



European Union Water Initiative Plus for Eastern Partnership Countries (EUWI+): Results 2 and 3

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WATER MONITORING ASSESSMENT REPORT – AZERBAIJAN



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Abbreviations

BQE	Biological quality element
CW	Coastal water
DOA	Description of action
EC	European Commission
EaP	Eastern Partnership
EECCA	Eastern Europe, Caucasus and Central Asia
EU	European Union
EUWI+	European Union Water Initiative Plus
EPIRB	Environmental Protection of International River Basins
EQS	Environmental Quality Standards
GW	Groundwater
GWB	Groundwater body
ISO	International Standards Organisation
IWRM	Integrated Water Resources Management
MENR	Ministry of Ecology and Natural Resources
NPD	National Policy Dialogue
QA	Quality assurance
QC	Quality control
QM	Quality management
RBMP	River Basin Management Plan
SW	Surface water
SWB	Surface water body
TW	Transitional water
USAID	United States Agency for International Development
WB	World Bank
WFD	Water Framework Directive
WSS	Water supply and sanitation
WTP	Water treatment plant
WUA	Water Users Association

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

1 PROJECT SUMMARY

The Eastern Partnership (EaP) is a policy initiative launched at the Prague Summit in May 2009. It aims to deepen and strengthen relations between the European Union and its six eastern neighbours: Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine.

In recent years, the countries of the Eastern Partnership have demonstrated a willingness to align their water policies and practices with the general principles and specific requirements of the EU Water Framework Directive (WFD), as well as other thematic and sectoral water directives and UN Multilateral Environmental Agreements (MEAs). Moreover, Georgia, Moldova, and Ukraine have assumed commitments to reform water policies and implement the EU water *acquis* as part of the Association Agreements signed with the EU in 2014.

It is within this context that the *European Union Water Initiative Plus for the Eastern Partnership* (EUWI+) for Eastern Partnership Countries was initiated by the Directorate-General for Neighbourhood and Enlargement Negotiations (DG NEAR) of the European Commission.

The *European Union Water Initiative Plus for the Eastern Partnership* (EUWI+) was launched in September 2016 to assist the six Eastern Partnership countries to approximate to the EU Water Framework Directive and its associated directives. Its objective is to improve the sustainable management of water resources with a focus on trans-boundary river basin management.

EUWI+ focuses on five thematic areas:

1. Legislation, policy development and institutional consolidation
2. Laboratory and monitoring system enhancement
3. River Basin Management Plan development
4. River Basin Management Plan implementation
5. Public awareness, communications, and data/information management

The OECD and UNECE are implementing activities under thematic area 1. Thematic areas 2–5 are being undertaken by a consortium of EU member states comprised of the Environment Agency Austria (UBA) and the International Office for Water (OIEau/IOWater) of France. Experts from other EU member states will also be involved in project activities.

The budget for these thematic areas for all six countries amounts to a total of EUR 24.6 million and is financed by the European Union with contributions from the governments of Austria and France. Its planned period of operation is from September 2016 until August 2020 (48 months).

A website has been created (<http://euwipluseast.eu/en/>) for the publication and dissemination all the data, information and services developed and used within the framework of this project.

2 EXECUTIVE SUMMARY

The *European Union Water Initiative Plus for the Eastern Partnership* (EUWI+) was launched in September 2016 to assist the six Eastern Partnership countries to approximate to the EU Water Framework Directive and its associated directives. Its objective is to improve the sustainable management of water resources with a focus on trans-boundary river basin management.

This assessment report summarises the current state of knowledge regarding the existing water monitoring and management systems in Azerbaijan and takes into account the findings of the forerunner EPIRB project and existing River Basin Management Plans. It indicates the needs identified for capacity building in Azerbaijan, which are necessary in order to bring the country's water management into line with the Water Framework Directive (WFD).

Assessment focused primarily on the current status of ground- and surface water (identification and delineation of water bodies and preliminary identification of main pressures) and gaps in the light of the requirements of the WFD. The secondary focus was on the current situation of the quantitative and chemical groundwater monitoring network, as well as the monitoring of the biological quality elements in surface and coastal waters, and some general indications of areas of improvement.

Azerbaijan's key institution engaged in groundwater management is the Complex Hydrogeology and Geology Expedition of the Ministry of Ecology and Natural Resources, which is also involved in the current project. The institution currently carrying out surface, transitional and coastal water quality monitoring is the Environmental Pollution Monitoring Centre, which is part of the National Environmental Monitoring Department (MENR). In order to establish a representative monitoring network for groundwater and all categories of surface water, human resources and budgets for operation and maintenance are needed.

The current groundwater monitoring network in Azerbaijan consists of around 600 groundwater monitoring sites, including some monitored springs, and a team of 40 samplers and geologists. The MENR expressed concerns that it would be difficult to assess groundwater bodies on the basis of the currently available data. It explained that there is a need for additional monitoring wells with depths of approximately 110 m in the northwest of Azerbaijan, where monitoring is particularly weak. In order to support the development of groundwater monitoring in Azerbaijan, the delineation of groundwater bodies is required, as these constitute the groundwater management units used under the Water Framework Directive. Some groundwater bodies were already identified and delineated during the EPIRB project.

An assessment of the MENR's laboratories and personnel showed that the Biological Quality Element expertise required for transitional and coastal water monitoring is lacking. Furthermore, although the MENR employs experienced personnel regarding taxonomy, there is a need for training regarding sampling and data analysis. The limited number of experienced staff for surface water monitoring will limit the development of ecological assessment systems and delay the implementation of River Basin Management Plans.

In order to facilitate the development of River Basin Management Plans and build respective capacity in Azerbaijan's administration, a clear and pragmatic step-by-step procedure regarding the delineation of water bodies and the development of monitoring networks (based on the existing guidance of the Common Implementation Strategy of the Water Framework Directive and of the EPIRB project) is under development. This procedure will include draft templates for water body characterisation and a template for the characterisation of monitoring sites (based on the EPIRB Water Body at Risk Report and EU and Austrian experience). These will be introduced in a series of workshops and via work packages completed in the interim periods, which will be complemented by theoretical and practical training on sampling in close coordination with field surveys.

3 INTRODUCTION

The European Neighbourhood Policy (ENP) provides a framework for closer relations between the EU and its neighbouring countries Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine. The European Union Water Initiative Plus for Eastern Partnership Countries project (EUWI+) aims to furnish these states with further support in improving their water quality and has a special focus on trans-boundary river basin management in the light of the WFD principles.

The EUWI+ action is built on the lessons learned from several development initiatives of the European Union in the water sector in Azerbaijan, consisting primarily of the EUWI EECCA and EPIRB projects.

This overall project objective addresses existing challenges in both the development and implementation of efficient water resource management.

One key, outstanding challenge is the further enhancement of water monitoring capacity through the geographical coverage of monitoring networks, laboratory infrastructure and the methodological basis for sampling and biological and (physico-)chemical analyses. In view of limited resources and the necessity for effectiveness and efficiency, ground- and surface water monitoring must be carried out where it is most urgently required. The data generated has to be transformed into the information needed to acquire and use the knowledge necessary for risk-based and targeted water management, as stipulated by the WFD. A second key challenge is therefore the strengthening of water management capacities within the framework of River Basin Management Planning and its implementation.

Groundwater is often a major source of drinking water and an important resource for industry (food processing etc.), agriculture (e.g. irrigation, fish farming) and thermal water supply (balneology, heating purposes). Furthermore, it plays a vital role in the hydrological cycle, as it is critical for the maintenance of wetlands and feeding of river flows. It acts as an important buffer during dry periods and provides the base flow to many surface water systems.

Restricted water quantity is one of the many threats posed to surface waters and therefore aquatic organisms. Pollution ranging from chemicals and pesticides (e.g. agricultural runoff) to organic waste, and morphological alterations can impact water quality and ecological status.

Surface water systems are amongst the most threatened but precious habitats, as they are subject to multiple pressures. They account for less than 0.01% of the planet's total surface area, but support more than 100,000 species. Continuous monitoring of the ecological status of rivers and lakes that takes pressure-impacted relationships into account represents a platform for sustainable water management and thus provides a basis for many human lives.

The WFD aims to achieve good chemical status of all water bodies, good ecological status or potential of all surface waters, and good quantitative status of groundwater bodies. Achieving these objectives requires the implementation of various steps and both the identification and delineation of water bodies, and targeted and cost-efficient monitoring are essential. These basic steps subsequently help to focus the implementation of the most appropriate measures in a cost-efficient manner and thereby achieve the greatest possible benefit from the resources available.

This report covers the water-related aspects of the following activities:

- Activity 2.1.1 Assessment of monitoring and laboratory infrastructure, capacities and needs;
- Activity 2.1.2 Purchase of equipment, including hydrological and water quality monitoring stations and the rehabilitation and upgrade of existing equipment and existing laboratories;
- Activity 2.2.1 Preparation of training plans and the organisation of hands-on training and trainer training of trainers with regard to monitoring and laboratory analyses and the support of laboratories for accreditation

- Activity 2.3.1 Assessment of the needs and identification of priorities in respect of the implementation of the RBMPs
- Activity 2.3.2 Technical support during the preparation and implementation of pilot RBMPs.

These activities are closely related to Activity 2.2.1 regarding capacity building in the laboratories (equipment, analytics, QA/QC, accreditation) and Activities 2.3.1 to 2.3.7, which involve the development and implementation of RBMPs.

In order to define and target the exact water-related steps to be taken within each activity of Result 2 of the EUWI+ project, it was necessary to conduct a thorough assessment of the status quo and the related trajectories of the partner country administrations. This ground- and surface water management assessment report summarises the current state of knowledge on the existing water monitoring and management systems. It indicates the needs identified for capacity building along with the step-by-step approach of the WFD to cyclical ground- and surface water management. This extends from the delineation and characterisation of water bodies, including the anthropogenic pressures to which they are subjected, to the resultant risk to the achievement of the WFD's environmental objectives, the definition of a suitable and feasible monitoring network, sampling at the monitoring sites, the analysis of the generated data, the assessment of water body status, the definition of measures to ensure the adequate protection of water resources and biological quality elements, and the required implementation of these steps.

This report also has links to the rehabilitation and/or procurement and installation of monitoring equipment. The assessments presented in this report are preliminary, information having been gathered and elaborated through meetings between the responsible technical and management staff in the Azeri administration and the UBA water team. The assessments are subject to constant revision, as the teams working in the Azeri administration and the member state consortium continue to develop the activities foreseen under the EUWI+ project.

4 ASSESSMENT OBJECTIVES

4.1 Objectives

In order to establish project priorities and targets, an assessment of the current state of ground- and surface water management and the monitoring situation was carried out with the aim of identifying potential gaps and areas of support via the project. According to the step-by-step approach of the WFD, as management units water bodies have first to be identified and delineated before a water monitoring network can be developed in line with the directive's principles.

The WFD typology for surface waters (Annex II, section 1) is organised by initially classifying water bodies in broad categories (rivers, lakes, transitional, coastal waters, artificial water bodies, heavily modified water bodies) and secondly, by differentiating water body types within these categories. This is achieved using fixed typologies: System A, which is based on an eco-region, altitude, catchment area and geology, and an alternative typology, System B, which consists of a mixture of obligatory and optional factors.

Due to this dependency, at this stage the assessment focused primarily on the current status of ground- and surface waters (identification and delineation of water bodies and preliminary identification of the main pressures), and the gaps in the light of WFD requirements.

The secondary focus was on the current situation of the groundwater monitoring network and the monitoring of biological quality elements, as well as some general indications of areas of improvement. The detailed assessment of the groundwater monitoring infrastructure and capacities will be completed once the groundwater bodies are established. The following aspects required assessment:

- The need for a review of existing delineation methodology and groundwater bodies in EPIRB pilot basins (feeds into Activity 2.3.1);
- The need for hands-on training to delineate groundwater bodies in the river basin districts newly included in the EUWI+ project (feeds into Activities 2.2.1 and 2.3.2);
- The current status of groundwater monitoring and initial indications with respect to training, infrastructure and equipment requirements (feeds into Activities 2.1.1 and 2.1.2).

The assessment of the surface water monitoring infrastructure was completed during six missions. Corresponding questionnaires in the respective countries were prepared with a focus on:

- The current status of surface water monitoring (feeds into Activity 2.1.1):
 - Qualified staff numbers and their respective fields of expertise
 - The existing monitoring of biological quality elements and available expertise
 - Monitoring and reference sites
 - Data availability
- Equipment needs (feeds into Activity 2.1.2):
 - On-site assessment of sampling/monitoring equipment
 - Identification of equipment needs
- Training needs (feeds into activity 2.2.1):
 - Initial indication of training needs for sampling and identification
 - Sampling and identification training for additional biological quality elements

This assessment report summarises the findings described in detail in the mission reports, which are an essential part of the assessment activities. Moreover, the assessment report identifies gaps and proposes steps aimed at the sustainable implementation of the WFD within the EUWI+ project, as well as providing a strategic outlook on the further needs for action beyond the time frame of the EUWI+ project.

4.2 Assessment methodology

During the inception phase and the assessments at the beginning of the implementation phase of the EUWI+ project, meetings were held with representatives of the responsible administration and relevant international projects. The key Azeri institution working in groundwater management and involved in the present project is the Complex Hydrogeology and Geology Expedition of the Ministry of Ecology and Natural Resources. In order to collect the required information, meetings took place with both management and technical staff from the Expedition.

The following aspects were discussed:

- Existing EPIRB methodologies, e.g.
 - Guidelines on identification, characterisation and delineation of groundwater bodies
 - Guidelines on sampling
- The existing (draft) River Basin Management Plan(s)
 - The identified, delineated and characterised groundwater bodies
 - The pressure analysis methodology for groundwater
 - The pressure data employed
 - The risk and status assessment methodology and the results
- The existing and planned groundwater monitoring activities:
 - The legal basis, existing rules and responsibilities
 - The distribution and location of monitoring points
 - The monitored parameters and monitoring frequency

The administration's experts were asked to provide their opinions regarding the following:

- Are the EPIRB methodologies understandable, logical, tailored to the local situation and easily applicable in other areas? What needs to be improved? What should be better explained? Who are the readers/users?
- Have gaps or problems with regard to the groundwater aspects of the existing (draft) RBMP(s) already been identified. Is there a need for updates?
 - Are you happy with the identified groundwater bodies, or might a re-delineation be necessary and helpful?
 - Are you happy with the methods and procedures applied in the RBMPs? Are they clearly explained, understandable and logical? Can they be easily applied to other river basins?
 - Have all pressures been considered (e.g. land use, urban areas, forests, location of industrial sites, dump sites, groundwater abstractions, ...)? Have all potential pollutants been identified and considered?

- According to your instincts and experience does the RBMP identify those areas, which should be prioritised for action?
- Do you think that the results of the risk and status assessment reflect the actual situation? If not, is this because of the assessment methodology or the fact that certain data is incomplete or completely missing?
- Who is responsible for groundwater monitoring network/sampling? What kind of quality assurance is considered? Who receives the monitoring data results and what is the data used for?

The aim of these discussions with the national administration was to understand:

- Who will actually be responsible for the various steps of WFD implementation and who will be our counterparts for the single aspects.
- Which aspects of the EPIRB methodologies need to be improved in order to become more user-friendly and better tailored to the national situation/needs, as well as what needs to be improved for alignment with the WFD.
- Which additional (pressure) data needs to be explored and compiled for the next working steps.
- What are the next steps and who is doing what.

The Azeri institution currently working on surface-, transitional and coastal water issues and monitoring is the Environmental Pollution Monitoring Centre, which is part of the National Environmental Monitoring Department (MENR). In addition, a meeting with experts from the Scientific-Research Institute of Hydrometeorology (also part of MENR) took place regarding hydromorphology.

A questionnaire was sent to and completed by our Azeri partners after the surface water mission in order to summarise and supplement the knowledge gathered.

One ongoing international project with groundwater-related links to EUWI+ is the UNDP-GEF Kura II project. In an EUWI+ mission to Georgia, the UBA GW team participated in the first meeting of the UNDP-GEF Kura II Project Advisory Group, which was held in Tbilisi in July 2017.

4.3 Chronology

The aforementioned assessments were completed during the following missions:

- 1st groundwater assessment mission 12.7.2017
- 1st surface water assessment mission 26 – 28.7.2017
- 1st transitional and costal water mission
- A questionnaire on surface water monitoring was sent in August 2017 to the institutions visited
- The MENR Environmental Pollution Monitoring Centre returned the questionnaire on 11 October 2017

5 ACTIVITIES

In conjunction with the review of the deliverables from the previous EPIRB project, the discussions with representatives of the responsible administration revealed the following current status and areas for support through the EUWI+ project.

5.1 Activities regarding groundwater

5.1.1 Activity 2.1.1 Assessment of monitoring and laboratory infrastructure, capacities and needs

Discussions concerning the current status of the monitoring infrastructure, capacities and needs were held with the technical and management staff of the Complex Hydrogeology and Geology Expedition of the Ministry of Ecology and Natural Resources. The terminology used in the Soviet era and the terminology of the WFD do not match and therefore a need for clarification exists. For example, it seems that the terms 'confined aquifer' and 'unconfined aquifer' may be interpreted differently.

The Expedition explained that there are currently around 600 groundwater monitoring sites in Azerbaijan, including some monitored springs, and a team of forty samplers and geologists.

5.1.2 Activity 2.1.2 Purchase of equipment, including hydrological and water quality monitoring stations and rehabilitation and upgrade of existing equipment and existing laboratories

Decisions on the rehabilitation and upgrading of existing monitoring sites and the purchasing and installation of equipment for new groundwater monitoring sites will be made when the delineation of GWBs is in its final stage. This step will be taken on the basis of a sound understanding of the pressures on the GWBs and once the planning of the groundwater monitoring network has been finalised and the monitoring frequency and parameters determined.

Some groundwater bodies have already been identified and delineated in the EPIRB pilot basin. Under Activity 2.3.2, this work will be continued in the EUWI+ pilot basins. Once the existing monitoring infrastructure is fully assessed in all the pilot basins and can be assigned to the newly identified, delineated and characterised groundwater bodies, and in addition the gap between the status quo and the newly developed plan for the monitoring network is known, it will be possible to determine if, where, and how the rehabilitation of existing sites and the installation of new sites will be necessary, most suitable and possible with the resources available in order to implement the revised groundwater monitoring network. The selected equipment will influence the content of the training to be carried out under Activity 2.2.1. For further details see the groundwater roadmap for Azerbaijan in chapter 7.2.

5.1.3 Activity 2.2.1 Preparation of training plans and organisation of hands-on trainings and training of trainers with regard to monitoring and laboratory analyses and to support laboratories for accreditation

Expedition staff were already involved in the EPIRB project, which worked on the Central Kura basin. A contracted GIS expert from the HMC company carried out the groundwater body delineation. This expert was present at the meetings with the Expedition and would be available for similar work to be completed as part of the EUWI+ project. It was mentioned by the Azeri experts that while they were able to gain some experience with the EPIRB methodologies and guidelines by working on the Central Kura basin, further training is required. It was agreed that the Expedition will identify a young specialist, who will assume responsibilities and participate in training.

The preliminary training plans for groundwater monitoring will be based on the insights obtained during the stepwise implementation of the groundwater roadmap for Azerbaijan in chapter 5.2. Similarly, the individual training and the field survey(s) will be developed over the course of the EUWI+ project in order to allow maximum targeting on the needs of the Azeri administration. Training material and the groundwater survey manual will be based on EPIRB manuals, which will be revised if necessary. Sampling training and field survey(s) will be carried out once groundwater bodies have been identified, delineated and characterised and after the design of the monitoring network, including frequencies and parameters as part of Activity 2.3.2. The surveys will serve the validation of conceptual understanding and the gathering of the data necessary for enabling risk and status assessment. The exact content of training will also depend upon the equipment purchased, or to be purchased under Activity 2.1.2. Possibilities for conducting some of the monitoring training and the field surveys as regional workshops and trans-boundary exercises, and thereby fostering an exchange of experience between administrations and the establishment of working relations on a technical level, will be evaluated with all the stakeholders involved. For further details see the groundwater roadmap for Azerbaijan in chapter 7.2.

5.1.4 Activity 2.3.1 Assessment of the needs and identification of priorities in implementation of the RBMPs

The Expedition voiced concerns that it would be difficult to assess groundwater bodies on the basis of the currently available data. In particular, it mentioned the need for additional monitoring wells with a depth of approximately 110 m in AZ's northwest, where monitoring is particularly weak.

The general working approach of the EUWI+ project and the difference to a technical assistance project were explained. The step-by-step nature of WFD groundwater management, including the importance of groundwater bodies and the related concept, were also clarified and discussed. It was stressed that it is important to assign and assume responsibilities on an individual level.

The UBA GW team underlined that the WFD is ideal for focusing effort where it is needed most. It would appear that it is extremely important to achieve mutual understanding on two quite distinct approaches to GW management. On the one hand, there is the conceptual management approach as stipulated by the WFD and on the other, the more traditional scientific hydrogeological approach followed in the Soviet era. GW bodies are management units and not scientifically correct or precise descriptions of (parts of) aquifers. Similarly, full agreement and appreciation is necessary in respect of the WFD's risk-based management approach, as opposed to the more rigid approach followed in the Soviet era.

Further observations:

- Shallow GW is a highly significant aspect for consideration under the WFD because of the risks to which it is subject and its relevance for drinking water supplies;

- It is assumed by the Expedition that no data on pesticides is available.

5.1.5 Activity 2.3.2 Technical Support in the elaboration and implementation of the pilot RBMPs

This activity focuses on the implementation of the existing RBMP for the Central Kura basin developed during the EPIRB project, and on its upgrade to a new RBMP for the entire Upper Kura basin.

The EPIRB project placed great emphasis upon the work of the international experts. Responsibility was insufficiently transferred to the Azeri specialists. Partner country institutions and their experts were not in a position to assume ownership of the previous project and its outcomes.

In order to facilitate the development of RBMPs and create related capacity in the Azerbaijan administration, a clear and pragmatic step-by-step procedure on how to identify aquifers, delineate GWBs and design monitoring networks (based on existing CIS and EPIRB guidance) is currently undergoing completion. This procedure will include a draft template for GWB characterisation (based on the EPIRB Water Body at Risk Report and EU and AT experience) and a template for the characterisation of monitoring sites (based on EU and AT experience).

The UBA GW team provides input on important aspects for consideration when identifying, delineating and characterising groundwater bodies. Centre hydrogeologists will assemble relevant background information for the preliminary delineation and characterisation of GW bodies in the Upper Kura basin. This will include an overview of the available geological and hydrogeological information and the pressures to which GW is subject. EMIC hydrologists will draw up a preliminary list of the relevant pressures with the support of the UBA GW team. The resulting draft list of GW-relevant pressures will then be used by the IOW to collect pertinent data under Activity 2.3.6. Subsequently, a draft list of indicator parameters and monitoring frequencies related to these relevant pressures will be compiled.

There will be a kick-off workshop and three key hands-on workshops regarding the development of GWBs and the corresponding monitoring network. The workshops will represent joint efforts by the Centre hydrogeologists and the UBA GW team. They will feed into the RBMP work led by the IOW. Before and after the workshops, EMIC hydrologists (possibly with support from external consultants) will work through the clearly defined steps necessary for the preparation of the next event. This will allow continuous and well-paced progress towards the RBMPs, with capacity being accumulated within the administration in order to ensure the institutional sustainability of WFD groundwater management.

The kick-off workshop will deal with the:

- a. Presentation of the procedure and underlying principles
- b. Hands-on training on GWB delineation
- c. Hands-on training on groundwater monitoring network design

The first workshop will focus on the:

- a. Discussion of draft GWBs and hands-on revision
- b. Discussion of the template for GWB characterisation
- c. Discussion/finalisation of identified GW-relevant pressures
- d. Discussion of draft monitoring networks and hands-on revision
- e. Presentation and discussion of a characterisation template for monitoring sites
- f. Discussion/finalisation of monitoring frequency and relevant (chemical) indicator parameters
- g. Discussion of investment needs
- h. Planning of sampling training and potential surveys

The second workshop will consist of:

- a. Further discussion and hands-on training/finalisation of GWB delineation
- b. Further discussion and hands-on training/finalisation of GWB characterisation (template and description);
- c. Further discussion and hands-on training/finalisation of the monitoring network
- d. Further discussion and hands-on training/finalisation of the characterisation of monitoring sites (template)
- e. Further discussion/finalisation of investment needs including the specifications.

The focus of the third workshop will depend upon progress made thus far:

- a. Finalisation of GWB delineation
- b. Finalisation of GWB characterisation
- c. Finalisation of the monitoring network
- d. Finalisation of monitoring site characterisation
- e. Finalisation of investment needs and specifications

These workshops will be followed by theoretical and practical training on sampling in close connection with the field survey(s), and possibly within a regional or trans-boundary context, as explained in chapter 5.1.3. For further details see the groundwater roadmap for Azerbaijan in chapter 7.2.

5.2 Activities regarding surface water

5.2.1 Activity 2.1.1 Assessment of monitoring and laboratory infrastructure, capacities and needs

The National Hydrometeorology Department conducts the water quantity monitoring of rivers and reservoirs and the National Environmental Monitoring Department is responsible for the quality monitoring of surface waters.

The Scientific-Research Institute of Hydrometeorology of MENR, did not return the questionnaire, but provided information during the SW mission. Hydromorphological monitoring was conducted for the upper reaches of the River Kura during the EPIRB project and has been extended to the Azeri river basin. A standardised protocol is available, as it was developed for assessing river morphology based on the EPIRB methodology.

The MENR's Environmental Pollution Monitoring Centre provided a list of available equipment (incl. brand, date of first operation and status, as well as capacities (number of staff and level of knowledge) and assessment methods (e.g. parameters, interval, WFD compliance).

Table 1: Existing monitoring expertise of the Scientific-Research Institute of Hydrometeorology of MENR according to the questionnaire

Fields of expertise	Level of knowledge Trainee/Experienced/Advanced	No. of staff
Fish	Trainee	
Macroinvertebrates	Advanced	
Phytobenthos	Experienced	
Phytoplankton	Experienced	
Macrophytes	Experienced	
Hydromorphology	Experienced	
Hydrology	-	
Other, please specify	Experienced	
Zooplankton,zoobentos	Experienced	
Mikrobiologiya	Trainee	

Experienced personnel for identification are available, but there is a need for training regarding sampling and data analysis (specified in chapter 3.2.3 Activity 2.2.1). There is a focus on macroinvertebrates and an interest in improved fish monitoring.

Table 2: Existing assessment methods of the Scientific-Research Institute of Hydrometeorology of MENR according to the questionnaire

Method	Parameter/s	Interval	Site type • Monitoring site • Reference site • Project-based site selection	Number of samples	WFD compliance
In deep rivers EN ISO 9391 and in shallow rivers with stones in the bottom is conducted according to EN 28265 standarts		By seasons	1. After each 1.1-2 meter in the direction of flow samples are taken from 5 points	1	Yes
			2. From Kura river in 21 points, In Ganikh(Alazan) in 14 points	105	

The evaluation of the different methods in terms of WFD-compliance has yet to be completed.

5.2.2 Activity 2.1.2 Purchase of equipment, including hydrological and water quality monitoring stations and rehabilitation and upgrade of existing equipment and existing laboratories

Final decisions on procurement are yet to be made, but the equipment wish list provided by the MENR in the questionnaire will be assessed during procurement.

Equipment needs at the Scientific-Research Institute of Hydrometeorology of MENR according to the questionnaire:

- Boat (about 10 m. length, with generator)
- Water quality measuring portative equipment;
- Water quality measuring portative equipment;

- Electron plankton meter
- Electrofishing gear;
- Benthic grab (0.100 m²);
- Idromar
- Hansen closing plankton net, with messenger and messenger-operated closing mechanism;
- Ultrabiological lamp;
- Bathometer (10 litre).
- Drying cupboard for microbiology- Boks LT Scientific Inc
- Mikrobiological analyzer-Bio-trak 4250
- Laboratory blender
- Koliform pan(basin)

Additional comment by the Scientific-Research Institute of Hydrometeorology of MENR: In order to conduct biological monitoring in addition to main equipment in order to collect laboratory analyses there is need to have set of net(mush), ribbon clothes(combizon), ribbon boots (for micro invertebrates), non electro conductive isolated closes and gloves, pots with divisions(centimeters) to measure fish, hermetic equipment for conservation of samples, cooling containers needed to deliver samples to labs, additional lightener to microscope to analyze micro invertebrates, pinsets, pots for selections, special equipment for fish analyses, relevant scaled pots, weight, transport units to deliver samples to labs, air conditioner to keep room temperature stable (for sustainability of exploitation period of use of lab equipment).

The first assessment mission revealed that the MENR's laboratories in Azerbaijan do not cover the BQE's required for monitoring of TW & CW. A similar situation has also been noted in some other EU member states and usually laboratories from universities or institutes are contracted for biological monitoring. A similar agreement has been reached with the Deputy Head of the MENR's National Environmental Monitoring Department for the performance of biological monitoring in TW & CW. After the mission, labs for particular BQE's (phytoplankton, macroalgae, benthic invertebrates, angiosperms and fish) were identified at the Baku State University, but an assessment of these laboratories has yet to be performed. The assessment methodology for the upcoming lab evaluations will be of a general nature (staff capacities, facilities, analytical equipment, data handling, reports, etc., but also of WFD-relevance (appropriate sampling and determination techniques, monitoring frequencies, quality assurance, inter-calibration exercises, national reference conditions, use of indices, etc.).

The financial EUWI+ assistance needed is summarised and takes into account the fact that the MENR does not have a suitable research vessel, sampling devices for work in the shallow waters of the Kura Delta Pilot area, or equipment for the analysis of saline samples (see also the Assessment Report for Chemical Labs).

Technical and advisory support from the EUWI+ project should be directed towards the areas of monitoring planning, performance and results evaluation in the form of workshops.

5.2.3 Activity 2.2.1 Preparation of training plans and organisation of hands-on trainings and training of trainers with regard to monitoring and laboratory analyses and to support laboratories for accreditation

The preliminary training plans for surface water monitoring will be based on the detailed assessment of the needs of the institutions responsible for surface water monitoring in Azerbaijan. Similarly, the individual training and the field survey(s) will be developed over the course of the EUWI+ project in order to allow maximum targeting on the requirements of the Azeri administration. Training materials and a surface water survey manual will be based on EPIRB manuals, which will be revised if necessary. Sampling training and field survey(s) will be carried out for different monitoring parameters. The surveys will serve the validation of conceptual understanding and the gathering of the data necessary for enabling risk and status assessment. The exact content of training will also depend upon the equipment purchased, or to be purchased under Activity 2.1.2. The fostering of exchanges of experience between administrations and the establishment of working relations on a technical level will be evaluated.

Initial regional workshops are planned in order to discuss the requirements of the WFD and develop a stepwise implementation approach. Secondly, individual training will be organised for specific needs relating to the assessment of biological quality elements. Trans-boundary training is also planned.

The Scientific-Research Institute of Hydrometeorology of MENR stated training needs in the questionnaire:

- Benthic macroinvertebrates in lakes and rivers;
- Phytoplankton in lakes and rivers ;
- Zooplankton in lakes and rivers;
- Benthic macroinvertebrates in lakes and rivers;
- Phytobenthos/macrophytes in lakes and rivers);
- Ichthyology
- Microbiology and micrology
- Initial pH, oxymeter, electric conductivity, TDS)

Taking into account the aforementioned, the objectives will involve the identification of laboratory needs for:

- Analytical and determination equipment, equipment service and consumables, which feeds into Act. 2.1.2);
- Training on intercalibrated methods suitable for the Caspian Sea and the development of reference conditions, EQR concept (feeds into Act.2.2.1).

5.2.4 Activity 2.3.1 Assessment of the needs and identification of priorities in implementation of the RBMPs

During the EPIRB project, initial SWB delineation exercises were carried out in the Central Kura. Further SWB delineation according to system A of the WFD will be completed during the EUWI+ project.

As already mentioned under Activity 2.1.1, the legal basis, administrative responsibilities and water management organisation and monitoring are currently being restructured in a move towards WFD-compliance. Training content will depend greatly upon the needs identified and the difficulties to be overcome. At the same time, the SW experts will continue their work between the workshops and should questions arise, communications can take place via emails or phone. The GWBS delineation of SWBs has to be completed for the whole country.

5.2.5 Activity 2.3.2 Technical Support in the elaboration and implementation of the pilot RBMPs

This activity focuses on the implementation of the existing RBMP for the Central Kura basin, which was developed under the EPIRB project, and on its upgrading into a new RBMP for the entire Kura basin above the Mingechavir reservoir.

The EPIRB project placed a great deal of emphasis on the work of the international experts. Responsibility was not sufficiently transferred to the Azeri specialists. Partner country institutions and their experts were not in a position to assume ownership of the previous project and its results.

In order to facilitate the development of RBMPs and create related capacity in the Azeri administration, a clear and pragmatic step-by-step approach (manual) for SWBs and the design of monitoring networks (based on existing CIS and EPIRB guidance) is currently in preparation. This procedure will include a draft template for SWB characterisation (based on the EPIRB Water Body at Risk Report and EU and AT experience) and a template for the characterisation of monitoring sites (based on EU and AT experience).

The UBA SW team provides input on the important aspects requiring consideration when identifying and delineating surface water bodies. Azeri experts will draw up a preliminary list of relevant pressures with the support by the UBA SW team. The resulting draft list of SW-relevant pressures will then be used by the IOW to collect data under Activity 2.3.6. Subsequently, a draft list of indicator parameters and monitoring frequencies related to these relevant pressures will be compiled.

6 RELATED ISSUES

6.1 Institutional sustainability of selected institutions

In order to establish a representative monitoring network for GW and all categories of SW, human resources, as well as a basic budget for infrastructure maintenance and the purchase of essentials are needed. The very limited number of experienced staff for surface water monitoring will limit the development of ecological assessment systems and delay RBMP implementation.

In particular, this applies to the TW and CW categories of surface waters, where the MENR laboratories have no experienced specialists for most of the required BQE's and a strategic partnership with Baku State University and National Academy of Science has to be established.

7 NEXT STEPS

7.1 Linkage with laboratory assessment

The identification of the significant anthropogenic pressures on water goes hand-in-hand with the identification of the associated chemical substances and indicators, which should be part of the monitoring system. Precise adjustment in line with Activity 2.1.2 in terms of laboratory needs and capacities is recognised as a guarantee that these substances can be analysed in the relevant laboratories.

7.2 Programming and next steps

7.2.1 Groundwater programming

A clear and pragmatic step-by-step procedure on how to identify aquifers, delineate GWBs and design monitoring networks is currently under development.

If considered necessary by the member state consortium and the Azeri administration, a groundwater survey might be organised during the summer of 2018 in order to fill the gaps in the baseline data required for further steps in the RBMP process.

A regional workshop on the principle requirements of the WFD could be organised jointly for the Azeri institutions working on ground- and surface water.

See below for the groundwater roadmap for Azerbaijan.

Table 3: Groundwater roadmap for Azerbaijan

	Implementation steps	Azeri experts	MS-consortium	Timing (Location)
1.	<p>Preparatory (home) work by MS consortium experts:</p> <ul style="list-style-type: none"> • A clear and pragmatic stepwise procedure (terms of reference) on how to identify aquifers, delineate GWBs and design monitoring networks (based on existing CIS and EPIRB guidance). • This will include a draft template for GWB characterisation (based on the EPIRB Water Body at Risk Report and EU and AT experience) and a template for the characterisation of monitoring sites (based on EU and AT experience). 		UBA (ToR)	
2.	<p>Kick-off workshop</p> <ol style="list-style-type: none"> a. Presentation and discussion of step-by-step procedure. Background and principles of: GWB delineation, characterisation and groundwater monitoring. b. Exemplified, practical hands-on training on GWB delineation for a selected case study. c. Exemplified, practical hands-on training on groundwater monitoring network design for a selected case study. 	Name/institute	UBA	
3.	<p>Preparatory (home) work by country experts:</p> <p>Groundwater bodies</p> <ol style="list-style-type: none"> a. First draft delineation of the GWBs following the stepwise procedure (in map 1:200,000): <ol style="list-style-type: none"> I. Compilation of hydrogeological information (maps, profiles...). II. Selection of aquifers of relevance from a WFD perspective (used, intended to be used, linked to ecosystems). III. Compilation of available pressure information (maps, inventories). b. Compilation of a draft list of GW-relevant pressures for each GWB (that should be considered by IOW for data collection). <p>Monitoring</p> <ol style="list-style-type: none"> a. Inventory of existing monitoring sites and existing wells/springs, which could be potentially used as monitoring sites (consider multipurpose use). b. First draft monitoring network for each GWB in line with the principles of the step-by-step procedure. c. Compilation of a draft list of (chemical) indicator parameters related to the relevant pressures and monitoring frequencies. <p>Documentation of the applied methodology and considered information (extension and tailoring of the 'step-by-step procedure', inclusion of references and literature).</p>	Name/institute		

	Implementation steps	Azeri experts	MS-consortium	Timing (Location)
4.	<p>1st workshop with a focus on:</p> <p>Groundwater bodies</p> <ul style="list-style-type: none"> a. Discussion of draft GWBs and hands-on revision. b. Presentation and discussion of the characterisation template and the structure of the ‘verbal’ description of GWBs. c. Discussion/finalisation of the list of identified GW-relevant human pressures. <p>Monitoring</p> <ul style="list-style-type: none"> a. Discussion of draft monitoring networks and hands-on revision. b. Presentation and discussion of the characterisation template for monitoring sites. c. Discussion/finalisation of monitoring frequency and relevant (chemical) indicator parameters. d. Discussion of investment needs (e.g. new sites and those to be refurbished, additional infrastructure and sampling equipment). e. Planning of sampling training and potential surveys. 	Name/institute	UBA	
5.	<p>Preparatory (home) work by country experts:</p> <p>Groundwater bodies</p> <ul style="list-style-type: none"> a. Revision of GWB delineation according to the conclusions of the workshop. Inclusion into GIS. b. Modification of the GWB template and the description structure to national needs in accordance with the conclusions of the workshop. c. Characterisation of each GWB according to the template and the description structure. <p>Monitoring</p> <ul style="list-style-type: none"> a. Revision of monitoring networks for each GWB, based on the conclusions of the workshop. Inclusion into GIS. b. Adjustment of the monitoring site template to national needs according to the conclusions of the workshop. c. Characterisation of the monitoring sites according to the template. d. Elaboration of investment need specifications (e.g. new sites and those to be refurbished, additional infrastructure and sampling equipment). <p>Documentation of the applied methodology and considered information (extension and tailoring of the ‘step-by-step procedure’, inclusion of references and literature).</p>	Name/institute		
6.	<p>Preparatory (home) work by MS consortium experts:</p> <ul style="list-style-type: none"> a. Training material on sampling (if necessary update of the EPIRB manual with UA examples). b. Survey manual. 		UBA	

	Implementation steps	Azeri experts	MS-consortium	Timing (Location)
7.	<p>2nd workshop Depending upon the progress made between the workshops, the following activities could either be finalised, or progress and open questions discussed further:</p> <p>Groundwater bodies</p> <ol style="list-style-type: none"> Further discussion and hands-on training/finalisation of GWB delineation. Further discussion and hands-on training/finalisation of GWB characterisation (template and description). <p>Monitoring</p> <ol style="list-style-type: none"> Further discussion and hands-on training/finalisation of monitoring network. Further discussion and hands-on training/finalisation of monitoring site the characterisation (template). Further discussion/finalisation of investment needs including specifications. 	Name/institute	UBA	
8.	<p>Preparatory (home) work by country experts. Depending on the progress made thus far:</p> <p>Groundwater bodies</p> <ol style="list-style-type: none"> Completion of GWB delineation. Completion of GWB characterisation (templates and description). <p>Monitoring</p> <ol style="list-style-type: none"> Completion of monitoring network design. Completion of monitoring site characterisation. Completion of investment need specifications. <p>Documentation of the applied methodology and considered information (extension and tailoring of the 'step-by-step procedure', inclusion of references and literature).</p>	Name/institute		
9.	<p>3rd workshop – focus depends on the progress made thus far:</p> <p>Groundwater bodies</p> <ol style="list-style-type: none"> Finalisation of GWB delineation. Finalisation of GWB characterisation. <p>Monitoring</p> <ol style="list-style-type: none"> Finalisation of the monitoring network. Finalisation of monitoring site characterisation. Finalisation of investment needs and specifications. 	Name/institute	UBA	
10.	Theoretical and practical training on sampling (e.g. in close harmony with field survey(s)).	Name/institute	UBA	
	The document regarding the step-by-step implementation procedure is a living document, which is continuously being supplemented with AZ details and the literature used in order to finally achieve tailored AZ guidance.	Name/institute	UBA	

7.2.2 Surface water programming

In accordance with the step-by-step approach of the WFD, the implementation of the following activities is planned for 2018 and 2019.

Training can be incorporated into surface water surveys and might be organized for the summer of 2018. The goal is to ensure standardised sampling techniques and data collection as a basis for all monitoring activities. In order to maximise the outcome, fieldwork will aim at the generation of valuable survey data and thus fill in the gaps in the baseline data required for further steps in the RBMP process.

Table 4: Surface water roadmap for Azerbaijan

	Implementation steps	Azeri experts	MS-consortium	Timing (Location)
1.	<p>Preparatory (home) work by MS consortium experts:</p> <ul style="list-style-type: none"> • Assessment of the status quo: EPIRB documents regarding characterisation, typology and surface water body delineation • ToR for SW water body delineation • Review of existing characterisation, typology and surface water body delineation • Organisation and logistics of regional workshops 		UBA	
2.	<p>Delineation workshop One joint workshop covering water body delineation is planned Characterisation, typology and surface water body delineation</p> <ol style="list-style-type: none"> a. Background and principles b. Review of existing data/documents c. Presentation of examples 	Name/institute	UBA	25 – 26 April 2018 Kiev
3.	<p>Preparatory (home) work by country experts: Presentation of Water Framework Directive implementation/compliance steps containing information on:</p> <ul style="list-style-type: none"> • Pre-existing water body delineation • Selection of biological quality elements • Monitoring site selection • Pressure impact relation 	Name/institute		
4.	<p>Regional workshops A regional workshop is planned for MD, BY & UA focusing on:</p> <ol style="list-style-type: none"> a. Assessment systems <ol style="list-style-type: none"> I. Biological quality elements II. Standardised sampling and indication potentials b. Monitoring network <ol style="list-style-type: none"> I. Monitoring network design II. Site selection III. Sampling frequency 	Name/institute	UBA	11 – 15 June 2018 Tbilisi

	Implementation steps	Azeri experts	MS-consortium	Timing (Location)
	Interactive hands-on training a. Risk assessment and pressure impact relationships I. Presentation of the selected case study and general discussion II. Two working groups for biological quality elements and hydromorphology possible			
5.	Sharing workshop outputs with French team a. Preliminary risk assessment b. Preliminary SW WB delineation		UBA/IOW	
6.	Evaluation of equipment list a. Preparation of procurement b. Confirmation of equipment list by countries		UBA	
7.	Preparatory (home) work by MS consortium experts: Survey design a. Logistics b. Dates		UBA	
8.	Preparatory (home) work by country experts: a. Site selection for training/survey activities based on interactive hands-on training (regional workshop) I. One site per country in pristine conditions/ with little impact and one heavily impacted site within new EUWI+ river basins II. Site selection considering logistics: max. of 4-hour drive between sampling sites b. Identification of main pressures I. Review of EPIRB documents and existing data II. Finalisation of the list of the main pressures on different types of water bodies	Name/institute		
9.	1st training/survey For the first training/survey two suitable sampling sites (e.g. above and below an impoundment) should already be identified. a. Field work with a focus on standardised sampling techniques b. Macroinvertebrates will be investigated in all six countries c. As an additional biological quality element, phytobenthos is proposed in four countries, except for Georgia and Azerbaijan, where fish sampling will be conducted during joint training d. Species identification and data evaluation will be discussed, but can only be focused on additionally during specific in-depth training later in the year.	Name/institute	UBA	Second week of September
10.	Preparatory (home) work by country experts: a. Species identification b. Data gathering	Name/institute		
11.	Preparatory (home) work by MS consortium experts: a. Training material on sampling (if necessary update of the EPIRB handbook) b. Draft manuals		UBA	

	Implementation steps	Azeri experts	MS-consortium	Timing (Location)
12.	2nd training/survey Depending upon the first fieldwork activities and the questionnaire on biological monitoring, the second round of training can be tailored to specific needs.	Name/institute	UBA	2019
13.	Linkage with French team Data management and delivery of training/survey data		UBA/IOW	
	The document regarding the step-by-step implementation procedure is a living document, which is continuously being supplemented with AZ details and the literature used in order to finally achieve tailored AZ guidance.	Name/institute	UBA	

8 STRATEGIC OUTLOOK AND RECOMMENDATIONS

The Complex Hydrogeology and Geology Expedition and the UBA GW team will discuss and agree a groundwater roadmap for Azerbaijan. The steps foreseen in this roadmap will then be implemented jointly, with ownership of the process lying with the Institute, and the UBA GW team providing support.

The involvement of significant numbers of junior staff in the exercises and training is highly recommended in order to facilitate the long-term transfer of hydrogeology and groundwater management knowledge. The gathering of such specific knowledge usually takes many years and intensive practice and forms the basis for sustainable groundwater management, environmental protection and water supply security in the future.

This step-by-step procedure owned by Azerbaijan's administration will ensure positive results, while adhering to the concept of institutional sustainability, i.e. the development of capacity within Azerbaijan's administration, which will enable it to continue along the path of approximation to the WFD and the principles of IWRM. It is recognised that the EUWI+ project will represent a first and important step in this direction, but that additional external support might be required at later stages of this approximation process. The Expedition emphasised that following the EUWI+ project, it wished to expand groundwater management in line with the WFD to the whole of Azerbaijan. A similar approach has to be implemented for SW management.



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