe.org/education/online-and-on-campus-short-courses>

⁴ <https://www.un-ihe.org/node/118>

professionals working in ministries of water, environment, or natural resources, river basin authorities and water boards, local or regional environmental agencies, climate resilience and infrastructure planning units.

Unlike conventional technically oriented water education, this programme approaches water management primarily through the lens of governance and institutional coordination. The course focuses on internationally recognized principles of integrated and multilevel water governance, emphasizing the interaction between national, regional, and local authorities, water service providers, river basin institutions, civil society actors, and communities.

A particularly important feature of the programme is its strong emphasis on the legal, political, institutional, and financial dimensions of water management. Participants examine issues such as water allocation, stakeholder engagement, conflict resolution, financing of water services, climate resilience, ecosystem services, and disaster risk management. The course also combines conceptual learning with practical exposure through Dutch case studies, field visits, and applied policy discussions, thereby linking academic knowledge with real-world governance practice.

University of Waterloo, Collaborative Water Program, Canada⁵

The University of Waterloo offers one of the most interdisciplinary water-related graduate models in Canada through its Collaborative Water Program. What is particularly notable is that the programme is co-delivered across multiple faculties and academic disciplines (co-delivered by 11 departments and schools from across all 6 faculties), linking engineering, environmental sciences, economics, planning, and governance. Students receive specialized training in their home disciplines while also participating in common interdisciplinary courses focused on current water management challenges, field-based learning, stakeholder engagement, and applied project work. This model demonstrates how water education can maintain disciplinary depth while simultaneously building integrative and collaborative capacities.

The Collaborative Water Program is training the next generation of water leaders by focusing on the thinking, knowledge and skills required to navigate complex water challenges in a fast-changing water world. Collaborative Water Program students with diverse disciplinary backgrounds develop the cognitive, self-efficacy, management, technological and collaborative skills sought after by employers.

Collaborative Water Program students complete their specialist training in their respective home department or school while working with students from a variety of disciplines in completing the program's core required courses: WATER 601 and WATER 602.

WATER 601 is a 12-week course generally offered in the Winter term. The course provides an overview of current issues and challenges in water research and management from a variety disciplinary perspective, including water science, engineering, governance and economics. Its purpose is to provide students with a broad knowledge base of the key theories, concepts and terminology from various water-related fields, and to allow them to develop connections with peers, water researchers and professionals in other areas of study. Seminars and discussions with Water Institute faculty members and professionals from different disciplines will introduce students to current research and practice

⁵ <https://uwaterloo.ca/collaborative-water-program>

WATER 602 is a project-based course designed to extend the interdisciplinary learning in WATER 601 from the classroom to the world of practice. WATER 602 is generally offered in the Fall term and is comprised of an intensive field-based learning component and a classroom-based and self-directed project component. Field-based learning focuses on the Grand River watershed through the perspective of various stakeholders, including conservation authorities, municipalities, practitioners, industry and citizens groups. Projects challenge interdisciplinary groups of students to work collaboratively and with stakeholders to address specific opportunities or challenges.

Research seminar milestone: in addition to WATER 601 and WATER 602, Collaborative Water Program students must complete a Research Seminar milestone to discuss how learnings from WATER courses were applied in, or influenced, research work in the student's home department or school. This milestone is normally met in March, following completion of WATER 602, during the Water Institute's World Water Day program.

University of Southampton, UK⁶

The University of Southampton provides another important example through its water-related environmental science pathways and its MSc in Water Resources Management, designed under the Geography and environmental science department. These programmes combine hydrology, freshwater ecosystems, water and wastewater engineering, environmental law, environmental management, socio-economic dimensions, and field-based research. A notable strength is the integration of scientific, engineering, legal, and management perspectives within a single academic framework, alongside applied learning through field exercises, policy briefs, and collaboration with external organizations. This integrated design closely reflects international best practice in water education.

This MSc Water Resources Management master's degree develops the professional skills required for a rewarding career as a water focused environmental scientist. The importance of accurately assessing potential and existing impacts on the water environment from industrial practices, abstraction and agriculture sits at the heart of this course.

American University of Beirut, Lebanon⁷

At the American University of Beirut, water-related teaching and research are strongly linked to regional environmental realities, particularly water scarcity, water quality, ecosystem conservation, and governance challenges in arid and semi-arid contexts⁸. Its approach is particularly relevant because it connects scientific knowledge with the socio-environmental pressures characteristic of water-stressed regions.

The University provides BSc in "Environmental and Water Resources Engineering", equipping students with advanced technical skills and practical expertise to solve environmental and water-related challenges. Students can choose between two options: Thesis Track, Non-thesis Track. The thesis program prepares students through course work and provides them with significant

⁶ <https://www.southampton.ac.uk/courses/water-resources-management-masters-msc>

⁷ <https://www.aub.edu.lb/>

⁸ <https://www.aub.edu.lb/academics/Pages/Graduateprograms.aspx>

research experience in their selected area of concentration. All graduate students must satisfy either the thesis or the non-thesis program requirements.

In addition, American University of Beirut has the MS in Irrigation program aims to develop skills to address issues related to the management of water resources for sustainable crop production. Graduate students in Irrigation get exposed to state-of-the-art classroom instruction, laboratory and fieldwork, research in advanced irrigation technologies and real-world projects, professional irrigation design practices, and more.

University of Sharjah, College of Health Sciences, UAE⁹

Another relevant international example is the “Water and Wastewater Sanitation” course (4 credits) under BSc in Environmental Health Sciences¹⁰ offered by the University of Sharjah, College of Health Sciences, within its Environmental Health Sciences programme. Unlike conventional engineering-oriented water courses, this module approaches water management through the interconnected perspectives of environmental health, sanitation, water quality protection, and public health risk prevention.

The course covers the physical, chemical, and microbiological characteristics of water and wastewater, with particular emphasis on drinking water quality, protection of water sources, aquifer characteristics, water demand, measurement techniques, and wastewater treatment systems. Importantly, it also introduces students to administrative and regulatory frameworks for water source protection, as well as analytical and quantitative methods used in water quality monitoring and control. A notable strength of the course is its combination of theoretical instruction with practical analytical competencies relevant to environmental health management.

This example is particularly important because it demonstrates that contemporary water-related education increasingly links water quality, sanitation, public health, and environmental protection rather than treating water solely as an infrastructure or engineering issue.

Water Education in Ukraine¹¹

As of 2026, training of specialists in educational programs whose names are related to hydrology and water resources management in Ukraine is carried out by both classical universities (Odesa, Chernivtsi, Kyiv, Lutsk, Ternopil) and polytechnic universities (Zhytomyr, Dnipro).

In 2019-2020, due to the decline in popularity and the reduction in the number of entrants, enrolment in the educational program "Hydrology" was suspended in two higher education institutions of Ukraine:

⁹ <https://www.sharjah.ac.ae/Academics/healthsciences>

¹⁰ <https://www.sharjah.ac.ae/en/academics/degree/undergraduate/environmental-health-sciences>

¹¹ https://unece.org/sites/default/files/2026-04/1.%20Grebin_overview.pdf

- The National University of Water and Environmental Engineering (Rivne)¹² at the Department of Geology and Hydrology, which was the legal successor of the first Department of Hydrology in Ukraine, created by E. Oppokov in 1922 at the Kyiv Polytechnic Institute;
- Oles Honchar Dnipro National University¹³.

Ukrainian universities are distinguished by their advanced training in river basin management, hydrological modelling, and water systems engineering design. Traditionally, Ukraine has a strong scientific school in hydrology, which dates back to the Soviet period and has retained its influence to this day. This school is known for stream and river modelling methods, flood forecasting and risk assessment studies, and scientific approaches to reservoir and water system management.

In recent years, Ukrainian universities have been actively integrating EU Water Framework Directive approaches, climate change adaptation components, GIS and satellite data applications in water monitoring, ecosystem and nature-based solutions, etc.

One of the important features of the Ukrainian education system is a strong connection with practical application. students are involved in river basin studies, hydrotechnical structure design, water quality and pollution monitoring programs.

Table 3 represents the summary of the international universities/programmes on water-related education and its' relevance for Armenian high level educational programmes. Particularly relevant for Armenia is the programme's emphasis on linking scientific knowledge with practical governance challenges, interdisciplinary policy dialogue, and real-world case-based learning.

Table 3. Comparative benchmarking of international water-related educational models and its' relevance for Armenian

Institution / programme	Main orientation	Key thematic strengths	Relevance for Armenia
CIPSEM programme at the TU Dresden, Germany	Interdisciplinary environmental management and capacity building	Environmental governance, institutional strengthening, policy implementation, international environmental frameworks, case-based learning.	Shows the importance of linking technical knowledge with governance, institutional capacity, and policy-oriented professional training.
IHE Delft Institute for Water Education, Netherlands	Specialized international graduate-level water education	IWRM, hydrology, hydroinformatics, sanitation, governance, climate adaptation, water diplomacy, sustainability.	Demonstrates the value of dedicated interdisciplinary water degree programmes integrating technical and policy dimensions.
Multilevel Water Governance course at the Hague Academy for Local Governance. Netherlands	Governance-oriented professional training	Multilevel governance, stakeholder coordination, legal and institutional frameworks, financing, climate resilience, applied policy learning.	Particularly relevant for strengthening governance, legal, and institutional components of Armenian water curricula.

¹² <https://auu.com.ua/en/members/natsionalnyy-universytet-vodnogo-gospodarstva-ta-pyrodokorystuvannya/>

¹³ <https://www.dnu.dp.ua/eng>

Collaborative Water Program at the University of Waterloo, Canada	Interfaculty interdisciplinary water education	Engineering, environmental science, economics, planning, governance, collaborative problem-solving, applied project work.	Illustrates how interdisciplinary integration can be institutionalized without losing disciplinary specialization.
American University of Beirut, Lebanon	Regionally contextualized water and environmental education	Water scarcity, water quality, ecosystem conservation, governance under water stress conditions.	Relevant as a regional model linking education to context-specific environmental pressures and resource vulnerability.
University of Southampton, UK	Integrated scientific and management-oriented water education	Hydrology, freshwater systems, water resources management, environmental law, socio-economic dimensions, field learning.	Shows how engineering, science, law, and management can be combined within a single academic framework.
University of Sharjah, UAE	Public health and environmental health perspective	Drinking water quality, wastewater sanitation, microbiological risks, water quality monitoring, regulatory protection of water sources.	Particularly relevant for strengthening water quality, sanitation, and public health dimensions in Armenian curricula.
National University of Water and Environmental Engineering (Rivne), Ukraine	River basin management, hydrological modelling, and water systems engineering design	Combination of the classical hydrological school with modern ecological and management approaches.	Important regional reference example for water education reforms.

2.1.2 Cross-cutting lessons for Armenia based on international examples

Taken together, these international examples indicate several common characteristics of contemporary water-related education:

- Interdisciplinary integration across engineering, environmental sciences, governance, economics, law, and public health
- Strong incorporation of IWRM principles as a unifying academic framework, including SDG 6 targets and indicators, national and international water regulations policies, EU directives, etc.
- Practical and experiential learning formats, including fieldwork, internships, case studies, and applied projects
- Greater attention to climate resilience, water security, and sustainability
- Institutional and governance-oriented training, including stakeholder engagement, financing, and regulatory implementation
- Context-sensitive programme design, aligned with regional environmental and sectoral challenges

Compared with these international approaches, Armenia's higher education system still remains more fragmented, with technical, environmental, and policy-oriented knowledge largely separated rather than systematically integrated.

3 Recommendations for improving water sector education in Armenia

Based on the identified gaps and international benchmarking, the following priority recommendations may strengthen water-related higher education and professional capacity development in Armenia.

1. Update and modernization of existing university curricula

This recommendation primarily concerns the National University of Architecture and Construction of Armenia and the Yerevan State University, while the American University of Armenia may also be included. Existing water-related courses across different faculties and departments should be reviewed and updated with a stronger focus on the integrated water resources management (IWRM) framework and interdisciplinary approaches. Curricula should incorporate national water legislation, the principles of the EU Water Framework Directive, river basin management, standardization, the SDG 6 targets and indicators, monitoring of the current water situation in Armenia, water infrastructure challenges, and nature-based solutions. Updated programmes should more systematically integrate IWRM principles, including water governance, climate resilience, water policy, legal frameworks, and sustainability-oriented approaches, while preserving their existing disciplinary strengths.

In addition, during the curriculum revision process, it is recommended to also consider the experience of Ukrainian universities as one of the historically strongest regional “schools” of hydrology and water resources education. In Ukraine, specialized higher education institutions and academic tracks in hydrology and water resources management were established before the Soviet period and are still considered among the strongest scientific and applied universities in hydrology in the post-Soviet countries. Ukrainian universities are traditionally known for their excellence in hydrological modeling, river basin management, hydraulic engineering, and applied water science, and they continue to develop cutting-edge curricula integrating both classical hydrological science and modern ecological and management approaches. This experience can provide valuable lessons for strengthening hydrological education and scientific training in Armenian universities.

2. Development of short-term and advanced capacity-building programmes

Armenia would benefit from the introduction of summer schools, interdisciplinary field academies, short-term applied training programmes, and other flexible learning formats focused on contemporary water sector challenges. In addition, post-doctoral and advanced professional training courses, similar to the model of TU Dresden CIPSEM, could be developed for university staff, researchers, and sector professionals, combining scientific knowledge with governance, policy, and institutional practice. Particular attention should be given to fields where the shortage of specialists is already evident, especially hydrology, hydrochemistry, water economics, and water law.

3. Introduction of interdisciplinary course models

Following the example of the Collaborative Water Program at the University of Waterloo, Armenian universities could introduce joint interdisciplinary modules and research programmes connecting engineering, environmental science, governance, economics, and policy. Such programmes could be organized both within a single university and across multiple universities. For example, at the Yerevan State University, courses such as water law, water economics, water

chemistry, biology, and hydrology could be brought together under a common IWRM umbrella. At the inter-university level, cooperation between the National University of Architecture and Construction of Armenia and the Yerevan State University could create a particularly effective and comprehensive learning model, allowing students to choose courses offered by different departments and institutions, such as «Hydraulic course» in NUAC and «Water Law» or «Water Chemistry» in YSU, etc.

A similar approach is envisaged under the Armenian «Academic City» concept¹⁴. The Academic City of Armenia is a large-scale national initiative aimed at transforming higher education, research, and innovation infrastructure by consolidating universities, research institutions, and innovation ecosystems into a unified academic hub on the outskirts of Yerevan. The Academic City is designed to host multiple universities, research centers, and thematic clusters (technology, education, arts, medicine, and others), integrating education, research, and innovation within a single ecosystem. The City construction is planned to begin in 2027, with the first phase of infrastructure and academic facilities expected to be operational around 2029–2030, while full development is projected beyond 2034.

However, since Academic City implementation is expected only in the longer term, there is a risk that water-related education may not remain among the priority thematic areas. Therefore, this approach could be piloted earlier by Armenian universities, especially by the Yerevan State University, with support from international partners such as the European Union, United Nations (UNECE, UNESCO), Asian Development Bank, and GIZ, also including through dedicated Erasmus initiatives. This would also support the integration of international experience into Armenian water education.

4. Stronger cooperation with water sector institutions

The example of the Ecological Chemistry Department at the Faculty of Chemistry of the Yerevan State University, as well as numerous international examples, demonstrates the importance and high effectiveness of cooperation between universities and sector institutions. Higher education institutions should strengthen cooperation with water resources management authorities and water utilities, including the Ministry of Environment, Hydrometeorology and Monitoring Center, Water Committee, Veolia Djur, also private water companies, etc. Such cooperation would support the systematic organization of internships, industrial placements/practices, field-based training, applied student projects, and practice-oriented learning directly linked to sectoral needs.

In such a context, students' motivation is strongly enhanced by the prospect of direct employment opportunities immediately after graduation. As a result, public institutions and private sector organizations are increasingly perceived as potential employers for young specialists, rather than distant or abstract career destinations.

A strong example of this type of effective academia–industry cooperation in Armenia is the long-standing partnership between Synopsys Armenia and Yerevan State University. This collaboration represents one of the most successful models of integrating higher education with industry needs in the country. Through joint educational programmes, specialized courses, and internship opportunities, Synopsys has contributed to aligning university curricula with real labor market requirements, particularly in engineering and information technologies.

¹⁴ <https://acarmenia.am/en>

The cooperation includes student training programmes, practical laboratory work, mentorship by industry professionals, and early involvement of students in applied projects. As a result, many graduates gain not only theoretical knowledge but also practical skills that significantly increase their employability. This model demonstrates how structured university–industry partnerships can effectively bridge the gap between academic education and labor market demands, creating a sustainable pipeline of qualified young professionals.

In the context of water sector education, a similar model of collaboration between universities and key sector institutions could significantly enhance students’ professional readiness and employment prospects, while also strengthening institutional capacity within the water sector itself.

In addition, the state support mechanisms should be introduced to encourage enrollment and professional specialization in the water sector. In particular, state-funded places could be allocated within BSc and MSc programmes in strategically important water-related fields. In parallel, incentive-based cooperation models between students and potential employers, especially public institutions responsible for water resources management, could be established. Under such arrangements, students demonstrating strong academic performance in water-related specializations could receive tuition fee reductions or full scholarships, combined with guaranteed employment opportunities in relevant governmental institutions upon graduation.

5. Continuing education for public sector specialists

Universities and other specialized public or non-governmental organizations (Foundations, NGOs, etc) should play a stronger role in organizing regular professional training and refresher courses for specialists working in public institutions responsible for water resources management, protection, regulation, and infrastructure operation. This is particularly relevant in light of 27.11.2025 Armenian Government decision N 1712-L¹⁵ requiring professional training for public sector employees receiving bonuses and additional payments. In this context, it is important that the leadership/administration of relevant public institutions actively encourage staff participation in specialized training: not only selecting general and easy topic, but also profession related (water management, water law/policy, climate change, SDGs, etc). Thus, the establish cooperation with universities and water innovation training providers is required.

6. Joint research, applied innovation, and PhD-level cooperation

A further priority is the expansion of joint research activities between universities, research institutions, and public sector bodies, including stronger support for applied research and doctoral studies. Opportunities could be further developed under the Higher Education and Science

¹⁵ “10 percent of the award given to the person who received the incentive, and in case the amount of the latter exceeds 250 thousand drams, 250 thousand drams, is intended for expenses related to education or scientific activities, including publications in internationally reputable scientific journals (hereinafter referred to as education), during the semester following the semester of payment. In case of failure to submit documents confirming the expenses for funds received for educational purposes, this part is subject to deduction from the incentive fund for the following period”.- Article 17 of the Pilot Procedure of the Decision of the Government of the Republic of Armenia N 1712-L on "Pilot Procedure for Performance Assessment of Individual Bodies of the State Administration System and Incentives Based on It" approved on November 27, 2025.

Committee of Armenia, such as “Targeted-2027” or similar programme¹⁶, which aimed at addressing practical sectoral challenges while simultaneously strengthening academic capacity and knowledge transfer.

Water research institutions in Armenia possess considerable scientific and technical expertise but remain only partially integrated into undergraduate and master’s-level teaching. Stronger institutional cooperation would facilitate knowledge transfer, early-stage capacity building, and greater student exposure to current research methods and sectoral challenges. In this regard, closer collaboration among the Armenian research and specialized Institutions (which are focusing commonly on PhD level education) with National University of Architecture and Construction of Armenia, Yerevan State University, and the American University of Armenia, as well as regional universities in Goris, Gavar, Ijevan, could help create complementary course structures, shared modules, joint field training, and interdisciplinary academic pathways.

7. Reducing regional disparities in educational access

Regional universities in Armenia currently offer limited opportunities for specialized water-related education. Targeted support should therefore be directed toward expanding water-related modules, elective courses, short-cycle training programmes, and applied capacity-building initiatives in regional higher education institutions, including those in Ijevan¹⁷, Gavar, and Goris.

At the same time, regional higher education institutions should not merely replicate the curricula of larger universities in Yerevan. A more strategic and sustainable approach would be to develop place-based educational and research specializations focused on the most pressing water-related challenges of their respective regions.

For example, institutions in Gavar could develop specialized courses and research tracks related to the protection and ecosystem restoration of Lake Sevan. Universities in Goris could focus on water-related challenges associated with mining activities in Syunik, including the development of closed-loop water circulation systems, industrial wastewater management, and the assessment and mitigation of water-related ecological risks. The branch of Yerevan State University Ijevan Branch could place greater emphasis on issues relevant to the Debed River Basin and Aghstev River Basin, such as flood risk assessment, early warning systems, and preventive watershed management.

Such a regional specialization model would strengthen the academic profile of these institutions while making their educational offer more distinctive and competitive. It would also increase the employability of local graduates by preparing them for narrower, region-specific professional niches that directly correspond to local environmental and economic realities.

Importantly, this approach would allow regional universities to complement rather than duplicate the programmes of larger national institutions. By building expertise around locally relevant water issues, regional universities could become valuable centers of applied knowledge, regional innovation, and targeted human capacity development for Armenia’s water sector.

¹⁶ <https://www.hesc.am/hy/calls/27target/>

¹⁷ <https://ijeavan.ysu.am/en>

4 Actions and Next Steps

Based on the recommendations described in the Chapter 3 of this report, the next steps can be structured as practical implementation actions, as follows:

Action 1. Establishment of a Water Education Network in Armenia

A national Water Education Network will be established to bring together representatives of universities, researchers, government institutions, sectoral actors, and international donor organizations. The Network will serve as a collaborative platform for continuous dialogue, coordination, and knowledge exchange aimed at strengthening water-related education and capacity development in Armenia.

The Network will facilitate regular meetings, thematic discussions, and working sessions focused on improving the quality and relevance of water education. Members will be able to share up-to-date sectoral information, policy documents, technical reports, course syllabi, and learning objectives, as well as collaboratively support the revision and modernization of existing water-related curricula across higher education institutions.

In addition, the Network will function as a strategic cooperation platform for joint applications to international funding and research programmes, including EU Erasmus+ and Horizon Europe initiatives. It will also enable stronger alignment between academic research and policy needs by creating a structured space for dialogue between universities, researchers, and government agencies. This will support the identification of priority applied research topics in water resources management and facilitate the use of research evidence in the development of national regulations, river basin management plans, and other policy instruments.

At the initial stage, the Network may focus on the following key actions:

- Development of a national roadmap for water education reform in Armenia
- Identification and agreement on priority thematic areas, including Integrated Water Resources Management (IWRM), hydrology, hydrochemistry, water governance, water economics, and water law, and their systematic integration into updated curricula
- Strengthening donor engagement (including the EU, UNESCO, UNECE, Asian Development Bank, and GIZ) to mobilize investment in water education reform, professional training of academic staff, and preparation of future water sector professionals

Key members of the Network

- Heads of academic programmes, department chairs, and professors from Yerevan State University, National University of Architecture and Construction of Armenia, American University of Armenia, Armenian National Agrarian University, as well as universities in Gavar and Goris, etc.
- Representatives of research institutes and Erasmus+ programme participants
- Government institutions, including the Ministry of Environment and the Water Committee of Armenia
- Water sector stakeholders such as Veolia Djur, mining companies, and financial institutions (e.g., Ameriabank, Ardshinbank, ACBA Bank), particularly those supporting environmental or water-related projects
- International development and donor organizations implementing water-related programmes (EU, UNESCO, UNECE, Asian Development Bank, GIZ)

Potential Coordination Mechanism of the Network

The coordination of the Water Education Network is intended to be carried out by a neutral and independent organization, ensuring impartiality, inclusiveness, and balanced representation of all stakeholders. The long-term coordination of the Network could be entrusted to the NGO “Environment and Health,” which has an existing Memorandum of Understanding with the Ministry of Environment of the Republic of Armenia (since 2022) aimed at promoting environmental education and ecological awareness in Armenia. Since 2026, the NGO has also been cooperating with UNESCO’s World Water Assessment Programme and has signed a co-publishing agreement for the translation, publication, and dissemination of the United Nations World Water Development Report. In addition, the NGO maintains an extensive national network of cooperation with more than 260 schools across all regions of Armenia.

Why the coordination of the Network should not be assigned to a single academic institution, government body, or donor organization/programme? - International and national experience suggests that assigning the coordination of a multi-stakeholder Water Education Network to a single type of institution, whether an academic institution, a governmental body, or a donor organization, can significantly reduce the effectiveness, neutrality, and long-term sustainability of the initiative.

First, when a university assumes the coordination role, there is a risk of institutional bias. In such cases, the coordinating institution may unintentionally prioritize its own academic programs, research agendas, and visibility, which can lead to unequal representation of other universities and educational providers. This may create perceptions of unfairness or competition among participating institutions, thereby weakening trust and collaboration within the Network.

Similarly, if coordination is placed under a government institution, there is a potential risk of administrative or policy-driven bias, where priorities may be aligned primarily with the immediate needs of the public sector rather than the broader academic and research community. This can limit the openness of the platform and reduce its attractiveness for independent academic participation and critical scientific dialogue.

In the case of donor-led or programme coordination, sustainability becomes a key concern. Donor organizations and funded programmes are typically time-bound, and once the project cycle ends, there is often no institutional mechanism or mandate to ensure the continuation of coordination activities. As a result, networks established under donor leadership frequently lose momentum or become inactive after project completion.

This challenge has been observed in Armenia as well. A relevant example is the Environmental Education Network established at the American University of Armenia, which operated between 2014 and 2017 under the Norwegian Embassy Small Grants Programme. Although the initiative was successful during its implementation phase, the network’s activities gradually ceased after the project ended, primarily due to the absence of a long-term institutional host responsible for its continued coordination and maintenance.

More broadly, international experience shows that sustainable multi-stakeholder networks require neutral, facilitative coordination mechanisms that are not directly tied to the operational interests or short-term funding cycles of any single actor.

For these reasons, the coordination of the Water Education Network should preferably be assigned to an independent, non-partisan facilitation structure capable of ensuring neutrality among participating institutions, balanced representation of all stakeholders, continuity beyond donor-funded project cycles, low administrative burden on universities and government agencies,

and long-term institutional memory and knowledge management. Such a model would help ensure that the Network remains inclusive, sustainable, and focused on system-wide improvement of water education rather than institutional competition or short-term project objectives.

Within this framework, the Environment and Health NGO could assume a facilitative and coordination role by organizing regular meetings, thematic discussions, and knowledge-sharing activities among Network members, thereby ensuring continuity and efficiency without creating additional administrative burden for universities or public institutions.

Furthermore, having strong relationships with universities, schools, government institutions, and the public sector, the NGO could contribute to:

- Organizing study visits for school students to universities, government institutions, and water sector organizations, thereby increasing awareness and interest in water-related careers.
- Supporting the design and implementation of thematic short-term research projects in cooperation with universities and public authorities.
- Facilitating structured career orientation activities for school students to promote engagement in water-related professions.
- Organizing regular professional orientation sessions, as well as thematic training programmes for school teachers and university lecturers.

Action 1 Implementation Timeline

Period	Activity	Key Actions	Expected Outputs
June–September 2026	Launch of the Water Education Network in Armenia	- Formal establishment of the Network - Invitation of stakeholders from universities, government, water sector, and donors - Definition of basic governance and coordination principles	- Network officially launched-Membership list established - Agreed coordination framework and participation structure
October 2026	First introductory and experience-sharing meeting	- First official meeting of Network members - Presentation of ongoing water curriculum reforms for 2026–2027 academic year - Sharing institutional experiences and identifying gaps	- Common understanding of current curriculum status - Identification of priority gaps and needs - Initial agreement on harmonization areas
October–November 2026	Development of strategic planning documents for the Network	- Drafting of National Roadmap for Water Education Reform - Preparation of Action Plan of the Network for 2027 - Consolidation of inputs from all stakeholders	- Draft National Roadmap for Water Education Reform - Draft 2027 Action Plan with priority interventions - Agreed strategic direction for next phase of reforms

Activity 2. Piloting Updates of Ongoing Water-Related Curricula

As a short-term pilot initiative for the 2026–2027 academic year, it is proposed to revise a selected number of educational programmes at the Yerevan State University. In particular, preliminary agreement has already been reached with the programme coordinators and faculty members of the Institute of Pharmacy and the Faculty of Chemistry. Specifically, within the “Food Chemistry” and “Pharmaceutical chemistry” Bachelor’s programmes the syllabus of the “Fundamentals of Ecology and Environmental Protection” course will be reviewed and officially updated (<https://www.ysu.am/faculty/495/educational-program-509/edu-plan>)

The revision will focus on strengthening the curriculum by incorporating key thematic areas related to integrated water resources management, water governance, national water legislation, national and EU WFD policy frameworks, SDG 6, and river basin management principles. In addition, the updated syllabus will include a more comprehensive and applied perspective on water resource management, ensuring that students gain a stronger understanding of the interlinkages between environmental protection and water systems.

The course will also be supplemented with an updated list of recommended literature, policy documents, and technical resources to support students’ independent learning, analytical skills development, and research activities. This will contribute to a more interdisciplinary and practice-oriented educational approach, aligned with current national and international water sector priorities.

In addition, this pilot example and the experience gained from the curriculum revision process will be presented and discussed with other universities in Armenia, with the aim of encouraging similar updates and integration of water-related components into their own educational programmes and courses. To further support higher education institutions in this process, an Water Educational Guideline (in both Armenian and English) will be developed and provided to universities as a practical reference tool for revising, updating, or integrating water-related courses and curricula.

Action 2 Implementation Timeline

Period	Activity	Key Actions	Expected Outputs
June 2026	Curriculum review initiation and development of revised syllabus	- Revision of the “Fundamentals of Ecology and Environmental Protection” course syllabus, integrating topics related to IWRM, water governance, legislation, EU WFD principles, SDG 6, river basin management, etc	- Draft revised syllabus prepared - Updated educational and reference materials compiled
August 2026	Preparation of supporting Water Educational Guideline	- Development of an Water Educational Guideline to support universities in revising or integrating water-related curricula	- Draft Educational Guideline prepared in two languages
September 2026	Official implementation of updated curriculum	- Official approval and introduction of the updated syllabus for the 2026–2027 academic year - Distribution of updated educational materials to lecturers and students (updating YSU web page on the educational program)	- Revised course officially launched
October 2026	Dissemination of pilot experience and stakeholder engagement through the Water Education Network in Armenia	- Presentation of pilot results and lessons learned to other Armenian universities - Organization of discussions on possible replication of similar curriculum updates in other higher education institutions	- Increased awareness among universities and raise interest from other institutions in curriculum modernization - Basis created for broader national curriculum reform initiatives

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