EU4Environment in Eastern Partner Countries:
Water Resources and Environmental Data (ENI/2021/425-550)

REGIONAL REPORT ON SURFACE WATER

OUTPUTS 1.1 and 1.4

Funded by
the European Union

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ABOUT THIS REPORT

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ABOUT EU4ENVIRONMENT – WATER RESOURCES AND ENVIRONMENTAL DATA

This Programme aims at improving people's wellbeing in EU's Eastern Partner Countries and enabling their green transformation in line with the European Green Deal and the Sustainable Development Goals (SDGs). The programme's activities are clustered around two specific objectives: 1) support a more sustainable use of water resources and 2) improve the use of sound environmental data and their availability for policy-makers and citizens. It ensures continuity of the Shared Environmental Information System Phase II and the EU Water Initiative Plus for Eastern Partnership programmes.

The programme is implemented by five Partner organisations: Environment Agency Austria (UBA), Austrian Development Agency (ADA), International Office for Water (OiEau) (France), Organisation for Economic Co-operation and Development (OECD), United Nations Economic Commission for Europe (UNECE). The programme is principally funded by the European Union and co-funded by the Austrian Development Cooperation and the French Artois-Picardie Water Agency based on a budget of EUR 12,75 million (EUR 12 million EU contribution). The implementation period is 2021-2024.

https://eu4waterdata.eu

CONTENTS

List of abbreviations

ADA ..... Austrian Development Agency
BQE ..... Biological Quality Elements
DoA ..... Description of Action
DG NEAR ..... Directorate-General for Neighbourhood and Enlargement Negotiations of the European Commission
EaP ..... Eastern Partners
EC ..... European Commission
EECCA ..... Eastern Europe, the Caucasus and Central Asia
EMBLAS ..... Environmental Monitoring in the Black Sea
EPIRB ..... Environmental Protection of International River Basins
ESCS ..... Ecological Status Classification Systems
EU ..... European Union
EU4WD ..... Eu4Environment – Water Resources and Environmental Data programme
EUWI+ ..... European Union Water Initiative Plus
GEF ..... Global Environmental Fund
ICPDR ..... International Commission for the Protection of the Danube River
INBO ..... International Network of Basin Organisations
IOW/OIEau ..... International Office for Water, France
IWRM ..... Integrated Water Resources Management
NESB ..... National Executive Steering Board
NFP ..... National Focal Point
NGOs ..... Non-Governmental Organisations
NPD ..... National Policy Dialogue
OECD ..... Organisation for Economic Cooperation and Development
RBD ..... River Basin District
RBMP ..... River Basin Management Plan
Reps ..... Representatives (the local project staff in each country)
ROM ..... Result Oriented Monitoring
ToR ..... Terms of References
UBA ..... Umweltbundesamt GmbH, Environment Agency Austria
UNDP ..... United Nations Development Programme
UNECE ..... United Nations Economic Commission for Europe
WFD ..... Water Framework Directive

Country Specific Abbreviations Armenia

EMIC ..... Environmental Monitoring and Information Centre (until January 2020)

HMC..... Hydrogeological Monitoring Centre (since February 2020)

MNP..... Ministry of Nature Protection

SCWS..... State Committee on Water Systems

SWCIS..... State Water Cadastre Information System of Armenia

WRMA ..... Water Resources Management Agency

Country Specific Abbreviations Azerbaijan

Azersu JSC..... JSC Water Supply and Sanitation of Azerbaijan

MENR..... Ministry of Ecology and Natural Resources

WRSA ..... Water Resources State Agency of Ministry of Emergency Situations

Country Specific Abbreviations Georgia

MENRP..... Ministry of Environment and Natural Resources Protection

NEA ..... National Environment Agency

NWP..... National Water Partnership

Country Specific Abbreviations Moldova

AAM..... Agency “Apele Moldovei”

AGMR..... Agency for Geology and Mineral Resources

AMAC..... Association of Apacanals

EAM ..... Environment Agency Moldova

MoAgri..... Ministry of Agriculture (of the Republic of Moldova)

MoENV..... Ministry of Environment (of the Republic of Moldova)

Moldova..... Republic of Moldova

SHS..... State Hydrometeorological Service

Country Specific Abbreviations Ukraine

MENR..... Ministry of Ecology and Natural Resources

NAAU ..... National Accreditation Agency of Ukraine

SAWR ..... State Agency of Water Resources

SEMS..... State Environment Monitoring System

UkrHMC ..... Ukrainian Hydrometeorological Center

Executive Summary

This report summarizes the main activities carried out in Armenia, Azerbaijan, Georgia, Moldova and Ukraine in the framework of the Eu4Environment Water Resources and Environmental Data Program for surface water in 2022-2024. The implemented activities comprised theoretical and practical trainings in the field and the laboratory, supported surface water surveys in specific national areas as well as at transboundary level.

All activities built on the results of the work of the previous program (EUWI+, 2016–2021). They aimed at further strengthening local staff capacities, the availability of more quality-assured data for better surface water governance and management, the communication and cooperation with neighbouring countries and finally, and at enabling and improving the implementation of the WFD as the main planning and management instrument for all water resources.

The types of offered and implemented support activities in the countries varied, as they have been identified and executed according to the individual needs and available resources in each country.

1. Activity 1.1.1 – Support to the preparation of River Basin Management Plans

In Armenia, Georgia and Ukraine, the elaboration of **twelve new RBMPs** was **supported** between 2022 and 2024. Ukraine prepared nine RBMPs covering the entire country; Armenia developed another one for the Northern River Basin District (RBD) and Georgia two RBMPs for the Enguri RBD and the Rioni RBD. For all RBMPs, various surface water-related guidance was provided focusing on reviewing all related chapters on surface water bodies, characterisation, monitoring, risk and status assessment, on the Programmes of Measures and the corresponding maps. Multiple proposals on improvements were given to the authors, and the improved chapters were quality-checked again.

STATUS ASSESSMENT IN UKRAINE

Over the course of 2022 and 2023, a contractor developed a methodology for status assessment for Ukrainian surface water bodies. This methodology comprises the Biological Quality Elements (BQE) of: phytoplankton, phytobenthos, macrophytes, and benthic invertebrates. Since suitable field data from Ukraine is scarce or non-existent, values and class boundaries of related similar water body types of Romania and Slovakia were adapted. EU4WD experts screened and commented on this method. It was agreed upon, that the current solution was acceptable for the time being and should be amended and revised when enough national data will become available over the next years of water monitoring. This was also noted in the Ukrainian RBMPs.

2. Activity 1.4.1 – Water monitoring and surveys

Surface water monitoring is a key activity for the proper management of water resources and the preparation of RBMPs. Surface water management, the implementation of measures and the assessment of the effectiveness of the implemented measures is based on monitoring data. Hence, sufficient reliable data are needed to derive correct conclusions and to implement the most appropriate, effective and efficient measures.

Overall aim was to strengthen the monitoring and sampling capacities to produce more and quality-assured surface water monitoring data and specifically promote the proficiency of analysing biological quality elements (BQE), focusing on macrozoobenthos (MZB, benthic invertebrates) and phytobenthos (PHB, diatoms). In 2022, questionnaires about the current state of the national surface water monitoring programme were sent to the responsible authorities and answers were received from all five beneficiary countries. Thereafter, several national (Activity 1.4.1) and transboundary (Activity 1.4.3) surveys were supported by the Programme to consolidate previously introduced methodologies and to strengthen the sustainability of the acquired knowledge of national experts.

2.1. Surface Water Surveys

Over the runtime of the Programme, nine national surface water surveys have been supported in the beneficiary countries Moldova, Azerbaijan, Armenia and Georgia. These surveys were aimed at fostering the implementation of WFD-compliant monitoring, specifically supporting the preparation of field surveys within the national monitoring, solidifying sampling methods, assisting in interpretation of the monitoring results, including by training in the taxonomy of benthic invertebrates and diatoms, as well as in data interpretation.

A total of 185 sites in four countries have been investigated and assessed. EU experts participated and exchanged with local experts in the field on the sampling methods (especially for diatoms). A careful selection of sampling sites in regards to the investigation objective was stressed, as occurring pressures and the local situation must be considered. Monitoring reports of all countries were reviewed, evaluated and commented by the EU experts. A commented version was returned to the local experts of beneficiary countries to show deficits or missing aspects and give options for improvement, until a final version was produced and agreed upon by both the beneficiaries and the Programme experts.

List of National SW Surveys

Armenia

- Investigative Surface Water Survey 2022 (15 sites)
- Surface Water Survey 2022 (25 sites)
- Surface Water Survey 2023 (25 sites)

Azerbaijan

- Surface Water Survey 2022 (15 sites)
- Surface Water Survey 2023 (17 sites)

Georgia

- Surface Water Survey 2022 (26 sites)
- Surface Water Survey 2023 (27 sites)

Moldova

- Surface Water Survey 2023 (20 sites)
- Joint Surface/Groundwater Survey 2024 (15 SW/15 GW sites)

Figure 1: Armenia investigative survey 2022, ©V.Tonoyan

Figure 2: Georgia survey 2022, ©D.Trauner

Figure 3: Azebaijan survey 2023, ©D.Trauner

Figure 4: Moldova survey 2023, ©D.Trauner

Due to the Russian war of aggression on Ukraine, needed field activities under the EU4WD programme in Ukraine were explored but ended up as impossible to conduct (notably due to health risk).

2.2. Trainings

Prior to the activities and missions, questionnaires were provided to gain updated information about the state of knowledge in the beneficiary countries and to explore specific questions and wishes of the targeted participants for trainings. Based on the responses and previous experiences in the beneficiary countries, the EU4WD experts devised a programme of national and regional trainings to increase the knowledge of the beneficiary experts on BQE (benthic invertebrates, diatoms), data management and

interpretation. Over the course of two years, various trainings were executed. A full list can be found below:

- Diatom online trainings in April, Mai and September 2023
- MD study visit to Austria including MZB, PHB and data training
- MZB & PHB Training Armenia
- MZB & PHB Training Georgia (including Azerbaijan)
- Benthic Invertebrate Identification Exercise
- Data trainings with Armenia, Georgia, Ukraine and Moldova
- Diatoms slides 2024.

DIATOM ONLINE TRAINING I AND II (24 APR, 2 MAY AND 19-20 SEP 2023)

The trainings were held on 24th April and 2nd May 2023 and 19th to 20th September 2023 and lasted for 2–4 hours per session. PDF of the EU expert presentations were distributed. The objective was to provide a basic understanding of diatom morphology, taxonomy, sampling methodology, and ecology. While some of the trainees had same pre-knowledge on the group, others were real beginners.

After the training, the participants understood the essential and correct routine of diatom analysis and identification. In particular, they got familiar with diatom morphology, terminology, and the identification literature. In addition, they learned how to apply the widely used diatom software Omnidia, including calculation of diatom indices, export and import of data and the search in the software's database for purposes of biomonitoring.

MD STUDY VISIT TO AUSTRIA INCLUDING MZB, PHB AND DATA TRAINING (2–5 OCT 2023)

The Environment Agency of Moldova (EAM) and the EAM Reference Laboratory for Water sent five persons for a study visit to Vienna. Umweltbundesamt and DWS Hydro-Ökologie used this mission to train Moldovan experts on surface water monitoring practices and enable a related knowledge transfer on the level of competent public institutions.

The EAM director and the Head of the EAM Lab used the opportunity of meetings with various water authorities and stakeholders. The Department of National and International Water Management at the Austrian Ministry for Agriculture and Water Management gave an overview of the WFD-related water monitoring situation in Austria (organization, procedures, reporting). The Water Management Department of the City of Vienna presented the view on WFD at the provincial level and the monitoring at municipal level. The visit was also used to go to the Secretariat of the International Commission for the Protection of the Danube River (ICPDR). Monitoring in the Danube river basin was discussed and Moldova was encouraged to participate in the upcoming Joint Danube Survey 2025 (JDS5). Umweltbundesamt presented their national water database, its management, and the reporting obligations.

The three remaining chemical and biological experts still working at the EAM Reference Laboratory visited the lab of DWS Hydro-Ökologie in Vienna. They got a general training in WFD implementation, but also a specific one in MZB and PHB taxonomy as well as in data analysis. Especially the joint work at the microscope was very much appreciated and got a larger weight during the mission. The MD diatom expert learned about morphology and taxonomy of selected diatom groups. It was agreed to establish and informal technical exchange, if necessary, but also to provide more information on identification literature and, if possible, prepare mounted glass slides with pre-identified taxa as their own reference material. The invertebrate experts discussed how to analyse oligochaetes, a taxonomic group difficult to

identify on species level. The local MZB expert learned basic characteristics and features to determine Oligochaeta on species or at least genus level.

Besides the lab work, a joint field sampling was carried out at several sites south of Vienna to explain key aspects of chemical and biological sampling. The participants benefited from accompanying Austrian experts in a rhithral and more potamal (ditch-like) rivers and learned where strict adherence to the methodical guidelines is necessary and where adaptations to local conditions are appropriate, if not advised.

Figure 5: MD Field training with DWS, ©D.Trauner

Figure 6: MD Meeting with Water Management Department, City of Vienna, ©D.Trauner

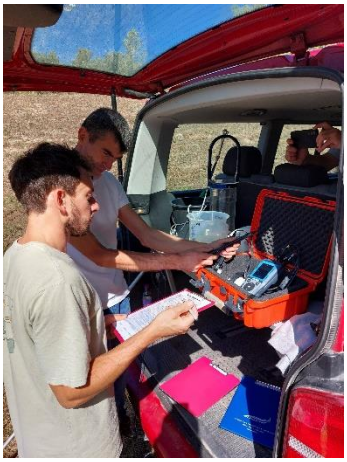

Figure 7: MD Field training with DWS, ©D.Trauner

Figure 8: MD Meeting with the ICPDR, ©A.Zinke

MZB AND PHB TRAINING IN ARMENIA (7–8 NOV 2023)

From 7th to 8th November 2023, a taxonomic training took place in Armenia for local experts on macrozoobenthos and phytobenthos. The objective of the mission was to train them on all essential aspects of laboratory processing and on the analysis of benthic macro-invertebrates and diatoms. The trainees learned to understand the essential and correct analytical routine of the two biological elements

focusing on both methodological aspects and correct identification, and how to get familiar with their morphology, terminology, and identification literature. In total, 10 experts from two different institutions (6 HMC and 5 NAS RA) participated in the trainings, plus one additional student from NAS RA who joined in the afternoons.

MZB AND PHB TRAINING IN GEORGIA, 21-22 NOV 2023

From 21st to 22nd November 2023, another taxonomic training took place in Georgia for eight local experts from Georgia (5) and Azerbaijan (3) on macrozoobenthos and phytobenthos. The objective of the mission was to train on all essential aspects of laboratory processing and the analysis of benthic macro-invertebrates and diatoms. The trainees learned to understand the essential and correct analytical routine of the two biological elements focusing on both methodological aspects and correct identification and to get familiar with their morphology, terminology, and the identification literature.

Figure 9: Sample of diatoms, ©D.Hlúbiková

Figure 10: MZB and PHB training in Armenia, ©V.Tonoyan

Figure 11: MZB and PHB training in Armenia, ©W.Stockinger

Figure 12: Data training in Vienna, ©D.Trauner

MZB Identification Exercise

As a result of these trainings, it had been agreed to carry out kind of a **proficiency test on MZB taxonomy** based on samples taken during the MD visit in autumn 2023 as well as on additional material from Austria sampled on different occasions. Objective was to evaluate local skills in MZB identification as well as to give recommendations about improvements. Generally, the outcome was very useful and revealed remarkable differences among experts from different countries. EU experts produced five reports for each beneficiary country to illustrate achieved skills and pending deficits. The local experts from the five countries got valuable feedback and can now better assess their own skills, which is an important prerequisite for individual improvement.

NR	MAJOR ORDER	SPECIES/GOAL	SOURCE	COUNTRY 2	ACC.	FEEDBACK
1	Coleoptera	Elmis sp. Adult	WSB 2302623 01 Scr.	Elmis sp. Ad	A	Goal achieved, perfect
2	Coleoptera	Elmis sp. Lv.	WSB 2302623 01 Scr.	Elmis sp. Lv	A	Goal achieved, perfect
3	Coleoptera	Esolus sp. Lv.	WSB 2302623 01 Scr.	Esolus sp. Lv.	A	Goal achieved, perfect
4	Coleoptera	Hydraena sp. adult	WSB 2302623 01 Scr.	Hydraena cf. belgica	A	Goal achieved, H. belgica is possible if it was a male and the penial structure examined.
5	Coleoptera	Hydrophilidae Lv.	Armenien, Debet, Kirovka	Laccobius cf. minutus	B	Likely Laccobius, but the species is uncertain because it is still a larvae.

Figure 13: Excerpt of the MZB identification exercise including evaluation and feedback.

Data trainings in Vienna on 21-22 May 2024 and 28-29 May 2024

Two trainings lasting two days each were held in Vienna in May 2024 for experts from AM, GE (21-22 May) and for MD and UA (28-29 May). The training covered different aspects of data collection and analysis, including presentations and practical work. All participants had brought their own laptops to carry out calculations and test new software programs on their own technical device. The training was carried out partly at the Austrian Environmental Agency, partly at the DWS Hydro-Ökologie office.

This allowed the participants to gain knowledge of key parameters, methods, and sampling techniques in connection to quality assurance and data quality. They developed proficiency in their data analysis techniques, statistical tools and software applications, but also enhanced their skills in identifying trends, anomalies, and compliance with WFD standards through data analysis.

Preparation of diatom slides for all five countries (August 2024)

While MZB has been part of national monitoring in all five beneficiary countries, diatoms are less used, because their identification is difficult and requires years of experience. To support the efforts of the five countries in diatom taxonomy – which is important for WFD implementation and crucial to identify eutrophication of rivers –, mounted glass slides were prepared for transfer to the labs of MD, UA (5 labs), AM, GE and AZ.

Objective was to provide diatom slides compliant with the relevant EU standard methods, which could serve the local biologists as a representative training material for diatom identification. EU experts selected five samples from five different rivers with their ecological status varying from very good to moderate, and prepared 45 diatom slides (9 slides of each sample). Diatom assemblages in the selected samples differ in terms of species composition, life forms and structure of ecological guilds, indicating

different ecological status and river type. A total of 118 diatom taxa belonging to 48 diatom genera was identified in the five samples.

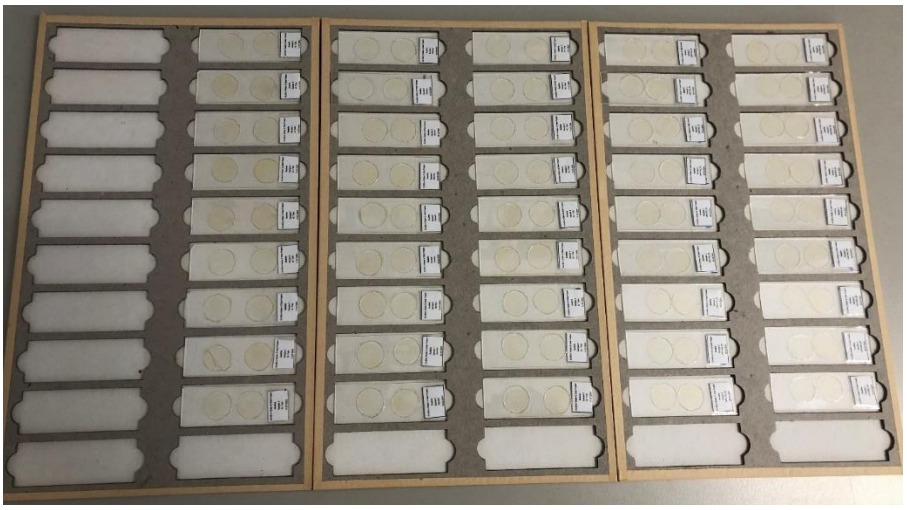

Figure 14: Diatom slides, ©D.Hlúbiková

3. Activity 1.4.3 – Monitoring and assessment of transboundary waters

- Transboundary SW Survey Armenia - Georgia 2023
- Transboundary SW Survey Azerbaijan - Georgia 2023

Two transboundary surface water surveys were carried out. One between Armenia (in the Northern RBD) and Georgia (in the Khrami-Debed(a) RBD), and one between Azerbaijan (Kura-Araz RBD) and Georgia (Alazani-Iori RBD). The aim of transboundary surveys was to establish communication between competent agencies of neighbouring countries, align their methodological approaches and to exchange and compare their individual results. Another aim of this initial step was to stipulate more communication, coordination and routine of future transboundary surveys and data exchange. The results and conclusions are summarised in two Technical Reports on the transboundary surface water bodies, which are bilaterally connected in the selected RBDs.

The **transboundary survey** between **Armenia and Georgia** was conducted on 4-5 September 2023 at six sites in the Debed river basin (3 sites in Armenia, 3 in Georgia). The implementing institutions were the National Environment Agency of Georgia (NEA) and the Hydrometeorology and Monitoring Center of Armenia (HMC). The survey was supervised by EU experts of the EU4WD programme. The investigation included chemical, biological, and hydro-morphological parameters with the aim to compare and harmonize the sampling, analyzing, and reporting routines of both participating institutions. Both teams were able to sample all six sites together.

The **transboundary survey** between **Azerbaijan and Georgia** was implemented and completed in 2023. Implementing institutions were the National Environment Agency of Georgia (NEA), the National Hydrometeorological Service (NHS) of Azerbaijan, and Azelab LLC conducted a Transboundary Surface Water Survey in the Alazani/Ganikh river basin. The Georgian team investigated 7 sites, while the Azeri team opted to sample at 9 sites during this survey. It was legally not possible for both teams to cross national borders and take samples jointly. For that reason, each team included 4 sites in their sampling campaign along the border river Alazani/Ganikh which were sampled at the same location and time, but on the opposite banks of the river to increase the comparability of results.

Figure 15: Georgian and Armenian colleagues collecting BQE. ©P.Hohenblum

Figure 16: Georgian and Armenian colleagues comparing measurements. ©V.Tonoyan

Figure 17: Georgian experts looking across the border to the Azeri sampling team. ©NEA

Figure 18: Azeri experts taking samples and measurements. ©NHS

3.1. Transboundary agreement between Armenia and Georgia on water monitoring and data exchange

The lessons learned from the Armenian-Georgian transboundary surface water survey fed directly into the drafting of the technical annex (Guidance Document on Transboundary Monitoring Programme of Water Resources in Khrami-Debed(a) River Basin) of the new transboundary "Agreement between Armenia and Georgia on Water Monitoring and Data Exchange in transboundary Khrami-Debed(a) River Basin". This agreement had been prepared by UNECE and UBA, consulted with both Parties in 2023 and 2024. Both, the annex as well as the agreement were commented and finalised for undersigning. Regrettably, Georgia was unable to sign it in autumn 2024, while Armenia was then ready to do so.

4. Documentation and products

4.1. Activity 1.1.1 – Support to the preparation of River Basin Management Plans

Surface Water Status Assessment Methodology, Ukraine
Ukrainian RBMPs for all nine River Basins
Northern Basin RBMP, Armenia
Enguri RBMP, Georgia
Rioni RBMP, Georgia

4.2. Activity 1.4.1 – Water monitoring and surveys

Investigative Surface Water Survey Armenia 2022, Survey Report, 2023
Surface Water Survey Armenia 2022, Survey Report, 2022
Surface Water Survey Armenia 2023, Survey Report, 2024
Surface Water Survey Azerbaijan 2022, Survey Report, 2023
Surface Water Survey Azerbaijan 2023, Survey Report, 2024
Surface Water Survey Georgia 2022, Survey Report, 2023
Surface Water Survey Georgia 2023, Survey Report, 2024
Surface Water Survey Moldova 2023, Survey Report, 2024
Joint Surface and Groundwater Survey Moldova 2024, Survey Report, 2024

Surface Water Manual for Diatom Samples and Preparation, Guidance Document, 2023

Training Report – Moldovan Study Visit, Training Report, 2023
Training Report – MZB & PHB Training Armenia 2023, Training Report, 2023
Training Report – MZB & PHB Training Georgia 2023, Training Report, 2023
Surface Water Data Training Armenia and Georgia, Training Report, 2024
Surface Water Data Training Moldova and Ukraine, Training Report, 2024
Surface Water MZB-Exercise Armenia, Training Report (internal/not for public), 2023
Surface Water MZB-Exercise Azerbaijan, Training Report (internal/not for public), 2024
Surface Water MZB-Exercise Georgia, Training Report (internal/not for public), 2024
Surface Water MZB-Exercise Moldova, Training Report (internal/not for public), 2024
Surface Water MZB-Exercise Ukraine, Training Report (internal/not for public), 2024

4.3. Activity 1.4.3 – Monitoring and assessment of transboundary waters

Transboundary Surface Water Survey 2023 - Armenia and Georgia, Survey Report, 2024
Transboundary Surface Water Survey 2023 - Azerbaijan and Georgia, Survey Manual, 2024
Guidance Document on Transboundary Monitoring Programme of Water Resources in Khrami-Debed(a) River Basin, Guidance Document, 2024

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