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Environmental Protection of International River Basins

DEVELOPMENT OF DRAFT RIVER BASIN MANAGEMENT PLAN FOR A SELECTED PILOT BASIN IN BELARUS (THE UPPER DNIEPER BASIN)

ENVIRONMENTAL OBJECTIVES

Prepared by

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With assistance of
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ABBREVIATIONS

AWB	artificial water bodies
Belarus	Republic of Belarus
BNTU	Belarusian National Technical University
CRICUWR	Central Research Institute for Complex Use of Water Resources (MNREP, Belarus)
CSCP	Communication Strategy and Communication Plan for Upper Dnieper Basin
EPIRB	EU-funded project "Environmental Protection of International River Basins"
EU	European Union
GWB	Groundwater body
HMWB	Heavily modified water body
MNREP	Ministry of Natural Resources and Environmental Protection of the Republic of Belarus
NEMS	National Environmental Monitoring System of the Republic of Belarus
PoM	Program of Measures
RBMP	River Basin Management Plan
REC	Regional Environmental Center for Central and Eastern Europe
RCRCEM	Republican Center of Radiation Control and Environmental Monitoring (MNREP, Belarus)
RCACEP	Republican Center of Analytical Control in the field of Environmental Protection (MNREP, Belarus)
SWB	Surface water body
SWC	State Water Cadaster of the Republic of Belarus
Water Convention	United Nations Economic Commission for Europe (UNECE) – Convention on the protection and use of transboundary watercourses and international lakes
WFD	Directive 2000/60/EC of the European Parliament and the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (EU Water Framework Directive)

RPC for Geology	State Enterprise"Research and Production Center for Geology"(MNREP, Belarus)
UCEWP	Ukrainian Center of Environmental and Water Projects of Academy of Technological Sciences (Ukraine)
TCP	Technical Code of Common Practice (national regulations, Belarus)
project	International project “Development of draft river basin management plan pilot basin of the upper Dnieper, Belarus"
PA	Protected areas
NAS	National Academy of Sciences of Belarus
GWB	Ground water body

INTRODUCTION

The present report is prepared by specialists of CRICUWR with assistance its partners RCRCEM and RCACEM, within the signed contract Development of draft River Basin Management Plan for a Selected Pilot Basin in Belarus (the Upper Dnieper Basin) in the scope of EU funded project "Environmental Protection of International River Basins".

The following experts participated in preparing this report:
- V.N.Korneev, A.V.Pakhomau, K.S.Tsitou, L.N.Hertman, I.A.Bulak (CRICUWR);

In preparing the report the materials were used which are presented in the following project reports:
- "Identification, characterization and delineation of groundwater bodies in the Dnieper basin, Belarus" (author - Bernardas Paukshtis);
- "Pressures and impacts analysis on water bodies" (report prepared by CRICUWR);
- "Water bodies and risl analysis" (report prepared by CRICUWR);
- "Classification of groundwater bodies" (prepared by Bernardas Paukshtis - KE5 expert on groundwater);

and other project materials.

When carrying out the environmental objectives significant methodological assistance and cooperation have been provided by the key project expert A.P.Stankevich.

The main documents in the analysis environmental objectives is the Guiding document #20 "On exemptions to the environmental objectives".

Additionally, in the analysis of pressures and impacts following regulations and tools of the water-ecology policy were used:

- Directive of the European Parliament and the Council of the European Union № 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive);
- Guidance document #1 "Economics and the environment. The implementation challenge of the Water Framework Directive";
- Water Code of the Republic of Belarus in the 2014 edition;
- Water Strategy of the Republic of Belarus for the period until 2020 (approved by the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus 11.08.2011 № 72- P);
- TCP 17. 06-08-2012 (02120) Environmental protection and nature use. Hydrosphere. The procedure for establishing standards for allowable discharges of chemical and other substances in the wastewater;
- TCP 17.13- XX -201H/OP Environmental protection and nature use. An analytical control and monitoring. The procedure of classification of a surface water body on ecological status;

Photo on the cover – river Dnepr downstream of Orsha near Levky village presented by Kanstantsin Tsitou.

1 ENVIRONMENT OBJECTIVES AND EXEMPTIONS

1.1 Environmental objectives

Determionation of the environmental objectives based on the article 4 (paragraphs 4.3-4.7) of the CIS Guidance document to the EU WFD #1"Economics and the environment. The implementation challenge of the Water Framework Directive".

The main methodological ideas for the environmental objectives are the followings:

- for surface water, the highest ecological and chemical status possible is achieved, given impacts that could not reasonably have been avoided due to the nature of the human activity or pollution;

- for groundwater, the least possible changes to good groundwater status, given impacts that could not reasonably have been avoided due to the nature of the human activity or pollution.

The WFD requires achievement of the following environmental objectives

a. *good ecological/chemical status* of surface water bodies;

b. *good ecological potential* and *chemical status* of HMWBs and AWBs;

c. *good chemical/quantitative status* of groundwater bodies.

Finally environmental objectives for the upper Dnieper river basin are based on the good ecological status class/ good ecological potential of surface water bodies which is determined take into account the chemical (hydrochemical) status, hybrobiological status and and hydromorphological changes[1] (adjusted scheme is shown in Figure 4)

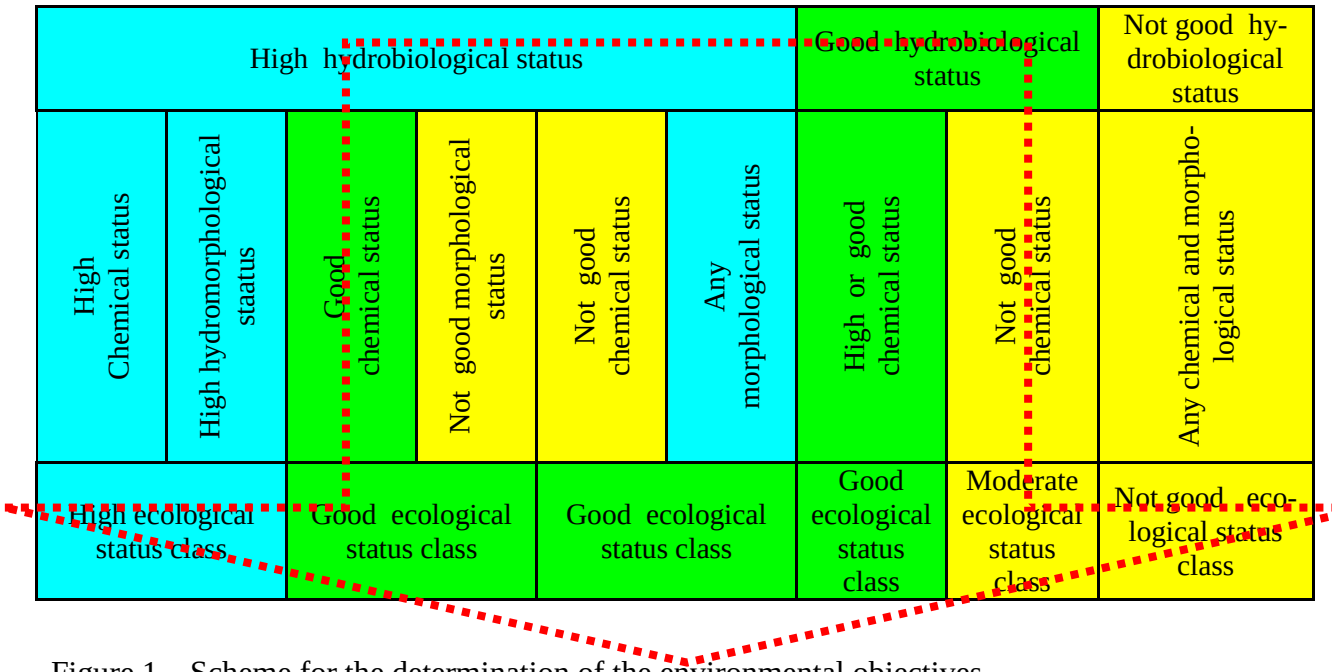

Figure 1 – Scheme for the determination of the environmental objectives

[1] In determining the ecological status class TCP 17.13-XX-201X/OP "Environment protection and natural resources. Analytical control and monitoring. Rules of reference of a surface water body to classes of ecological status" was used.

The Upper Dnieper River Basin Management Plan (UDRBMP) provides an overview of the status assessment results of both surface water bodies and groundwater bodies and risk assessment classifications.

According to paragraph (26) of the Water Framework Directive states "... should aim to achieve at least good water quality by identifying and implementing the necessary measures ...". Consequently, the targets for the upper Dnieper basin water bodies are defined by upper limit of the range of surface water quality, respective good chemical (hydrochemical) status (Tables 1, 2 of the Attachment A)[2].

For the chemical (hydrochemical) status under the WFD targets to achieve the required *hydrobiological status* of water bodies of the upper Dnieper basin are determined by upper limit of range of indicators of surface water quality, relevant good status (Tables 3, 4 of the Attachment A)[3]. Typing of water objects is the same as in the definition of the chemical (hydrochemical) status.

[2] when setting targets, the following regulations of the Republic of Belarus, harmonized with the European legislation were used:
- TCP 17.13-XX-201X (02120) Environmental protection and nature use. An analytical control and monitoring. Rules of definition the chemical (hydrochemical) status of river ecosystems;
- TCP 17.13-XX-201X (02120) Environmental protection and nature use. An analytical control and monitoring. Rules of definition the chemical (hydrochemical) status of lakes ecosystems;

[3] when setting targets, the following regulations of the Republic of Belarus, harmonized with the European legislation were used:
- TCP 17.13-XX-201X (02120) Environmental protection and nature use. Analytical control and monitoring. Rules of definition the ecological (hydrobiological) status of river ecosystems;
- TCP 17.13-XX-201X (02120) Environmental protection and nature use. Analytical control and monitoring. Rules of definition the ecological (hydrobiological) status of lakes ecosystems.

1.2 Exemption according to WFD

An integral part of the environmental objectives set out in Article 4 of WFD are the so-called exemptions.
Article 4.4, 4.5, 4.6 and 4.7 describe the conditions and the process in which they can be applied. These exemptions range from small-scale temporary exemptions to midand long term deviations from the rule "good status by 2015", and include the following aspects:

- the extension of the deadline , in other words, good status must be achieved by 2021 or 2027 at the latest (Article 4.4) or as soon as natural conditions permit after 2027;
- the achievement of less stringent objectives under certain conditions (Article 4.5);
- the temporary deterioration of the status in case of natural causes or "force majeur" (Article 4.6);
- new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, or failure to prevent status deterioration of a body of surface water (including from high status to good status) as a result of new sustainable human development activities (Article 4.7).

The exemption decribed in Article 4.6 not taken to account due to our water objects at risk can not be affected by natural factors more than antropogenic pressures in the future.

The application of WFD Article 4.4 indicates that respective measures probably will not be implemented in the upper Dnieper river basin by 2022, whereas less stringent environmental objectives will be aimed for in water bodies subject to WFD Article 4.5.

The term of 2022 of year was accepted due to following reasons:

- The Upper Dnieper River Basin Management Plan (UDRBMP) will be finalized and approved in 2015;
- Realization of UDRBMP will be implemented during next six years from 2016 till 2022.

For the 104 surface river water bodies of the upper Dnieper river basin it can be summarised that Article 4.4 is applied for 4 water bodies (4%) and Article 4.5 for 4 water bodies (4%) and article 4(7) is implemented in 4 water bodies (4%) (Table 1).

There are determined that 5 surface water bodies and one ground water body probably will not reached environmental objectives to 2022 after implementation of the Program of measures

For other water bodies at risk can be expected possibilities to reach of the environmental objectives to 2022 after implementation of the Program of measures.

Table 1 – Summary table of Exemption according to WFD - water bodies which probably will not reached environmental objectives to 2022 after implementation of the Program of measures

Code	Name	Reasons
Surface water bodies		
BY010812/03	Svisloch (downstream Minsk)	Article 4.4 It will be expected that good ecological status designation for this water object will be extent for 2022 or 2028 due to significant impact from point sources located in the Minsk urban and industrial area (MUPE "Minskvodokanal"). Past years data shows annual substantional increase of population in Minsk as well as Minsk region due to demographic situation and migration condition. Expected possible problem with watering of Svisloch River due to limit of funds for maintain current level of diversion from Viliya river can caused to deterioration of the status for the water body. Article 4.5 Possible activity in connection with local environmental measures (increasing capacity of Minsk WWTP, modernizaion of city storm sewer system) can be affect on improving water quality in the River Svisloch Article 4.7 Increasing impossibilities of self-purification of river Svisloch can affect on ecological status
BY010812/04	Svisloch (downstream Osipovichi reservoir)	Article 4.7 Secondary pollution affected from the Osipovichy reservoir where bottom sediments are extremely polluted. Pollution transfer from the upper river district.
BY011015	Uza	Article 4.4 It will be expected that good ecological status designation for this water object will be extent for 2022 or 2028 due to significant impact from point sources located in the Gomel urban and industrial area (MUPE "Gomelvodokanal", JSC "Gomelsteclo", JSC "Gomel chemical plant" etc.) Article 4.5 Possible activity in connection with local environmental measures (increasing capacity of Gomel WWTP, modernizaion of city storm sewer system) can be affected on improving water quality in the River Uza

Code	Name	Reasons
		Article 4.7 Increasing impossibilities of self-purification of river Uza can affect on ecological status
BY010805/01	Plissa (Smolevichi d-t)	Article 4.4 It will be expected that good ecological status designation for this water object will be extent for 2022 or 2028 due to significant impact from new point sources (new urban settlement of the city Misk) which will be located in the Smolevichy district as well as exsisting big agricultural enterprizers. Article 4.5 Possible activity in connection with local environmental measures (increasing capacity of Smolevichi WWTP, etc.) can be affected on improving water quality in the river Plissa. Article 4.7 Increasing impossibilities of self-purification of river Plissa can affect on ecological status
BY010805/02	Plissa (Smolevichi and Borisov d-t)	Article 4.4 It will be expected that good ecological status designation for this water object will be extent for 2022 or 2028 due to significant impact from industrial point sources (JSC "BELAZ", etc) which was located in the Smolevichy district. Article 4.5 Possible activity in connection with local environmental measures (increasing capacity of local wwtp of the JSC "BELAZ") will affect on improving water quality in the river Plissa.
Ground water bodies		
Groundwater bodies in the Dnieper-Sozh and Proterozoic sediments in the area of Minsk urban agglomeration in areas of all 12 group intakes.		Articles 4.4, 4.7 of WFD. Uncontrolled groundwater extraction around Minsk exceeds their available resources, where megacone formed diameter up to 40-70 km reducing to the center to 25-40 m as a result of intensive exploitation of groundwater. Extensive growth of population on Minsk agglomeration and increase of water intake from ground water bodies.

ATTACHMENT A – RANGES OF CHEMICAL AND HYDROBIOLOGICAL PARAMETERS FOR THE GOOD WATER BODIES STATUS IN THE UPPER DNIEPER BASIN

Table 1 - The ranges of hydrochemical data for watercourses related to good chemical status (class 2)

Indicator/group performance	watercourses type		
	1	2	3
1 Gas composition			
Dissolved oxygen, mgO_2/dm^3	6,0 - 7,4	6,0 - 6,9	6,0 - 6,4
2 Hydrogen ions			
Hydrogen parameter (pH), minimum maximum	6,5 - 6,9 8,1 - 8,5	6,5 - 6,9 8,1 - 8,5	6,5 - 6,9 8,1 - 8,5
3 Organic substances			
Biochemical oxygen demand BOD5, mgO_2/dm^3	1,5-3,0	1,7 - 3,0	3,1 - 4,5
Dichromate oxidation, mgO_2/dm^3	19,1 - 30,0	21,1 - 30,0	30,1 - 45,0
4 Nitrogen-containing substances			
Ammonium ion, mgN/dm^3	0,31 - 0,39	0,31 - 0,39	0,40 - 0,59
Nitrite ion, mgN/dm^3	0,015 - 0,024	0,017 - 0,024	0,025 - 0,038
Nitrate ion, mgN/dm^3	1,1 - 3,0	2,1 - 4,0	3,1 - 5,0
Total Kjeldahl nitrogen, mg/dm^3	1,3 - 5,0	1,4 - 5,0	5,1 - 7,5
5 Phosphorous-containing substances			
Phosphate ion (including hydro - and dihydro forms) mgP/dm^3	0,067 - 0,099	0,067 - 0,099	0,067 - 0,099
Total phosphorus, mg/dm^3	0,11 - 0,20	0,12 - 0,20	0,21 - 0,30
6 Metals			
Copper, mg/dm^3	0,0026 - 0,0040	0,0029 - 0,0043	0,0033 - 0,0045
Zinc, mg/dm^3	0,009 - 0,012	0,011 - 0,014	0,013 - 0,016
Iron (total), mg/dm^3	0,146 - 0,230	0,166 - 0,250	0,186 - 0,270
Manganese, mg/dm^3	0,021 - 0,032	0,023 - 0,035	0,026 - 0,038
Nickel, mg/dm^3	0,0051 - 0,0100	0,0051 - 0,0100	0,0101 - 0,0150
Chrome (общий), mg/dm^3	0,0021 - 0,0050	0,0021 - 0,0050	0,0051 - 0,0075
7 Contaminants			
Oil and oil products dissolved and emulsified state, mg/dm^3	0,017 - 0,050	0,018 - 0,050	0,051 - 0,075
Synthetic anionic surfactants (including alkilok si ethylated -sulfates, alkylsulfonates, olefinsulfonates, alkylbenzene sulfonates, alkyl sulfates, sodium and potassium salts of fatty acids, mg/dm^3	0,011 - 0,100	0,021 - 0,100	0,101 - 0,150

Note: Typing rivers/river sites is carried out on the watershed area A (km^2): type 1 (small) - A <100; type 2 (medium small) - A range from 100 to 1000; type 3 (large and very large) - A> 1000.

Table 2 - The ranges of physico-chemical parameters for good chemical (hydro-chemical) status of lake ecosystems

Indicator/group performance	Lake type		
	1	2	3
1 Gas composition			
Dissolved oxygen, mgO_2/dm^3	6,0 - 7,4	6,0 - 7,4	6,0 - 7,4
2 Hydrogen ions			
Hydrogen parameter (pH), minimum maximum	 6,2 - 6,4 8,3 - 8,5	 6,2 - 6,4 8,3 - 8,5	 6,2 - 6,4 8,3 - 8,5
3 Physical properties parameter			
transparency, m	0,70 - 0,99	1,54 - 1,99	2,30 - 2,99
4 Organic substances			
Biochemical oxygen demand BOD5, mgO_2/dm^3	2,6 - 3,5	2,1 - 3,0	1,6 - 2,5
Dichromate oxidation, mgO_2/dm^3	30,1 - 40,0	25,1 - 35,0	20,1 - 30,0
5 Nitrogen-containing substances			
Ammonium ion, mgN/dm^3	0,32 - 0,47	0,28 - 0,39	0,21 - 0,32
Nitrite ion, mgN/dm^3	0,020 - 0,029	0,018 - 0,024	0,013 - 0,019
Nitrate ion, mgN/dm^3	3,6 - 6,5	2,1 - 5,0	0,6 - 3,5
Total Kjeldahl nitrogen, mg/dm^3	1,3 - 4,7	0,9 - 1,9	0,5 - 1,8
6 Phosphorous-containing substances			
Phosphate ion (including hydro - and dihydro forms) mgP/dm^3	0,054 - 0,079	0,047 - 0,066	0,031 - 0,053
Total phosphorus, mg/dm^3	0,17 - 0,24	0,15 - 0,20	0,11 - 0,16
7 Metals			
Copper, mg/dm^3	0,0028 - 0,0041	0,0028 - 0,0041	0,0028 - 0,0041
Zinc, mg/dm^3	0,009 - 0,012	0,009 - 0,012	0,009 - 0,012
Iron (total), mg/dm^3	0,089 - 0,132	0,089 - 0,132	0,089 - 0,132
Manganese, mg/dm^3	0,016 - 0,023	0,016 - 0,023	0,016 - 0,023
Nickel, mg/dm^3	0,006 - 0,010	0,006 - 0,010	0,006 - 0,010
Chrome (общий), mg/dm^3	0,0026-0,0050	0,0026 - 0,0050	0,0026 - 0,0050
8 Contaminants			
Oil and oil products dissolved and emulsified state, mg/dm^3	0,011 - 0,035	0,011 - 0,035	0,011 - 0,035
Synthetic anionic surfactants (including alkilok si ethylated -sulfates, alkylsulfonates, olefinsulfonates, alkylbenzene sulfonates, alkyl sulfates, sodium and potassium salts of fatty acids, mg/dm^3	0,011 - 0,050	0,011 - 0,050	0,011 - 0,050

Note: Typing lakes is carried out on the average depth H (m): Type 1 - H <3; Type 2 - H in the range from 3 to 9; Third type - H> 9.

Table 3 - Range of hydrobiological indicators for good hydrobiological status of river ecosystems

Hydrobiological parameters	Index
small rivers/river sites	
Saprobity index (by phytoperiphyton)	1,61-1,85
Biotic index (by macrozoobenthos)	8-6
medium rivers/river sites	
Saprobity index (by phytoperiphyton)	1,66-1,90
Biotic index (by macrozoobenthos)	7-6
large and very large rivers/river sites	
Saprobity index (by phytoperiphyton)	1,76-1,95
Biotic index (by macrozoobenthos)	6-5

Table 4 – Range of hydrobiological indicators for good hydrobiological status of lake ecosystems

Hydrobiological parameters	Saprobity index
1 type	
by phytoplankton	1,81-2,16
by zooplankton	1,61-1,92
2 type	
by phytoplankton	1,71-2,04
by zooplankton	1,51-1,80
3 type	
by phytoplankton	1,61-1,92
by zooplankton	1,41-1,68