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

REGIONAL REPORT ON ACTIVITY 1.4.1:

COASTAL AND TRANSITIONAL WATERS SURVEY REPORTS

PUBLIC REPORT

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EU4Environment
Water and Data in Eastern Partner Countries

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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 action is co-funded by the European Union, 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
AWB ..... Artificial Water Body
BQE ..... Biological Quality Elements
CDSE ..... Copernicus Data Space Ecosystem
CLC ..... CORINE Land Cover
CLMS ..... Copernicus Land Monitoring Service
CORINE ..... Coordination of Information on the Environment
DG NEAR ..... Directorate-General for Neighbourhood and Enlargement Negotiations of the European Commission
DoA ..... Description of Action
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
EUWI+ ..... European Union Water Initiative Plus
GEF ..... Global Environmental Fund
HMWB ..... Heavily Modified Water Body
HYMO ..... Hydromorphological Monitoring
HRVPP ..... High Resolution Vegetation Phenology and Productivity
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 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

1. Introduction

This report summarizes the main activities carried out in Azerbaijan and Georgia in the framework of the Eu4Environment Water and Data Program for Coastal and Transitional Waters. The monitoring of coastal and transitional waters in Azerbaijan and Georgia included several activities related to the implementation of the WFD in both countries, which were carried out within the project in pilot areas by identifying the occurring water types and water bodies as well as heavily modified water bodies, selecting monitoring stations, evaluating the monitoring results and adapting the river basin management plan (RBMP).

The activities carried out in both countries build on the results of the work of the previous program (EUWI+, 2016-2021), in particular with regard to:

- Procurement of missing laboratory equipment and equipment for sampling and in-situ measurements

- Understanding the purpose and principles of the EU Water Framework Directive through workshops and discussions

- Drafting proposals for coastal and transitional water types and water bodies

In view of the fact that the situation was completely different from previous marine environmental research in both countries, a specific approach was required for both countries.

Studies of individual physico-chemical and biological properties of the Caspian Sea in Azerbaijan were mostly conducted in an uncoordinated manner at individual departments of Baku State University and the Azerbaijan Fisheries Research Institute, while the work area of AZELAB LCC as the responsible laboratory of the Ministry of Ecology and Natural Resources of Azerbaijan focused mainly on the status of rivers and lakes. The main efforts during the EUWI+ and Eu4Environment Water and Data Programs were to extend the scope of work of this laboratory to the area of transitional and coastal waters in accordance with the requirements of the WFD.

Many years of scientific research in the Black Sea by NEA's Department of Fisheries, Aquaculture and Aquatic Biodiversity in Batumi, Georgia, and its involvement in previous EU projects (EPIRB, EMBLAS) provided a good starting point for a final delineation proposal, the selection of appropriate biological methods and the fine-tuning of physico-chemical thresholds.

2. Main Activities and Ouputs

2.1. Azerbaijan

All activities were carried out jointly with the staff of AZELAB LCC as the responsible laboratory of the Ministry of Ecology and Natural Resources of Azerbaijan (MENR) for water analysis and status assessment

Activity 1: Preparation of field data log and training on seawater sampling, preservation of samples until analysis and field measurements of physico-chemical parameters (temperature, salinity, transparency) (Fig.1) and performed at stations MP3 and MP5 (Fig. 3) in October 2022.

Figure 1: Field training on data entry into the data log (a), sampling for the determination of dissolved oxygen, nutrients and chlorophyll a (b) and dissolved oxygen fixation (c).

Activity 2: Introduction of analytical methods for seawater (nutrients, dissolved oxygen and chlorophyll a in the laboratory (Fig.2). This activity started under the EUWI+ program and was completed under the Eu4Environment Water and Data Program. The successful application of the methods to samples from the Caspian Sea was demonstrated after the first study campaign in October 2022 (Fig. 2).

Figure 2: Determination of dissolved oxygen content by thiosulfate titration (a), filtration of samples through glass fiber filters for chlorophyll a determination (b), preparation of ammonia standards (c), spectrophotometric determination (d) and observed calibration line (e).

Activity 3: Organisation of a workshop (Implementation of the EU Water Framework Directive (2000/60/EC) for the coastal and transitional waters of Azerbaijan) for the staff of AZELAB LCC and Complex Caspian Laboratory in October 2022 with 4 topics:

- General objectives of the Water Framework Directive
- Draft proposal for the delineation of coastal and transitional waters of Azerbaijan
- Required monitoring parameters for the assessment of the ecological and chemical status of water bodies
- Proposal and discussion on monitoring sites and parameters in coastal and transitional waters of Azerbaijan during the EU4Environment Water and Data programme

Activity 4: Organisation and implementation of two surveillance monitoring surveys (October 2022 and June 2023) with measurements of physico-chemical parameters and sampling to determine the oxygen content and nutrient and chlorophyll a concentrations in the coastal and transitional waters at a total of 20 stations from the north of Azerbaijan to the transitional waters of the Kura River in the south (Fig. 3, 4).

Figure 3: Map of surveillance monitoring stations in the northern part of Azerbaijan, in the wider area around Baku and in the Kura river delta.

Figure 4: Start of the sampling campaign in the area of the Bay of Baku (a) and in the delta of the River Kura (b).

Activity 5: Organisation of two investigative monitoring surveys.

- A strong intrusion of seawater into the Kura Delta and more than 60 km upstream was observed in June 2020. An investigation of seawater intrusion into the Kura Delta was conducted in October 2022 under similar conditions, i.e. at a low river flow of 90 m3/s) The results obtained at seven stations (Fig. 5) showed that the spatial distribution of temperature and salinity in the transition area of the Kura River has a homogeneous structure of the water column with uniformly low salinity values (typical for freshwater). The fact that there was no seawater intrusion in October 2022 indicates that, in addition to the low discharge of the river, other factors such as low air pressure, storm winds, high sea level or high tides could also be important for the intrusion of seawater.
- The area along the lower Kura River is densely populated and characterized by intensive agriculture and livestock farming. In order to assess the impact of agriculture, leaching of

fertilizers from agricultural land and the discharge of untreated wastewater from households, the distribution of nutrients along the Kura River section from Neftchala to Muğan Gəncəli was investigated at 6 stations in May 2023. The results (Fig. 6) show positive concentration gradients from Neftchala (station KR1) to Muğan Gəncəli (station KR6) for both nutrients, with the highest concentrations found at stations KR3 (Arabkardashbeyli) and KR6 (Muğan Gəncəli) for dissolved inorganic nitrogen and at stations KR3 (Arabkardashbeyli) and KR5 (Khilli) for orthophosphates.

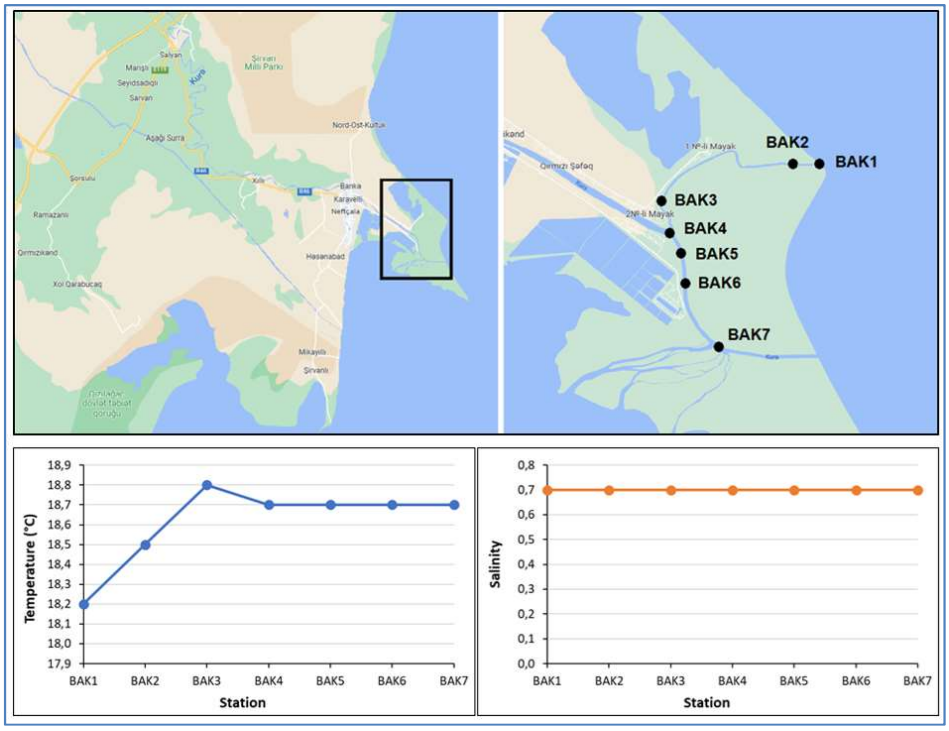

Figure 5: Map of measuring points for saltwater intrusion into the Kura River delta in October 2022 and observed results for temperature and salinity.

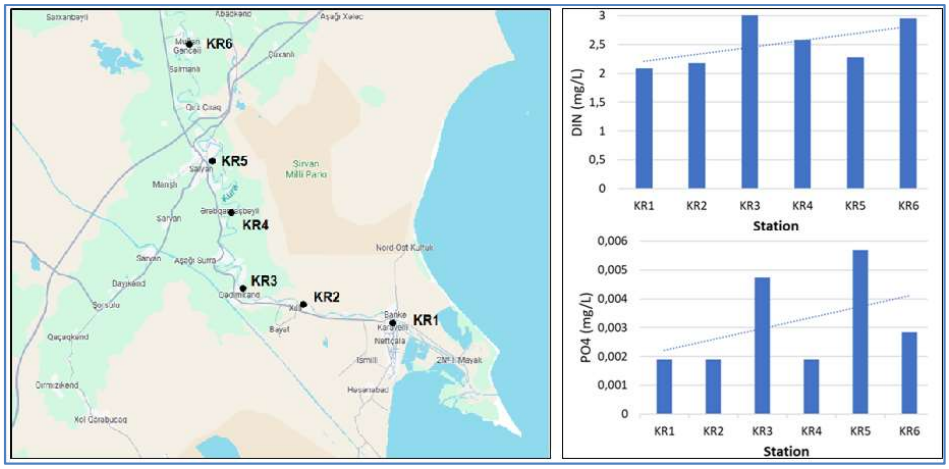

Figure 6: Map of the sampling points in the Kura River for nutrient analysis with obtained concentrations for dissolved inorganic nitrogen (DIN) and orthophosphate (PO4).

Activity 6: Preparation of a data sheet for all parameters measured during the surveys.

Activity 7: Based on the data collected during the two monitoring surveys, proposal of threshold values for supporting physico-chemical quality elements (dissolved oxygen, dissolved inorganic nitrogen and orthophosphate) and for the biological quality element phytoplankton and proposal of a reference site for coastal waters.

Activity 8: An assessment of the ecological status of the four water bodies surveyed during the study period was presented (table below), indicating a good ecological status of the coastal water body in the northern part of Azerbaijan from Samurchay to Shuraabad, while the ecological status of the water bodies around Baku was classified as moderate and bad.

Coastal water body	Type and location of water body	STATUS				
		Physico-chemical quality elements			Biological quality element	ECOLOGICAL
		O_2	DIN	PO4	Phytoplankton	
AZ_CW1_NSS	Oligohaline and shallow coastal waters from Samurchay to Shuraabad	H	G	G	G	**G**
AZ_CW1_STB	Oligohaline and shallow coastal waters from Turkan to Baku	G	H	M	B	**B**
AZ_CW1_BB	Oligohaline and shallow coastal waters of Baku Bay *(Candidate of heavily modified water body)*	M	M	M	G	**M**
AZ_CW1_SBS	Oligohaline and shallow coastal waters from Baku to Sangachal	H	M	M	H	**M**

2.2. Georgia

All activities were carried out jointly with the staff of the Fisheries, Aquaculture and Water Biodiversity Department and the Ambient Air, Water and Soil Analysis Laboratory in Batumi as the responsible laboratories of the National Environmental Agency of Georgia for seawater analysis and status assessment

Activity 1: Ongoing exchange of information with the EU4EMBLAS project leader on planned WFD-compliant coastal water monitoring activities and observed bottle necks.

Activity 2: Preparation of the field data log and agreement on the sampling protocol and the geographical location of the sampling stations (Fig. 7) in the coastal zone from Kobuleti to Anaklia.

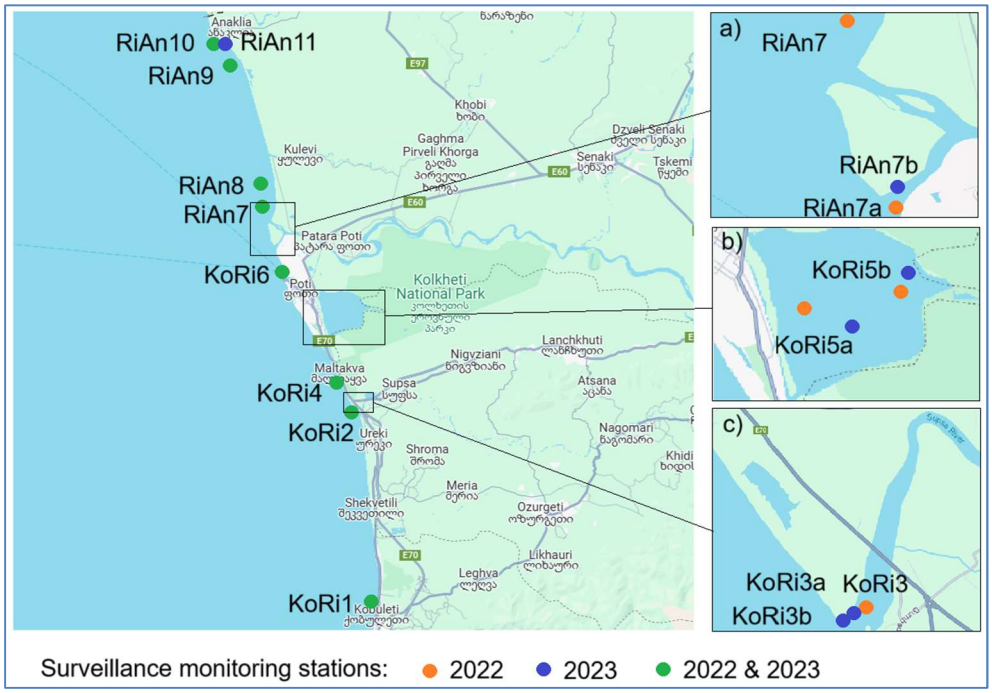

Figure 7: Selected surveillance monitoring stations from Kobuleti to Anaklia.

Activity 3: Organisation and implementation of two surveillance monitoring surveys (August 2022 and May 2023) with measurements of physico-chemical parameters (transparency, temperature and salinity) and sampling to determine the oxygen content, nutrient concentrations and abundance of phyto- and mesozooplankton as well as macrozoobenthos in the coastal and transitional waters of at a total of 19 stations.

Figure 8: Fieldwork at coastal stations on board the ship “Beshumi” in October 2022.

Activity 4: Sediment sampling at 22 stations in the coastal waters from Kobuleti to Anaklia to determine the substrate (as one of the delineation factors).

Activity 5: Temperature and salinity measurements in and near the mouths of the Supsa, Rioni and Enguri rivers and in Lake Paliastomi (Fig. 9) to identify transitional waters and the influence of river plumes on the physico-chemical characteristics of coastal waters.

Figure 9: Fieldwork in the mouths of the rivers Supsa (a), Rioni (b) and Enguri (c) as well as in Lake Paliastomi (d).

Activity 7: Calculation of the limit of detection (LoD) and the limit of quantification (LoQ) in the chemical laboratory for nutrients in order to express the sum of nitrate + nitrite + ammonia (dissolved inorganic nitrogen) and calculate average nutrient values.

Activities 8, 9, 10, 11: Based on the results of the monitoring surveys, the measurements of the salinity distribution in the estuaries and the characterization of the supstrate in the coastal water bodies from Kobuleti to Anaklia:

- An improved delineation proposal for the coastal and transitional waters of Georgia was presented (Fig. 10), in which 6 types of coastal waters and only one type (and one water body: Lake Paliastomi) of transitional waters appear;

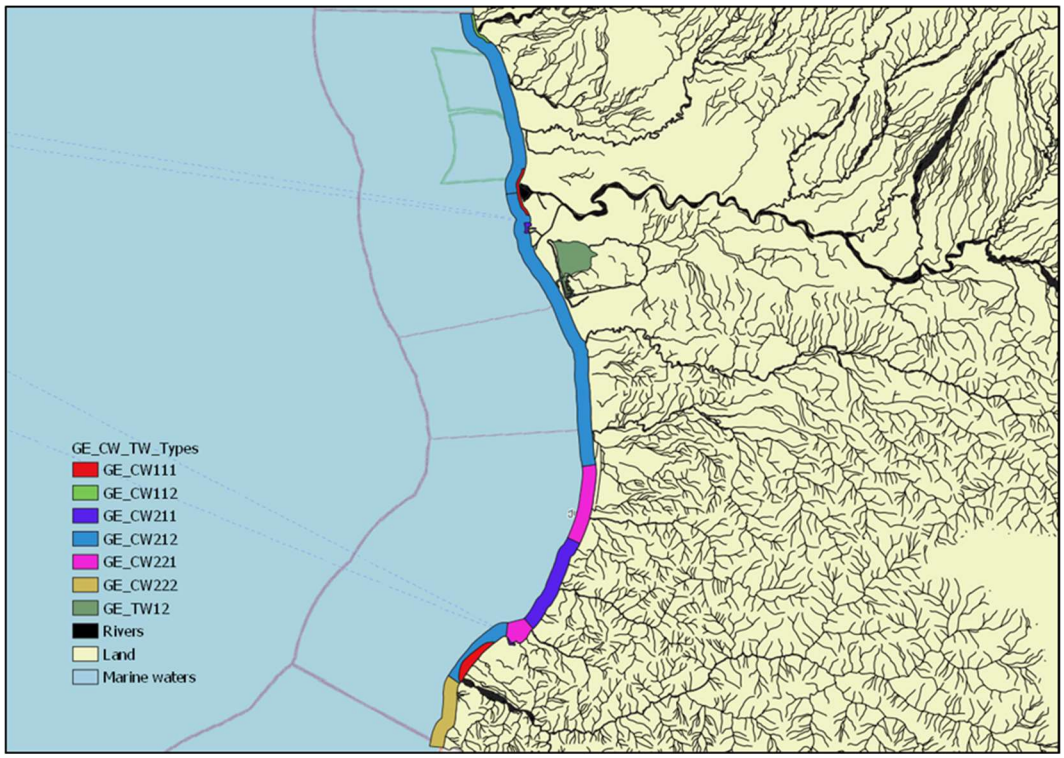

Figure 10: Coastal and transitional water types that occur in the Georgian coastal zone from Sarpi (border with Turkey) to Anaklia.

- The previous threshold values for certain physico-chemical supporting quality elements (proposed during the EUWI+ Program) were slightly modified;

• Data sheets for all parameters measured during the surveys have been produced;

• The ecological status of the water bodies investigated during the study period was assessed as follows: good ecological status for the coastal water body from Rioni to Anaklia (CW212_RiAn), moderate ecological status for the water body from Kobuleti to Rioni (CW212_KoRi) and poor ecological status for the water body Poti Harbour (CW211), which also qualifies for HMWB status.

Coastal water body	CW211_PoHa	CW212_KoRi	CW212_RiAn
Status of physico-chemical quality elements	G	M	G
Status of biological quality elements	P	H	G
Ecological status	**P**	**M**	**G**

Activity 12: Organisation of two workshops (Harmonization of nutrient thresholds with biological quality elements thresholds according to the JRC Nutrient Toolkit and Assessment of the ecological potential in coastal heavily modified water bodies) in May 2023.

These workshops have been organized to demonstrate in a practical manner:

- The nutrient toolkit, who was developed to calculate nutrient thresholds using statistical methods rather than setting them based on expert opinion;
- The importance and assessment of the ecological potential of heavily modified water bodies such as the ports of Batumi and Poti in Georgia.

Activity 13: Organisation of a training course in November 2023 on the determination and status assessment of macrophytes and macroalgae in seawater at the Ruđer Bošković Institute - Center for Marine Research in Rovinj, Croatia, for a biologist from the Fisheries, Aquaculture and Water Biodiversity Department in Batumi.

Figure 11: Field research by Ms. Mariam Tsetskhladze, Ph.D., with Croatian colleagues on the shores of the northern Adriatic Sea.

Activity 14: Development of a national methodology for the assessment of the hydromorphological status of the coastal and transitional waters of the Black Sea in Georgia by national consultants (completed March 2024) and testing of the methodology in the Poti pilot area (completed May 2024) by national consultants (Mr. Mamuka Gvilava and Mr. Zura Savaneli).

Hydromorphology is an important element for the assessment of the ecological status of water bodies or their designation as artificial or heavily modified water bodies. The proposed national methodology for assessing the hydromorphological status of coastal and transitional waters in Georgia is based on EN standards (i.e. water quality guidance on determining the degree of modification of the hydromorphological features of transitional and coastal waters) and based on an assessment of 13 metrics (table below), culminating in a final classification resulting from the cumulative score.

Metric 1a	Shoreline alteration	Metric 7a	Change in river flow
Metric 2a	Presence or absence of barriers within and between water bodies	Metric 7b	Change in residence time
Metric 3a	Bed disturbance	Metric 8a	Change in dominant fraction particle size (sediment characteristics)
Metric 3b	Change in habitat	Metric 8b	Change in turbidity
Metric 4a	Change in the spatial extent of Marshes and Seagrass Beds	Metric 9a	Change to stratification
Metric 5a	Change in tidal regime, coastal flood recurrence and/or sea level rise rates	Metric 9b	Change in salinity
Metric 6a	Change in wave regime		

The method was successfully tested in the Poti pilot area (Fig.12).

Figure 12: Assessment of the HYMO quality index for the Poti pilot area according to the metric analysis.

3. Conclusions

All activities carried out in both countries during the Eu4Environment Water and Data Program in relation to coastal and transitional waters have led to the acquisition of the capacity to continue to independently carry out monitoring activities and assess the ecological status of coastal water bodies in accordance with the requirements of the Water Framework Directive.

Follow-up activities in both countries are the inclusion of river basin-specific pollutants, priority substances and priority hazardous substances into monitoring.

Country specific follow-up activities are:

Azerbaijan:

- Extension of surveillance monitoring to the remaining coastal area from the Kura river delta to Astara (border with Iran);
- Redefinition of the area of transitional waters in the Kura River delta following the construction of barriers to prevent seawater from entering the river;
- Selection of river basin specific pollutants;
- Involvement of experts from Baku State University for BQEs (except phytoplankton) in the monitoring activities;
- Development of a national methodology for the assessment of the hydromorphological status of coastal and transitional water bodies in Azerbaijan.

Georgia:

- Selection of river basin specific pollutants;
- Replacement of the actual biomass-based phytoplankton indices by the intercalibrated IBI indices for the Black Sea;
- Assessment of the ecological status of the only transitional water body in Georgia, Lake Paliastomi.

4. Annexes

4.1 Report on the ecological status in selected coastal water bodies of Azerbaijan in the period 2022-2023 (Survey Report) (EU4EnvWD_A1.4.1_AZ_CTW_SurveyReport_2022-2023_Eng)

4.2 AN IMPROVED DELINEATION PROPOSAL FOR GEORGIAN COASTAL AND TRANSITIONAL WATERS AND AN ASSESMENT OF THE ECOLOGICAL STATUS OF COASTAL WATER BODIES FROM KOBULETI TO ANAKLIA FROM 2022 TO 2023 (Survey Report) (EU4EnvWD_A1.4.1_GE_CTW_SurveyReport_2022-2023_Eng)

4.3 PROPOSAL OF A NATIONAL METHODOLOGY FOR THE ASSESSMENT OF THE HYDROMORPHOLOGICAL STATUS OF THE BLACK SEA COASTAL AND TRANSITIONAL WATER BODIES IN GEORGIA (EU4EnvWD_A1.4.1_GE_CTW_HyMo_Methodology_Eng)

4.4 PROPOSAL OF A NATIONAL METHODOLOGY FOR THE ASSESSMENT OF THE HYDROMORPHOLOGICAL STATUS OF THE BLACK SEA COASTAL AND TRANSITIONAL WATER BODIES IN GEORGIA: PILOT AREA APPLICATION – POTI (EU4EnvWD_A1.4.1_GE_CTW_HyMo_Methodology-Poti_Eng)

5. Figures

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