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

SURFACE WATER SURVEY MOLDOVA 2023

Contract-No: 20940-C1/MD-EAM-2023/2

Funded by the European Union

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ABOUT THIS REPORT

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July 2024

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

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List of abbreviations

ADA	Austrian Development Agency
BQE	Biological Quality Elements
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
EPIRB	Environmental Protection of International River Basins
ESCS	Ecological Status Classification Systems
EU	European Union
EU4EnvWD	EU4Environment in Eastern Partner Countries: Water Resources and Environmental Data
EUWI+	European Union Water Initiative Plus
IWRM	Integrated Water Resources Management
RBD	River Basin District
RBMP	River Basin Management Plan
ROM	Result Oriented Monitoring
ToR	Terms of References
UBA	Umweltbundesamt GmbH, Environment Agency Austria
UNECE	United Nations Economic Commission for Europe
WFD	Water Framework Directive

Country Specific Abbreviations Moldova

AAM	Agency “Apele Moldovei”
AGMR	Agency for Geology and Mineral Resources
AMAC	Association of Apacanals
ANRE	National Agency for Economic Regulation of the Energy Sector (also regulates WSS)
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

Executive Summary

The “European Union Water Initiative Plus for Eastern Partnership (EaP) Countries (EU4Env)” involves six eastern neighbours of the EU: Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine. The EU4Env project addresses existing challenges in both development and implementation of efficient management of water resources. It specifically supports the EaP countries to move towards the approximation to EU acquis in the field of water management as identified by the EU Water Framework Directive (WFD).

River Basin Management Plans (RBMPs) are the planning tools that give the overall orientation of water management in the River Basin District and the objectives to be reached, and the priorities in the actions to be developed. Monitoring data are an important basis for water management, for risk, status and trend assessment. A strong monitoring system is critical in prioritising investment and creating a cost-effective management system. Hence, it is crucial that monitoring data are reliable (of high quality) to avoid implementing wrong and potentially costly measures.

As specified under activity 2.3.4 ecological and chemical surveys are to be carried out to enable the development and implementation of the RBMPs. The monitoring data gathered under this activity will be used for ecological classification, the validation of the biological assessment methods, the validation of the surface water body delineation, the validation of the monitoring design and the validation of the pressure-impact assessment. Furthermore, the gathered data build a basis for the upcoming risk, status and trend assessment.

The field survey in Prut River Basin carried out with the support of EUWI+ at 20 sampling sites between 17th until 21st of July has to serve as an example for further investigative monitoring in order to obtain reliable monitoring data for covering monitoring data gaps.

1. Introduction and Scope

The objective of the survey in July 2023 was to form a sound methodological basis for future monitoring programs as an essential part of river basin management planning.

The scope was to

- Train the experts on BQE and chemical sampling;
- Provide data for the evaluation of the water body delineation;
- Provide data for the classification of selected surface water bodies as part of the RBMP;
- Provide data for the evaluation of the monitoring design in preparation of future surveys;
- Provide data for the pressure-impact assessment in order to evaluate existing assessment
- methods or develop new ones;
- Create a database for the upcoming risk, status and trend assessment.

Involved institutions: the main beneficiary is, of course, the Ministry of Environment. Since June 2018 Environment Agency (EAM) of the Republic of Moldova has been appointed as the institution responsible for monitoring, including also surface waters. The Reference Laboratory was involved directly and took part in the survey with its own sampling team and analysing the taken samples. Austrian experts have been also involved during the whole process, starting with planning, sampling campaign, samples analyses and, even, reporting.

Table 1: Parameters analysed in the field and in the laboratory.

Country	Republic of Moldova
River basin	Prut the Danube and the Black Sea
Campaign 1)	Summer 2023
Objective	• Collecting data for the evaluation of existing or development of new assessment methods for benthic invertebrates • Providing a database for the definition of reference conditions for benthic invertebrates in selected river types
Quality elements	Biological quality components: • Macrozoobenthos • Phytobenthos Supporting elements: • Hydro-morphological site description • General physico-chemical quality elements
Preparation of field work	13-14 July
Field work	Dates (17-21 July)
Chemical analyses	Expected date period (24 July-11 August)
Biological analyses	Expected date period (24 July-27 October)
Reporting	Expected date period (27 October – 30 November)
Submission of technical report	1st of December (1st draft), 23rd July 2024 (final version)

2. Methods

2.1. Selected river basins and sampling sites

All 20 sampling stations have been selected within the Prut River Basin taking into account the lack of monitoring data for the water bodies they correspond to (figure 1). It happened that they are all situated in the North part of the Republic of Moldova, except 2 sections.

On average, 4 or 5 sites could be sampled per day. The survey included field documentation including photo documentation for each site, water and biological quality elements sampling, chemical and biological analyses, a hydro-morphological description of the sampling sites and reporting of the results. The present report provides a brief overview of the sampling campaign, while all raw data are presented in separate documents or summarised tables as Annexes.

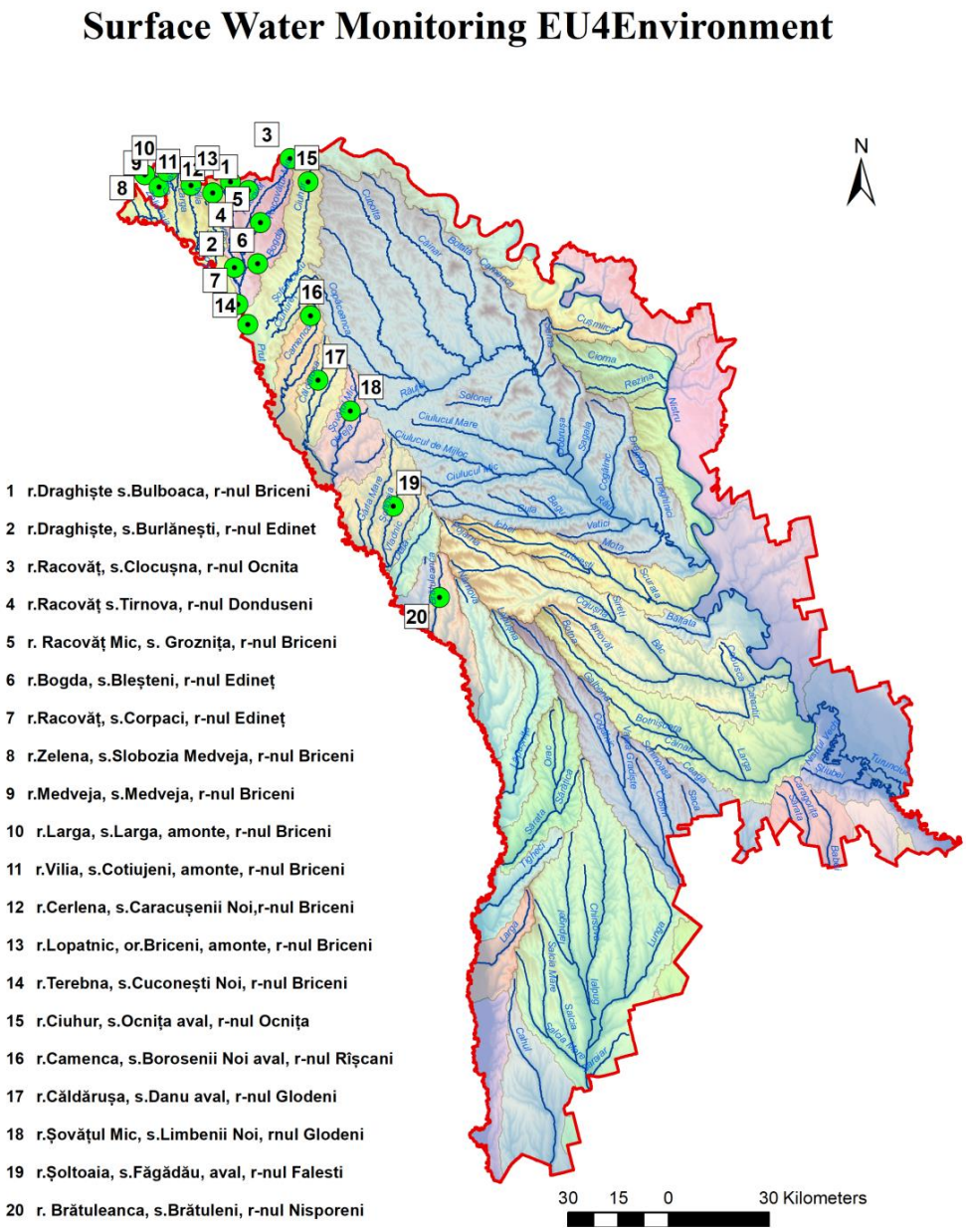

Figure 1: Map of sampling

Table 2: List of sampling sites.

River basin	River	WB	River type	WB Type	Site	Nr	HMWB 1)	Risk 2)	Significant Pressure 3)	Latitude 4)	Longitude 4)
Prut, Danube, Black Sea	Draghișteˇ River	MD02012202/1	A_12_2	XII	Bulboaca Village; Briceni District	1	No	R	M	48.342394	27.184529
Prut, Danube, Black Sea	Draghișteˇ River	MD02012202/2	A_12_2	II	Burlănești Village; Edinet District	2	No	R	M	48.119299	27.122589
Prut, Danube, Black Sea	Racovăț River	MD020126/2	A_12_2	V	Clocușna Village; Ocnita District	3	Yes	R	M	48.434911	27.365242
Prut, Danube, Black Sea	Racovăț River	MD02012204/2	A_12_2	IV	Tirnova Village; Edinet District	4	Yes	R	M	48.184898	27.658591
Prut, Danube, Black Sea	Racovăț Mic River	MD02012204/1	A_12_2	XII	Groznița Village; Briceni District	5	Yes	R	M	48.251002	27.232110
Prut, Danube, Black Sea	Bogda River	MD02012203/2	A_12_2	II	Blești Village; Edinet District	6	Yes	R	M	48.128857	27.224322
Prut, Danube, Black Sea	Racovăț River	MD020122/2	A_12_2	II	Corpaci Village; Edinet District	7	yes	R	M	48.013831	27.138509
Prut, Danube, Black Sea	Zelena River	MD020127/1	A_12_2	VII	Slobozia Medveja Village; Briceni District	8	No	PR	M	48.387967	26.734377
Prut, Danube, Black Sea	Medveja River	MD020126/1	A_12_2	VII	Medveja Village; Briceni District	9	No	R	M	48.353209	26.795768
Prut, Danube, Black Sea	Larga River	MD020125/1	A_12_2	XI	Larga Village, upstream; Briceni District	10	No	R	M	48.396886	26.831338
Prut, Danube, Black Sea	Vilia River	MD020124/1	A_12_2	V	Cotiujeni Village,upstream; Briceni District	11	Yes	R	M	48.357957	26.934784
Prut, Danube, Black Sea	Cerlena River	MD02012401/1	A_12_2	XII	Caracușenii Noi Village; Briceni District	12	Yes	R	M	48.336233	27.028537
Prut, Danube, Black Sea	Lopatnic River	MD020123/1	A_12_2	XI	Briceni Village, upstream; Briceni District	13	Yes	R	M	48.367450	27.105699
Prut, Danube, Black Sea	Terebna River	MD020121/1	A_12_2	V	Cuconești Noi Village; Briceni District	14	Yes	R	M	47.959302	27.194415

Prut, Danube, Black Sea	Ciuhur River	MD020120/1	A_12_2	V	Ocnița Village, downstream; Ocnita District	15	Yes	R	M	48.366986	27.443812
Prut, Danube, Black Sea	Camenca River	MD020119/1	A_12_2	VII	Borosenii Noi Village, downstream; Riscani District	16	Yes	R	M	47.979891	27.450011
Prut, Danube, Black Sea	Căldărușa River	MD02011903/1	A_12_2	VII	Danu Village, downstream; Glodeni District	17	Yes	R	M	47.792999	27.481758
Prut, Danube, Black Sea	Șovățul Mic River	MD02011901/1	A_12_2	VII	Limbenii Noi Village; Glodeni District	18	Yes	R	M	47.704016	27.619944
Prut, Danube, Black Sea	Șoltoaia River	MD020115/1	A_12_2	VII	Făgădău Village, downstream; Falesti District	19	Yes	R	M	47.426792	27.799596
Prut, Danube, Black Sea	Bratuleanca River	MD020112/1	A_12_2	IV	Brătuleni Village; Nisporeni District	20	Yes	R	M	47.162014	27.991887

[1)] Assignment as provisional HMWB: yes / no

[2)] Assignment of the risk status: R = at risk, PR = possibly at risk, NR = not at risk

[3)] Significant pressure: N = no significant pressure, P = organic pollution, E = eutrophication, T = toxic impact, H = hydro-morphological alterations, M = multistressor, O = other, U = unknown

[4)] Latitude, Longitude: Format = Degree with six decimals (e.g. as 44.630139, conversion from 44° 37’ 48.5’’ through calculation 44 + 37 / 60 + 48.5 / 3600)

2.2. Sampling period and conditions

The sampling period has been chosen in summer, July. Accordingly, during the field survey the weather was warm to hot (23-35˚C) with no precipitations. The water level in the rivers was low in most cases, except Draghiste and Racovat Rivers. Due to weather and hydrological conditions, as well as water abstraction, 7 sampling sites were lacking water; thus no samples could be taken there. The turbidity of the water in most analysed sampling points has been high due to high concentration of suspended solids from the mud.

2.3. Quality Elements and sampling methods

The biological quality elements sampled have been: benthic invertebrates and phytobenthos.

The **benthic invertebrates** have been sampled using the multi-habitat sampling (MHS) method developed during EU AQEM and STAR projects. Prior to taking samples, the sampling reach was inspected along a 50-100 m river stretch in order to get a representative sample. For each river stretch it was taken into account all possible substrates potentially inhabited by benthic invertebrates, i.e. the river bottom sediment, wooden debris, artificial substrate, macrophytes etc. The identification of benthic invertebrates started in the field by using white trays. Rare and endangered animals such as large mussels have been picked out, documented in the field and released again; they were not taken to the lab. After removal of larger wooden pieces, leaves and larger stones (whilst removing clinging animals) from the sample; rinsing and sieving to remove the mud; the samples have been fixed with ethanol 96%, giving a final concentration of 70%. The samples have been stored in the cooling box and delivered to the laboratory for sorting and identification.

In order to sample **benthic diatoms**, the preferred substrate was cobbles, but also pebbles and boulders at some stations. At least 5 cobbles or rather 10 cm² of suitable substratum have been brushed or scraped. The collected suitable cobbles or similar substrate were put in the tray along with some river water. The upper surface of the stones has been brushed with a clean stiff toothbrush vigorously to remove the diatom film, rinsing the toothbrush periodically in the water. In case we could not take cobbles or other hard substrate, macrophytes have been washed up (ex. Racovat River-Brinzeni Village – site no. 7). Afterwards, the samples have been preserved with alcohol and transferred to the laboratory in a cool box.

2.4. Chemical analyses

The taking of the water samples for the chemical analyses was done before taking biological samples to avoid bias effects from stirred-up sediment. During the sampling field survey, water field measurements (water temperature, pH, conductivity, dissolved oxygen concentration and saturation) have been performed. Also, the observed parameters, like turbidity, smell and colour were fixed in protocols. For laboratory analyses at each sampling site 3 bottles have been taken for specific analyses like mineral components, nutrients, heavy metals and oxygen parameters. The samples have been preserved accordingly to avoid changes in the composition. The sampling and preservation were carried out following the standard EN ISO 5667-6.

Table 3: List of analysed parameters and analytical methods

Parameter	Unit	Method/Standard
Field measurements		
Water temperature	Degrees Celsius	Thermometer measurement
pH		PO-pH-A-7.2.1-02
		(based on SM SR EN ISO 10523:2014)
Electrical conductivity	µS/cm	
Dissolved oxygen concentration	mg O_2/l	
Oxygen saturation	%	
Colour	description	observation
Smell	description	observation
Turbidity	Description (1 to 4)	observation/turbidimetric method
Laboratory analyses		
Biological oxygen demand (BOD_5)	mg/l	PO-CBO_5-A-7.2.1-04
		(based on SM SR EN 1899-2:2012)
Chemical oxygen demand, $K_2Cr_2O_7$ (COD)	mg/l	PO-CCO_{Cr} -A-7.2.1-03
		(based on SM SR ISO 6060:2006)
Ammonium-N	mg/l	PO-NH_4+ -A-7.2.1-14
		(based on the Guidance on the chemical analysis of surface waters, Leningrad, 2009)
Nitrite-N	mg/l	PO-NO_2- -A-7.2.1-15
		(based on the Guidance on the chemical analysis of surface waters, Leningrad, 2009)
Nitrate-N	mg/l	PO-NO_3--A-7.2.1-06
		(based on SM SR ISO 7890-3:2006)
Orthophosphate-P	mg/l	PO - P_{total} /P-$PO_4$3- -A-7.2.1-11
		(based on SM SR EN ISO 6878:2011)
Total phosphorus (unfiltered) (TP)	mg/l	PO - P_{total} /P-$PO_4$3- -A-7.2.1-11
		(based on SM SR EN ISO 6878:2011)
Chloride (Cl–)	mg/l	PO-Cl--A-7.2.1-07
		(based on SM SR ISO 9297:2012)
Sulphates ($SO_4$2–)	mg/l	PO-$SO_4$2-A-7.2.1-12
		(based on the Guidance on the chemical analysis of surface waters, Leningrad, 2009)
Total hardness	mMol/L	PO-D/Ca2+/ Mg2+-A-7.2.1-05
		(based on SM SR ISO 6059:2012)
Calcium (Ca2+)	mg/l	PO-D/Ca2+/ Mg2+-A-7.2.1-05
		(based on the Guidance on the chemical analysis of surface waters, Leningrad, 2009)
Magnesium (Mg2+)	mg/l	PO-D/Ca2+/ Mg2+-A-7.2.1-05
		(based on the Guidance on the chemical analysis of surface waters, Leningrad, 2009)
Sodium (Na+)	mg/l	PO-Na/K-A-7.2.1-13
		(based on SM STAS 8295:2007)
Potassium (K+)	mg/l	PO-Na/K-A-7.2.1-13
		(based on SM STAS 8295:2007)
Total suspended solids (TSS)	mg/l	PO-MS-A-7.2.1-09
		(based on SM STAS 6953:2007)
Copper dissolved (Cu)	µg/l	PO-Me-A--7.2.1 -12
		(based on SR EN ISO 15586:2003)

Zinc dissolved (Zn)	µg/l	PO-Me-A--7.2.1 -12
		(based on SR EN ISO 15586:2003)
Manganese dissolved (Mn)	µg/l	PO-Me-A--7.2.1 -12
		(based on SR EN ISO 15586:2003)
Nickel dissolved (Ni)	µg/l	PO-Me-A--7.2.1 -12
		(based on SR EN ISO 15586:2003)
Lead dissolved (Pb)	µg/l	PO-Me-A--7.2.1 -12
		(based on SR EN ISO 15586:2003)
Cadmium dissolved (Cd)	µg/l	PO-Me-A--7.2.1 -12
		(based on SR EN ISO 15586:2003)
Chromium dissolved (Cr)	µg/l	PO-Me-A--7.2.1 -12
		(based on SR EN ISO 15586:2003)
Mercury dissolved (Hg)	µg/l	PO-Hg-A--7.2.1 -13
		(based on SR EN ISO 17852:2006)

2.5. Responsibilities

The design of the field survey was developed under the EU4Env project. Austrian experts have been very cooperative during the whole process, starting with planning, sampling campaign, samples analyses and, even, reporting.

The responsible institution in Moldova has been EAM through Reference Laboratory which was involved directly and took part in the survey with its own sampling team and analysing the taken samples.

Table 4: Responsibilities during the SW Survey 2023

Responsibilities	Institution, contact person, email-address
General	
Responsible for the organisation of surface water body sampling	Institute: EAM Contact person: LUNGU Marina E-Mail: m_lungu@am.gov.md
Field work	
Responsible for field work (biological and chemical sampling, hydro-morphological site description)	Institute: EAM Contact person: JĂPĂLĂU Vladislav UBA expert: Daniel TRAUNER Supporting person(s): PARAȘCIUC Vasile LUCHIANOVA Victoria; ZGIRCU Natalia E-Mail:v_japalau@am.gov.md v_parasciuc@am.gov.md v_luchianova@am.gov.md n_zgircu@am.gov.md
Responsible for functional check of sampling equipment	Institute:EAM Contact person: JĂPĂLĂU Vladislav E-Mail: v_japalau@am.gov.md
Responsible for calibration of on-site measuring equipment	Institute: EAM Contact person: JĂPĂLĂU Vladislav E-Mail: v_japalau@am.gov.md
Chemical analysis	
Overall responsible for the chemical analysis in the lab, including reporting and data delivery	Institute: EAM Contact person: MIHNI Olga E-Mail:o_mihni_@am.gov.md
Responsible for sample transport from the field to the laboratory	Institute: EAM Contact person: JĂPĂLĂU Vladislav/ PARAȘCIUC Vasile E-Mail: v_japalau@am.gov.md v_parasciuc@am.gov.md
Analysing laboratory and contact person	Institute:EAM Contact person: MIHNI Olga E-Mail:o_mihni_@am.gov.md
Biological analysis	
Overall responsible for the biological analysis in the lab, including reporting and data delivery	Institute: xxx Contact person: LUCHIANOVA Victoria/ ZGÎRCU Natalia E-Mail: v_luchianova@am.gov.md n_zgircu@am.gov.md

2.6. Quality assurance

Quality assurance is achieved through the Quality Management System (SMC), ensured in the laboratory and confirmed by the National Accreditation Body of Moldova (MOLDAC). The laboratories are accredited to ISO 17025/LÎ-133.

According to the Regulation the objectives of the Quality Assurance Laboratory are:

- ensures the impartiality, independence and integrity of the laboratory staff, including the exclusion of any outside influence on the results of the laboratory activity;
- ensures a high level of technical training of the personnel and of the technical equipment necessary for carrying out the specific tests, taking into account the requirements of the test methods;
- allocates the necessary resources for the proper functioning of the laboratory and the continuous improvement of the management system.

CENTRUL NAȚIONAL DE ACREDITARE DIN REPUBLICA MOLDOVA
MOLDAC

str. Gheorghe Tudor, 5, MD-2009, mun. Chișinău, Republica Moldova

MOLDAC este semnatar EA - MLA pentru încercări

CERTIFICAT DE ACREDITARE

Nr. LÎ - 133

MOLDAC declară că:

LABORATORUL DE REFERINȚĂ DE MEDIU
DIN CADRUL AGENȚIEI DE MEDIU

Adresa juridică/sediul central: MD-2005, mun. Chișinău, str. Albișoara, 38, cod CUIIO 39062856
Adresa locației: MD-2072, mun. Chișinău, str. Grenoble, 134

satisface cerințele **SM EN ISO/IEC 17025:2018** și este competent să efectueze încercările definite în Anexa la prezentul Certificat de Acreditare.

Certificatul este valabil numai însoțit de Anexa din 22.05.2023, care constituie parte integrantă a acestui Certificat de Acreditare.

Acreditarea acordată este valabilă cu condiția îndeplinirii în mod continuu a criteriilor de acreditare stabilite de MOLDAC.

Data acreditării inițiale: 18 martie 2021
Data ultimei modificări: 22 mai 2023
Data expirării: 17 martie 2025

Director **Iurie FRIPTULEAC**

Reproducerea parțială a acestui Certificat este interzisă
Valabilitatea prezentului Certificat poate fi verificată pe site-ul **www.acreditare.md**

3. Results

3.1. Field protocols and hydro-morphological site description

The field protocols and hydromorphological site description have been scanned and are presented in annexes 2, 3. Also, annex 1 presents the field protocols in excel format.

In 7 locations there was no water due to the drought and water abstraction. Most of the investigated rivers have low to medium depth; 7 of them have natural channel cross section, 5 - semi-natural and 1 embanked. The channel plan form of the rivers was sinuous in most cases, while the river valley has U-shape in 4 cases, asymmetrical in 2 cases and with no perceptible river valley in 6 cases. Some of the rivers have many embankments and formed lakes on them, most of them are being used for agriculture.

The weather conditions in the field were good, the air temperature was appropriate for July month (23-35 degrees Celsius). It was sunny most of the days, with no precipitation, warm and even hot.

The measured parameters in the field were: pH, conductivity, temperature of water, turbidity, oxygen concentration and saturation. Thus the water temperature ranged from 18-29°C; the pH from 7,36-8,97; the highest electrical conductivity (4032 µS/cm) has been measured in Bratuleanca River/site nr. 20; the oxygen concentration ranged from 2,36-10,43 mg/l, while the oxygen saturation was 30,1-136,8%.

3.2. Chemical results

The obtained results on chemical analyses are presented in annex 4.

The minimum DO concentration and saturation have been measured at station nr. 12 - Lopatnic River (fig.2). COD ranged between 10,34-13,78 mgO_2/l (fig. 3).

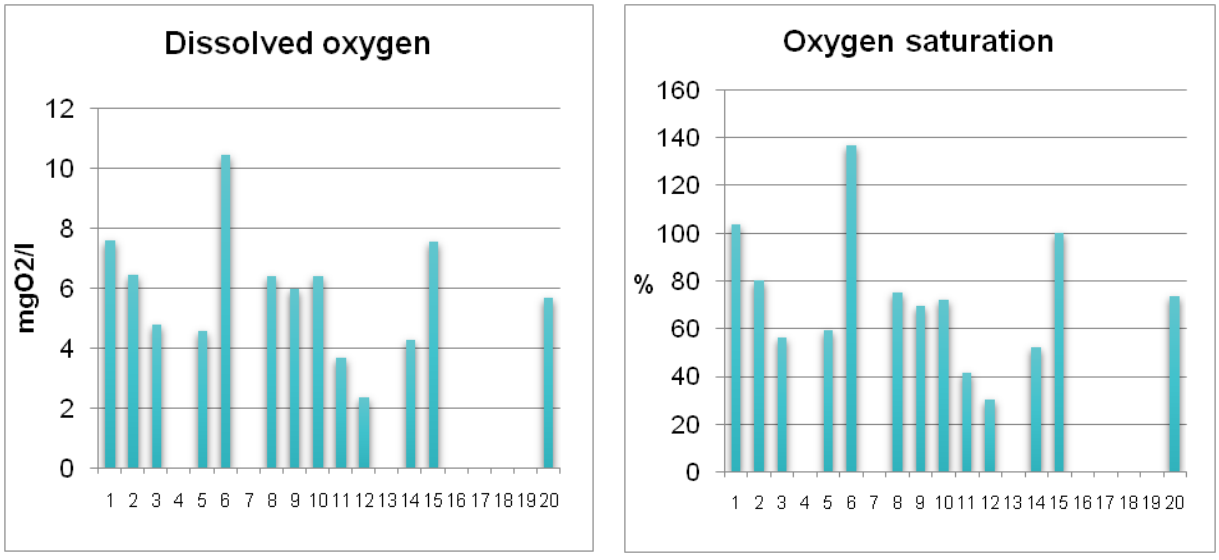

Figure 2: Dissolved oxygen concentration and oxygen saturation measured during the field survey

Many maximum values of physico-chemical parameters (BOD, magnesium, sulphate, chloride, sodium, potassium, ammonium nitrogen, orthophosphate) have been detected for Bratuleanca River (station nr. 20, annex 4). Also, at this station anionic surfactants have had the highest value (0,125 mg/l).

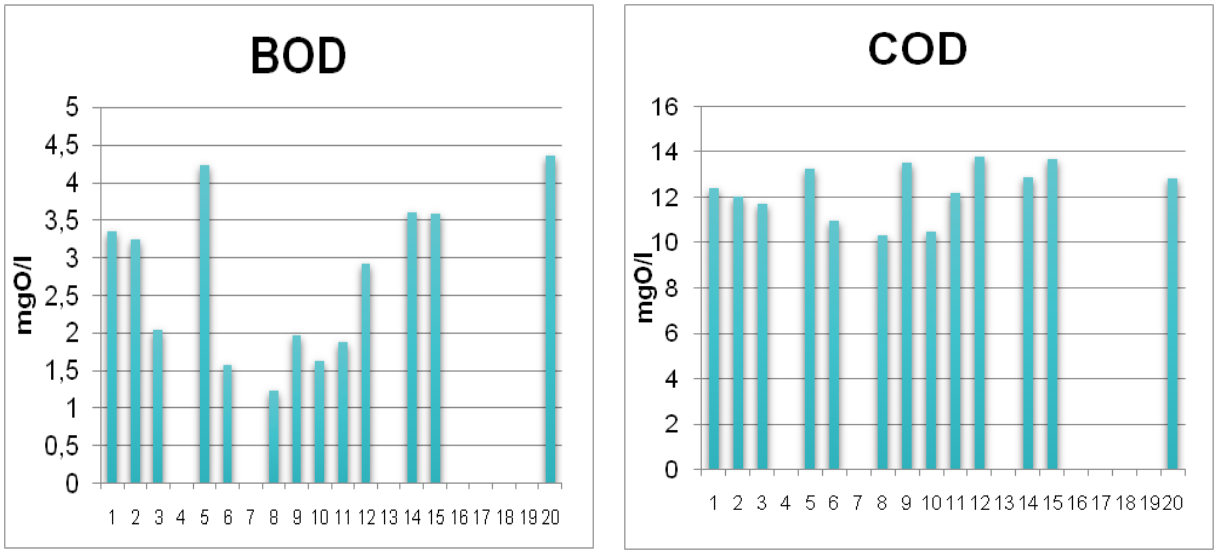

Figure 3: BOD5 and COD measured in the samples

Nutrients (fig.4 and 5) have had the maximum values for:

- Ammonium nitrogen – 0.428 mgN/l at Bratuleanca River/station nr. 20;
- Nitrites – 0.093 mgN/l at station nr. 3 on Racovat River;
- Nitrates – 0.07 mgN/l at station nr. 14 – Ciuhur River, Ocnita Village;
- Orthophosphates – 0.851 mgP/l at Bratuleanca River/station nr. 20;
- Total phosphorus – 1.124 mgP/l in Draghiste River-Bulboaca Village, station nr. 1.

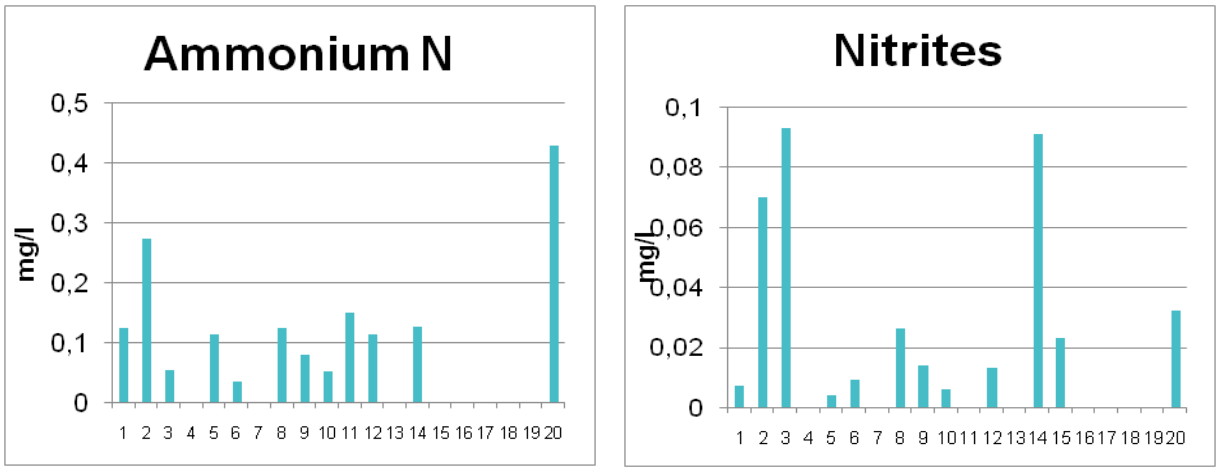

Figure 4: Variation of ammonium nitrogen and nitrites in the samples from JFS

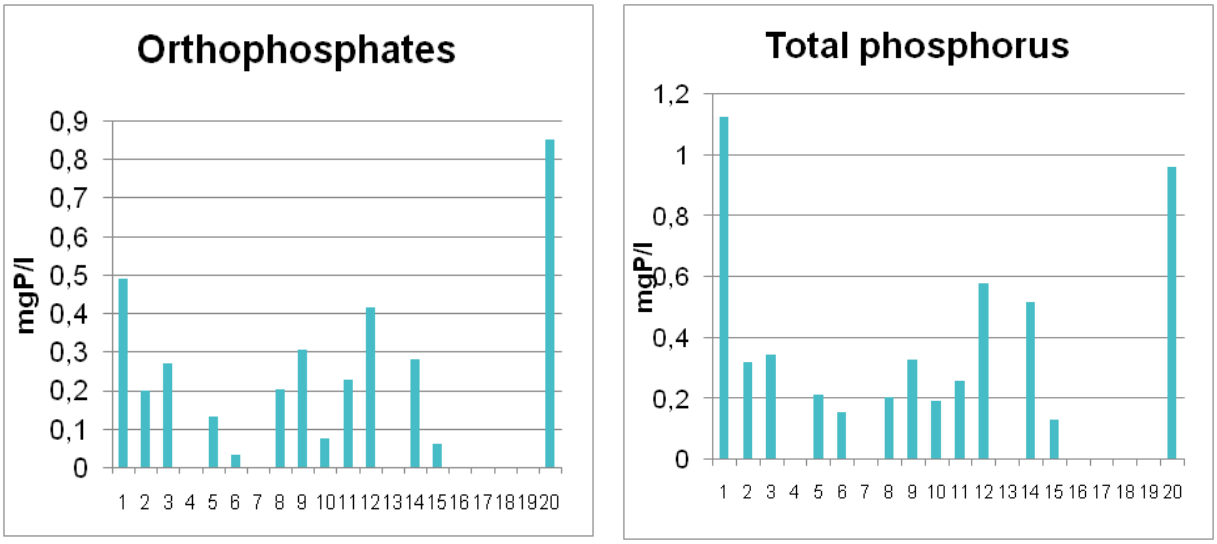

Figure 5: Variation of phosphorus parameters in the samples from JFS

From heavy metals there have been analysed 8 parameters, dissolved forms, and total iron. Traces of lead and cadmium have not been found.

3.3. Biological results

Benthic invertebrates: The samples have been abundant in species, less species (4) being found in Draghiste River-Burlanesti Village (2-nd sampling point). The 113 species found belong to 60 families of 8 major groups.

Table 5: Taxa list of benthic invertebrates

Major Group	Order/Class	Family	Genus/Species	AQEM ID
Annelida	Clitellata		Oligochaeta Gen.sp.	8736
Annelida	Clitellata	Lumbriculidae	*Stylodrilus heringeanus*	6935
Annelida	Clitellata	Naididae	*Potamothrix moldaviensis*	6533
Arachnida	Araneae	Cybaeidae	*Argyroneta aquatica*	4349
Collembola	Poduromorpha	Poduridae	*Podura aquatica*	
Crustacea	Amphipoda	Crangonyctidae	*Crangonyx pseudogracilis*	11227
Crustacea	Amphipoda	Gammaridae	*Gammarus fossarum*	5288
Crustacea	Amphipoda	Gammaridae	*Gammarus kischineffensis*	21819
Crustacea	Amphipoda	Gammaridae	*Gammarus pulex*	5291
Crustacea	Amphipoda	Niphargidae	*Niphargus* sp.	6127
Crustacea	Amphipoda	Pontogammaridae	*Pontogammarus robustoides*	10491
Crustacea	Isopoda	Janiridae	*Jaera istri*	8700
Crustacea	Ostracoda	Cyclocyprididae	*Cypria ophtalmica*	
Hirudinea	Arhynchobdellida	Erpobdellidae	*Erpobdella octoculata*	5159
Hirudinea	Arhynchobdellida	Erpobdellidae	*Erpobdella testacea*	5161
Hirudinea	Arhynchobdellida	Haemopidae	*Haemopis sanguisuga*	5373
Hirudinea	Rhynchobdellida	Glossiphoniidae	*Alboglossiphonia heteroclita*	4261
Hirudinea	Rhynchobdellida	Glossiphoniidae	*Alboglossiphonia hyalina*	7856
Hirudinea	Rhynchobdellida	Glossiphoniidae	*Glossiphonia concolor*	5307
Hirudinea	Rhynchobdellida	Glossiphoniidae	*Helobdella stagnalis*	5413
Insecta	Coleoptera	Dytiscidae	*Ilybius fuliginosus* Ad.	11730
Insecta	Coleoptera	Dytiscidae	*Laccophilus minutus* Ad.	12054
Insecta	Coleoptera	Dytiscidae	*Laccophilus* sp. Lv.	5706
Insecta	Coleoptera	Dytiscidae	*Platambus maculatus* Lv.	6437
Insecta	Coleoptera	Elmidae	*Elmis* sp. Lv.	5095
Insecta	Coleoptera	Elmidae	*Riolus* sp. Lv.	6797
Insecta	Coleoptera	Haliplidae	*Haliplus fluviatilis* Ad.	12436
Insecta	Coleoptera	Haliplidae	*Haliplus lineatocollis* Ad.	12442
Insecta	Coleoptera	Haliplidae	*Haliplus* sp. Lv.	5396
Insecta	Coleoptera	Hydrophilidae	*Anacaena bipustulata* Ad.	12960
Insecta	Coleoptera	Scirtidae	*Elodes marginata* Lv.	14043
Insecta	Coleoptera	Scirtidae	*Elodes* sp. Lv.	5418
Insecta	Diptera	Ceratopogonidae	Ceratopogonidae Gen. sp.	4585
Insecta	Diptera	Ceratopogonidae	*Culicoides* sp.	9664
Insecta	Diptera	Chironomidae	Chironomidae Gen sp.	4642
Insecta	Diptera	Chironomidae	Chironominae Gen. sp.	4643
Insecta	Diptera	Chironomidae	Chironomini Gen. sp.	4644
Insecta	Diptera	Chironomidae	*Macropelopia* sp.	5934
Insecta	Diptera	Chironomidae	Prodiamesinae sp.	10332
Insecta	Diptera	Chironomidae	Tanypodinae Gen. sp.	6972
Insecta	Diptera	Culicidae	*Anopheles (Anopheles)* sp.	18947
Insecta	Diptera	Culicidae	*Uranotaenia unguiculata*	7774
Insecta	Diptera	Dixidae	*Dixa dilatata*	10368
Insecta	Diptera	Dixidae	*Dixa* sp.	4989
Insecta	Diptera	Fanniidae	Fanniidae sp.	16815
Insecta	Diptera	Limoniidae	Limoniidae Gen. sp.	8483
Insecta	Diptera	Limoniidae	*Pilaria* sp.	6403
Insecta	Diptera	Muscidae	Muscidae Gen. sp.	8659
Insecta	Diptera	Pediciidae	*Dicranota* sp.	4955
Insecta	Diptera	Ptychopteridae	*Ptychoptera* sp.	7492
Insecta	Diptera	Scathophagidae	Scathophagidae Gen. sp.	9601
Insecta	Diptera	Simuliidae	*Simulium aureum*-Gr.	9769
Insecta	Diptera	Simuliidae	*Simulium* sp.	6853

Insecta	Diptera	Tabanidae	*Chrysops* sp.	9324
Insecta	Diptera	Tabanidae	*Tabanus* sp.	6963
Insecta	Diptera	Tipulidae	*Tipula* sp.	7077
Insecta	Diptera		Sphaeromiini sp (pupa)	
Insecta	Ephemeroptera	Baetidae	*Baetis fuscatus*	4397
Insecta	Ephemeroptera	Baetidae	*Baetis rhodani*	4415
Insecta	Ephemeroptera	Baetidae	*Baetis* sp.	4419
Insecta	Ephemeroptera	Baetidae	*Baetis tracheatus*	4423
Insecta	Ephemeroptera	Baetidae	*Cloeon dipterum*	4705
Insecta	Ephemeroptera	Caenidae	*Caenis robusta*	4527
Insecta	Ephemeroptera	Leptophlebiidae	*Leptophlebia marginata*	5730
Insecta	Hemiptera	Aphelocheiridae	*Aphelocheirus aestivalis*	4335
Insecta	Hemiptera	Corixidae	*Hesperocorixa linnaei*	5462
Insecta	Hemiptera	Corixidae	*Hesperocorixa sahlbergi*	5463
Insecta	Hemiptera	Corixidae	*Sigara falleni*	6825
Insecta	Hemiptera	Gerridae	*Gerris lacustris*	5299
Insecta	Hemiptera	Micronectidae	*Micronecta griseola*	8200
Insecta	Hemiptera	Micronectidae	*Micronecta scholtzi*	8202
Insecta	Hemiptera	Micronectidae	*Micronecta* sp.	6002
Insecta	Hemiptera	Naucoridae	*Ilyocoris cimicoides* ssp.	19346
Insecta	Hemiptera	Nepidae	*Nepa cinerea*	6118
Insecta	Hemiptera	Nepidae	*Ranatra linearis*	6674
Insecta	Hemiptera	Notonectidae	*Notonecta glauca* ssp.	19375
Insecta	Hemiptera	Notonectidae	*Notonecta* sp.	6139
Insecta	Hemiptera	Notonectidae	*Notonecta viridis*	8208
Insecta	Hemiptera	Pleidae	*Plea minutissima* ssp.	19392
Insecta	Hemiptera	Veliidae	*Velia caprai*	7149
Insecta	Megaloptera	Sialidae	*Sialis lutaria*	6822
Insecta	Trichoptera	Hydropsychidae	*Hydropsyche angustipennis* ssp.	21230
Insecta	Trichoptera	Hydropsychidae	*Hydropsyche instabilis*	5598
Insecta	Trichoptera	Hydroptilidae	*Hydroptila* sp.	5616
Insecta	Trichoptera	Limnephilidae	*Anabolia furcata*	4298
Insecta	Trichoptera	Limnephilidae	*Micropterna nycterobia*	6022
Insecta	Trichoptera	Limnephilidae	*Stenophylax* sp.	6912
Insecta/Odonata	Anisoptera	Libellulidae	*Orthetrum brunneum*	7441
Insecta/Odonata	Anisoptera	Libellulidae	*Orthetrum cancellatum*	6207
Insecta/Odonata	Anisoptera	Libellulidae	*Sympetrum sanguineum*	6948
Insecta/Odonata	Zygoptera	Calopterygidae	*Calopteryx splendens*	4530
Insecta/Odonata	Zygoptera	Coenagrionidae	Coenagrionidae Gen. sp.	4723
Insecta/Odonata	Zygoptera	Coenagrionidae	*Enallagma cyathigerum*	5100
Insecta/Odonata	Zygoptera	Coenagrionidae	*Erythromma viridulum*	5165
Insecta/Odonata	Zygoptera	Lestidae	*Chalcolestes viridis*	4629
Insecta/Odonata	Zygoptera	Platycnemididae	*Platycnemis pennipes*	6438
Malacostraca	Isopoda	Asellidae	*Asellus aquaticus*	8691
Malacostraca	Mysida	Mysidae	*Limnomysis benedeni*	8730
Mollusca	Bivalvia	Sphaeriidae	*Euglesa casertana*	19391
Mollusca	Bivalvia	Sphaeriidae	*Euglesa subtruncata*	6426
Mollusca	Bivalvia	Sphaeriidae	*Sphaerium/Musculium lacustre*	7966
Mollusca	Bivalvia	Unionidae	*Anodonta anatina*	7381
Mollusca	Bivalvia	Unionidae	*Unio pictorum* ssp.	19441
Mollusca	Gastropoda	Hydrobiidae	*Avenionia roberti*	12922
Mollusca	Gastropoda	Lymnaeidae	*Galba truncatula*	5284
Mollusca	Gastropoda	Lymnaeidae	*Lymnaea stagnalis*	5916
Mollusca	Gastropoda	Lymnaeidae	*Radix balthica*	16959
Mollusca	Gastropoda	Lymnaeidae	*Radix labiata*	16982
Mollusca	Gastropoda	Planorbidae	*Anisus vortex*	4318

Mollusca	Gastropoda	Planorbidae	*Gyraulus parvus*	5358
Mollusca	Gastropoda	Valvatidae	*Borysthenia naticina*	4471
Mollusca	Gastropoda	Valvatidae	*Valvata piscinalis piscinalis*	7144

Based on the collected and identified taxa the saprobic index was calculated. According to the Moldovan Government Decision (GD) 890, this index is used for status assessment. Furthermore, the data was entered into the Ecological Status Classification System (ESCS) based on Multi-Metric Indices (MMI) of benthic invertebrates developed previously during the project EUWI+[1]. Table 6 shows both calculated ecological results. Out of 20 sites, seven had no water at the time of sampling. According to the MMI ESCS, site 2 shows Bad Status, six sites Poor Status, three sites Moderate Status, two sites Good Status, one site High Status. Detailed results are provided in Annex 7. The status based on GD 890 paint a different picture, with one site in high status (I), eight in good status (II), three in moderate status (III), and one site in poor status (IV). These differences in the results are due to the nature of both classification methods. The Saprobic Index (GD 890) is a system that indicates pressures caused by nutrient input. The MMI takes into account a multiple indices and calculates the status based on thresholds derived from river type specific reference conditions. The MMI is more sensitive than the Saprobic Index and different versions of this approach are used in the EU member states for status assessment.

Table 6: Biological Status based on benthic invertebrates

Site	River	WB	Site Name	Biological Status MMI*	AQEM saprobic index/ Zelinka Marvan	Biological Status GD 890**
1	Draghiște River	MD02012202/1	Bulboaca Village; Briceni District	**POOR**	**2,1**	**II**
2	Draghiște River	MD02012202/2	Burlănești Village; Edinet District	**BAD**	**1,9**	**II**
3	Racovăț River	MD020126/2	Clocușna Village; Ocnita District	no water		
4	Racovăț River	MD02012204/2	Tirnova Village; Edinet District	**POOR**	**2,28**	**II**
5	Racovăț Mic River	MD02012204/1	Groznița Village; Briceni District	no water		
6	Bogda River	MD02012203/2	Blești Village; Edinet District	**MODERATE**	**2,026**	**II**
7	Racovăț River	MD020122/2	Corpaci Village; Edinet District	**POOR**	**2,028**	**II**
8	Zelena River	MD020127/1	Slobozia Medveja Village; Briceni District	no water		
9	Medveja River	MD020126/1	Medveja Village; Briceni District	**MODERATE**	**2,14**	**II**
10	Larga River	MD020125/1	Larga Village, upstream; Briceni District	**GOOD**	**2,144**	**II**
11	Vilia River	MD020124/1	Cotiujeni Village,upstream; Briceni District	**HIGH**	**2,602**	**III**
12	Cerlena River	MD02012401/1	Caracușenii Noi Village; Briceni District	**POOR**	**2,704**	**III**

[1] https://www.euwipluseast.eu/en/component/k2/item/1116-moldova-definition-of-reference-conditions-and-class-boundaries-in-rivers-of-moldova-for-the-bqe-benthic-invertebrates-eng?fromsearch=1

Site	River	WB	Site Name	Biological Status MMI*	AQEM saprobic index/ Zelinka Marvan	Biological Status GD 890**
13	Lopatnic River	MD020123/1	Briceni Village, upstream; Briceni District	**POOR**	**2,758**	**IV**
14	Terebna River	MD020121/1	Cuconești Noi Village; Briceni District	no water		
15	Ciuhur River	MD020120/1	Ocnița Village, downstream; Ocnita District	**POOR**	**1,761**	**I**
16	Camenca River	MD020119/1	Borosenii Noi Village, downstream; Riscani District	**GOOD**	**2,064**	**II**
17	Căldărușa River	MD02011903/1	Danu Village, downstream; Glodeni District	no water		
18	Șovățul Mic River	MD02011901/1	Limbenii Noi Village; Glodeni District	no water		
19	Șoltoaia River	MD020115/1	Făgădău Village, downstream; Falesti District	no water		
20	Bratuleanca River	MD020112/1	Brătuleni Village; Nisporeni District	**MODERATE**	**2,562**	**III**

*Biological Status calculated based on Multi-Metric Indices (MMI) in an ESCS based on type-specific reference conditions developed previously during EUWI+.
**Biological Status according to the official Moldovan method, using the Saprobic Index, based on Government Decision (GD) 890.

Benthic Diatoms. 205 diatom taxa were identified in 13 samples. The largest number of species was identified in Dragiste River in the site near the village of Bulboaca – 59 species. The lowest number of species was identified in Brătuleanca River at Brătuleni Village and reached only 21 species. The most abundant and the most frequent species were *Achnanthidium minutissimum* (Kützing) Czarnecki var. *minutissimum*, *Amphora pediculus* (Kützing) Grunow var. *pediculus*, *Cocconeis placentula* var. *euglypta* (Ehrenberg) Grunow, *Craticula subminuscula* (Manguin) C.E. Wetzel & Ector in Wetzel et al. *Cyclotella meneghiniana* Kützing, *Cyclotella atomus* Hustedt var. *atomus*, *Navicula tripunctata* (O.F.Müller) Bory var. *tripunctata*, *Navicula cryptotenella*-Type in Kelly (TDI), *Nitzschia dissipata* (Kützing) Grunow, *Nitzschia inconspicua* Grunow, and *Rhoicosphenia abbreviata* (C.Agardh) Lange-Bertalot.

More detailed information on phytobenthos can be found in Annex 10 with the complete list of species.

4. Discussion of results

The objective of the survey has been accomplished and it will serve as a methodological basis for future monitoring programs as an essential part of river basin management planning.

During field work, also laboratory part, the Moldavian experts have had the opportunity to collaborate with the Austrian team and this exchange of experience has a good impact on future surface water monitoring activities according to WFD. Also, specialists from the Environmental Agency had the opportunity to visit Austrian institutions involved in monitoring and data management, to be instructed on BQE key determination, assessment and validation of data till the presentation of this information to the broad public.

For the field survey there have been selected monitoring stations on rivers at risk and with an impact on the community. Also, these selected water bodies have not been before monitored – so the information obtained will be very useful for further planning.

At first sight one could see that the water level was very low in most of the rivers, some of them even disappearing, due to weather conditions and human impact (water abstraction and construction of dams). As a consequence, the concentration of chemical parameters got higher results and biological elements had poor results.

Study visit organised later in October by the Umweltbundesamt, Environment Agency Austria (EAA) within the framework of the EU4Environment program Water resources and environmental data comes with the mission to strengthen the capacities of specialists in data evaluation and interpretation. The study visit organised for both managers and laboratory specialists strengthened knowledge on the correct implementation of European water monitoring policies, providing insights into Austrian routines and practices and providing training on biological laboratory work.

5. Next steps and Lessons learned

The experience gained in all directions (planning of the field survey; choosing of monitoring sites in the office and at the river; filling of field protocols; sampling; determination, etc) would be applied in routine monitoring activities.

The selected stations could be further included in the monitoring plans in order to have at least 4 physico-chemical data for assessment according to national legislation. This measure will cover data gaps for next management plans.

Regular trainings on physico-chemical analyses, data validation according to new standardized methodologies is welcomed. The achievement of the new standardized methods and consumables for them could improve the chemical results of the laboratory.

Also, regular training on certain groups of organisms (Bacillariophyceae, Trichoptera, Ephemeroptera, Plecoptera, Diptera, Oligochaeta, Hirudinea, etc.) and certain determination keys accordingly would improve water quality assessment.

And not the least, more qualified staff in the laboratory is a must.

6. Annexes

Annex 1: Field protocols summary (in Excel format)

Annex 2: Field protocols

Annex 3: Hydro-morphological site description

Annex 4: Chemical data summary (in Excel format)

Annex 5: Protocol for sample handover

Annex 6: Water quality norms

Annex 7: Biological data summary (in Excel format)-benthic invertebrates

Annex 8: MHS field tables

Annex 9: Protocols for Diatom sampling

Annex 10: Biological data summary (in Excel format)- Diatoms

Annex 11: Photo documentation

Annex 12: Metadata

Annexes are available as separate documents

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