Environmental Protection of
International River Basins
Service Contract No. ENPI/2011/279-666

Towards the introduction of WFD-compliant monitoring and assessment of the status of groundwater and surface water bodies

Monitoring Strategy Ukraine

Initial draft

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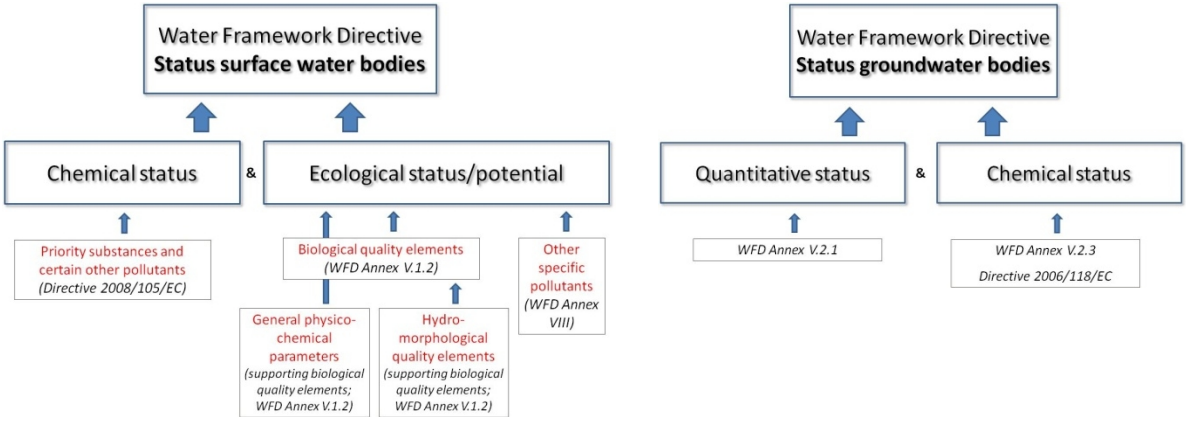
Table of Contents: Main Text

Annex I: Interviewees September 2013

1 Introduction

The ultimate objective of the European Union’s Directive 2000/60 *establishing a framework for Community action in the field of water policy* (better known as the Water Framework Directive, WFD) is ‘good status’ of all groundwater and surface water bodies. The actual status of water bodies has finally to be determined via monitoring and assessment. WFD’s status concept introduces specific requirements; due to its complexity, it can take countries several years for the development of monitoring and assessment programmes in line with the requirements of the WFD.

Figure Overview of components constituting the status of water bodies



The project Environmental Protection of International River Basins (EPIRB) decided to prepare strategies for guiding its beneficiary countries[1] along the long and winding road towards introduction of WFD-compliant monitoring and assessment, also after the lifetime of the project. These monitoring strategies can serve various purposes, ranging from being used as a mere checklist while further developing monitoring programmes through supporting national planning, including seeking for external assistance.

The monitoring strategies merely mention the topics and issues relevant for WFD-compliant monitoring and assessment of the status of water bodies; how to actually deal with these topics and issues is outside of their scope. However, several guidance documents, manuals and background reports will be prepared under the EPIRB project. Since various topics and issues continue being addressed by the EPIRB project, the baseline situation will change. Several sections are therefore still (nearly) void, since it will be more efficient to prepare them at a later stage, when more and up-to-date details have become available. Therefore, the strategies are living documents that will be updated throughout the project’s implementation.

1 Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine

The monitoring strategies are issued in two separate volumes:

- A country-specific volume (the present document)
- A volume with a summary of the general technical requirements, enumerating the key elements of WFD-compliant monitoring and assessment of the status of water bodies, applicable to all countries.

In principle, the present document can be read independently from the summary of the general technical requirements. However, the latter provides details and background information implied by the next two chapters.

Chapter 2 of provides a summary of the current state of affairs (autumn 2013) in Ukraine. Besides the technical capacities, institutional capacities and arrangements, human capacities, and legal settings are addressed. Chapter 3 contains a preliminary summary of pending interventions required for enabling WFD-compliant monitoring and assessment of the status of water bodies, based on the state of affairs in autumn 2013.

2 Current State of Affairs

The current state of affairs is based on information available through September 2013, including:

- reports prepared under the EPIRB project[2],
- specific knowledge and expertise of the project’s key and non-key experts,
- interviews with several key representatives in Kyiv in September 2013 (refer to Annex I for a list with interviewees),
- additional information provided by Mrs. Natalia Zakorchevna, the project’s River Basin Management Expert for Ukraine.

Additional consultations are required for verification and completion the present contents.

Many tasks and activities of the EPRIB project focus on the pilot river basins; in the case of Ukraine these are the Prut and the Upper Dnieper (sub-)basins. The situation within these two (sub-)basins may not representative, so some reservations should be kept in mind when extrapolating findings and observations to the country as a whole. It is furthermore good to notice that the EPIRB sister project “Improving Environmental Monitoring in the Black Sea” is expected to address comparable topics and issues for the Black Sea.

2.1 Technical requirements

2.1.1 Chemical Status of Surface Water Bodies

Key Issues

Good chemical status means compliance with the environmental quality standards (EQS) of the ‘Priority substances and certain other pollutants’ instigated by the Directive 2008/105/EC[3].

Laboratory requirements for analysis of the ‘Priority substances and certain other pollutants’ include:

- modern analytical equipment,
- certified reference material plus other reagents and consumables,
- EN/ISO standards for analysis methods,
- an operation in accordance with EN ISO/IEC-17025,
- sufficient and experienced staff,
- budgets for operation and maintenance.

2 Documents can be downloaded via http://blacksea-riverbasins.net/en/downloads-section

3 Directive 2008/105/EC *on environmental quality standards in the field of water policy amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council*.

There is no laboratory inside the two project’s pilot (sub-)basins —Prut and Upper Dnieper— already capable of assessing the chemical status of surface water bodies. Laboratories have difficulties in meeting basically all relevant laboratory requirements (refer to the Key Issues textbox above and to the General Technical Requirements volume).

The EPRIB project is not in the position for making a country-wide inventory of laboratories. Nevertheless, it seems reasonable to assume that there will be only few laboratories in the whole country that could meet the requirements (if existing at all).

Because of the size of the country, it will be necessary to establish several laboratories inside Ukraine that will finally be able to analyse the full range of Priority substances and certain other pollutants. Here, the key question is: “*How many laboratories would be needed and where to establish them*?” which has several institutional implications as well (section 2.2).

2.1.2 Ecological Status: Biological Quality Elements

Key Issues

The biological quality elements are **key to the ecological status/potential**.

Essential requirements for monitoring and assessment of the biological quality elements include:

- EN/ISO standards for sampling,
- establishment of type-specific reference conditions and ecological quality ratios,
- recognised assessment methods for classification,
- participation in intercalibration exercises,
- sufficient and experienced staff,
- budgets for operation and maintenance.

The Hydrobiological Laboratory of the Central Geophysical Observatory of the Hydrometeorological Centre of Ukraine conducts monitoring of hydrobiological parameters since 1974. The network comprises 100 sampling sites in 57 water bodies all over Ukraine. The parameters include: species composition and quantitative development of phytoplankton, zooplankton, benthic invertebrate fauna, periphyton and macrophytes. The core staff comprises 6 persons, while noticing that sampling is often conducted by other employees who are not necessarily proficient in hydrobiological parameters. The Hydrobiological Laboratory still applies rather traditional sampling and assessment methods.

Fish is not routinely monitored at all in Ukraine, maybe except for commercial fishery purposes.

Generally, experiences with WFD-compliant monitoring and assessment of biological quality elements have been obtained on the basis of (national and international funded) projects that targeted at a selected number of (sub-)basins. Not always staff of the Hydrobiological Laboratory was involved in these projects; often, representatives of universities or the Academy of Sciences participated.

So, although there is certainly knowledge about and experience with WFD-compliant monitoring and assessment of biological quality elements in Ukraine, this has not yet been obtained at a more systematic basis and for the country as a whole. It seems reasonable to assume that there are still several gaps.

2.1.3 Ecological status: General Conditions

Key Issues

The General conditions are supporting the biological quality elements, but **also determine the ‘good’ ecological status/potential**.

Essential requirements for monitoring and assessment of the General conditions include:

- EN/ISO standards for analysis,
- an operation in accordance with EN ISO/IEC-17025,
- establishment of type-specific reference conditions,
- type-specific criteria for distinguishing at least the boundaries between high/good and good/moderate status (either ‘good and above’ ecological potential),
- sufficient and experienced staff;
- budgets for operation and maintenance.

General conditions concern traditional physico-chemical water quality parameters, well known by basically all Ukrainian laboratories, perhaps except for organic nitrogen (requiring e.g. the Kjeldahl method). Laboratories often use GOST[4] standards for the analysis of various parameters.

Establishing type-specific reference conditions and classification criteria for general conditions has not really been touched upon yet, although it may have been addressed for certain (sub)basins in specific projects.

2.1.4 Ecological status: Hydromorphological Quality Elements

Key Issues

4 The word GOST is a Latin transliteration of the Russian acronym ГОСТ: **го**сударственный **ст**андарт, meaning “state standard”.

The hydromorphological quality elements are supporting the biological quality elements, but **do not determine the ‘good’ ecological status/potential**.

Essential requirements for monitoring and assessment of the hydromorphological quality elements include:

- EN/ISO standards for measurements and assessment (when available),
- establishment of type-specific reference conditions,
- sufficient and experienced staff,
- adequate equipment (e.g. hydrological posts),
- budgets for operation and maintenance.

Measuring the ‘quantity and dynamics of river water flow’ (one of the hydromorphological quality elements) is traditionally under the domain the Hydrometeorological Centre of Ukraine. The State Water Agency of Water Resources of Ukraine (via its subordinate Water Basin Administrations) collects data for, among other things, the operation of reservoirs and conducts observations of banks re-shaping and the hydrogeological status of storage reservoirs’ littoral areas.

Experiences with WFD-compliant monitoring and assessment of hydromorphological quality elements has been obtained in specific projects (e.g. Pripyat and Tisza (sub)basins), in which the Faculty of Geography of the Ukraine State University participated, as well as representatives of various services.

2.1.5 Ecological status: Other specific pollutants

Key Issues

The Other specific pollutants concerns chemical water quality parameters not included under the ‘Priority substances and certain other pollutants’ or the ‘General conditions’. The Other specific pollutants **also determine the ‘good’ ecological status/potential**.

Essential requirements for monitoring and assessment of the Other specific pollutants will include:

- modern analytical equipment,
- certified reference material plus other reagents and consumables,
- EN/ISO standards for analysis methods,
- an operation in accordance with EN ISO/IEC-17025,
- establishment of environmental quality standards,
- sufficient and experienced staff,
- budgets for operation and maintenance.

WFD Annex V.1.1: Quality elements for the classification of ecological status, mentions the following in conjunction with the Other specific pollutants: “*Pollution by other substances identified as being discharged in significant quantities into the body of water.*” Obviously, this leaves ample room for interpretation.

Nevertheless, when examining the indicative list of the main pollutants in WFD Annex VIII, one could anticipate pollutants ranging between e.g. the traditional chemical oxygen demand (COD) through ‘more sophisticated’ micropollutants comparable with the Priority substances and certain other pollutants.

One can expect most Ukrainian laboratories already being capable to analyse the more traditional pollutants (compare subsection 2.1.3), whereas for most micropollutants the situation will be more comparable to the analysis of the Priority substances and certain other pollutants (subsection 2.1.1).

The WFD (either subordinate directives) does not provide with defined environmental quality standards (EQS). Member States are expected to establish EQSs for the Other specific pollutants in accordance with the procedure set out in Annex V 1.2.6 of the WFD. To which extent Ukraine is already in the position to apply this demanding procedure has not been pursued.

2.1.6 Groundwater: Quantitative Status

Key Issues

Good quantitative status implies that the level of groundwater in the groundwater body is such that the available groundwater resource is not exceeded by the long-term annual average rate of abstraction.

Essential requirements for assessing the quantitative status include:

- modern equipment for recording groundwater levels,
- sound understanding about the recharge-discharge conditions of aquifers, abstractions, etc.,
- sufficient and experienced staff,
- budgets for operation and maintenance.

Routine groundwater monitoring is conducted by the organizations under the Ukrainian State Service of Geology and Mineral Resources, comprising seven regional departments. In January 2011, the state groundwater monitoring network consisted of 923 observation stations, of which 307 monitoring wells are used for the monitoring of unconfined aquifers, 224 monitoring points are installed into sub-artesian aquifers and in 392 reference monitoring stations observations of the formation of groundwater resources are carried out. Water

levels are largely recorded with traditional methods (mechanical water level meters inherited from the Soviet time); data loggers are not available.

However, there are remarkable differences between the two pilot river basins. Whereas groundwaters are still monitored inside the Ukrainian part of the Upper-Dnieper subbasin by the Center for Geological, Hydrogeological and Environmental Research of the State Service of Geology and Mineral Resources of Ukraine, inside the Ukrainian part of the Prut River Basin currently no groundwater monitoring is conducted at all!

2.1.7 Groundwater: Chemical Status

Key Issues

Good groundwater chemical status is the chemical status of a body of groundwater, which meets all the conditions set out in table 2.3.2 of WFD Annex V and the groundwater quality standards of the Directive 2006/118/EC.[5]

Essential requirements for assessing the groundwater chemical status include:

- modern analytical equipment, including field equipment,
- certified reference material plus other reagents and consumables,
- EN/ISO standards for analysis methods,
- an operation in accordance with EN ISO/IEC-17025,
- establishment of environmental quality standards,
- sufficient and experienced staff,
- budgets for operation and maintenance.

No specific details are available about the laboratories operating under the State Service of Geology and Mineral Resources. However, according to the representatives interviewed in September 2013, the laboratories are outdated. It seems reasonable to assume that they will not meet the essential requirements mentioned in the textbox above.

2.2 Characterization of water bodies

The WFD has a quite specific perception of water bodies, which are also key units for designing monitoring networks and programmes.

The procedure for identification and characterisation of surface water bodies is rather well described in Annex II of the WFD. Its application basically requires: computers with geographical information system software (GIS) and digitised maps with several types of data, including hydro graphic networks. The

5 Directive 2006/118/EC *on the protection of groundwater against pollution and deterioration*.

procedure for identification and characterisation of groundwater bodies in WFD Annex II is less detailed, but meanwhile methodologies are available.

Technically, there are no complications for identification of water bodies in Ukraine, although not all required information might be already available in digital formats.

During various projects, water bodies have been identified in line with WFD procedures in several (sub-)basins, including the Prut and Upper Dnieper (sub-)basins by the EPIRB project. There is no programme yet to complete the identification and characterisation of water bodies for the country as a whole.

2.3 Institutional Capacities and Arrangements

2.3.1 Surface waters: physico-chemical quality elements

The following governmental bodies are involved in monitoring of surface water quality:

- State Agency for Water Resources, through its Water Basin Administrations,
- State Hydrometeorological Service,
- Sanitary and Epidemiological Services of the Ministry of Health.

The latter focus the surface water monitoring activities to drinking water abstraction and bathing waters, which the WFD distinguishes among the Protected areas. WFD's surface water status criteria, however, are not directly linked to these more specific water uses, with e.g. microbiological conditions being important as well.

To which extent the surface water quality monitoring programmes of the State Agency for Water Resources and the State Hydrometeorological Service are complementary either overlapping has not been investigated.

It seems reasonable to assume that the laboratories operating under both central governmental authorities are capable of analysing the more traditional pollutants (compare subsection 2.1.3), whereas they most likely cannot yet meet the requirements for analysis of the 'Priority substances and certain other pollutants' and other micropollutants (subsection 2.1.1).

Anticipating WFD-compliant monitoring and assessment of the status of surface water bodies implies that clear arrangements are to be made concerning the future responsibilities and tasks of the State Agency for Water Resources and/or the State Hydrometeorological Service with respect to the physico-chemical quality elements.

This issue is not only relevant from a ‘good governance’ point of view, but also crucial for decisions to be taken about which laboratories should become capable of analysing the full range of micropollutants. The requirements for such a laboratory are quite demanding, as already mentioned in subsection 2.1.1. One should take into account that enhancing the capacity of one laboratory will involve, inter alia:

- Capital investments that —depending on already available equipment— can range from tens of thousands to several hundreds of thousands of Euros.
- Significant operation and maintenance costs.
- Employment of highly qualified, well-trained staff.

So, clearly one will have to be selective in which laboratories to upgrade. Financial and human resources, which are quite critical now, will most likely become even more critical in the near future.

In subsection 2.1.1, the question: “*How many laboratories would be needed and where to establish them*?” was raised already. Because of the size of the country, it seems inevitable to create laboratories capable of analyse the full range of priority substances and other pollutants at several locations. It will require dedicated studies to decide about the optimal number. (Five laboratories can be already easily imaged, covering the central, northern, eastern, southern and western parts of Ukraine.)

Optimally, these laboratories will not only process the samples taken by the governmental body ‘owning and running’ the labs, but also can be used by other organisations involved in environmental monitoring (if only at market-equivalent prices).

The latter adds yet one another consideration: the selected laboratories should have the capacity for analysing not only water samples, but also e.g. air and soil.

Last, but not least, besides capital investments, also budgets should be assured for annual operation and maintenance of the monitoring units (employing staff, laboratory analysis, sampling, data processing, administration, etc.). Presently, most units are under-staffed and receive insufficient finances for performing even their current monitoring obligations. WFD-compliant monitoring and assessment will definitely impose more demands on the monitoring units.

2.3.2 Surface waters: biological quality elements

The institutional settings regarding monitoring the biological quality elements definitely require thorough attention.

This might well be illustrated by the following example. During (and because of) the EPRIB project, the Dnipro Basin Administration decided to employ a new staff

member, who is to become involved in monitoring of biological quality elements. By itself, this initiative can only be appreciated. However, this new employee has no real experience with monitoring of hydrobiological parameters yet. From this point of view, perhaps it might have been more effective when the services of the Hydrobiological Laboratory of the Central Geophysical Observatory of the Hydrometeorological Centre would have been requested.[6] Formal central governmental arrangements for monitoring of biological quality elements appear to be lacking, even though the Hydrobiological Laboratory of the Central Geophysical Observatory of the Hydrometeorological Centre has been monitoring several biological parameters already since 1974.

In terms of expertise, the situation appears to be rather scattered. For example, the Hydrobiological Laboratory is still monitoring in rather traditional ways, whereas units of universities and the Academy of Sciences already have been exposed to WFD-compliant monitoring and assessment during various (technical assistance) projects.

It is important that on a short term decisions are taken and formalised about the organisation(s) to become responsible for the WFD-compliant monitoring and assessment of biological quality elements. Also, here considerations go beyond mere 'good governance'. For example, it is important to involve those people in technical assistance projects and training activities that are (to become) formally responsible for monitoring the biological quality elements.

Regarding capacity building, the following can be further noticed:

- Compared to the physico-chemical quality elements, capital investments for monitoring the biological quality elements will be rather modest. The more expensive items are e.g. microscopes, equipment for sampling of fish, and (small) boats.
- Highly skilled staff is required, with thorough knowledge about all individual biological quality elements.
- Operation and maintenance costs will presumably be modest, at least when compared with e.g. the monitoring and assessment of physico-chemical quality elements (notably the micropollutants).

It is not yet clear whether there are already sufficient skilled experts available but not yet properly mobilised, either there is currently an overall lack of qualified experts in Ukraine.

Priority should be given to an initiative that will result in recommendations to the Government of Ukraine for formalising institutional arrangements concerning the

6 Then again, even if such request would have been made, then it still would be doubtful whether the Hydrobiological Laboratory could provide with the necessary services, since a staff capacity of six persons is rather limiting.

monitoring and assessment of biological quality elements. This initiative should also address the anticipated numbers of staff, as well as expected investments.

2.3.3 Surface waters: hydromorphological quality elements

Several of the current practises of the Hydrometeorological Centre and the State Agency of Water Resources can already be (tentatively) headed under monitoring of hydromorphological quality elements (subsection 2.1.4). However, quite a few hydromorphological quality elements were novelties for most EU Member States, so it shouldn’t come as a surprise that monitoring of hydromorphological quality elements is not yet fully covered in Ukraine.

Of course, this implies that the monitoring the full range of hydromorphological quality elements has yet to be decided and formalised.[7] Also here it is important that clarity is provided as soon as possible, in order to know where to target further capacity building interventions (investments, staffing, training, etc.). Investments-wise, probably the hydrological monitoring network would be the most expensive component. However, a network already exists, albeit it might no longer be functioning optimally.

Priority should be given to an initiative that will result in recommendations to the Government of Ukraine for formalising institutional arrangements concerning the monitoring and assessment of hydromorphological quality elements. This study should also address the anticipated numbers of staff, as well as expected investments.

2.3.4 Groundwaters: quantitative status and chemical status

As such, the role and responsibility of the State Service of Geology and Mineral Resources regarding ambient groundwater is clearly assigned. Eighteen regional geological units (parties) are practically responsible for groundwater monitoring and reporting data to the State Enterprise “Geoinform” for further processing. Majority of regional geological parties used to have own laboratories for analyses of main cations and anions and some trace elements. Today most regional geological units lack financing and therefore perform limited monitoring activities while some of them (e.g. former South-western regional geological party responsible for the Prut sub-basin) have neither groundwater monitoring staff nor monitoring wells.

However, considering the poor laboratory capacities, it would be worth to investigate options for the State Service of Geology and Mineral Resources to outsource analysis of the water samples (if only temporary), notably for the micropollutants. After all, groundwaters are normally sampled once or twice per year, substantially less than surface waters. Rather than investing in upgrading

7 Note that for example the ‘connection to groundwater bodies’ could imply involvement of the State Geological Service.

the capacity of the laboratories under State Service of Geology and Mineral Resources, it will be more cost-effective to use the services of already better equipped labs (refer also to section 2.3.1).

2.3.5 Characterization of water bodies

So far, characterization of water bodies has been carried out a number of projects, including the EPIRB project, for a limited (sub-)basins via their selected consultants.

Finally, this task, as well as other tasks: like updating, reporting to European Environment Information and Observation Network, etc., will have to be formally assigned to a certain organisation.

Probably, little other capacity building interventions will be involved here, since the required hardware, software and experts are basically already available.

2.3.6 Designing WFD-compliant monitoring programmes

It is too early for to raise details regarding institutional arrangements for designing the WFD-compliant monitoring programmes. Right now, it should suffice noticing that besides specific responsibilities and tasks, also *co-ordination* will become an important point of attention, since several organisations (headed under different central authorities) will become involved.

2.4 Human Capacities

Key questions with respect to human capacities include:

- Do we have sufficient staff?
- Is our staff skilled at WFD-compliant monitoring and assessment of the status of water bodies?

Except for the characterization of water bodies, the current answer to both questions is: no.

2.4.1 Staff numbers

Numbers of staff are often mainly linked to the budgets that are made available for the various monitoring activities (including salaries). Unfortunately, Ukraine is right now not in the position for allocating the necessary funds for maintaining the present monitoring tasks and activities. WFD-compliant monitoring and assessment will definitely increase the demands, implying higher budgets as well.

However, staffing issues will not be limited to financial issues only. The ‘good status of all water bodies’ objective is mandatory for EU Member States, implying that for example monitoring of biological quality elements has become a *regulatory* requirement! If such an obligation would apply to Ukraine as well,

then one has to anticipate easily multiple amounts of the 100 sites right now maintained by the —understaffed— Hydrobiological Laboratory of the Central Geophysical Observatory of the Hydrometeorological Centre.

Hence, (inspired by the above example, which can be extended to many other quality elements and to groundwaters), actually another key question can be added:

- Are there sufficient adequate experts available at all, which we could mobilise?

2.4.2 Skills

The WFD introduces several new monitoring and assessment topics, like analysis of priority substances, assessments based on type-specific reference conditions and ecological quality ratios, good quantitative status of groundwaters (including, assessment of surface-groundwater interaction), several hydromorphological parameters, etc.

However, training needs are not only limited to future WFD-compliant monitoring requirements. For example, many laboratories already have equipment like GC-MS without staff being able to operate them properly.

Right now, it is not yet possible to elaborate on training needs, other than emphasising that it will be important to target skill capacity building initiatives to:

- staff (-candidates) that are/will become involved in specific monitoring/assessment tasks, *and*
- training-for-trainers, since most likely also new generations of experts will have to be trained, besides the existing staff.

2.5 Legal Frameworks

	***November 2013*** *The Water Code of June 1995 is Ukraine’s piece of primary legislation for water management, including enabling basic provisions for monitoring and assessment. The Water Code has been amended regularly afterwards until recent years. After the year 2000, several proposals for amendments and enhancements have been prepared, also anticipating harmonisation/convergence with EU’s* environmental acquis*. Not all proposals for changes in the subsidiary secondary legislation —orders, resolutions, etc. — have been adopted yet.* *The bottom line is that the legal settings of Ukraine probably will not support/facilitate introduction of WFD-compliant monitoring and assessment of the status of water bodies yet.* *Meanwhile, one important additional driving factor is pending: signing the Association Agreement between Ukraine and the European Union during the summit in Vilnius, 28 – 29 November 2013. Specific details are not yet made public, it is generally expected that the association agreement will include —elements of— the Water Framework Directive. To which extent this also includes the more specific elements relevant for WFD-compliant monitoring and assessment of the status of water bodies remains to be seen as well.* *Thus, sections related to Legal settings will be elaborated in future updates of the monitoring strategy.*

2.6 Transboundary Arrangements

	***November 2013*** *Ukraine’s neighbouring countries include EU Member States (Hungary, Poland, Romania and Slovakia), and none member states (Belarus, Moldova and the Russian Federation), quite complex settings. Details about Transboundary arrangements will be added in future monitoring strategy updates.*

2.7 Synthesis

The summary in the next two pages is a preliminary, tentative one, based on best expert judgements. It attempts to provide already with a reflection for Ukraine as a whole, despite the EPIRB project’s focus on the Upper Dnieper and Prut (sub-)basins. The summary is explicitly not supposed to be used for drawing any substantial conclusions yet.

WFD-compliant M&A Ukraine – tentative summary November 2013

Legend

No more interventions are required	*The situation is satisfactory, although some improvements could still be achieved*	*Several provisions are already in place, but interventions are required*	*Little provisions are in place; many interventions are required*	*No/insufficient provisions in place*

Chemical Status

Sampling equipment	Sampling methods	Laboratory equipment	EN/ISO analysis methods	QA/QC, ISO 17025	Selection relevant pollutants	O&M budget	№ of staff	Training

Ecological Status: Biological Quality Elements

	Sampling devices	EN/ISO sampling methods	QA/QC	Type-specific ref. conditions	Ecological quality ratios	Intercalibration	O&M budget	№ of staff	Training
Benthic invertebrate fauna									
Phytoplankton									
Phytobenthos									
Macrophytes									
Macroalgae and angiosperms									
Fish									

Ecological status: General Conditions

Sampling devices	Sampling methods	Laboratory equipment	EN/ISO analysis standards	QA/QC, ISO 17025	Type-specific reference conditions	Classification	O&M budget	№ of staff	Training

Ecological Status: Hydromorphological Quality Elements

		Measurement devices	EN/ISO measurement methods	QA/QC	Type-specific ref. conditions	Classification	O&M budget	№ of staff	Training
Rivers	Hydrological regime								
	Morphological conditions								

		Measurement devices	EN/ISO measurement methods	QA/QC	Type-specific ref. conditions	Classification	O&M budget	№ of staff	Training
Lakes	Hydrological regime								
	Morphological conditions								
Transitional waters	Hydrological regime								
	Morphological conditions								
Coastal waters	Hydrological regime								
	Morphological conditions								

WFD-compliant M&A Ukraine – tentative summary November 2013

Ecological status: Other Specific Annex VIII Pollutants

Sampling equipment	Sampling methods	Laboratory equipment	EN/ISO analysis standards	QA/QC, ISO 17025	Selection relevant pollutants	EQSs for classification	O&M budget	№ of staff	Training

Groundwater: Quantitative Status

Measurement equipment	Measurement methods	QA/QC	Classification (good/bad)	O&M budget	№ of staff	Training

Groundwater: Chemical status

Sampling equipment	Sampling methods	Laboratory equipment	EN/ISO analysis standards	QA/QC, ISO 17025	Classification (good/bad)	O&M budget	№ of staff	Training

Characterization of Water Bodies

	Technical requirements	Categorisation		Characterization		Training
Surface water		river, lake, transitional,		System A		

		coastal water; AWB, HMWB		System B	
Groundwater					

Design of WFD-compliant Monitoring Programmes and Networks

	Surveillance monitoring sites	**Operational monitoring sites**	**Operational monitoring parameters**	**Sampling/ measurement frequencies**	**Training**
Surface water					
Groundwater					

Institutional Capacities and Arrangements for WFD-compliant Monitoring and Assessment

			Capacities	**Arrangements**
Surface water	Chemical status			
	Ecological status	*Hydrobiological quality elements*		
		General conditions		
		Other Annex VIII pollutants		
		Hydromorphological quality elements		
Groundwater	Quantitative status			
	Chemical status			
Delineation/characterisation of water bodies				
Design of monitoring programmes and networks				

Legal Framework Supporting Introduction of WFD-compliant Monitoring and Assessment

Water Code	
Bylaws	

3 Summary of pending interventions

While referring to the summary overview in section 2.7, obviously the main challenge will be to reach green colours all over.

Even though the underlying version is an initial draft, a first batch of potential interventions though could be identified. The lists with potential interventions, as well as their levels of detail, will be enhanced during future monitoring strategy updates. It is too premature for inclusion of —tentative— time schedules for implementation of interventions; this will be added in future updates. Nevertheless, the list in each section already implies a certain sequence in time; many interventions could be implemented in parallel.

3.1 Surface water: physico-chemical quality elements

1) Decide about, and formalise which governmental body/bodies will become responsible for monitoring and assessment of physico-chemical quality elements.
2) Investigate the optimal number of laboratories that should become capable of analysing the full range of priority substances and other specific pollutants, including their locations.
3) Prepare investment plans for the selected laboratories, addressing inter alia:
    a. capital investments;
    b. staff requirements;
    c. operation and maintenance costs.
4) Actually enhance the capacities, involving inter alia:
    a. procurement of equipment, certified reference material, reagents, consumables, etc.;
    b. IS0 17025 accreditation;
    c. introduction of EN/ISO standards for analyses;
    d. employment of additional staff;
    e. training of present and new staff;
    f. annual budget allocation;
    g. etc.

3.2 Surface water: biological quality elements

1) Decide about which governmental body/bodies will become responsible for monitoring and assessment of biological quality elements.
2) Launch initiatives that will result in recommendations to the Government of Ukraine for formalising institutional arrangements concerning the monitoring and assessment of biological quality elements.
3) Prepare capacity building plans for the selected organisations, addressing inter alia:
    a. capital investments;
    b. staff requirements;
    c. operation and maintenance costs.

4) Actually enhance the capacities, involving inter alia:
    a. equipment procurement;
    b. employment of additional staff;
    c. training of present and new staff;
    d. annual budget allocation;
    e. etc.

3.3 Surface water: hydromorphological quality elements

1) Decide about which governmental body/bodies will become responsible for monitoring and assessment of hydromorphological quality elements.
2) Launch initiatives that will result in recommendations to the Government of Ukraine for formalising institutional arrangements concerning the monitoring and assessment of hydromorphological quality elements.
3) Prepare capacity building plans for the selected organisations, addressing inter alia:
    a. capital investments;
    b. staff requirements;
    c. operation and maintenance costs.
4) Actually enhance the capacities, involving inter alia:
    a. equipment procurement;
    b. introduction of EN/ISO standards;
    c. employment of additional staff;
    d. training of present and new staff;
    e. annual budget allocation;
    f. etc.

3.4 Groundwater: quantitative status

1) Make a nation-wide inventory of the actual state of groundwater monitoring in the various (sub-)basins. This inventory would address issues like how many monitoring sites are existing; how many of these sites are actually actively being monitored; how many sites would be required; which devices/methods are used for recording groundwater levels; how much staff is available; et cetera?
2) Prepare a plan for upgrading the groundwater monitoring network nation-wide, addressing inter alia:
    a. capital investments, including modern electronic equipment;
    b. staff requirements;
    c. operation and maintenance costs.
3) Implement the plan for upgrading the groundwater monitoring in Ukraine.

3.5 Groundwater: chemical status

1) Make an inventory of the capacity of the laboratories operated under the State Service of Geology and Mineral Resources (equipment, methods, staff numbers and capacities, financial resources, et cetera).
2) Investigate options for the State Service of Geology and Mineral Resources to outsource analysis of water samples (notably micropollutants).
3) Prepare recommendations regarding analysis of groundwater samples.

3.6 WFD-compliant assessment criteria

1) Prepare a strategy for establishing WFD-compliant assessment criteria for *all quality elements* for *all Ukrainian water bodies*.
2) Prepare detailed programmes/projects for establishing WFD-compliant assessment criteria for all quality elements for all Ukrainian water bodies.
3) Implement the agreed programmes, possibly with external support.

3.7 Characterization of water bodies

1) Decide about the organisation that will become responsible for all aspects related to characterization of water bodies and formalise all other arrangements (legally, financially, etc.).

3.8 Designing WFD-compliant monitoring programmes

	***November 2013*** *Currently, this section is merely a placeholder; details will be added in future monitoring strategy updates. Nevertheless, one could already refer to subsection 2.3.6 for anticipated topics.*

3.9 Human capacity building

	***November 2013*** *Currently, this section is merely a placeholder; details will be added in future monitoring strategy updates. Nevertheless, one could already refer to subsection 2.4 for anticipated topics.*

3.10 Legal frameworks

	***November 2013*** *Currently, this section is merely a placeholder; details will be added in future monitoring strategy updates.*

3.11 Transboundary arrangements

	***November 2013*** *Currently, this section is merely a placeholder; details will be added in future monitoring strategy updates.*

Annex I: Interviewees September 2013

As part of the preparation of the preliminary draft monitoring strategy, meetings were organised in Kyiv on 23 and 24 September 2013 with the following people:

- BABCHUK, Valery; Head of the Monitoring Division of the State Agency of Water Resources of Ukraine
- DEZIRON, Alexander; Hydrometeorological Centre of Ukraine
- KUZNETSOVA, Tatyana; Head of the Hydrobiological Laboratory of the Central Geophysical Observatory of the Hydrometeorological Centre of Ukraine
- TKACHENKO, Larisa; Leading Expert of the Monitoring Division of the State Water Agency of Water Resources of Ukraine
- VASILENKO, Valentina; Strategic Monitoring Division of the Ministry of Natural Resources and Environmental Protection of Ukraine
- PYSHNAJA, Nataliia; Head of the Division of Monitoring of Groundwater of the State Geology Services of Ukraine
- ZARITOVSKA, Nataliia; Deputy Head of the Geophysical Department of the State Geology Services of Ukraine