OECD Studies on Water

Developing a Water Policy Outlook for Georgia, the Republic of Moldova and Ukraine



OECD

OECD Studies on Water

Developing a Water Policy Outlook for Georgia, the Republic of Moldova and Ukraine

OECD
BETTER POLICIES FOR BETTER LIVES

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document was produced with the financial assistance of the European Union. The views expressed herein can in no way be taken to reflect the official opinion of the European Union.

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Please cite this publication as:
OECD (2021), *Developing a Water Policy Outlook for Georgia, the Republic of Moldova and Ukraine*, OECD Studies on Water, OECD Publishing, Paris, *https://doi.org/10.1787/512a52aa-en*.

ISBN 978-92-64-44504-8 (print)
ISBN 978-92-64-82664-9 (pdf)

OECD Studies on Water
ISSN 2224-5073 (print)
ISSN 2224-5081 (online)

Photo credits: Cover © tetiana_u/Shutterstock.com.

Corrigenda to publications may be found on line at: *www.oecd.org/about/publishing/corrigenda.htm*.

© OECD 2021

The use of this work, whether digital or print, is governed by the Terms and Conditions to be found at *http://www.oecd.org/termsandconditions*.

Foreword

This study was delivered as part of the OECD's programme of work under the GREEN Action Task Force. The Task Force has been supporting the countries of Eastern Europe, the Caucasus and Central Asia (EECCA) to green their economies for more than 20 years and water policy reform has been a key feature of the work programme.

The Water Policy Outlook study aims to compare and contrast existing policy frameworks against the long-term strategic plan and vision for the water sector by respective governments. The outlooks aim to map the future policy challenges and policy reform opportunities required to achieve these long-term strategic objectives.

This innovative work was applied in Georgia, the Republic of Moldova and Ukraine for the first time in 2019-20. These countries are of particular interest, as many of the long-term strategic objectives are based on Association Agreements with the European Union and time-bound requirements to approximate to EU legislation including the Water Framework Directive. Multilateral Environmental Agreements including the Sustainable Development Goals also drive strategic targets and focus of the water sector.

The outlooks baseline the country policy framework and current performance and challenges and then define the long-term vision and aspirations to 2030, identifying opportunities for improving policy coherence and reform. These outlooks are intended to be used to stimulate policy discussion at the national level and have potential to be replicated in other countries throughout the EECCA region as methodology is further developed and refined.

This present report is based on three country-level analyses carried out by local consultants in Georgia, the Republic of Moldova and Ukraine. Matthew Griffiths (OECD Environment Directorate) drafted the overview chapter (Chapter 1) using material from the three country-level analyses. The three country studies were delivered under the guidance and management of Tatiana Efimova (Georgia and Ukraine) and Alexandre Martoussevitch (Moldova) (both OECD Environment Directorate) who provided advice, comments and expertise throughout the conceptualisation and execution of the project. Douglas Herrick (OECD Environment Directorate) adapted the three country-level analyses and drafted supplementary material to produce Chapters 2, 3 and 4 of the present publication under the supervision of Matthew Griffiths. The lead authors of the country-level analyses were the International School of Economics at Tbilisi State University Policy Institute for the Georgia chapter; Svetlana Zhekova, Independent Consultant, for the Moldova chapter; and Volodymir Bilokon, Independent Consultant, for the Ukraine chapter. The studies benefitted from local consultation with key stakeholders. The authors would like to thank the following experts for their comments and input into this publication: Scarlett Crawford catalogued the material in the national draft reports and provided comprehensive suggestions on the present publication's structure and focus, Xavier Leflaive and Harry Smythe (both OECD Environment Directorate) contributed to the conceptualisation of the country studies and provision of data to inform the analyses. Xavier Leflaive (OECD Environment Directorate) and Takayoshi Kato (OECD Development Co-operation Directorate) provided useful comments on the report, Mark Foss edited the report, and Lupita Johanson (OECD Environment Directorate) prepared it for publication.

The work was delivered with the financial support of the Government of Norway, which is appreciated. The work also benefited from cooperation and synergies with activities under the European Union Water Initiative Plus (EUWI+) project and this support is acknowledged.

The views expressed in this document are those of the authors and can in no way be taken to reflect the official opinion of the European Union or the Government of Norway.

Abbreviations and acronyms

AA	Association Agreement
AAM	(Water) Agency *Apele Moldovei*
ANRE	National Energy Regulatory Agency of the Republic of Moldova
BAU	Business as usual
DCFTA	Deep and Comprehensive Free Trade Agreement
DES	Department of Environmental Supervision of the Ministry of Environmental Protection and Agriculture of Georgia
DPBSD	Danube-Prut Black Sea District
EaP	EU Eastern Partnership
EPI	Environment Protection Inspectorate under the Ministry of Agriculture, Regional Development and Environment of the Republic of Moldova
EU	European Union
EUR	euro
EUWI+	EU Water Initiative for the Eastern Partnership countries
FAO	Food and Agriculture Organization of the United Nations
GA	Georgian Amelioration
GEF	Global Environment Facility
GEL	Georgian lari
GNERC	Georgian National Energy and Water Supply Regulatory Commission
GWB	Groundwater bodies
ha	hectare
HMWB	Heavily modified water body
HPP	Hydropower plant
ICPDR	International Commission for the Protection of the Danube River
IWRM	Integrated Water Resources Management
JSC	Joint-stock company
LPA	Local Public Authority

MARDE	Ministry of Agriculture, Regional Development and Environment of the Republic of Moldova
MCTD	Ministry of Communities and Territorial Development of Ukraine
MDL	Moldovan leu
MEI	Ministry of Economy and Infrastructure of the Republic of Moldova
MEPA	Ministry of Environmental Protection and Agriculture of Georgia
MEPNR	Ministry of Environmental Protection and Natural Resources of Ukraine
METAD	Ministry of Economic, Trade and Agrarian Development of Ukraine
MHLSP	Ministry of Health, Labour and Social Protection of the Republic of Moldova
MoESD	Ministry of Economy and Sustainable Development of Georgia
MRDI	Ministry of Rural Development and Infrastructure of Georgia
MTBF	Medium term budget framework
NAP	National Adaptation Plan
NBS	National Bureau of Statistics of the Republic of Moldova
NEAP	National Environmental Action Programme (of Georgia)
NEF	National Ecological Fund
NEHAP	National Environmental and Health Plan (of Georgia)
NES	National Environmental Strategy
NFA	National Food Agency of Georgia
NPD	National Policy Dialogue
NRDF	National Regional Development Fund
O&M	Operations and management
SAWR	State Agency of Water Resources of Ukraine
SEI	State Ecological Inspectorate of Ukraine
SHS	State Hydrometeorological Service under the Ministry of Agriculture, Regional Development and Environment of the Republic of Moldova
PoM	Programme of Measures
PSGS	Public Service on Geology and Subsoil
PV	Present value
RBD	River basin district

RBM	River basin management
RBMD	River basin management districts
RBMO	River basin management organisation
RBMP	River basin management plan
SAP	Strategic Action Programme
SDG	Sustainable Development Goal
TDA	Transboundary Diagnostic Analysis
UAH	Ukrainian hryvnia
UCSME	Ukrainian Scientific Centre for Marine Environment
UNECE	United Nations Economic Commission for Europe
UWSCG	United Water Supply Company of Georgia
WFD	Water Framework Directive
WSS	Water supply and sanitation

Table of contents

Foreword 3

Abbreviations and acronyms 5

Executive Summary 10

1 Overview 12
Conclusions and recommendations 13
1.1. State of play 14
Notes 27

2 Developing a water policy outlook for Georgia 28
Georgia's relationship with the European Union provides a framework for water policy reform 29
2.1. State of play 31
2.2. Next steps: Scenarios for reform 48
References 57
Notes 58

3 An outlook of Moldova's water policy journey to 2030 59
Moldova's relationship with the European Union provides a framework for water policy reform 60
3.1. State of play 62
3.2. Next steps: Scenarios for reform 81
References 88

4 Options for Ukraine's water policy reform journey – challenges in developing a water policy outlook 90
Ukraine's relationship with the European Union provides a framework for water policy reform 91
4.1. State of play 93
4.2. Next steps: Scenarios for reform 105
References 118

Tables

Table 1.1. Scenarios in Georgia, Moldova, and Ukraine 23
Table 2.1. EU directives on water quality and resource management and timeframes for their implementation in Georgia 29
Table 2.2. Water management issues in Georgia's river basin districts 36
Table 2.3. Environmental objectives of the RBMPs 37
Table 2.4. Estimated cost structure of RBMPs 40

Table 2.5. Legal framework for water resources management in Georgia 42
Table 2.6. Key water management regulation in Georgia 45
Table 2.7. Major water management institutions within Georgia 47
Table 2.8. Activities and initial and recast timelines for the full-reform and alternative full-reform scenarios 49
Table 2.9. Comparative analysis of the proposed scenarios 50
Table 2.10. Impact analysis for each scenario 52
Table 2.11. Present value (PV) of additional financial requirements for each scenario, million GEL (million EUR in parenthesis)* 54
Table 2.12. Progress monitoring indicators 55
Table 3.1. EU directives on water resource management and timeframes for their implementation in Moldova 60
Table 3.2. Water management issues within the RBDs 68
Table 3.3. Measures proposed in the second RBMP for the DPBS district 2022-27 70
Table 3.4. Objectives of the first RBMP for Dniester River Basin District (2017-22) 72
Table 3.5. Key legislation for water management in Moldova 77
Table 3.6. Key water management regulation in Moldova 78
Table 3.7. Major water management institutions in Moldova 79
Table 3.8. Comparative analysis of the proposed scenarios 83
Table 3.9. Financing needs of scenarios and other water management elements 86
Table 3.10. Progress monitoring indicators 87
Table 4.1. EU directives on water quality and resource management and timeframes for their implementation in Ukraine 91
Table 4.2. Environmental objectives of the Dnieper RBMP 96
Table 4.3. Programme of measures in the Dnieper RBMP: Achieving the environmental objectives 97
Table 4.4. Key legislation for water management in Ukraine 99
Table 4.5. Key water management regulation in Ukraine 101
Table 4.6. Water institutional bodies and arrangements in Ukraine 101
Table 4.7. Alignment of each scenario to the EU framework directives 106
Table 4.8. Comparative analysis of the proposed scenarios' activities: Baseline scenario (BS), future scenario (FS) and business-as-usual scenario (BAU) 108
Table 4.9. Financial requirements for each scenario, in thousands of euros per year 112
Table 4.10. Progress monitoring indicators 116

Figures

Figure 2.1. Water use in Georgia 32
Figure 3.1. Water use in Moldova 64
Figure 4.1. Water use in Ukraine 94

Executive Summary

The Water Policy Outlook study aimed to compare and contrast existing policy frameworks against the long-term strategic plan and vision for the water sector by respective governments. The outlooks aimed to map the future policy challenges and policy reform opportunities required to achieve these long-term strategic objectives. This innovative work was applied in Georgia, the Republic of Moldova and Ukraine for the first time in 2019-20. These countries are of particular interest, as many of the long-term strategic objectives are based on Association Agreements with the European Union, which set the ambition and direction of water policies and contain time-bound requirements to approximate to EU legislation including the Water Framework Directive.

The outlooks baseline the country policy framework and current performance and challenges and define the long-term vision and aspirations to 2030, identifying opportunities for improving policy coherence and reform. These outlooks are intended to be used to stimulate policy discussion at the national level and have potential to be replicated in other countries throughout the EECCA region as methodology is further developed and refined.

Despite recent progress in the countries, it is considered that Georgia, Moldova and Ukraine are unlikely to fully meet their stated policy targets by 2030 following a "business as usual" application of existing policy frameworks. Challenges are numerous including legal and regulatory gaps and poor implementation, inconsistent development and application of economic policy instruments and coordination challenges from fragmented institutional frameworks leading to inefficiencies in water management.

The Association Agreements with the European Union pose a particular challenge with a set timetable and ambition for progression. In particular the requirements for alignment with the Water Framework Directive and associated EU Directives pose legislative challenges and institutional challenges. They reveal a considerable back-log in terms of water and wastewater infrastructure requirements. The infrastructure gap is particularly notable with regard to the meeting obligations under the EU's Urban Wastewater Treatment Directive, and achieving SDG 6.1 and 6.2 targets in rural areas. The establishment of technically and financially sustainable River Basin Management Organisations also poses a challenge. Long-term strategic planning, that is harmonised across different sectors, such as water supply and sanitation and irrigation, and is supported by sustainable financing mechanisms will be crucial to bridge infrastructure gaps.

"Business as Usual" scenarios predict: revenues generated with the existing tariffs for water supply and sanitation services are insufficient for improving the quality of water management; where they exist, economic instruments (abstraction and pollution charges) are ineffective in driving water use efficiency and discouraging water pollution; rural populations may be "left behind" with regard to water supply and sanitation development; water consumption patterns will remain inefficient, with wastage through distribution and use and unclear water allocation regimes; water pollution is likely to increase and water quality will deteriorate with an associated impact on the loss of biodiversity; governmental water resource management expenditure will likely be affected by the negative impact of COVID-19 magnifying the need to become more targeted and cost-effective.

Most Government strategies strive to contribute to universal and equitable access to safe and affordable drinking water, adequate sanitation and improved hygiene, a reduction in water borne diseases and a

reduction in the number of illnesses and fatalities from water pollution. However, in the region, strategy documents typically focus on a narrow discussion of aspects of water policy, being sector specific e.g. irrigation or water supply and sanitation management. A unified and comprehensive strategic vision is required to ensure universal access to safe water and the rational utilisation of water resources. This will aid prioritisation of action and optimise the use of limited resources and should factor in demographic trends and reflect robust projections on climate change.

Key issues in terms of achieving policy goals such as progression of SDG targets and alignment with the EU's Water Framework Directive were identified as:

- Georgia: legislative barriers blocking progress - notably the need to progress the Draft Law on Water Resources Management and consider future implementation and enforcement arrangements.
- Moldova: a lack of financial resources - better coordination of institutional (agglomeration) and investment measures, aiming at economy of scale, as well as exploring new financing mechanisms based on improved water demand management and taxation of water use and pollution.
- Ukraine: sector fragmentation and absence of an overarching national water resources strategy to align sector priorities and strategic financing.

For all countries, policy reform must be supported by practical implementation mechanisms, compliance monitoring and enforcement and appropriate attention to supporting sustainable financing of the water policy reform and supporting infrastructure.

The annual costs of full reform scenarios were estimated as follows:

- Georgia: EUR 197 million (equivalent to EUR 52.9 per capita)
- Moldova: EUR 2.04 billion (equivalent to EUR 76.8 per capita)
- Ukraine: EUR 23 billion (equivalent to EUR 57.5 per capita)

Differences in reporting and classification of costs across different governmental departments leads to difficulties in linking public expenditures to particular water-related EU directives or specific national strategic goals. Monitoring and assessing overall cost-effectiveness of public expenditures on water resources management remains a challenge and opportunity for further work. The importance of appropriate enabling environments to pave the way for reform is also a key lesson learned.

1 Overview

This chapter summarises the findings of three country studies conducted in Georgia, Republic of Moldova and Ukraine on the water policy outlook to 2030. The chapter considers the current strategic vision and targets for each country, with particular reference to the time-bound commitments in the Association Agreements that each country has signed with the European Union, and targets under multilateral environmental agreements including the Sustainable Development Goals. The chapter summarises the existing policy framework in each country and current and future challenges each country is expected to face with regard to water management. The chapter considers the suitability of the existing policy framework to rise to these challenges and meet the current targets and vision and proposes alternative reform scenarios for consideration.

Conclusions and recommendations

The Water Policy Outlook study aimed to compare and contrast existing policy frameworks against the long-term strategic plan and vision for the water sector by respective governments. The outlooks aimed to map the future policy challenges and policy reform opportunities required to achieve these long-term strategic objectives. This innovative work was applied in Georgia, the Republic of Moldova and Ukraine for the first time in 2019-20. These countries are of particular interest, as many of the long-term strategic objectives are based on Association Agreements with the European Union, which set the ambition and direction of water policies and contain time-bound requirements to approximate to EU legislation including the Water Framework Directive.

The outlooks baseline the country policy framework and current performance and challenges and then define the long-term vision and aspirations to 2030, identifying opportunities for improving policy coherence and reform. These outlooks are intended to be used to stimulate policy discussion at the national level and have potential to be replicated in other countries throughout the EECCA region as methodology is reviewed and further developed and refined.

Despite recent progress in the countries, it is considered that Georgia, Moldova and Ukraine are unlikely to fully meet their stated policy targets by 2030 following a "business as usual" application of existing policy frameworks. Challenges are numerous including legal and regulatory gaps and poor implementation, inconsistent development and application of economic policy instruments and coordination challenges from fragmented institutional frameworks leading to inefficiencies in water management.

The Association Agreements with the European Union pose a particular challenge with a set timetable and ambition for progression. In particular the requirements for alignment with the Water Framework Directive and associated EU Directives pose legislative challenges and institutional challenges. They reveal a considerable back-log in terms of water and wastewater infrastructure requirements. The infrastructure gap is particularly notable with regard to the meeting obligations under the EU's Urban Wastewater Treatment Directive, and achieving SDG 6.1 and 6.2 targets in rural areas. The establishment of technically and financially sustainable River Basin Management Organisations also poses a challenge.

"Business as Usual" scenarios predict: revenues generated with the existing tariffs for water supply and sanitation services are insufficient for improving the quality of water management; where they exist, economic instruments (abstraction and pollution charges) are ineffective in driving water use efficiency and discouraging water pollution; rural populations may be "left behind" with regard to water supply and sanitation development; water consumption patterns will remain inefficient, with wastage through distribution and use and unclear water allocation regimes; water pollution is likely to increase and water quality will deteriorate with an associated impact on the loss of biodiversity; governmental water resource management expenditure will likely be affected by the negative impact of COVID-19 magnifying the need to become more targeted and cost-effective.

Most Government strategies strive to contribute to universal and equitable access to safe and affordable drinking water, adequate sanitation and improved hygiene, a reduction in water borne diseases and a reduction in the number of illnesses and fatalities from water pollution. However, in the region, strategy documents typically focus on a narrow discussion of aspects of water policy, being sector specific e.g. irrigation or water supply and sanitation management. A unified and comprehensive strategic vision is required to ensure universal access to safe water and the rational utilisation of water resources. This will aid prioritisation of action and optimise the use of limited resources.

Key issues in terms of achieving policy goals such as progression of SDG targets and alignment with the EU's Water Framework Directive were identified as:

- Georgia: legislative barriers blocking progress - notably the need to progress the Draft Law on Water Resources Management and consider future implementation and enforcement arrangements.
- Moldova: a lack of financial resources - better coordination of institutional (agglomeration) and investment measures, aiming at economy of scale, as well as exploring new financing mechanisms based on improved water demand management and taxation of water use and pollution.
- Ukraine: sector fragmentation and absence of an overarching national water resources strategy to align sector priorities and strategic financing.

The annual costs of full reform scenarios were estimated as follows:

- Georgia: EUR 197 million (equivalent to EUR 52.9 per capita)
- Moldova: EUR 2.04 billion (equivalent to EUR 76.8 per capita)
- Ukraine: EUR 23 billion (equivalent to EUR 57.5 per capita)

Differences in reporting and classification of costs across different governmental departments leads to difficulties in linking public expenditures to particular water-related EU directives or specific national strategic goals. Monitoring and assessing overall cost-effectiveness of public expenditures on water resources management remains a challenge and opportunity for further work. The importance of appropriate enabling environments to pave the way for reform is also a key lesson learned.

1.1. State of play

Georgia, Republic of Moldova, and Ukraine have all signed Association Agreements (AA) with the European Union. These Agreements commit the countries to approximate EU Directives into national legislation and to implement international standards, including in the fields of environment and water management. Obligations are extensive, for example in Moldova, EU policies on environment, natural resources management and climate change entail nearly one third of Moldova's commitments in the AA, requiring the approximation of over 40 legal acts ("acquis communautaires") and setting the grounds for their further implementation.

1.1.1. Water resources in Georgia, Republic of Moldova and Ukraine: Trends and challenges

1.1.1.1. Georgia

Although water is abundant in Georgia, its quality*, due to anthropogenic factors varies widely. A prominent source of pollution is the discharge of untreated wastewater into surface waters. Over a third of wastewater discharged into water bodies in Georgia is insufficiently treated. Therefore, water quality is highly dependent on the type of wastewater discharged upstream and its level of treatment. Abstraction from surface water bodies for agricultural needs has more than doubled since 2003, and higher concentrations of agriculture-linked pollutants have been recorded near agricultural areas due to leaching.*

An additional challenge in Georgia is the population's relatively low level of access to modern water supply and sa*nitation systems. While the share of Georgians connected to public water supply systems and sanitation has consistently increased, as of 2019, one third of the population still lacks access to the public water supply and about half of the population does not have access to wastewater collection systems. Improving access to modern water supply and sanitation services and minimising the discharge of untreated or insufficiently treated wastewater into surface water bodies should be among the key objectives in Georgia's strategy to safeguard its water resources.*

Georgia relies on its water resources not only for domestic, agricultural and industrial use, but also for the vast majority of its power generation. Tensions between these competing uses have emerged, which are mentioned in the Irrigation Strategy of Georgia and can be summarised as follows:

- Irrigation and hydropower plants (HPPs) – Conflicts with HPPs occur during the irrigation season when largescale power production occurs and rivers are at low flow. This is a particular concern when water used by HPPs is diverted outside the basin and is therefore unavailable for downstream irrigation;
- Irrigation and drinking water supply – Although around 60% of Georgian drinking water comes from groundwater, Tbilisi and districts including Bolnisi, Dmanisi, Marneuli, and Tsalka depend on surface water for their potable supply; a large portion of the capital's supply is from the Tbilisi Reservoir. Since surface water is also used for irrigation, this creates a conflict between these two uses of surface water;
- Irrigation schemes along the same river – There can be several irrigation canals in a single river and competition between them increases when, in summer and autumn, water demand is high and supply is low.

The irrigation strategy highlights that Georgia is generously endowed with water resources, though availability varies greatly from season to season. In addition to its surface water resources, Georgia has abundant groundwater which, although little used at present, could be tapped for irrigation – particularly in drip irrigation systems.

The irrigation strategy also outlines some critical issues related to the Draft Law on Water Resources Management and suggests that, overall, there are two fundamental challenges affecting the adequate provision of irrigation services:

- Ensuring the operation and maintenance of facilities used to deliver water for irrigation;
- Generating sufficient revenues to cover the operation and maintenance cost of those facilities.

These challenges are pertinent not only for irrigation systems but also for the general water infrastructure, most of which is outdated and requires rehabilitation.

Yet another challenge is outlined in the Agriculture and Rural Development Strategy of Georgia 2021-2027, and relates to the inefficient use of water and its contamination by agricultural and non-agricultural enterprises. Consequently, in spite of the annual increase in irrigated area, some regional access to cheap water for irrigation is limited and the overall quality of water is deteriorating.

The issue of contamination of surface and ground water is addressed in the National Strategy for Waste Management and the Action Plan, according to which there is at least one unofficial landfill in each Georgian region, leading to water contamination. The action plan therefore envisions the development of wastewater treatment plants with donor support.

1.1.1.2. Republic of Moldova

Moldova's water resources are characterised by typically poor water quality and that river flow formation occurs outside of the country borders. The largest surface water sources in Moldova are the Dniester and Prut Rivers. However, their available volume depends essentially on the territory of Ukraine, where around 80 percent of the rivers' flow is formed. The total average annual discharges of all other inland rivers flowing in the country is comparatively smaller, making the Dniester and Prut rivers extremely important water sources. Moldova's hydrographic network also includes roughly 60 natural lakes and approximately 3500 artificial reservoirs and ponds constructed for irrigation purposes, flow regulation, and fishing pools. The main ground water reserves hold a total of 1.3 km^3, including 0.7 km^3 of water of drinking quality. However, groundwater is often too mineralised to be used for domestic or irrigation purposes.

With respect to water quality, which has implications on available quantities, Moldova is still facing issues. Nearly 50% of rivers and streams are considered *heavily polluted* and 27 percent *polluted*, making them unfit for swimming, fishing and drinking. Further, less than 50% of the groundwater reserves meet the required drinking water quality standards. More specifically, within the territory of the Dniester Basin in Moldova, 94% of waterbodies are assessed at risk of *not achieving good ecological status*. Water pollution within Moldova is caused by both point and diffuse sources including wastewater effluent discharges which, although regulated, are not yet under control. In addition, transboundary pollution contributes to water quality problems in Moldova. According to the Dniester river basin management plan (RBMP), two additional cycles (until 2039) are needed to achieve a *good ecological status* - if urgent measures are taken and implemented.

Moldova's available water resources are also expected to be further impacted by future climate change. Climate models under various scenarios predict a decrease in water availability and resources unless adequate adaptation measures are taken on time. Specifically, climate change is projected to decrease surface flows by 16–20% by 2030 and models project lowering precipitation will decrease annual runoff by 13% with annual flows becoming more unstable with more frequent spring and flash floods.

Water use has been relatively stable over the past two decades, while a generally shrinking population has led to modest increases in water availability per capita. Groundwater and surface water abstractions as well as the water used for production and drinking needs remained relatively stable between 2014-2019 while access to safely managed water resources and access to sewerage services both saw marginal increases over the period. Despite this, areas with vulnerable, mainly rural, populations are already experiencing water shortages, as well as decreasing water depth in unconfined aquifers due to overexploitation. Although Moldova is far from facing severe water stress, higher water stress conditions are exacerbated by seasonal fluctuations.

Water management in Moldova was optimised in 2013, integrating IWRM principles whereby the three hydrographic basins in Moldova were merged into two river basin management districts (RBMD). Accordingly, two RBMPs were developed along with two River Basin Committees to implement the IWRM management principles. The country's water agency, *Apele Moldovei*, has begun to reform its functions and structure and is responsible for RBMP implementation and coordination at the national level. The two river basin districts share similar challenges deriving from climate change, natural disaster risks, and negative anthropogenic impacts. Impacts are primarily due to the high share of ploughed agricultural land, the significant hydro-morphological changes along the rivers, and the discharge of insufficiently treated wastewater from public utilities and industries.

On a transboundary level, cooperation with Ukraine is crucial for improving the status of the Dniester River and ensuring more sustainable management. Understanding this, the new cycle of the Dniester River Basin Management Plan (2022-2027) extends to focus on transboundary aspects.

1.1.1.3. Ukraine

Ukraine is a relatively water-abundant country, though resources in the country are fragile in terms of their formation and distribution, and having a large population, with an economy often linked to agriculture, means water use is intensive. Resources are unevenly distributed across the country's territory due to climate conditions, topography, and the geological structure of individual river basin districts. The Dnieper River basin's significance is difficult to overestimate as it is the largest Ukrainian Basin and its water resources make up 80% of all water resources within the country, supplying drinking water to two-thirds of the population. The southern regions of Ukraine host the majority of agricultural and industrial water users and consequently, the regions suffer from water stress and insecurity, since they rely solely on the Dnieper River. This concentration of water resources is compounded by the fact that only a fraction of Ukraine's water resources are formed in country, with the majority being formed in Belarus, Romania and Russia.

Further to this, the pronounced long-term hydrological regime change over the last 20 years has led to the shallowing and further disappearance of small rivers and streams. The impacts of climate change, lax definitions around ecological water requirements, and the large water requirements of industrial and agricultural production, among other drivers, are contributing to these hydrological regime changes. Intensive agricultural activity is particularly reducing runoff in two regions by up to by 10%. In addition, poor water quality, caused by the discharge of insufficiently treated wastewater into water bodies, due to a lack of infrastructure, impacts water resource availability. These water resource conditions highlight some of the fragilities within the Ukrainian water resource environment and the need for more robust management.

Freshwater abstractions in Ukraine have begun to increase in recent years (following decreases between 2000 and 2015). Industrial needs dominate water abstraction, with irrigation and drinking water needs being roughly similar though representing the second and third highest water use categories. Most abstractions are from surface water sources with groundwater and marine water being used in relatively smaller quantities (85%, 10.4% and 4.6% respectively in 2019). Water use for household and drinking needs is impeded by the lack of water supply and sewerage infrastructure. By 2030, Ukraine aims to overcome inequalities in access to water and sanitation by guaranteeing a social minimum for drinking water and sanitation conditions. In support of this, over 1 160 reservoirs with a cumulative volume of approximately 55 cubic kilometers have been constructed.

In line with EU Water Directives, Ukraine defined nine river basins districts with RBMPs to achieve specific environmental objectives for each basin. They were developed based on best practice for the implementation of the EU's Water Framework Directive. The common goals across all basins include achieving and maintaining the good ecological status of surface and groundwater bodies, and the good ecological potential of artificial or significantly altered surface waterbodies. As of 2021, RBMP implementation has begun on only one of Ukraine's nine river basin districts, the Dnieper River Basin. In the Dnieper RBMP's next cycle, assessments of water monitoring results should further build on the programme of measures to achieve the relevant environmental objectives of the basin. The plan will serve as the basis for other RBMPs throughout Ukraine that are currently in development.

Currently, the RBMP's objectives are taken up on a transboundary level by the Strategic Action Programme (SAP) for Dniester River Basin developed on the basis of a Transboundary Diagnostic Analysis (TDA) of the District.[1] The SAP adoption by the Moldovan and Ukrainian governments is expected in 2021. Both the TDA and SAP are considered a good basis for the second cycle of Dniester RBMP and for the development of Moldova's country specific Programme of Measures.

1.1.2. Progress and challenges towards Integrated Water Resources Management and approximation with the EU acquis

1.1.2.1. Georgia

The current water management environment in Georgia can be viewed through the legal, regulatory, institutional and policy lenses. There are opportunities within these frameworks for improving effective water resource management and opportunities exist to improve alignment with EU Directives and the Association Agreement. The existing legislative framework defines several administrative bodies as responsible for various water-related matters, meaning management is fragmented. Similarly, Georgia's regulatory framework is considered complex, and the system is siloed, often without a unified approach. Institutional responsibilities, although formally disseminated at the national and local levels, typically operate in a centralised manner due to limitations in their functioning. The policy framework would benefit from a comprehensive strategic vision to support policy development.

The current legislative framework has ambiguities and shortcomings which can complicate the efficiency of water management in Georgia. The principal article of national water legislation is the Law of Georgia on Water (1997) (the Water Law), which regulates the Georgian water resource management system.

Despite being the key piece of legislation for water sector regulation and establishing the major objectives and principles of water resource management policy, the Water Law is currently under review, though proposed changes to align with EU legislation have not yet been implemented. Shortcomings with the existing law include the lack of requirements for the sustainable and effective management of water resources; no comprehensive or clear regulations for the prevention of water pollution and no direction regarding the excessive use of water resources.

Georgia has designed the new draft law on water resource management to align water management with the major principles and approaches provided within the relevant EU Directives and to fulfil Association Agreement obligations. The draft law covers surface water bodies and underground fresh water and stipulates quantity and quality. Although yet to be adopted, the draft law can be considered robust and well aligned with EU objectives, overcoming the major legislative gaps of the existing water law. It will establish a legal framework for water resource regulation and provide a better understanding of the distribution of powers among the responsible institutions.

The draft law complies with the EU Water Framework Directive and establishes an integrated water resource management system, using the principles of river basin management. It designates responsible agencies and fulfils the requirements of the relevant provisions in the Water Framework Directive. It also provides specifications for the preparation of river basin management plans, ensures public participation in discussions, and sets obligations for the publication of river basin management plans. More precisely, river basins' boundaries will be determined by the government via the adoption of the relevant resolution.

Georgia's water resources are divided into two catchment areas, the western one flowing to the Black Sea with a cumulative annual volume of 49.8 km^3, and the eastern one emptying into the Caspian Sea via Azerbaijan with a cumulative annual volume of 16.5 km^3. The new draft Law on Water Resources Management, and the subsequent draft governmental Resolution on the Approval of the Boundaries of Basin Territorial Entities of River Basin Management, proposes six territorial entities, or River Basin Districts (RBD), to be established within Georgia's territory. Within the Association Agreement with the EU, Georgia committed to developing and adopting Water Framework Directive (WFD) compliant RBMPs for all its river basin districts, including the involvement of the public in consultations. Under the Agreement, plans should be implemented within ten years of signing the Agreement. While progress has been made with the development of RBMPs, until the draft law on Water Resources management is adopted, no activity can commence. To understand the financial requirements of the RBMPs, programmes of measure of priority water management interventions in basin plans, have been identified and financially evaluated These costs are forecast to be incurred over a six-year period, to 2024, corresponding to the first implementation timeframe of the RBMPs.

To overcome the current legislative shortcomings, the draft law establishes a classification system for water bodies, sets objectives and standards for water quality, provides water pollution prevention measures, sets a monitoring and enforcement system, including monitoring programs, classifies river basin districts, and ensures public participation. A key feature of the draft law is the establishment of a permit system for abstraction from and discharge into surface waters, together with fees for water usage. Monitoring compliance and enforcement will be key.

The draft law also provides new institutional arrangements for water resource management, clearly and systematically defining the responsibilities and obligations of governmental agencies and municipalities in water resource regulation processes.

Implementation of the new water law would be supported by improved regulations. Current issues with regulation include the lack of a common vision and approach by the state and existing regulatory bodies, a lack of charges for surface water abstraction, and weak and underdeveloped water monitoring and control systems for planning and implementing water management activities. Regarding monitoring, it is imperative that the regulatory framework provides specific criteria for the evaluation of water quality and

quantity. Controlling, monitoring, and creating integrated databases would further support robust water management.

Institutional responsibilities for water resource management are split between the national and local levels, though due to technical and financial capacity limitations, the system is largely centralised. Cooperation between agencies is often difficult and their functions are not oriented towards solving the system's obstacles. Further, decentralisation of powers between central and local governments is often unfeasible due to resource limitations and issues with timely coordination and cooperation among agencies.

Although the functions of each institution are prescribed in relevant laws and subordinate legal acts, the regulatory system still lacks a unified governing strategy that coordinates their work efficiently. Regulation is limited at the local level due to the weak institutional, professional, and financial capacities of municipalities, meaning they often cannot exercise their prescribed responsibilities.

1.1.2.2. Republic of Moldova

Moldova's recent (2016) legislative, regulatory, institutional, and policy reforms achieved better alignment with EU Water Framework Directives and its associated directives although bottlenecks still exist. The reforms achieved needed economies of scale, though also delegated responsibilities to agencies lacking the necessary knowledge, staff, and financial capacities for implementation.

Moldova has several policies shaping the water management policy framework in line with EU good practice. The National Development Strategy (NDS) "Moldova 2020" prioritised the provision of clean, accessible, and affordable water in the development agenda (this has now been updated to "Moldova 2030"), the Water Supply and Sanitation Strategy 2014-2030 (WSS Strategy) established ambitious targets to gradually ensure access to safe drinking water for the entire population by 2028, the National Environmental Strategy (NES) 2014-2023 partly addressed water sector needs through "soft" legal, institutional and awareness raising measures, and the National Programme for the implementation of the Protocol on Water and Health in the Republic of Moldova for 2016-2025 set targets and deadlines covering water, sanitation, hygiene, and health.

Moving forward, the WSS Strategy was extended to 2030 and new Action Plans were adopted to support implementation. The initial Action Plan (2014-18) made progress in WSS provision, though there were discrepancies between provision to urban and rural areas. The major objective of the 2020-24 Action Plan was to cover the urban rural gaps and to provide 80% and 75% coverage in urban and rural areas respectively by 2025. In addition, the current plan pursues more specific objectives at the river basin district level. These objectives are outlined in and implemented through the River Basin Management Plans.

Alongside the WSS Strategy, Moldova's National Programme on the "Implementation of the Protocol on Water and Health in the Republic of Moldova 2016-2030" underpins the SDG 6 targets and the objectives set in "Moldova 2030". The Programme outlines 77 actions, such as strengthening the legal framework, improving water quality monitoring, and developing WSS infrastructure in order to achieve the major objectives which include improving water security, and ensuring an adequate supply of good quality water among others. To date, progress has been made in introducing the principles of IWRM to Moldova's policies and legislation, decreasing water related diseases per 100 000 inhabitants, and reducing outbreaks of water related infections. However, considerable efforts are still needed to improve water quality of all sources used for human consumption.

Despite improvements in the policy framework, existing shortcomings impede Moldova's water management. Inconsistent policy goals and overlapping objectives across strategies, fragmented planning and a lack of capacity, insufficient monitoring and evaluation, and low levels of public spending lead to an inconsistent policy environment, a wide urban-rural gap in water services provision, and a lack of data availability to inform decision making.

In line with the country's international commitments, Integrated Water Resources Management principles were introduced into Moldovan legislation in 2018 in the Water Law No 272/23.12.2011. The legislation, responsible for implementing the EU directive "*2000/60/EC establishing a framework for Community action in the field of water policy (WFD)",* develops the legal framework for integrated water resources management, establishes the legal framework for protection and efficient water use, establishes water rights, and stipulates measures for preventing the deterioration of state of water. However, the legislation contains gaps. Inefficient metering and monitoring mechanisms (with no monitoring alignment with the WFD requirements), a lack of comprehensive analysis and assessment of groundwater quality, and a lack of regulation on the use of groundwater for irrigation inhibit a more robust application of water management.

Legislative gaps and issues vary according to the alignment to the specific EU directive. However, there are similar issues that could broadly be addressed to strengthen the legal framework. Addressing inefficiencies in monitoring and metering, a lack of information sharing and publication, a lack of analysis and assessment of water resources and their quality – particularly groundwater, and weak enforcement of legislation and regulations could provide a more solid basis for general water management regulation and institutions.

The regulatory framework, which includes four principal regulations relating to water management are underpinned by codes of practice, River Basin Management Plans, and national guidelines. The major gap in water regulation involves a lack of direction in wastewater treatment. Specifically, the lack of implementation and enforcement of a permission system for water use and wastewater discharge. Overcoming these gaps would help resolve management issues stemming from the steadily increasing anthropogenic pollution of water resources and also provide more equal treatment of water users.

Sound and stable institutions in Moldova remain an important precondition for developing and implementing water policy. Though a lack of institutional stability and weaknesses of existing institutions contributes to problems in implementing the new integrated water management policy in the context of its approximation with the EU legal and regulatory framework. To assist in this coordination and provide good opportunities for engaging and empowering water management sector stakeholders, a National Policy Dialogue (NPD) platform was established in 2006. As part of the NPD, the steering mechanism has become a valuable platform for providing the needed horizontal cooperation between different sectors. Further, institutional arrangements regarding the provision of water and sanitation services were decentralised to local public authorities (LPAs) following the Law on Public Services of Communal Management (2002). However, drastic cuts in the number of staff of specialised administration, has seriously impacted the targeted performance of key public sectors in agriculture, environment, natural resources management, and regional and rural development. Although reforms yielded financial savings, they also assigned additional and new responsibilities to executive agencies that that do not always have the necessary knowledge, staff, and financial capacities to successfully implement them, hindering the effective implementation of objectives.

Looking at Moldova's transboundary water management, the RBMPs' objectives are currently taken up on a transboundary level by the Strategic Action Programme (SAP) for the Dniester River Basin developed on the basis of a Transboundary Diagnostic Analysis (TDA) of the district. The SAP adoption by the Moldovan and Ukrainian governments of Moldova and Ukraine is expected in late 2021. Both the TDA and SAP are considered a good basis for the second cycle of Dniester RBMP and for the development of Moldova's country specific Programme of Measures. The Programme of measures will include transboundary actions such as establishing norms for water use (prevention of overuse), enforcing norms for wastewater discharges, and improving water quality monitoring programmes (among others). However, implementation of actions will depend on the availability of funding and sustainability of the responsible institutions.

1.1.2.3 Ukraine

The legal, regulatory, policy and institutional environment in Ukraine is in the process of becoming more aligned with the EU Water Framework Directive. Work to streamline and clarify roles and responsibilities of institutions and establish long-term policy objectives will help align Ukraine with the EU's water management directions.

Broadly, Ukrainian water policy can be seen through two interconnected 'policy avenues', the first being around the rational use of water resources and quantitative restoration and the second being focused on quality aspects combating and preventing pollution. Various policies and strategies underpin these policy avenues. Until 2020, the Law of Ukraine *"On basic principles (strategy) of the environmental policy of Ukraine till to 2020"* served as the main prerequisite for obtaining EU Sectoral Budget Support. The strategy proposed five strategic objectives including introducing IWRM according to river basin principles, developing and implementing a plan to reduce water pollution, and ensuring compliance with regulatory requirements.

Beside these strategies, the "Concept of Water Sector Reforming" was developed to establish a water market within Ukraine, separate the economic functions of water service supply from state water governance and establish the National Water Council. Long-term, the "Concept" aims to ensure equal access to WSS services and to achieve and maintain the 'good' ecological status of the various types of water bodies within Ukraine in alignment with requirements of the Water Framework Directive.

In 2020, the Ministry of Ecology and Natural Resources developed the Law of Ukraine "On basic principles (strategy) of the state environmental policy of Ukraine till to 2030" which more closely aligns Ukrainian and EU policy objectives. The law's implementation process is supported by the National Action Plan for the period 2020 – 2025 (and the second stage 2026-2030) and will be evaluated against indicators outlined in the strategy. Objectives include maintaining a permanent dialogue with stakeholders in strategic decision making, defining functions on environmental protection and economic activity related to the use of natural resources, and implementing principles of good environmental governance. However, the uptake of the draft strategy and the "Concept of Water Sector Reforming" are dependent on the stability of the Ministry of Environmental Protection and Natural Resources and securing sustainable funding.

Ukraine's natural resources have the status of public ownership, and this sentiment underpins Ukraine's water legislation. The Water Code of Ukraine (2002) is the main piece of legislation driving Ukrainian water management and the 2017 updates to the Code aligned large parts of legislation with EU Directives. In accordance with the EU Water Framework Directive, legal changes to the Code (in 2017) defined legal provisions for moving towards IWRM and further establishing basin principles for water resource management. The main improvements were related to defining river basin districts and establishing river basin councils and procedures for RBMP development. The second major piece of water legislation is the Law of Ukraine 'on drinking water, drinking water supply, and wastewater drainage' (2017). The law stipulates the requirements of drinking water provisions, provides guidelines for receiving wastewaters in centralised sewage systems and includes penalties for exceeding norms, among other stipulations.

Direct action is not generally a component of Ukrainian legislation and actions are often delegated to lower legislative levels such as sub-legal and normative legal acts. This approach means that although high-level legislation may outline effective water management, subsequent lower-level acts may distort or counteract their effectiveness.

The regulatory framework of Ukraine contains six major regulations dealing directly with water management. The regulations cover pollutants and their permissible discharges, include guidelines for developing the river basin management plans, stipulate drinking water supply, provide guidelines for water monitoring and flood risk management plans, and contain directions for issuing permits for special water use. Although alignment between Ukrainian legislation and EU Directives has strengthened, regulation

could be improved. Streamlining and clarifying wording of regulations could lead to stronger water management in practice.

Regarding Ukraine's institutional framework, 11 major institutional bodies govern water management. The two principal institutions include the Ministry of Environment Protection and Natural Resources (MEPNR), and the State Agency of Water Resources (SAWR). MEPNR is the Institutional body responsible for implementing the Water Framework Directive, 2000/60/EC and the Marine Strategy Framework Directive, 2008/56/EC. Among other responsibilities, MEPNR formulates water policy, including approaches for RBMP development and implementation, delegating water permits, and water monitoring. The SAWR is the central apparatus implementing water policy for surface freshwater bodies. It is supported by oblast sub-divisions and basin departments. SAWR's role includes, issuing water permits, managing water monitoring, and undertaking water reporting and accounting, among other duties. MEPNR and SAWR are supported by 13 River basin Councils which were established as advisory bodies.

Shortcomings hindering robust water management from an institutional standpoint include a lack of clear roles and responsibilities in practice, and a lack of data exchange between authorities. These shortcomings result in shifting onuses for carrying out objectives, and inefficiencies in information exchanges between monitoring institutions, ultimately hindering decision making.

1.3. Scenarios

The water policy outlooks aim to baseline the country policy framework and current progress and then define the long-term vision and aspirations to 2030. The outlooks aim to demonstrate the likelihood of the current policy framework to achieve the long term objectives and desired future state of the water sector, and through development of scenarios, identify opportunities for improving policy coherence and policy priorities that have the opportunity to improve the likelihood of success. Table 1.1 presents the scenarios developed for the three countries.

In addition to "baseline scenario" for Georgia, two scenarios are proposed:

- In the full-reform scenario the draft Law on Water Resources Management would be adopted by the end of 2021, though will still require complementary normative acts or other pieces of legislation to address all of obligations within EU mandates. The full reform scenario aims to improve water resource management and ensure sustainable water use, reduce water resource pollution, and improve water quality and quantity monitoring.
- In the alternative full-reform scenario, the draft law is similarly assumed be adopted by the end of 2021 and the same key activities are considered. The alternate scenario differs by recasting governmental strategic ambition and setting more realistic timeframes. The alternative sub-scenario also considers the probability that some infrastructural projects will not occur and adjust costs accordingly. Differences in the reform scenarios stem from concerns regarding the delayed adoption of the draft law and consequent activities, setbacks in wastewater treatment plant construction due to local resistance, COVID-19 restrictions, and prolonged tender procedures.

For Moldova, two scenarios are proposed in addition to the "baseline":

- In the "business-as-usual (BAU) scenario", trends in water policy, management and investment continue. The scenario envisages some improvements in the IWRM system. However, they are not enough to achieve the 2030 targets set by national policy documents and EU commitments. Overall, the water sector development under the BAU scenario for water policy would leave Moldova ill-prepared to meet major challenges in the water sector.
- The "optimal scenario" achieves robust and sustainable water management, fully aligning with commitments in EU directives and reaching water-related goals by 2030. The scenario envisages

increasing the amount of water allocated to environmental uses. It would also connect all urban and most rural households to safely managed water systems. Finally, it would achieve greater social equity and environmental protection through both carefully designed but steady reforms in the water sector and sound government action. The scenario foresees reasonably higher prices for water and higher water-use efficiency than under the business-as-usual scenario, resulting in reduced consumption. Water would be dedicated to environmental uses, over time resulting in improved quantity and quality of water resources. This would increase reliability of supply for domestic needs, irrigation and production. The scenario envisages improvements to domestic water supply through universal access to safely managed water systems for rural and urban households, while addressing affordability issues. In the scenario, investments are well balanced between water supply and wastewater treatment measures. It introduces economic instruments and social incentives to improve water-use efficiency, conserve water and generate revenues that are re-invested into the water system in an inclusive and transparent manner.

For Ukraine, in addition to the baseline scenario, two scenarios are developed:

- The "business-as-usual" scenario presumes only marginal alignment with the WFD. The scenario foresees persistent challenges with financing for water protection measures which will not be sufficient to establish the nine RBMPs required.
- In the "future scenario", Ukraine will ensure efficient water resource and environmental management nationally by 2030 by developing and implementing institutional and legal reforms in 2024. However, the development of the scenario depends on the availability of strategic policy documents. In this scenario, amendments to the Water Code will provide a solid base for the WFD's provisions. Further, it will develop an appropriate organisational structure for integrated water resources management at both central and basin levels.

Table 1.1. Scenarios in Georgia, Moldova, and Ukraine

Scenario	Georgia	Moldova	Ukraine
BAU – some efforts are made, but unlikely to reach all targets by 2030	**Known as the alternative full reform scenario**	**Known as business as usual scenario**	**Business as usual scenario**
	EUR 199 million total annual cost	EUR 705 million to 2030	EUR 4 billion annually
	The alternative full-reform scenario ultimately recasts governmental strategic ambition by setting more realistic timeframes for complying with EU Directives – therefore, same objectives achieved, though with a longer time frame required. Objectives and targets the same as full reform scenario. • The introduction of a Basin Management System • The introduction of new economic instruments for water management (changes in the permit system for the abstraction of surface water and water discharge) • The creation of a water balance and water user register (preferably in GIS) • The rehabilitation and construction of urban wastewater collection and treatment systems	• Future governments and water users implement regulatory, institutional and management reforms in a limited and piecemeal way. • Water investments in rural areas and in appropriate sanitation and wastewater treatment are not prioritised in strategic planning. • Implementation and enforcement of regulations on wastewater treatment and discharge are not properly undertaken. • Climate change adaptation and flood and drought risk management measures are not streamlined in strategic development policies. • Public capital investments in water resources management remain under one percent of budgetary spending. • International donor funds remain focused primarily on supply infrastructure.	Adoption and implementation of Water Strategy and Marine Strategy: Envisages Water Strategy adoption in 2022. A sustainable institutional basis will not be implemented due to a lack of continuity in Ministerial teams and a lack of Government understanding around the importance of water and environmental issues. Implementation of the Strategy on irrigation and drainage in Ukraine on the period till 2030: Envisages NAP's adoption in 2021. The World Bank and the European Bank for Reconstruction and Development will not invest money until 2030 in the irrigation and drainage sector due to the unclear tariff situation. Implementation of the Strategy will be started, thanks to national investments, though it will be unstable and only partial. Development of Water User Organisations: Envisages adoption in 2023/24. Will improve investment conditions for national investors. Inter-farm and internal farm irrigation and drainage structures and networks will

Scenario	Georgia	Moldova	Ukraine
	• The identification of sensitive areas for urban wastewater discharges • The identification of polluted waters or waters at risk and the designation of nitrate vulnerable zones; the establishment of monitoring programs, action plans, and codes of good agricultural practice for such nitrate vulnerable zones. • The adaptation of monitoring practices and procedures for water quality and quantity (including drinking water). • Improving water resource management and ensuring the sustainable use of water • Reducing water pollution • Improving the monitoring of water quality and quantity.	• Economic incentives maintain political opposition. • The cost of supplying water to domestic and industrial users rises due to high water losses from deteriorated infrastructure. • Improved service delivery leads to some increases in the proportion of population connected to piped water. • Irrigation demand doubles following expansion of irrigated areas. Irrigation needs are not met. • The amount of water being allocated to preserving wetlands, diluting pollutants, maintaining riparian flora and other aquatic species, increases due to political pressure. • Water monitoring is strengthened. • Information sharing and reporting systems lag. Investment in monitoring stations and new technologies remain scarce.	be partly restored by 2030. Approximation to the Drinking Water Directive (98/83/EC) and its implementation, and implementation of SDG6 clean water and sanitation, SDG14 life below water and SDG15 life on land: By 2030 implementation of: • SDG6 by up to 70 percent. • SDG14 by 30 percent due to the lack of institutional capacity in marine policy implementation. SGD15- regarding reducing the share of arable land, land will be reduced to 55 percent though will not meet the required 47 percent. Approximation to the Water Framework Directive (2000/60/EC) and its implementation: Changes to societal attitude in regard to environment and water resources as a result of water shortages will lead to significant increases in water prices and prices for water pollution. Approximation to the Urban Wastewater Directive (91/271/EC) and its implementation: No implementation by 2030. Potential partial and inconsistent implementation due to financing absences for tertiary wastewater treatment initiatives and remaining problems with the utilisation of post-treatment sludge. These problems may be partially addressed in 2028/30. Approximation to the Nitrates Directive (91/676/EC) and its implementation: Expected adoption by 2024 with developed definitions of zones vulnerable to the accumulation of nitrate compounds and the Code of the best agricultural practice. First generation RBMPs will use vulnerable zones as recommendations, though they are not legally defined. Approximation to the Floods Directive (2007/60/EC) and its implementation: Envisages the development and adoption of Risks Flood Management Plans for every river basin district by 2024. Due to delays in development and adoption of River Basin Flood Risks Management Plans, plans will not be properly reflected in RBMPs (final plans should be prepared and adopted in August 2024).

Scenario	Georgia	Moldova	Ukraine
Baseline - the worst scenario – no efforts are made, targets generally unmet	**Called the baseline scenario**	**Known as the baseline scenario**	**Known as the baseline scenario**
	46.65 million euros total (annual cost)	Approx. 40 Euro million annually	2 billion Euro annually
	• The Law on Water Resource Management is not adopted. • The prevailing water management system does not change. • The available water sector economic instruments do not change; water use/abstraction tariffs are set according to the existing methodology; and governmental water sector subsidies continue. • Current trends in infrastructural development do not change. • The water quality monitoring system does not improve. • The inefficient water management system persists. • Water consumption patterns and irrational water use remain unchanged. • Water quality will not improve	• Economic and public budget problems worsen. • Governments further cut spending on wastewater services and irrigation systems. • Necessary reforms in water users' rights and obligations, institutional strengthening, and prioritised investment policies is not undertaken. • Attempts to fund operations and maintenance (O&M) of old, highly deteriorated water systems increase water prices for users. Increases are met with opposition. As a result, prices are kept artificially low. This undermines incentives for water use efficiency. • Spending on O&M falls, resulting in continued deterioration of water infrastructure systems. • Investments targeted to extending piped water and sewage systems to lag. • Water reserved for environmental purposes declines. It remains unregulated. • Farmers and industries use water less efficiently and withdraw more water to compensate for water losses in irrigation systems and due to the use of outdated irrigation techniques. Established management systems (e.g. integrated water information SIRA) deteriorates.	Adoption and implementation of Water Strategy and Marine Strategy: Both prepared by 2019 but not adopted due to unsustainable situation in the Ministry of Environmental Protection and Natural Resources. The Marine Strategy still requires the definition of Good Environmental Status descriptors. Implementation of the Strategy on irrigation and drainage in Ukraine on the period till 2030: Adopted by the Cabinet of Ministers of Ukraine's decisions #688 in 2019. The NAP, as the main implementation instrument is in the final stages of preparation and acceptance. Development of Water User Organisations: The draft Law "On organisations of water users (OWU)" is in the final stage of development. It should be proposed to stakeholders for discussion soon. Approximation to the Drinking Water Directive (98/83/EC) and its implementation, and implementation of SDG6 clean water and sanitation, SDG14 life below water and SDG15 life on land: The National Report "SDG: Ukraine" was prepared in 2015 and jointly adopted by the Cabinet of Ministers of Ukraine and the UNDP. The President Order #722 from 2019 envisages its implementation. Approximation to the Water Framework Directive (2000/60/EC) and its implementation: Despite successful approximation and implementation of the majority of the WFD, article 9 is still under the question. Currently, the cost recovery of water resources and services isn't achievable. Approximation to the Urban Wastewater Directive (91/271/EC) and its implementation: Delays due to the unpreparedness of the Ministry of Development of Communities and Territories and Vodokanals in meeting basic requirements Approximation to the Nitrates Directive (91/676/EC) and its implementation: Delays due to the absence of actions on the part of the Ministry of Economic, Trade and Agrarian Development. Approximation to the Floods Directive (2007/60/EC) and its implementation: Relative success under the auspice of the State Service on Extraordinary Situations. Guidance on the development of the Flood Risks Management Plan was adopted by the Cabinet of Ministers of Ukraine in decision #247 in 2018.
	• **Known as the "Full-reform scenario"**	**Known as the optimal scenario**	**Known as the future state scenario**

Scenario	Georgia	Moldova	Ukraine
	• 197 million Euro annual costs	2.04 billion Euro to 2030	23 billion Euro to 2030
Full reform – extensive efforts are made, all targets are met	• The introduction of a Basin Management System • The introduction of new economic instruments for water management (changes in the permit system for the abstraction of surface water and water discharge) • The creation of a water balance and water user register (preferably in GIS) • The rehabilitation and construction of urban wastewater collection and treatment systems • The identification of sensitive areas for urban wastewater discharges • The identification of polluted waters or waters at risk and the designation of nitrate vulnerable zones; the establishment of monitoring programs, action plans, and codes of good agricultural practice for such nitrate vulnerable zones. • The adaptation of monitoring practices and procedures for water quality and quantity (including drinking water). • Improving water resource management and ensuring the sustainable use of water • Reducing water pollution • Improving the monitoring of water quality and quantity.	• Current and future governments and international donors increase investments in technological change and reform of water management, boosting water productivity. • Policies improve and investments in rural infrastructure increase. • Climate adaptation options in the agricultural sector are streamlined. • Agricultural water prices gradually increase. A water market is gradually established due to purchasing and trading. • Incentive programs provide farmers income for the water they save. • Technological improvements and effective economic incentives reduce water demand. • Domestic water use is subject to reforms in pricing and regulation. • Water prices for connected households and connection fees for newly connected users correspond to investments. • Targeted subsidies support low-income and vulnerable households due to higher water prices. • Allocations of water for environmental uses increase due to political pressure. • Targeted reforms are undertaken in water intensive sectors. • Groundwater extraction policies introduce market-based approaches to assigning rights to groundwater based on both annual withdrawals and groundwater recharge. • Stricter groundwater regulations are established for water use and discharge, requirements for on-the-spot metering. These are supported by better enforcement. • Revenue from price increases is invested in reducing water losses and extending piped water to unconnected households. • An improved legal and institutional environment for preventing and eliminating conflicts better facilitates the allocation of water use rights. River basin organisations are empowered to allocate mainstream water among stakeholder interests under clear and transparent rules.	Adoption and implementation of Water Strategy and Marine Strategy: Envisages Water Strategy adoption in 2021. It will be properly reflected in RBMPs and relatively successfully implemented thanks to the growing global importance of water resources in combating climate change and the Government's awareness of this situation. Implementation of the Strategy on irrigation and drainage in Ukraine on the period till 2030: Envisages NAP's adoption in 2021. The World Bank and the European Bank for Reconstruction and Development will consider the tariff situation as an acceptable risk thanks to current land reforms and may propose an investment portfolio for Ukraine in 2023/24. National investors will join the process, improving the investment environment. Development of Water User Organisations: Envisages adoption in 2022. Will improve investment conditions for national investors. Inter-farm and internal farm irrigation, and drainage structures and networks will be restored by 2026. Approximation to the Drinking Water Directive (98/83/EC) and its implementation, and implementation of SDG6 clean water and sanitation, SDG14 life below water and SDG15 life on land: By 2030 implementation of • SDG6 by more than 90%. • SDG14 by 60% through the strengthening of institutional capacities in marine policy implementation. • SGD15 regarding reducing the share of arable land, land will be reduced to the required 47%. Approximation to the Water Framework Directive (2000/60/EC) and its implementation: Environmental and economic revisions of water recourses and services pricing in alignment with the framework of National Water Policy Dialog by 2024 will lead to a real increase of costs for first generation RBMP implementation. Approximation to the Urban Wastewater Directive (91/271/EC) and its implementation: Relative implementation success by 2030 thanks to the establishment of a flexible finance policy for building tertiary wastewater treatment facilities, smart implementation of local treatments by enterprises, and proper regulation of post-treatment sludge utilisation in the construction and agricultural sectors. Approximation to the Nitrates Directive (91/676/EC) and its implementation: Expected adoption by 2021/22with

Scenario	Georgia	Moldova	Ukraine
			developed definitions of zones vulnerable to the accumulation of nitrate compounds and the Code of the best agricultural practice. Vulnerable zones will be included in first generation RBMPs as the regulatory norms for implementation in agriculture production between 2025/30. Approximation to the Floods Directive (2007/60/EC) and its implementation: Envisages the development and adoption of River Basin Flood Risks Management Plans by 2022. In June 2021 draft plans should be published on the State Service on Extraordinary Situations' web-site and be reflected in every RBMP.

Note: Estimated costs of the scenarios are provided by the local consultants. Scenarios are not strictly comparable across the three countries. For more details about specific scenarios, refer to the country chapters.
Source: Author's own elaboration

Notes

[1] Within the GEF-financed project "Enabling transboundary co-operation and integrated water resources management in the Dniester River Basin", implemented by OSCE.

2 Developing a water policy outlook for Georgia

This chapter considers Georgia's ambitions and outlook for its water sector including water-related obligations under the Association Agreement with the European Union and targets under multilateral environmental agreements including the Sustainable Development Goals. Obligations under the EU Water Framework Directive and associated directives are discussed, including time-bound commitments concerning the identification of river basin districts and preparation of river basin plans. The chapter considers Georgia's current state of play with regard to water resources and pressures facing the sector. Finally, the chapter considers the existing policy and legislative framework and considers scenarios for possible future reforms.

Georgia's relationship with the European Union provides a framework for water policy reform

Georgia and the European Union (EU) have established and maintained close ties, notably in the framework of the EU Eastern Partnership (EaP) starting in 2009. A new milestone was reached in 2014 with the signing of the EU-Georgia Association Agreement (AA), which entered into force in 2016. Through the AA, Georgia committed to align its national legislation with EU directives and to implement international standards, including in the fields of environment and water management.

The AA defines timeframes in which Georgia is expected to approximate the EU directives related to water quality and resource management, including the marine environment. All provisions need to be implemented by 2026, which will mark ten years of the AA's entry into force. Of these directives, the Water Framework Directive (WFD) is the most crucial legal act concerning protection of water regulation. It aims to ensure the viable, socio-economic management of resources; protect the quantity and quality of water; and promote sustainable water use.

The AA transcends the WFD, extending to commitments more broadly related to the water sector, including the marine environment. Table 2.1 summarises the water-related EU directives, including provisions, timeframes for implementation as defined by the AA and status as of 2021. This assessment covers all water-related EU directives except the Floods Directive and the Marine Strategy Framework Directive.

Progress on all assessed provisions related to EU directives mentioned in Georgia's AA is pending adoption of the draft law on water resources management, which will supplement the 1997 Law on Water. While the draft law is largely compatible with the sector-related directives prescribed in the AA, some elements are missing. See section 2.1.2.2. Legal framework for further information.

Table 2.1. EU directives on water quality and resource management and timeframes for their implementation in Georgia

Directive	Provision	Timeframe (from entry into force in 2016)	Status (2021)
Water Framework Directive (Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy as amended by Decision No 2455/2001/EC)	Adoption of national legislation and designation of competent authority/authorities	Within four years (i.e. 2020)	New draft law on water resources management covers this issue, but it has not yet been adopted.
	Identification of river basin districts and establishment of administrative arrangements for international rivers, lakes and coastal waters	Within four years (i.e. 2020)	New draft law on water management covers these issues, but it has not yet been adopted. Government resolution on the approval of boundaries of river basins/ basin areas not yet drafted.
	Analysis of the characteristics of river basin districts	Within five years (i.e. 2021)	
	Establishment of programmes for monitoring water quality	Within six years (i.e. 2022) for surface water Within eight years (i.e. 2024) for groundwater	New draft law on water management covers these issues, but it has not yet been adopted. Government resolution on the rules for planning and implementation of water resources monitoring not yet drafted.

Directive	Provision	Timeframe (from entry into force in 2016)	Status (2021)
	Preparation of river basin management plans, consultations with the public and publication of these plans	Within ten years (i.e. 2026)	New draft law on water management covers these issues, but it has not yet been adopted. Government resolution on the procedures for development, discussion and approval of river basin management plans and related minister orders not yet drafted.
Floods Directive (Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks)	Adoption of national legislation and designation of competent authority/ies	Within four years (i.e. 2020)	Not covered in the present assessment.
	Undertaking preliminary flood assessment	Within five years (i.e. 2021)	
	Preparation of flood hazard maps and flood risk maps	Within seven years (i.e. 2023)	
	Establishment of flood risk management	Within nine years (i.e. 2025)	
Urban Waste Water Directive (Directive 91/271/EEC of 21 May 1991 concerning urban waste water treatment as amended by Directive 98/15/EC and Regulation (EC) No 1882/2003)	Adoption of national legislation and designation of competent authority/ies	Within four years (i.e. 2020)	New draft law on water resources management covers this issue, but it has not yet been adopted.
	Assessment of the status of urban wastewater collection and treatment	Within six years (i.e. 2022)	New draft law on water resources management covers this issue, but it has not yet been adopted.
	Identification of sensitive areas and agglomerations	Within seven years (i.e. 2023)	New draft law on water management covers these issues, but it has not yet been adopted. Related government resolutions not yet drafted.
	Preparation of technical and investment programme for the urban wastewater collection and treatment	Within eight years (i.e. 2024)	New draft law on water resources management. covers this issue, but it has not yet been adopted. Unclear which institution will be responsible.
Drinking Water Directive (Directive 98/83/EC of 3 November 1998 on quality of water intended for human consumption as amended by Regulation (EC) No 1882/2003)	Adoption of national legislation and designation of competent authority/ies	Within four years (i.e. 2020)	New draft law on water resources management covers this issue, but it has not yet been adopted.
	Establishment of standards for drinking water	Within four year (i.e. 2020)	New draft law on water management covers these issues, but it has not yet been adopted. Government resolution on water quality for human consumption not yet drafted.
	Establishment of a monitoring system	Within seven years (i.e. 2023)	
	Establishment of a mechanism to provide information to consumers	Within seven years (i.e. 2023)	New draft law on water resources management covers this issue, but it has not yet been adopted. Relevant minister orders not yet drafted.

Directive	Provision	Timeframe (from entry into force in 2016)	Status (2021)
Nitrates Directive (Directive 91/676/EC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources as amended by Regulation (EC) No 1882/2003)	Adoption of national legislation and designation of competent authority/ies	Within four years (i.e. 2020)	New draft law on water resources management covers this issue, but it has not yet been adopted.
	Establishment of monitoring programmes	Within five years (i.e. 2021) for surface water Within eight years (i.e. 2024) for groundwater	New draft law on water management covers these issues, but it has not yet been adopted. Government resolution on the rules for planning and implementation of water resources monitoring not yet drafted.
	Identification of polluted waters or waters at risk and designation of nitrate vulnerable zones	Within five years (i.e. 2021) for surface water Within eight years (i.e. 2024) for groundwater	New draft law on water management covers these issues, but it has not yet been adopted. Related subordinate acts not yet drafted.
	Establishment of action plans and codes of good agricultural practices for nitrate vulnerable zones	Within seven years (i.e. 2023)	
Marine Strategy Framework Directive (Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy)	Adoption of national legislation and designation of competent authority/ies	Within three years (i.e. 2019)	Not covered in the present assessment.
	Development of a marine strategy in co-operation with relevant EU member state(s) (and non-EU member states in alignment with the Black Sea Convention)	Within eight years (i.e. 2024)	
	Initial assessment of marine waters, determination of good environmental status and establishment of environmental targets and indicators	Within five years (i.e. 2021)	
	Establishment of a monitoring programme for ongoing assessment and regular updating of targets	Within seven years (i.e. 2023)	
	Preparation of a programme of measures to achieve good environmental status	Within eight years (i.e. 2024)	

Source: Author's own elaboration based on European Union (2014[1]), "Association agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and Georgia, of the other part", *Official Journal of the European Union,* l. 261/4, 30 August 2014, https://eur-lex.europa.eu/legal-content/en/TXT/PDF/?uri=CELEX:22014A0830(02)

2.1. State of play

2.1.1. Water resources in Georgia

2.1.1.1. Water use and main pressures on water resources

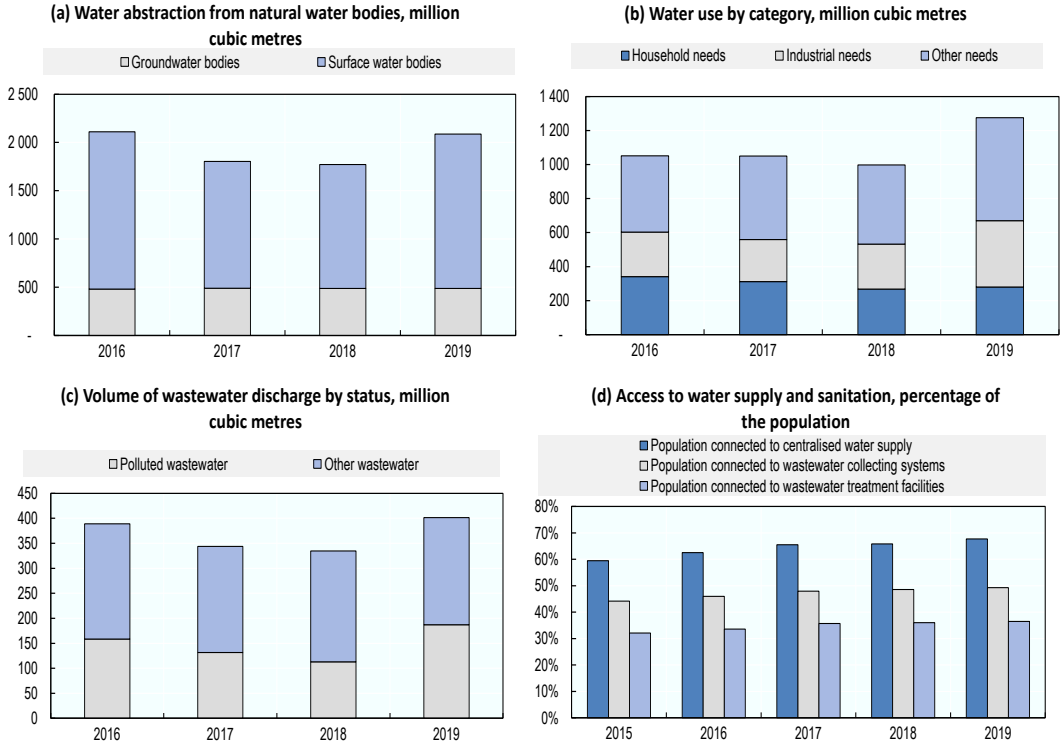
Georgia enjoys plentiful water resources. Its annual renewable freshwater availability per capita is consistently the highest among EaP countries by a wide margin (e.g. 12 418 cubic metres [m^3] in 2017 compared to 6 355 m^3 in Belarus, the next EaP country in the ranking) (European Environment Agency, 2020[2]). As such, at the national level, Georgia does not suffer from water stress. Given the country's stable population and water abstraction rates, Georgia does not face the same water security risks as many of its EaP peers.

Although water is abundant in Georgia, its quality due to anthropogenic factors varies widely. A prominent source of pollution is the discharge of untreated wastewater into surface waters. As shown in Figure 2.1(c), over a third of wastewater discharged into water bodies in Georgia is insufficiently treated. Therefore, water

quality depends highly on the type of wastewater discharged and its level of treatment. Abstraction from surface water bodies for agricultural needs has more than doubled since 2003. Higher concentrations of agriculture-linked pollutants have been recorded near agricultural areas due to leaching (European Environment Agency, 2020[2]).

An additional challenge in Georgia is the population's relatively low level of access to modern water supply and sanitation (WSS) systems (Figure 2.1[d]). The share of Georgians connected to public water supply systems and sanitation has consistently increased. However, as of 2019, a third of the population still lacked access to public water supply and about half did not have access to wastewater collection systems. Improving access to modern WSS services and minimising the discharge of untreated or insufficiently treated wastewater into surface water bodies should be key objectives in Georgia's strategy to safeguard its water resources.

Figure 2.1. Water use in Georgia



Source: *Source:* Author's own elaboration based on GeoStat (2020[3]), *Natural resources of Georgia and Environmental Protection 2019*, National Statistics Office of Georgia, Tbilisi, https://www.geostat.ge/media/35351/Natural_resources_of_Georgia_and_environmental_protection_2019.pdf

Georgia relies on its water resources not only for domestic, agricultural and industrial use, but also for the vast majority of its power generation. Tensions between these competing uses have emerged, which are mentioned in the Irrigation Strategy of Georgia. A summary follows:

- **Irrigation and hydropower plants (HPPs)** – Conflicts with HPPs occur during the irrigation season when large-scale power production occurs and rivers are at low flow. This problem is particularly intense when water used by HPPs is diverted outside the basin and, therefore, unavailable for downstream irrigation.
- **Irrigation and drinking water supply** – Around 60% of Georgian drinking water comes from groundwater. Tbilisi and districts, including Bolnisi, Dmanisi, Marneuli and Tsalka, depend on

surface water for their potable supply; a large portion of the capital's supply is from the Tbilisi Reservoir. Since surface water is also used for irrigation, this creates a conflict between these two uses of surface water.

- **Different irrigation schemes along the same river** – There can be several irrigation canals in a single river and competition between them increases when, in summer and autumn, water demand is high and supply is low.

The irrigation strategy highlights that Georgia is generously endowed with water resources, though availability varies greatly from season to season. In addition to its surface water resources, Georgia has abundant groundwater. Although it is little used at present, groundwater could be tapped for irrigation – particularly in drip irrigation systems.

The analysis of both surface water and groundwater hydrology has been severely handicapped by the virtual collapse of the national hydrologic data collection and analysis systems. Following the abrogation of the Amelioration Law in 2010, Georgia has lacked any legal framework for irrigation. Nevertheless, Georgian Amelioration (GA) plans to implement rehabilitation and modernisation of certain irrigation systems. In these cases, the strategy notes the development of primary, local level farmer-governed water user organisations to manage water delivery to individual farms.

By 2014, the irrigated area in Georgia had dwindled to one-tenth of the 400 000 hectares (ha) irrigated during the Soviet period. However, rehabilitation investment is expected to restore irrigation capacity to 200 000 ha by 2025. It will also increase water demand from around 150 million cubic metres (MCM), to around 900 MCM per year if the capacity is fully used.

The irrigation strategy also outlines some critical issues related to the draft Law on Water Resources Management. It suggests three fundamental challenges affecting the adequate provision of irrigation services:

- ensuring the operation of facilities used to deliver water for irrigation
- maintaining such facilities in working order
- generating sufficient revenues to cover the operation and maintenance cost of those facilities.

These challenges are pertinent not only for irrigation systems but also for the general water infrastructure. Most of this infrastructure is outdated and requires rehabilitation.

Yet another challenge is outlined in the Agriculture and Rural Development Strategy of Georgia 2021-27. It relates to the inefficient use of water and its contamination by agricultural and non-agricultural enterprises. Consequently, in spite of the annual increase in irrigated area, some regional access to cheap water for irrigation is limited and the quality of water is deteriorating.

The National Strategy for Waste Management and the Action Plan addressed the contamination of surface water and groundwater. These identify at least one unofficial landfill in each Georgian region, leading to water contamination. The action plan therefore envisions the development of wastewater treatment plants with donor support.

2.1.1.2. Georgia's water resources and river basins

Georgia has a rich natural endowment of water, but its availability varies greatly from season to season. Furthermore, water resources are unevenly distributed and are mainly accumulated in the western part of the country. There is also no formal system of water resource allocation in the country and amendments to the outdated law on water resources are still pending.

Georgia's water resources are divided into two catchment areas. The western area flows to the Black Sea with a cumulative annual volume of 49.8 cubic kilometres (km^3). Meanwhile, the eastern area empties into the Caspian Sea via Azerbaijan with a cumulative annual volume of 16.5 km^3 (GeoStat, 2020[3]). Georgia

plans to establish six territorial entities, or river basin districts (RBD), on its territory (section 2.1.1.2.1 River basin management plans): Alazani-Iori, Mtkvari (Kura), Khrami-Debeda, Rioni-Enguri, Chorokhi-Kintrishi (Chorokhi-Adjaristskali) and Bzipi-Kodori.

The EU-funded programme EU Water Initiative Plus (EUWI+) has been working on draft river basin management plans (RBMPs) and their implementation for three of the proposed RBDs: Alazani-Iori, Chorokhi-Adjaristkali and Khrami-Debeda.

2.1.1.2.1 River basin management plans

The draft law on water resources management (the draft law), and the subsequent draft resolution on the Approval of the Boundaries of Basin Territorial Entities of River Basin Management, define six RBDs. These are to be established within Georgian territory (all forms of basin management activity are to be carried out in these RBDs). The RBDs include Chorokhi-Kintrishi (Chorokhi-Adjaristskali), Alazani-Iori, Khrami-Debeda, Mtkvari (Kura), Rioni-Enguri and Bzipi-Kodori.

It is challenging to develop thorough and robust RBMPs that comply with the WFD. However, RBMPs are an obligatory component of the AA (2014). Within the Agreement, Georgia committed to developing and adopting WFD-compliant RBMPs for all its RBDs, including involvement of the public in consultations and publication. Plans should be implemented within ten years of signing the Agreement.

The draft law establishes RBDs as natural management units, based on certain geographical and hydrological characteristics. RBDs require RBMPs to develop, implement and address significant management issues for all water resources, including surface, ground, coastal and transitional waters. These plans should be reviewed and adjusted accordingly every six years.

The challenge of establishing RBMPs is illustrated by timing conflicts in the policy environment. Initial planning was scheduled between 2018-21 within the framework of the National Environmental Action Plan (NEAP). However, until the new draft law is adopted, river basin management-related activities cannot commence. The new draft law was expected to be adopted by the end of 2021, delaying the establishment of river basin management organisations and councils until then.

Chorokhi-Adjaristskali RBMP

The Chorokhi-Adjaristskali RBMP – the first designed according to the main principles of the WFD methodology – attempted to accommodate AA requirements. The Chorokhi RBMP aimed to become a management tool to protect, enhance and restore water resources. It was intended for various institutions and key beneficiaries, including the Georgian Ministry of Environment.

The plan addresses significant water management issues, particularly those that pose risks to the ecological status of water bodies. To that end, it sets several environmental objectives and designs a Programme of Measures (PoM), and its content and structure follow the standard outline of the WFD.

Implementation of the plan has been delayed. Implementation of the first RBMP cycle was scheduled between 2016-21. However, since adoption of the draft law has been delayed, the plan is not enforced and is limited to recommendations.

Furthermore, the plan has two other major limitations. First, it lacks a water quality and quantity monitoring system compliant with the WFD. Second, it lacks a water body classification system to define the chemical and ecological status of water bodies in accordance with the WFD.

Within the basin, 34 surface water bodies are deemed “at risk”. This means they are subject to serious human pressure affecting their physio-chemical, hydromorphological and hydro-biological conditions. Moreover, nine of these at-risk surface water bodies were identified as heavily modified water bodies (HMWBs) due to their significant hydromorphological changes. In addition to these at-risk surface water bodies, several bodies are deemed “possibly at risk”, meaning they require more investigation.

Two other RBMPs that closely follow WFD principles and address AA obligations were developed with the technical and financial support of the EUWI+ project. Both the Alazani-Iori and the Khrami-Debeda basin districts are within transboundary spaces with Azerbaijan and Armenia. Indeed, this was the main reason they were selected as pilot locations for RBMPs. However, these RBMPs are not finalised and the following sections present only initial results.

Alazani-Iori RBMP

Drafting an RBMP and implementation mechanisms for the Alazani and Iori river basins in line with WFD principles is difficult: lack of monitoring data prevents full alignment with the WFD. The Alazani-Iori RBD has 471 surface water bodies, of which 6% are considered "at risk", 30% "possibly at risk" and 56% "not at risk".

Regarding groundwater bodies, risk assessments showed that nitrate levels at 32 of 33 groundwater monitoring points did not exceed the maximum permissible concentration for drinking water quality (50 milligrammes per litre). Quantitative characteristics, including the discharge values of artesian aquifers, were also found to be mostly stable. However, many private and illegal wells may negatively impact groundwater bodies. Moreover, monitoring data are insufficient to assess all groundwater bodies and cannot provide the basis of risk evaluations according to the WFD.

Khrami-Debeda RBMP

Of the 347 surface water bodies in the district, roughly 13% are considered "at risk", 49% "possibly at risk" and 26% "not at risk". Risk assessment of groundwater bodies is limited by lack of data, with only two monitoring sites in the basin. Of these two points, both the concentrations of nitrate, as well as heavy metals and pesticides, did not exceed the maximum permissible concentrations for drinking water standards. Their quantitative characteristics were found to be mostly stable. Thus, none of the groundwater bodies are within the "at risk" category. Nevertheless, there are no structured methods for the aggregation of the groundwater monitoring data to offer a reliable assessment of the chemical and quantitative status.

2.1.1.2.2. Water management issues and pressures in Georgia's river basin districts

Water management issues within the three districts are quite similar and require management interventions to align with the WFD (Table 2.2).

Table 2.2. Water management issues in Georgia's river basin districts

Key water management issue	Chorokhi-Adjaristskali RBD	Alazani-Iori RBD	Khrami-Debeda RBD
Point source pollution linked to municipal and industrial wastewater discharge.	Yes.	Yes. There is no wastewater treatment plant (WWTP) in the river basin. However, a modern WWTP is under construction for the city of Telavi and the surrounding villages.	Yes. There are no operational wastewater treatment plants within the basin, although the construction of a modern wastewater treatment plant is planned in Marneuli.
Uncontrolled disposal of solid household waste.	Yes.	No.	No.
Industrial wastewater discharge into rivers.	Yes, from sand and gravel extraction.	Yes, from wine production, food processing, sand and gravel processing, among others.	Yes, from copper and goldmining. Despite recent measures, pollution of the Kazretula, Mashavera and Pholadauri rivers remains acute.
Pollution from municipal landfills.	No.	Yes. Despite upgrades, leakage and landfill gas emissions are still serious problems.	Yes. Drainage leakage into the groundwater and landfill gas emissions are all still common problems.
Pollution from agriculture.	Yes, stemming from soil fertilisation, use of pesticides in pest and weed control, and lax erosion control measures.	Yes. The main concern is the Alazani-Iori RBD presents a potential source of contamination for groundwater bodies. Its impacts are evident in all catchments, especially in areas with poorly drained soil and subsoil.	Yes. Extremely heavy fertiliser use within the region.
Livestock pollution.	No.	No.	Yes.
Water abstraction and flow diversion.	Yes, in relation to river regulation and damming.	Yes.	Yes. Abstraction for agriculture and irrigation, hydropower, public water supply and industry.
Hydromorphological alterations.	Yes. Water abstraction for drinking and household purposes and hydropower generation.	Yes. Work on flood defences, hydropower generation, and the building of reservoirs and irrigation schemes in rivers.	Yes. Causes changes in in flow regimes, the variability of flow, platform or channel pattern changes, and altered riparian habitats.

Environmental objectives were developed for the "at risk" surface water bodies to overcome the challenges in river basin management. A classification system (ecological and chemical) for surface water bodies does not yet exist in Georgia. Therefore, the major criteria for setting environmental objectives were the risk status for any given water body.

The environmental objectives for RBMPs are mainly targeted towards improvement of the ecological and chemical status of surface water bodies, as well as the quantitative and qualitative status of groundwater bodies. Objectives for surface water bodies include elements of their physio-chemical and hydromorphological quality, reducing or eliminating, where possible, the risk factors (significant pressures). Table 2.3 outlines the environmental objectives of the RBMPs.

Eight of nine HMWBs within the Chorokhi-Adjaristskali RBD are located within a section of the Chorokhi River that is regulated by a series of hydropower plants in Turkey. Owing to a lack of transboundary co-operation, Georgia cannot manage these HMWBs. As the Georgian government cannot impose any measures to improve their status, these bodies fall outside the pursuit of Environmental Objectives.

Table 2.3. Environmental objectives of the RBMPs

Environmental objectives	Chorokhi-Adjaristskali RBMP	Alazani-Iori RBMP	Khrami-Debeda RBMP
Improve water quality in terms of organic matter, nitrogen, phosphorus and other pollutants by reducing untreated wastewater discharge from sewerage systems and establishing and maintaining a sewerage treatment facility.	Yes, although a stipulation for the establishment of a sewerage treatment facility is omitted.	Yes.	Yes.
Improve water quality by reducing the concentration of the weighted portion and untreated or insufficiently treated wastewater discharge of the industrial sector.	Yes.	Yes.	Yes.
Improve water quality by reducing organic matter, nitrogen, phosphorus, pesticides and hazardous substances discharged into surface water bodies.	No.	Yes.	Yes.
Improve water quality by reducing the organic matter, nitrogen, phosphorus, pesticides and hazardous substances discharged into surface water bodies and improving manure management.	No.	Yes.	Yes.
Improve water quality by regulating illegal landfills.	No.	Yes.	Yes.
Improve the hydromorphological status of bodies of water (hydrology, continuity, morphology) by ensuring the environmental flow and improving the efficiency of water use.	Yes.	No.	No.
Improve the hydromorphological status of rivers, such as morphology, continuity and hydrology, by reducing flow disturbances and improving the condition of irrigation systems.	No.	Yes.	Yes.
Improve the hydromorphological status of rivers by reducing channel pattern changes, altered riparian habitats, bed and bank fixation, protecting environmental flow (e.g. low flow, variable flow, etc.), and assuring river continuity.	Yes.	Yes.	Yes.
Improve the hydromorphological quality of the section of river (hydrology, continuity, morphology) through maintaining environmental flow and carrying out riverbank and bed erosion control measures.	Yes, for the one heavily modified waterbody entirely under Georgian jurisdiction.	No.	No.
Improve water quality, and remove sulphates, heavy metals and other pollutants, by reducing untreated industrial wastewater discharges.	No.	No.	Yes.
Improve water quality with a reduction in untreated or insufficiently treated municipal wastewater and industrial wastewater discharges, and the elimination of uncontrolled waste disposal in waters and riverbanks.	Yes.	No.	No.
Improve water quality by reducing the nutrient and pesticide discharge in surface water bodies and implementing erosion control measures.	Yes.	No.	No.
Preservation of the current ecological status by the appropriate monitoring of water quality and quantity; law enforcement; application of best agricultural and environmental practices; and implementation of corrective measures in case of new risks.	Yes, for surface water bodies not “at risk”.	No.	No.

2.1.1.2.3. Programme of measures

To achieve the environmental objectives set in the RBMPs, several basic and supplementary measures were proposed. However, due to limited resources and funding, neither RBMP adopted all measures as "priority" in the first implementation RBMP cycles.

Programme of measures for the Alazani-Iori RBMP

The PoM, both basic and supplementary, for the Alazani-Iori RBMP proposes adoption of 28 priority measures (19 basic and 9 supplementary) in the first RBMP implementation cycle. From the selected measures, activities aimed at renovation of the sewerage system and construction of wastewater treatment plants (WWTP) to address the point source pressures from urban wastewater discharge. Diffuse source pollution (crop production and livestock) is addressed by various measures. These include renovating agricultural drainage systems, building buffer strips and hedges and producing vermicompost (bio-humus), among others. It proposes to rehabilitate the malfunctioning irrigation infrastructure to address excessive irrigation water abstraction. Other measures include improving access to information through education campaigns, training, publicity and other methods; identifying pressures caused by sand and gravel extraction; monitoring illegal landfills; sanctioning illegal waste disposal; creating sanitary protection zones; and assessing the possible impact of climate change on water bodies.

Programme of measures for the Khrami-Debeda RBMP

The PoM, both basic and supplementary, for the Khrami-Debeda RBMP proposes adoption of 49 priority measures (41 basic and 8 supplementary) in the first RBMP implementation cycle. Its basic measures are similar to those of the Alazani-Iori RBMP. However, they also include reducing point source pollution from mining.

2.1.1.2.4. Economic analysis of the planned programmes of measures

The PoM was identified and financially evaluated (see section below for the Chorokhi-Adjaristskali RBMP and Table 2.4) to understand the financial requirements of the RBMPs. The evaluation aimed to identify the cost-effectiveness of both basic and supplementary measures in the Alazani-Iori and Khrami-Debeda RBMPs, and as a tool to prioritise aid. Cost-effectiveness analysis involved an ecological effectiveness assessment, pricing the basic measures and prioritisation based on cost-effectiveness. These costs will be incurred over a six-year period, corresponding to the first implementation timeframe of the RBMPs.

Analysis of the Chorokhi-Adjaristskali RBMP programme of measures

The direct capital and annual operational expenses of basic structural measures could only be estimated due to insufficient data. Consequently, the analysis used three classes of measures:[1] low cost (under EUR 50 000), medium cost (between EUR 50 000-500 000) and high cost (over EUR 500 000). Of the 34 assessed measures, roughly 70% were deemed as high cost, 26.5% were medium cost and 3% were low cost. The state, donors and non-governmental organisations will fund implementation of the measures. Private funding will implement measures related to enterprises, such as wastewaters at the Batumi Oil terminal.

Economic analysis of basic and supplementary measures for the Alazani-Iori RBMP

Eight different basic measures and five supplementary measures were identified and financially evaluated for the Alazani-Iori RBMP. The basic measures include rehabilitating the main channel, and the wastewater network and sewerage system; renovating the agricultural drainage system; building a wastewater treatment plant and vermicompost; and creating buffer strips and hedges. Supplementary measures include implementing a water resource monitoring programme; controlling water abstraction volumes through economic instruments; training farmers in efficient water use; developing publicity campaigns; and strengthening the hydrological monitoring system.

Implementing these measures is expected to generate significant benefits for water users, but changes may also lead to increased tariffs. The Alazani-Iori RBMP notes that "due to the clear disconnect between the water tariffs and the costs to manage and run the system, it is impossible at this stage to estimate the impact of the implementation of the programmes on the final costs to consumers and companies."

Based on existing data, 67% of investment costs for the planned basic measures will be funded through the state budget and 33% from international organisations. Water supply companies are expected to absorb operational costs.

The analysis also highlights the importance of accurately defined economic instruments, particularly irrigation tariffs. Given tariffs fail to incorporate annual water supply costs, a review could address inefficient use of water.

Additionally, it suggests that local authorities should manage supplementary measures, including implementation of a water resource monitoring programme. This highlights the role of river basin organisations as supporting mechanisms in the RBMP process.

Economic analysis of basic and supplementary measures for the Khrami-Debeda RBMP

Within the Khrami-Debeda RBMP, nine different basic measures and five different supplementary measures were identified for economic analysis. The basic measures include rehabilitating the main channel and canal; renovating local irrigation systems; building vermicompost; setting buffer strips and hedges; building a chemical wastewater treatment plant and pumping station; and renovating or constructing a sewerage system. Supplementary measures are similar to the Alazani-Iori RBMP.

Based on the economic analysis, international organisations (such as the Asian Development Bank) will fund 94.6% of the investment in planned basic measures. Government will fund the remaining 5.4%. Water supply companies are expected to absorb the operational costs of basic measures.

The Khrami-Debeda has similar challenges as the Alazani-Iori RBMP. These include problems associated with higher water supply tariffs, an inefficient irrigation tariff structure and the responsibility of local authorities in the implementation of supplementary measures.

Table 2.4. Estimated cost structure of RBMPs

RBMP	Rounded PV, basic measures, investment expenses	Rounded PV, basic measures, operation costs[2]	Rounded PV, supplementary measures
Alazani-Iori (eight basic measures and five supplementary measures)	GEL 86.2 million (EUR 26.3 million)	GEL 38.1 million (EUR 11.65 million) (best-case scenario) GEL 56.4 million (EUR 17.2 million) (worst-case scenario)	GEL 759 566 (EUR 231 836)[3]
Khrami-Debeda (nine basic measures and five supplementary measures)	GEL 107.8 million (EUR 32.9 million)	GEL 88.4 million (EUR 27 million) (best-case scenario) GEL 176.8 million (EUR 54 million) (worst-case scenario)	GEL 734 520 (EUR 224 192)[4]

Note: PV = Present value.
Source: Author's own elaboration

In both plans' operational costs, the differences between the best- and worst-case scenarios are significant. Considering that water supply companies fund operational costs (as per the RBMPs), potential funding risks in the worst-case scenarios become more apparent.

2.1.2. Georgia's policy, legal and institutional framework

The water management environment in Georgia can be viewed through legal, regulatory, institutional and policy lenses. Broadly, there are opportunities within these frameworks for improving effective water resource management. There is also room to improve alignment with EU directives and the AA.

The legislative framework makes several administrative bodies responsible for various water-related matters, which fragments management. Similarly, Georgia's regulatory framework is considered relatively complex, and the system is siloed, often without a unified approach. Institutional responsibilities, although formally disseminated at the national and local levels, are centralised due to limitations at the local level. The policy framework would benefit from a comprehensive strategic vision, supported by a results-oriented approach and consistent actions for policy development.

2.1.2.1. Policy framework

Georgia's water resource management approach is driven by its international obligations in the framework of the AA and the Deep and Comprehensive Free Trade Area. There is no unified policy document on water resource management but rather several strategic documents outlining the government's vision. All strategies strive to contribute to universal and equitable access to safe and affordable water, adequate sanitation and hygiene, a reduction in water-borne diseases, and fewer illnesses and fatalities from water pollution and contamination.

The principle policy document is Georgia's Socio-Economic Development Strategy – Georgia 2020 (hereafter "Georgia 2020"), which defines strategic objectives for water supply and wastewater. It aims to provide a 24-hour, high-quality drinking water supply for the population, and to ensure improvement and effective functioning of water supply and sewerage systems. To that end, the government aims to transition

to the EU model of river basin management systems, embracing the importance of water supply, drainage and waste management.

The strategy notes the EU model allows policy makers to manage water resources more consistently because of its common management system for all water resources (rivers, lakes, underground reserves, etc.). The common system also ensures better distribution of resources among water users (for energy, irrigation, recreation and other purposes).

Although Georgia 2020 came into effect in 2014, a new water resource management system has still not been implemented. Thus, there has been a slow transition to an integrated water resource management (IWRM) system based on the sustainable management of water resources and river basin management principles. The government continues to improve water monitoring, evaluation and water usage systems.

Other key water policy documents are the Third National Environmental Action Programme (NEAP) and the National Environmental and Health Plan (NEHAP). In relation to water resources, NEAP (2017-21) aims to ensure the sufficient qualitative and quantitative status of surface, ground and coastal waters for human health and aquatic ecosystems. NEHAP's (2018-22) primary strategic objective is to improve access to safe water and sanitation for every child; reaching this objective is also crucial for attaining the UN Sustainable Development Goal 6.

Other policy documents include the 2018-20 Regional Development Program of Georgia, the 2019-23 Strategy on the Development of High Mountainous Areas, and the 2020-22 Integrated Development Program of Pilot Regions of Georgia. These also identify the goals of improvement of citizens' quality of life via the supply of uninterrupted, potable water. To achieve this, Georgia plans to modernise and develop water and sewerage networks through, for example, construction and rehabilitation of treatment plants throughout the country (excluding autonomous republic territories and Tbilisi city).

Broadly, the strategies define the need for improvements and alignment with EU directives. However, the overall strategic vision is not comprehensive. It lacks a results-oriented approach, and crucially, does not propose consistent actions for policy development.

2.1.2.2. Legal framework

The legal water management and protection framework consists of various legislative acts, including those related to environmental concerns. However, the legislative framework has ambiguities and shortcomings that can complicate water management efficiency. The principal piece of national water legislation is the Law of Georgia on Water (1997) (the Water Law), which regulates the Georgian water resource management system. The Water Law establishes the major objectives and principles of water resource management policy. However, it cannot be considered as a strong foundation to establish an efficient water resource management system. It is under review, although proposed changes have not yet been implemented. Table 2.5 identifies the shortcomings and strengths of the Water Law along with other major pieces of legislation.

Table 2.5. Legal framework for water resources management in Georgia

Legislation	Stipulations	Shortcomings
Law of Georgia on Water (1997)	• Defines the ownership status of water in Georgia: all water resources in Georgia are under state ownership. • Identifies the separation of powers between parties involved in water-related matters. • Defines responsibilities of the state, the autonomous republics, local self-governments, and individuals and legal entities. • Supports the core protection and rational use of surface waters.	• No requirements for the sustainable and effective management of water resources. • No comprehensive or clear regulations for the prevention of water pollution or for ensuring water quality. • No direction regarding the excessive use of water resources, the use of water bodies, nor water protection requirements and restrictions. • Neglects the legal regulation of groundwater and coastal waters.

Law on Licences and Permits	• Regulation relates to licences and permits, of which, two exist:
	  ○ the mineral resources extraction licence (licences for use and extraction of underground fresh water)
	  ○ the water supply licence (for operation).
	• Provides a comprehensive list of available licences and permits.
	• Stipulates procedures for licence distribution, change and repeal.
		• No surface water abstraction and discharge permits or licences exist.
		• Licences are not required when groundwater is on private land and used solely for household purposes.
		• Surface water abstraction is not licensed. Consequently, the provision that sets fees for the use of surface water is, in practice, invalid. As such, there is missed opportunity for significant revenue in the sector.

Law on Subsoil	• Groundwater is treated as a mineral resource. • Regulates groundwater.	
Environmental Assessment Code	• Covers vital strategic documents and public or private activities, that may have significant effects on the environment and human health. • Defines precise activities that an environmental impact assessment should be prepared for. • Distinguishes the competences of the institutions involved in the environmental impact assessment. • Abolished the permit system regulating the usage of water under the environmental impact permit. • Established the need for an environmental decision as a precondition for the issue of a licence or permit (mineral resources extraction licences are an exempt from this). • Licences and permits should not prescribe terms and conditions that conflict with environmental decisions. In the case of discrepancies, the environmental decision prevails.	• Mineral resource extraction licences may be issued without a prior environmental decision (provided that minerals extraction commences only after an environmental decision has been made, and the licence enters into force after receipt of the appropriate environmental decision).

Legislation	Stipulations	Shortcomings
Law on Energy and Water Supply (2019)	• Largely relates to detailed provisions of energy and natural gas. • Aims to ensure the safe, reliable and efficient operation of water supply systems and services for all consumers. • Offers both powers and obligations for water supply licences. • Stipulates responsibilities for any breach of supply licence conditions and conditions within the Law on Licences and Permits.	
Law on Public Health (2007)	• Stipulates the ministry shall determine Environmental Quality Standards (atmospheric air, water, soil and others). • Includes norms for maximum permissible concentration and exposure limits.	
Code of Administrative Offences	• Provides liabilities for breaches of the prescribed obligations of all relevant laws and subordinated legal acts in the water sector. • Determines regulations for violations of water protection, including protected areas. • Sets requirements for the infringement of water usage rules, for the breach of GNERC rules, and for the illegal use of drinking water or sewerage systems.	

Note: GNERC = Georgian National Energy and Water Supply Regulatory Commission.
Source: Author's own elaboration.

The Georgian government has drafted a law to align water resource management with the major principles and approaches in relevant EU directives and to fulfil AA obligations. The draft law covers surface water bodies and underground fresh water and stipulates quantity and quality regulation (the Law on Subsoil still regulates the use of groundwater). Although yet to be adopted, the draft law can be considered robust and well aligned with EU objectives, overcoming the major legislative gaps. Broadly, it will establish a legal framework for water resource regulation and provide better understanding of the distribution of powers among responsible institutions. However, in some instances the law must be supplemented by updated regulation or subordinate legal acts.

The draft law fully complies with the WFD. It establishes an IWRM system, using the principles of river basin management. It designates responsible agencies and fulfils the requirements of relevant WFD provisions. It also provides specifications for preparation of RBMPs, ensures public participation in discussions and sets obligations for their publication. More precisely, the government will determine river basin boundaries via adoption of the relevant resolution.

To overcome legislative shortcomings, the draft law establishes a classification system for water bodies; sets objectives and standards for water quality; provides water pollution prevention measures; establishes a monitoring and enforcement system, including monitoring programmes; classifies river basin districts; and ensures public participation. In another key feature, it establishes a permission system for abstraction from and discharge into surface waters, together with fees for water usage.

The draft law also provides new institutional arrangements for water resource management. It clearly and systematically defines the responsibilities and obligations of governmental agencies and municipalities in water resource regulation processes. For example, it will establish river basin management consultancy councils as advisory bodies to the Ministry of Environmental Protection and Agriculture of Georgia (MEPA). These councils will also examine RBMPs before government approval.

While the draft law is largely compatible with the sector-related directives prescribed in the AA, some elements are missing. The law includes state obligations to adopt specific sector-related legislation to fill the remaining gaps. For example, the draft law incorporates the main principles determined by EU directives on urban wastewater and drinking water that must be reflected in national legislation. However, other governmental resolutions will regulate rules to identify and determine boundaries for water bodies, water resource monitoring systems, surface water quality standards and other issues.

Further, the draft laws lack specific regulations for nitrate pollution. Consequently, several nitrate-related acts will be passed after adoption of the draft law, within the timeframe prescribed. By the end of 2021, for example, MEPA is to identify nitrate-contaminated areas and surface waters at risk of contamination, and areas vulnerable to nitrates. It will conduct the same process for groundwater by the end of 2022. Furthermore, by the end of 2022, MEPA also aims to identify sensitive areas and agglomerations at risk of exposure to urban wastewater. With such considerations, the river basin management system is regarded as the most appropriate mechanism to ensure sustainable development and maintain the appropriate quality of water resources.

Broadly, the draft law complies with the WFD and provides the foundation for robust water management. However, Parliament needs to approve the law, and the subordinate acts and regulations must be adopted to align Georgian water management with that of the European Union.

Gaps in legislation hinder establishment of a modern water resource management system. Georgia lacks a unified water framework that would regulate all forms of water bodies, including groundwater. This means water management is siloed and fragmented. The absence of a framework also leads to gaps in legislation, including the need for rules to improve water quality.

Building a more systematic legal basis for water management could help establish an IWRM system. Legislative gaps in licensing of surface water abstraction and water discharging lead to difficulties in both monitoring and controlling water use. Strengthened legislation in these areas could help protect and manage water resources more effectively.

2.1.2.3. Regulatory framework

The following table considers the major regulatory acts that govern water sector management.

Table 2.6. Key water management regulation in Georgia

Regulation	Stipulations and shortcomings
Resolution No. 17, on the Approval of Environmental Technical Regulations (2014)	• Sets out the obligations for any natural or legal person whose activities are not subject to an environmental impact assessment. • Develops draft technical conditions for water abstraction from surface water bodies, agreed upon by an authorised member of the Ministry of Environment and Ministry of Agriculture (five-year validity). • Stipulates conditions for the cancellation of technical conditions. • Prohibits discharging wastewater into surface water bodies that is not, or is insufficiently, purified and which may cause infectious diseases. • Applies to activities that do not require an environmental decision. • Conditions prescribed for certain compounds do not apply to protected zones (designated areas for water abstraction for human consumption, protected ecosystems and recreational zones). • Contaminants without permissible concentrations, or for which there are no research methods, may not be discharged into surface water bodies. **Shortcomings of the law include:** • Draft technical conditions for water abstraction from surface water bodies are not licences (though they can still be considered as a permit from an authorised institution). • When non-compliance with technical conditions arise, the regulation does not stipulate penalties.
Resolution No. 425, on technical regulation on the protection of surface waters from pollution (2013)	• Specifies general objectives and principles for surface water protection, including protection of the environment and water ecosystems, normalisation of water quality, regulation of the discharge of contaminants into surface waters, and planning of water protection measures, responsibilities and monitoring. • Regulates issues regarding types of entrepreneurial activity that can adversely impact surface waters and affect diffusion and point source pollution of surface water bodies (for example, in the energy and industry sectors). • Defines the conditions for water use, the composition and characteristics of water for ensuring public health, the ecological status of water bodies, based on the use of the water resource. • Provides a list of wastewaters and substances prohibited for discharge into surface waters. • Defines obligations of water users for controlling wastewater discharge volumes, and its compounds and characteristics, including into wastewater discharge sites.
Resolution No. 414, on technical regulations on the calculation of thresholds for permissible values of pollutants discharged into surface water and wastewaters (2013)	• Relates to the calculation of the threshold for permissible pollutants in surface and wastewaters. • Provides methods to determine the maximum allowable discharge of pollutants into surface water bodies, considering each surface water category, to meet established water protection requirements.
Resolution No. 431, on technical regulation on the conditions for discharge and intake of wastewater into the sewerage system and the thresholds of pollutants (2018)	• Defines the relationships between the systems operators and systems users, and the procedures for discharge and intake of wastewater into the sewerage system and its control mechanisms. • Defines the permissible concentrations of pollutants to be discharged into the sewerage system. • Regulates the effective and proper functioning of the sewerage system and interrelated water treatment plants. • Prohibits water users from discharging substances into the sewerage system that may decrease the efficiency of water treatment plants or cause chemical or manual impact damage that reduces systems operation. • Stipulates the substances prohibited in the sewerage system. • Defines supervision and control of the sewerage system (system operator). • Outlines that for violations of the regulation, fines are imposed on the water user and in some instances, compensation may also be granted to the system operator.

Regulation	Stipulations and shortcomings
Resolution No. 58, on technical regulation of drinking water (2014)	• Applies to natural or treated water used in food production, and in consumption, food preparation and for other household purposes, regardless of origin and method of delivery. • Outlines sanitary requirements and internal control and monitoring system for drinking water. • Stipulates that the responsible state agency provides drinking water quality control at the state level. • States that any organisation providing drinking water is obliged to control and monitor compliance with the established indicators by recording received data and ensuring access to information. • Stipulates that in instances of non-compliance with the established parameters, the drinking water supplier is obliged to take measures to ensure public health by informing the relevant bodies, immediately investigating causes of pollution, and limiting water consumption and other activities.
Resolution No. 32, on the rules for drinking water supply and usage (2008).	• Establishes the obligation for water suppliers to provide consumers with safe, continuous and reliable drinking water. • Stipulates the terms and conditions of service, and the obligations and powers of water suppliers and consumers.

Developing regulation would strengthen water resource management. Issues with regulation include the lack of a common vision and approach by both the state and regulatory bodies, a lack of tariffs for surface water abstraction, and weak and underdeveloped water monitoring and control systems for planning and implementing water management activities. Regarding monitoring, the regulatory framework must provide specific criteria to evaluate water quality and quantity. Controlling, monitoring and creating integrated databases would further support robust water management.

2.1.2.4. Institutional framework

Institutional responsibilities for water resource management are split between the national and local levels. However, due to limitations at local levels, the system is largely centralised. Co-operation between agencies is difficult and their functions are not oriented towards solving the system's obstacles. Further, decentralisation of powers between central and local governments is often unfeasible due to resource limitations and issues with timely co-ordination and co-operation among agencies.

The functions of each institution are prescribed in relevant laws and subordinate legal acts, but the regulatory system still lacks a unified governing strategy to co-ordinate their work efficiently. Regulation is limited at the local level due to the weak institutional, professional and financial capacities of municipalities. These weaknesses mean they often cannot exercise their prescribed responsibilities. Some municipalities build appropriate water supply infrastructure. However, due to limited resources, they generally transfer operation and maintenance to the United Water Supply Company of Georgia (UWSCG). This further centralises operations.

Table 2.7. Major water management institutions within Georgia

Institution	Broad roles and responsibilities
Ministry of Environmental Protection and Agriculture of Georgia (MEPA)	• Aligns with EU Water Framework Directive in relation to ensuring state policy based on the principles of sustainable development and water resources basin management. • Develops and implements state water resource management policy.[5] • Determines water resource protection mechanisms. • Ensures state policy based on the principles of sustainable development and water resources basin management (through the Law of Georgia on Public Health). • Authorises plans and measures that limit, suspend or prohibit water usage in special circumstances. • Governs the state jurisdictional institution (the Department of Environmental Supervision) and ensures state control of water protection. • Governs the National Environmental Agency (LEPL), which establishes the system for monitoring the quality and quantity of surface waters and groundwaters and ensures such implementation. • Governs the National Food Agency, responsible for state control and monitoring the quality of drinking water.
Ministry of Internally Displaced Persons from the Occupied Territories, Labour, Health and Social Affairs of Georgia	• Determines Environmental Quality Standards (including water), which include the norms for permissible pollutant concentrations and exposure limits.
Ministry of Economy and Sustainable Development of Georgia (MoESD)	• Elaborates and implements state policy in the sustainable management of mineral resources. • Provides state supervision over the use of mineral resources. • Governs functioning of the National Agency of Mines, which regulates groundwater use, issues licences for extraction of groundwater and controls fulfilment of extraction under conditions of licence.
National Food Agency	• Monitors drinking water quality.
Georgian National Energy and Water Supply Regulatory Commission (GNERC)	• Establishes terms and conditions for water supply licensing, according to the Law on Licensing and Permits. • Issues water supply licences, including mineral resource extraction licences for groundwater extraction to provide drinking water. • Determines the tariff methodology for various water-related services. • Establishes norms for drinking water consumption.

Institution	Broad roles and responsibilities
Ministry of Regional Development and Infrastructure (MRDI)	• Implements and co-ordinates development of the water supply system. • Seeks to improve infrastructure, including in water supply and sanitation. • Promotes regional development.
United Water Supply Company of Georgia (UWSCG, a 100% state-owned limited liability company)	• Provides water supply and wastewater services to urban settlements (except in Tbilisi, Mtskheta, Rustavi, the Gardabani municipalities and the Autonomous Republic of Adjara).
Georgian Water and Power Ltd.	• Provides water supply and wastewater services to Tbilisi, Mtskheta, Rustavi and the Gardabani municipalities.[6]
Municipalities	Under the Local Self-Government Code, the exclusive powers of municipalities are to ensure a water supply (including a technical water supply) and a sewerage system, and to develop local irrigation systems. These powers can be exercised through appropriate licences, under private law, in settlements where a licensed provider does not deliver services. • liable for management of natural resources of local importance, including water • authorised to determine procedures for water management.

Institutional issues that hinder robust water management include the following:

- Lack of co-ordination between institutions: the institutional framework lacks a mechanism for co-ordinating roles and responsibilities, including their interactions with other stakeholders.
- Limited ability to decentralise powers between central and local governments: local governments are hindered by resource limitations and issues with timely co-ordination and co-operation among agencies.
- Weaknesses in municipalities' capabilities due to resource and financing limitations.
- Lack of public awareness on the rational and sustainable use of water resources.
- Lack of information, skills and knowledge on modern water resource management.
- Lack of public participation in the development of strong institutions and sustainable use of water resources.

Overcoming these institutional limitations could improve the functioning of the water sector and increase efficiencies in water management.

2.2. Next steps: Scenarios for reform

2.2.1. Scenarios

The two reform scenarios are similar to NEAP and the AA Roadmap for most key activities but differ in their projected timeframes. The full-reform scenario assumes all tasks planned for 2021 will be completed by 2022. It relies on strategic documents and expert assessment for the remaining activities. The alternative full-reform scenario adjusts the activity timeframe by considering the various challenges in reform implementation. A third option, the alternative full-reform sub-scenario, further considers not implementing some construction due to unsecured funding (discussed in the funding section).

The scenarios assume complementary acts or legislation exist to support the main pieces of legislation (for example, the draft Law on Water Resources Management). Table 2.6summarises the timeline for activities within the full-reform and alternative full-reform scenarios, as well as the initial timeframes set by NEAP and the AA Roadmap. Meanwhile, Table 2.7 summarises each of the scenarios, their outcomes, and the associated risks and challenges.

2.2.1.1. Full-reform scenario

In the full-reform scenario, the draft Law on Water Resources Management would be adopted by the end of 2021. However, it would still require complementary normative acts or other pieces of legislation to address all obligations within EU mandates. This scenario aims to improve water resources management and ensure sustainable water use, reduce water resource pollution, and improve water quality and quantity monitoring. Required actions do not fall within the NEAP timeframe. Thus, it is unlikely that the full-reform scenario will be met.

2.2.1.2. Alternative full-reform scenario

The alternative full-reform scenario also assumes adoption of the draft law by the end of 2021 and considers the same key activities as the full-reform scenario. The alternative scenario differs by recasting governmental strategic ambition and setting more realistic timeframes (see Table 2.8). The alternative sub-scenario also considers the probability that some infrastructural projects will not occur and adjusts costs accordingly.

Differences in the reform scenarios stem from concerns regarding the delayed adoption of the draft law and consequent activities, setbacks in wastewater treatment plant construction due to local resistance, COVID-19 restrictions and prolonged tender procedures. However, consistent effort over the next ten years should allow enough time to regulate the legal framework and implement the planned actions. This implies the alternative full-reform scenario is more realistic.

Further, efforts will require significant human and financial resources from the state. The private sector will need to prepare for changes as the economy improves. This, in turn, will influence the success of water resource management policies. All of this is more realistic over a gradual timeframe.

Table 2.8. Activities and initial and recast timelines for the full-reform and alternative full-reform scenarios

Key activities related to scenario development	Initially planned	Full-reform timeframe	Alternative full-reform timeframe
Establishment of three river basin management organisations and councils	2018-21	2022	2023
Establishment of the remaining two river basin management organisations and councils	2018-21	2022	2025
Introduction of new economic instruments for water management (changes in the permit system for the abstraction of surface water and water discharge)		2024-26	2024-26
Creation of a water balance and water user register (preferably using GIS)		2024	2024
Identification of sensitive areas for urban wastewater discharge	2021	2022	2022
Monitoring nitrate concentration in 100% of selected surface water and groundwater bodies	In surface water bodies by 2021; in groundwater bodies by 2024	2022 and 2024, respectively	2024 and 2030-35, respectively
Identification of polluted waters or waters at risk from agricultural sources and designation of nitrate vulnerable zones	2019-20	2022	2024

Key activities related to scenario development	Initially planned	Full-reform timeframe	Alternative full-reform timeframe
Establish monitoring programmes, action plans and codes of good agricultural practice for nitrate vulnerable zones	2020-21	2022	2024
Changes in monitoring practices and procedures for surface water quality	2019-20	2022	2030
Rehabilitation or construction of urban wastewater collection and treatment systems in at least ten major settlements	2021	2022	2025

Source: Author's own elaboration

Table 2.9. Comparative analysis of the proposed scenarios

Scenario alternatives	Scenario development	Scenario outcomes	Risks and challenges
Baseline scenario	• The Law on Water Resource Management is not adopted. • The prevailing water management system does not change. • The available water sector economic instruments do not change; water use/abstraction tariffs are set according to the existing methodology; and governmental water sector subsidies continue. • Trends in infrastructural development do not change. • The water quality monitoring system does not improve.	• The inefficient water management system persists. • Water consumption patterns and irrational water use remain unchanged. • Water quality will not improve.	• Failure to meet strategic targets and international commitments. • Public health failures from low quality drinking water and an insufficient water supply in rural areas.
Full-reform scenario	• Introduction of a basin management system. • Introduction of new economic instruments for water management (changes in the permit system for the abstraction of surface water and water discharge). • Creation of a water balance and water user register (preferably in GIS). • Rehabilitation and construction of urban wastewater collection and treatment systems. • Identification of sensitive areas for urban wastewater discharges. • Identification of polluted waters or waters at risk and the designation of nitrate vulnerable zones; establishment of monitoring	• Improving water resource management and ensuring the sustainable use of water. • Reducing water pollution. • Improving the monitoring of water quality and quantity.	• Delaying adoption of the new Draft Law on Water Management. Consequently, achieving the full-reform scenario within the governmental action plan timeframe seems unrealistic. • Lack of financial support. • Availability of donor funding for developing the remaining RBMPs. • Since the COVID-19 epidemic has affected economic circumstances, governmental priorities may change. This may also concern water sector policy, resulting in delayed actions. COVID-19 restrictions also impinge on construction material imports for wastewater treatment plants and thus

Scenario alternatives	Scenario development	Scenario outcomes	Risks and challenges
	programmes, action plans and codes of good agricultural practice for such nitrate vulnerable zones. • Adaptation of monitoring practices and procedures for water quality and quantity (including drinking water).		delay the construction process. • The business sector might be unprepared for changes in water management, especially when the timeframes for implementing key activities are constrained. Thus, the successful implementation of water resource management policies could be at risk. With more realistic timeframes, it would become easier to adapt to new policies. Moreover, there is a risk of delaying WWTP construction due to local resistance, construction tender procedures and delay of certain key activities (section 6.2). This makes the full-reform scenario even less realistic.
Alternative full-reform scenario	• Recasts governmental strategic ambition by setting more realistic timeframes for complying with EU directives.	• Achieving the same targets as the full-reform scenario, though within a more reasonable timeframe.	• Availability of donor funding for developing the remaining RBMPs. • Due to lack of political will, even extended time periods may not be sufficient. • The COVID-19 pandemic has affected the economy, heightening risks to water sector policy due to changed governmental priorities and resulting in delayed planned action.

Note: RBMP = river basin management plan.
Source: Author's own elaboration

2.2.2. Financing each scenario

The following section offers an overview of the major costs[7] associated with the scenarios and presents the respective additional costs.[8] The baseline scenario costs are not calculated considering there are no changes to the policy framework and the financial requirements remain the same; in 2018, the public budget expenditure was GEL185.3 million.

Differences in the reform scenarios by recasting certain activities into the future do not yield huge differences in the financial needs of the scenarios. Table 2.6 summarises the total discounted additional costs for each scenario. The timeframe for other financial requirements, including expenses for additional personnel, equipment and maintenance, continues until 2030. Further analysis is presented in Table 2.10, which compares the economic, social and environmental impacts, and financial requirements, within the different scenarios to the baseline.

Table 2.10. Impact analysis for each scenario

Impact	Baseline scenario	Full-reform scenario	Alternative full-reform scenario
Economic	**Negative impacts:** • Revenues generated with the existing economic instruments are insufficient for improving the quality of water management.	**Positive impacts:** • More efficient allocation of scarce water resources among water users. • Increased economic productivity. • Revenue generated from additional economic instruments is expected to further improve water management. **Negative impacts:** • Introducing additional economic instruments, (e.g. tariffs and permit fees), would increase production costs for economic activities related to water use. • Financially burdensome for the government.	**Positive impacts:** • Similar to those of the full-reform scenario, with a higher likelihood of success due to the extended timeframe. **Negative impacts:** • Similar to those of the full-reform scenario, though less severe due to the extended timeframe. • Reduced immediate government financial burden.
Social	**Negative impacts:** • Neither water supply nor sanitation improves for rural populations. • The various water-borne health conditions will increase, and thus productivity will decline over time. • Increased health care costs.	**Positive impacts:** • Improved water supply and better sanitation for the rural population. • Health benefits with an associated productivity increase, alongside reduced health care costs. **Negative impacts:** • Improved water supply and sanitation services would increase their cost, which would be burdensome for low-income households.	Similar to the full-reform scenario. However, postponing activities means delaying benefits, e.g. from improved drinking water quality.
Environmental	**Negative impacts:** • Inefficient water consumption patterns remain. • Water pollution increases and water quality deteriorates – reduces available quantity for consumption. • Biodiversity loss.	**Positive impacts:** • Improved quality of underground and surface water bodies and drinking water. • Reduced water pollution. • Greater biodiversity. • Further resilience to climate change. • More rational use of water resources due to improved economic instruments.	Impacts are similar to the full-reform scenario, however, here as well, postponing activities could delay gaining positive effects on environment. Alternative full-reform sub-scenario may further constrain fully capturing benefits due to fewer WWTP projects implemented.

Impact	Baseline scenario	Full-reform scenario	Alternative full-reform scenario
Financial needs	Government water resource management expenditure remains the same.	• Total anual cost: GEL 793.4 mil (EUR 198.9 mil). • Some risks regarding government funding and changing priorities that mean water management becomes less urgent. • Small risk regarding donor funding and changing donor priorities.	• Total anual cost: GEL 785.5 mil (EUR 196.9 mil); for sub-scenario: GEL 697.2 mil (EUR 174.7 mil). • Similar to the full-reform scenario. However, PV of total costs is less as costs are distributed over a longer period. In the alternative sub-scenario, further infrastructure projects without funding are omitted.

Note: PV = Present value.
Source: Author's own elaboration

The greatest share of costs in both scenarios (98.8%) is associated with wastewater treatment plant and water supply and sanitation (WSS) projects. This means that costs may be a limiting factor to progress if funding requirements are unmet or difficult to obtain. Funding risks, arising from the large amount of funding sourced from donors, may also limit progress. In the alternative full-reform scenario, 82.2% of projects are donor-funded with the rest government-funded. However, donor funding risks are low because 91.8% of total funded projects are already in donor pipelines and 8.2% are ongoing. Of government-funded projects (GEL 138.5 mil), 34.2% are allocated to ongoing projects and 65.8% to planned projects. This represents a moderate risk for scenario progress; unforeseen circumstances may alter government funding priorities and make water management less urgent.

The present value for the "other" financial requirements represents only 1.2% of total financial requirements in the alternative full-reform scenario. From these total costs, 9.9% will be funded by donors and 90.1% by the government. The alternative full-reform sub-scenario costs considerably less (GEL 697.2 mil) as it excludes the part of infrastructure projects for which donor funding is not yet secured. This reduces the risk of slow progress, although it means reforms are less thorough. In this scenario, the cost of government-funded projects (ongoing and planned) remains the same. This means that funding risks are the same as in the other scenarios.

2.2.2.1. Financing the full-reform scenario

The full-reform scenario activities (see Table 2.11) consider various cost categories. These include the development of the remaining RBMPs; development of follow-up plans for each river basin; and additional staffing requirements, equipment and maintenance for MEPA and river basin organisations. "Other" financial requirements considered include the wastewater treatment plans and WSS capital costs (to be incurred by UWSCG).

The cost of developing the two remaining RBMPs (Mtkvari [Kura] and Rioni-Enguri) is included in the total scenario cost. However, it also includes financial support from donors. Follow-up plans (six years after adoption) for each river basin should be developed by 2027 for the Chorokhi, Alazani-Iori and Khrami-Debeda river basins, and by 2030 for the Mtkvari (Kura) and Rioni-Enguri river basins. Financial support from donors is also considered here, although uncertainty remains.

Calculation of the present value of total costs assumes adoption of the draft law by the end of 2021 and that all associated activities will be implemented from 2022 – within the timeline of the government's strategic plans and the EU Roadmap. For WWTP and WSS projects, timeframes are based on information provided by UWSCG.

2.2.2.2. Financing the alternative full-reform scenario and the alternative sub-scenario

The cost categories of the alternative full-reform scenario are the same as the full-reform scenario. However, the longer timeframes in the alternative scenario mean costs are distributed over a more pragmatic schedule. Additional personnel, equipment and maintenance costs of Mtkvari (Kura) and Enguri - Rioni river basin management organisations (RBMOs) are incurred from 2025, in lieu of 2022, and of the remaining RBMOs from 2023, instead of 2022. The UWSCG rehabilitation and construction costs for wastewater treatment plants are allocated over a more realistic timeframe – from 2020 to 2025. Additionally, the alternative sub-scenario considers the probability that some of the WWTP projects might not be implemented due to funding uncertainties from donor institutions.[9] For such projects, an implementation probability of 0.5 is assumed.

Table 2.11. Present value (PV) of additional financial requirements for each scenario, million GEL (million EUR in parenthesis)*

Scenario alternatives	Full-reform scenario		Alternative full-reform scenario			
			Scenario		Sub-scenario	
PV of additional financial requirements	**793.4 (198.9)**		**785.5 (196.9)**		**697.2 (174.7)**	
PV of WWTP and WSS projects	784.0 (196.5)		776.4 (194.6)		688.1 (172.5)	
Donor-funded	*644.1 (161.4)*		*637.9 (159.9)*		*549.6 (137.7)*	
	Ongoing	*Planned*	*Ongoing*	*Planned*	*Ongoing*	*Planned*
	57.4 (14.4)	*586.7 (147.0)*	*52.6 (13.2)*	*585.3 (146.2)*	*52.6 (13.2)*	*497.0 (124.6)*
Government budget	*139.9 (35.1)*		*138.5 (34.7)*		*138.5 (34.7)*	
	Ongoing	*Planned*	*Ongoing*	*Planned*	*Ongoing*	*Planned*
	48.7 (12.2)	*91.3 (22.9)*	*47.3 (11.9)*	*91.2 (22.9)*	*47.3 (11.9)*	*91.2 (22.9)*
PV of "other" financial requirements	9.4 (2.4)		9.1 (2.3)		9.1 (2.3)	
Donor-funded (RBMPs)	*0.9 (0.2)*		*0.9 (0.2)*		*0.9 (0.2)*	
Government budget (additional personnel, additional equipment and maintenance costs)	*8.5 (2.1)*		*8.2 (2.1)*		*8.2 (2.1)*	

Note: The corresponding annual GEL/ EUR exchange rate as of 24 December 2020 is 3.99. The total costs are discounted for 2020.
Source: Author's calculations.

2.2.3. Progress monitoring indicators

Progress monitoring indicators aim to track improvements in water resource management and the sustainable use of water, reductions in water resource pollution, and improvements in water quality and quantity monitoring. Some indicators are easy to track, such as determining whether the law on water resources management is adopted. However, others will require more work to measure progress, such as the value of environmental services and how this informs penalties for environmental damage. In this sense, tracking indicators to determine progress against directives is another element that project implementation should consider. Table 2.12 presents the required activities with the relevant progress monitoring indicators.

Table 2.12. Progress monitoring indicators

Activities	Indicators*	Implementing agency (and partner organisations) **	Timeframes*** 1) Initial 2) Revised
Objective 1: Improving water resource management and ensuring the sustainable use of water			
Finalisation and promotion of the Law on Water Resources Management (taken from the Water Framework Directive [WFD])	The law is adopted.	MEPA	1) 2017-18 2) By the end of 2021
Establishment of river basin management organisations (RBMOs) under the Ministry of Environmental Protection and Agriculture (taken from the WFD)	At least five RBMOs are established.	MEPA	1) 2018-21 2) Three RBMOs to be created by 2023 and the remaining two by 2025.
Establishment of river basin councils (taken from the WFD)	A governmental decree on the rules, composition and functioning of river basin councils is adopted. At least five river basin councils are established.	MEPA (with municipalities and NGOs as partner organisations)	1) 2018-21 2) Three river basin councils to be created by 2023 and the remaining two by 2025.
Adoption of the existing river basin management plans (RBMPs), taken from the WFD	Three (Alazani-Iori, Khrami-Debeda, and Chorokhi-Adjaristskali) RBMPs are adopted.	MEPA (with ministries, municipalities and NGOs as partner organisations)	1) N/A 2) 2022
Development of the remaining RBMPs (taken from the WFD)	The remaining two (Mtkvari (Kura) and Rioni-Enguri) river basin plans are developed.	MEPA (with ministries, municipalities and NGOs as partner organisations)	1) 2024 2) 2024
Improvement of household water use measures (taken from the WFD)	Percentage increase of total households with water meters.	MEPA, GNERC, municipalities, local water suppliers	To be determined by regional development plans
Better water abstraction monitoring for surface water bodies (taken from the WFD)	Percentage increase in the number of registered water users.	MEPA, GNERC, local government	1) N/A 2) 2022
Properly calculated environmental charges/fees, which ensures cost recovery and compliance with new environmental standards (taken from the WFD)	All charges/fees for water use and water abstraction are calculated according to a consistent methodology.	MEPA, GNERC, MoESD	1) N/A 2) 2024-26
Creation of a water balance (taken from the WFD)	A water balance is created.	MEPA	1) N/A 2) 2024
Development of a water allocation plan and the establishment of a water allocation system for integrated water management (taken from the WFD)	A water allocation plan is developed. The water allocation system is established and functioning according to the plan.	MEPA, NEA, Ministry of Energy, GA, MRDI	1) N/A 2) 2022-23
Development of uniform database for water users (taken from the WFD)	A water user register is created. The register is developed using GIS.	MEPA	1) N/A 2) 2024

Activities	Indicators*	Implementing agency (and partner organisations) **	Timeframes*** 1) Initial 2) Revised
Objective 2: Reducing water resource pollution			
Better monitoring of wastewater discharge in surface water bodies (taken from the Urban Waste Water Directive)	Existing number of registered pollutants has increased.	MEPA; GNERC, local government, MRDI	1) N/A 2) 2022
Rehabilitation and construction of urban sewage collection and treatment systems (taken from the Urban Waste Water Directive)	Urban WWTPs in at least ten major settlements are constructed or rehabilitated.	MRDI UWSCG	1) 2021 (at least ten urban WWTPs) 2) At least ten urban WWTPs exist in major settlements by 2025
Identification of areas sensitive to urban wastewater discharge (taken from the Urban Waste Water Directive)	The ministerial decree on the identification of sensitive areas of urban wastewater discharge is adopted.	MEPA (with MRDI as a partner organisation)	1) 2021 2) 2022
Monitoring nitrate concentration in surface water and groundwater bodies (taken from the Nitrates Directive)	100% of selected surface water and groundwater bodies are monitored for nitrate concentration.	MEPA, NEA	1) 2021 (surface water bodies), 2024 (groundwater bodies) 2) 2024 (surface water bodies), 2030-35 (groundwater bodies)
Identification of nitrates polluted surface waters or waters at risk caused by agricultural sources, and the designation of nitrate vulnerable areas (taken from the Nitrates Directive)	The number of nitrate polluted water or waters at risk mapped has increased. The number of identified nitrate vulnerable zones has increased.	MEPA	1) 2019-20 2) 2024
Establishment of action plans and regulations for good agricultural practice for nitrate vulnerable zones (taken from the Nitrates Directive)	Action plans are prepared for nitrate vulnerable zones.	MEPA	1) 2020-21 2) 2024
Objective 3: Improving the monitoring of water quantity and quality			
Penalties for environmental legislation offences, relative to the damage caused, to develop better user and pollutant conduct (taken from the WFD)	The percentage of penalties enforced for environmental damages has increased.	MEPA, DES	1) N/A 2) 2030
Improvement of monitoring for groundwater quality and quantity (taken from the WFD)	The percentage of groundwater bodies equipped with fully functioning monitoring systems has increased.	MEPA, NEA	1) 2017-20[10] 2) 2030
Development of a surface water quality monitoring programme (taken from the WFD)	A surface water quality monitoring programme is adopted.	MEPA NEA	1) 2019-20 2) 2030
Constant improvement in water quality status (taken from the WFD)	In each river basin, the percentage of surface water and groundwater bodies upgraded to a good quality status has increased.	MEPA, NEA, MRDI, GA, Ministry of Energy	1) N/A 2) 2036[11]
Revision of standards for drinking water (taken from the Drinking Water Directive)	The standards for drinking water are reviewed.	MEPA, NFA, Ministry of Health	1) 2021 2) 2021

Activities	Indicators*	Implementing agency (and partner organisations) **	Timeframes*** 1) Initial 2) Revised
Strengthening the urban drinking water monitoring system and the establishment of a rural drinking water monitoring system (taken from the Drinking Water Directive)	A drinking water monitoring system is established for both the urban and rural drinking water supply. Drinking water monitoring systems for both urban and rural drinking water supplies are functioning.	MEPA, NFA	1) 2023 2) 2023
Establishment of mechanisms to provide information to consumers (taken from the Drinking Water Directive)	A system for providing information to consumers is established. The established system for providing information to consumers is functioning.	MEPA, NFA	1) 2023 2) 2023

Note: *Some indicators are derived from both NEAP and the Roadmap for EU approximation in environmental and climate action (the AA Roadmap); they required revising or updating due to the conditions of the water management sector. **The implementing agencies and partner organisations are identified in NEAP or suggested by the authors and field experts. ***The initial timeframes are based on NEAP or the AA Roadmap. However, since the new draft law has not yet been adopted and all consequent activities were unable to start on time, most of the timeframes are revisions based on expert suggestions. DES = Department of Environmental Supervision (of the Ministry of Environmental Protection and Agriculture); GA = Georgian Amelioration; GNERC = Georgian National Energy and Water Supply Regulatory Commission; MEPA = Ministry of Environmental Protection and Agriculture of Georgia; MRDI = Ministry of Regional Development and Infrastructure; MoESD = Ministry of Economy and Sustainable Development; NFA = National Food Agency; NGOs = non-governmental organisations; RBMO = river basin management organisation; RBMP = river basin management plan; UWSCG = United Water Supply Company of Georgia; WWTP = wastewater treatment plant.
Source: Author's own elaboration

References

Balmer, P. and B. Mattsson (1994), "Wastewater Treatment Plan Operation Costs", *Pergamon*, pp. 7-15. [4]

European Environment Agency (2020), *Water availability, surface water quality and water use in Eastern Partnership countries: An indicator-based assessment*, https://www.eea.europa.eu/publications/regional-water-report. [2]

European Union (2014), "Association agreement between the European Union and the European Atomic Energy Community and their Member S tates, of the one part, and Georgia, of the other part", *Official Journal of the European Union* I. 261/4, https://eur-lex.europa.eu/legal-content/en/TXT/PDF/?uri=CELEX:22014A0830(02). [1]

GeoStat (2020), *Natural resources of Georgia and Environmental Protection 2019*, https://www.geostat.ge/media/35351/Natural_resources_of_Georgia_and_environmental_protection_2019.pdf. [3]

Notes

[1] Because the RBMP does not estimate the cost of some measures, the total cost of measures cannot be calculated.

[2] Operational costs of the basic measures are estimated based on assumptions in the literature. For example, to calculate the operational costs of WWTPs, the analysis considered the following costs: wages (30-50% of total operation costs), maintenance (0.5-2% of investment costs), utility costs (10-30% of total operation costs), disposal (15-50% of total operation costs) (Balmer and Mattsson, 1994[4]), and depreciation cost (5% for the WWTP and 8% of the investment cost for other investments). For other basic measures, only salaries (10-15% of total operation costs) and depreciation costs (8% of the investment) were estimated. Based on these estimates, the analysis calculated the lowest (the best-case scenario) and the highest (the worst-case scenario) possible operational costs.

[3] The Alazani-Iori River Basin Management Plan.

[4] The Alazani-Iori River Basin Management Plan.

[5] Resolution №112, 6 March 2018.

[6] Additional local service providers exist in the Autonomous Republic of Adjara.

[7] A real interest rate of 7.2% is assumed in the calculation of the present value (PV) of total additional costs.

[8] The nominal interest rate on eight- and ten-year government bonds (April 2020), corrected by the targeted inflation rate of 3%.

[9] Based on consultation with UWSCG, donor funding for some projects is not yet secured and the process of negotiations is ongoing.

[10] The action plan sets the timeframe for the purchase and installation of equipment on selected wells.

[11] The relevant agency should define interim indicators and timeframes.

3 An outlook of Moldova's water policy journey to 2030

This chapter considers Moldova's ambitions and outlook for its water sector including water-related obligations under the Association Agreement with the European Union and targets under multilateral environmental agreements including the Sustainable Development Goals. Obligations under the EU Water Framework Directive and associated directives are discussed, including time-bound commitments concerning the identification of river basin districts and preparation of river basin plans. The chapter considers Moldova's current state of play with regard to water resources and pressures facing the sector. Finally, the chapter considers the existing policy and legislative framework and considers scenarios for possible future reforms.

Moldova's relationship with the European Union provides a framework for water policy reform

The Republic of Moldova (hereafter "Moldova") and the European Union (EU) enjoy a close relationship, notably in the framework of the EU Eastern Partnership (EaP), which began in 2009. In June 2014, ties strengthened further with the signing of the EU-Moldova Association Agreement (AA), which entered into force in July 2016. Through the AA, Moldova committed to approximate its national legislation towards EU directives. It also committed to implement EU good practice, including in the fields of environment and water management. EU policies on environment, natural resources management and climate change entail nearly one-third of Moldova's commitments in the AA, requiring the approximation of over 40 legal acts ("*acquis communautaires*") and setting the grounds for their further implementation.

The AA defines timeframes in which Moldova is expected to align national practices with the EU directives related to water quality and resource management. All provisions are to be implemented within eight years of the AA's entry into force, i.e. by 2024. Of these directives, the Water Framework Directive (WFD) is the most crucial legal act concerning the management of water resources. It aims to ensure the viable, socio-economic management of resources; protect the quantity and quality of water; and promote sustainable water use.

The AA transcends the WFD, extending to commitments more broadly related to the water sector. Table 3.1 summarises the water-related EU directives, including provisions, timeframes for implementation as defined by the AA and their status as of 2021. This study covers all water-related EU directives except the Floods Directive.

Moldova has made considerable progress in aligning national legislation with EU directives and developing its regulatory and institutional frameworks since 2016. However, it needs to strengthen implementation and enforcement. In particular, monitoring, data collection, information-sharing mechanisms, and assessments of water resources and their quality remain weak points in Moldova's water resource management system.

Table 3.1. EU directives on water resource management and timeframes for their implementation in Moldova

Directive	Provision	Timeframe (from entry into force in 2016)	Status (2021)
Water Framework Directive (Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy as amended by Decision No 2455/2001/EC)	Adoption of national legislation and designation of competent authority/authorities	Within three years (i.e. 2019)	Water Law No. 27/23.12.2011 adopted in 2011 and amended in 2018. Competent authorities defined.
	Identification of river basin districts and establishment of administrative arrangements for international rivers, lakes and coastal waters	Within six years (i.e. 2022)	River basin districts defined and most administrative arrangements established.
	Analysis of the characteristics of river basin districts	Within six years (i.e. 2022)	Gaps in collection, analysis and publishing of information on water resources status.
	Establishment of programmes for monitoring water quality	Within six years (i.e. 2022)	No alignment of surface and groundwater quality monitoring with Water Framework Directive requirements.
	Preparation of river basin management plans, consultations with the public and publication of these plans	Within eight years (i.e. 2024)	River basin management plans published for both districts.

Directive	Provision	Timeframe (from entry into force in 2016)	Status (2021)
Floods Directive (Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks)	Adoption of national legislation and designation of competent authority/ies	Within three years (i.e. 2019)	Not covered in the present assessment.
	Undertaking preliminary flood assessment	Within four years (i.e. 2020)	
	Preparation of flood hazard maps and flood risk maps	Within seven years (i.e. 2023)	
	Establishment of flood risk management	Within eight years (i.e. 2024)	
Urban Waste Water Directive (Directive 91/271/EEC of 21 May 1991 concerning urban waste water treatment as amended by Directive 98/15/EC and Regulation (EC) No 1882/2003)	Adoption of national legislation and designation of competent authority/ies	Within three years (i.e. 2019)	Law No. 303/2013 adopted in 2013 and amended in 2019. The law is responsible for supporting implementation of the Urban Waste Water Treatment Directive. However, it would benefit from strengthening in areas such as identification of sensitive areas, maintenance of registry of water users and enforcement.
	Assessment of the status of urban wastewater collection and treatment	Within five years (i.e. 2021)	
	Identification of sensitive areas and agglomerations	Within six years (i.e. 2022)	
	Preparation of technical and investment programme for the urban wastewater collection and treatment	Within eight years (i.e. 2024)	
Drinking Water Directive (Directive 98/83/EC of 3 November 1998 on quality of water intended for human consumption as amended by Regulation (EC) No 1882/2003)	Adoption of national legislation and designation of competent authority/ies	Within three years (i.e. 2019)	Law No. 282/2019 in force since 2021.
	Establishment of standards for drinking water	Within four year (i.e. 2020)	
	Establishment of a monitoring system	Within six years (i.e. 2022)	Lack of well-equipped laboratories for regular monitoring of drinking water.
	Establishment of a mechanism to provide information to consumers	Within six years (i.e. 2022)	
Nitrates Directive (Directive 91/676/EC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources as amended by Regulation (EC) No 1882/2003)	Adoption of national legislation and designation of competent authority/ies	Within three years (i.e. 2019)	
	Establishment of monitoring programmes	Within three years (i.e. 2019)	
	Identification of polluted waters or waters at risk and designation of nitrate vulnerable zones	Within five years (i.e. 2021)	
	Establishment of action plans and codes of good agricultural practices for nitrate vulnerable zones	Within five years (i.e. 2021)	

Source: Author's elaboration based on European Union (2014[11]), "Association Agreement between the European Union and its Member States, of the one part, and the Republic of Moldova, of the other part, *Official Journal of the European Union*, L 260/4, 30 August 2014, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22014A0830(01)&from=EN

In addition to these directives, Moldova is party to 19 international conventions and 10 protocols in the fields of environment, natural resources and climate change, including the Paris Agreement from 2015. These instruments are briefly discussed below.

A key instrument in international co-operation on integrated water resource management (IWRM) is the 1992 UN Economic Commission for Europe (UNECE) Convention on the Protection and Use of

Transboundary Watercourses and International Lakes (hereafter "the Water Convention"). This lays down the principles for IWRM and transboundary co-operation.

The 1999 UNECE-WHO Regional Office for Europe Protocol on Water and Health takes a broader approach to protect human health and well-being. It focuses on better water management by building on IWRM principles. It also seeks to prevent, control and reduce water-related diseases, targeting access to water, sanitation and hygiene for all with a special focus on vulnerable and marginalised groups.

Moldova has been Party to the Water Convention since January 1994 and to the Protocol on Water and Health since September 2005. The principles of IWRM were first enshrined in the Framework Concept of the National Policy on Water Resources 2003-10, adopted by Parliament in July 2003 and implemented by subsequent water management development plans.

Other leading global initiatives include the Implementation Plan adopted at the 2002 World Summit on Sustainable Development in Johannesburg. This sought to develop national IWRM and water efficiency plans by 2005. It also adopted the water-related Millennium Development Goals, which became an important framework to foster action on water supply and sanitation (WSS) at national level. This framework was strengthened on the global level by the 17 Sustainable Development Goals (SDGs), adopted at the UN Summit in 2015. SDG 6 and SDG 14 apply directly to water resources.

Since its independence from the former Soviet Union, Moldova has also concluded four multilateral or bilateral agreements on transboundary water management, as follows:

- **Convention on Co-operation for the Protection and Sustainable Use of the River Danube**. Moldova has been a Contracting Party to the Danube Convention since 1999 and a member of its implementing body – the International Commission for the Protection of the Danube River (ICPDR). Since 2000, the ICPDR has been the platform for implementation of all transboundary aspects of the WFD. Since 2007, it has been the platform for implementation of the Floods Directive in the Danube River Basin. Moldova held the ICPDR Presidency in 2020, promoting five main priorities: improving co-operation and collaboration between ICPDR members; focusing on non-EU members; reducing water pollution in the Danube River Basin; crossing sectoral divides; and strengthening resilience to climate change.
- **Bilateral Agreement between the Government of Ukraine and the Government of the Republic of Moldova on the Joint Use and Protection of Transboundary Waters** (ratified in 1994). The Agreement is under revision to reflect the river basin management requirements of the WFD.
- **Agreement between Romania and the Republic of Moldova on co-operation in the field of protection and sustainable use of the Prut and Danube rivers** (Chisinau, 2010).
- **Treaty between the Government of the Republic of Moldova and the Cabinet of Ministers of Ukraine on co-operation in the field of protection and sustainable development of the Dniester River Basin** (Rome, 2012). The Treaty covers all aspects relating to river basin issues, except for navigation and hydropower. Its implementation is assigned to the Commission on Sustainable Use and Protection of the Dniester River Basin (the Dniester Commission), co-chaired by high level representatives of both countries.

3.1. State of play

From a macro-economic perspective, Moldova is defined as an agro-industrial economy. Approximately 70% of its rural population depend on agriculture for their livelihood, while agri-food accounts for about 45% of the country's total export. Agricultural land covers about 75% of total land area, 73% of which is estimated as arable. Despite these features, only 12% of the arable land is under permanent cultivation

and almost 90% of agricultural production is rain-fed (which makes it highly vulnerable to adverse weather conditions).

Moldova saw a considerable drop in the value-added share of its agriculture – from 30% to 10% of gross domestic product (GDP) over 2000-19 (World Bank, 2021[2]). This was due to high fragmentation of agricultural land among small-sized farms that affected its economic efficiency; the sector's vulnerability to climate change; and lack of investments in new technologies and climate-adaptive practices (including for irrigation).

Still, the sector employs over 30% of the Moldovan population and ensures a high proportion of its export. Therefore, annual GDP growth will continue to be affected by agricultural productivity for some years to come. Policy decisions – for development of the agro-industrial sector but also for other economic perspectives – will have considerable implications to the decisions on water demand management and respective investment priorities in Moldova for the coming decade.

Moldova is a predominantly rural society. As of January 2018, 57% of its 3.5 million population (2.5 million of whom are "usual residents"[1]) lived in rural villages and 45% in urban. Despite some gains in reducing poverty in the last decade, Moldova remains the poorest country in Europe, where poverty is most severe in rural areas. Weak governance and associated low economic growth after breaking from the Soviet Union have led to the emigration of almost one-third of the working age population. This has mainly affected rural areas, depriving them of needed labour for productivity. As a great many migrants originate from villages, remittances became a substantial part of the income benefiting the poorest segments of society. Remittances as a share of GDP reached as high as 31% in 2008 and gradually declined to 22% in 2016 (UNDP, 2017[3]). This influx of money, however, did not bring sustainable investments in the country's development.

Apart from migration and the fluctuation of the population, fragmented administrative territorial governance makes water-use management planning a challenge. The country is divided into 32 districts (rayons), 3 municipalities and 2 autonomous regions (Gagauzia and Transnistria). The status of Transnistria is disputed and the region is not controlled by the central government. Therefore, national strategic planning (including in water management) does not cover the Transnistrian settlements on the left bank of the Dniester River. There are 1 682 localities on the Moldovan territory, 982 of which have their own local public authorities. The remaining 699 villages are too small for independent governance, and are administered by *cities* or villages with *commune* status.

3.1.1. Water resources in Moldova

3.1.1.1. Water use and main pressures on water resources

Water use has been relatively stable over the past two decades in Moldova. Meanwhile, a shrinking population (-1.4% per annum between 2000 and 2017) has led to modest increases in water availability per capita (+1.3% over the same period). Although Moldova is far from facing severe water stress, the country experiences higher water stress conditions exacerbated by seasonal fluctuations than its more water-abundant neighbours, Belarus and Ukraine (European Environment Agency, 2020[4]).

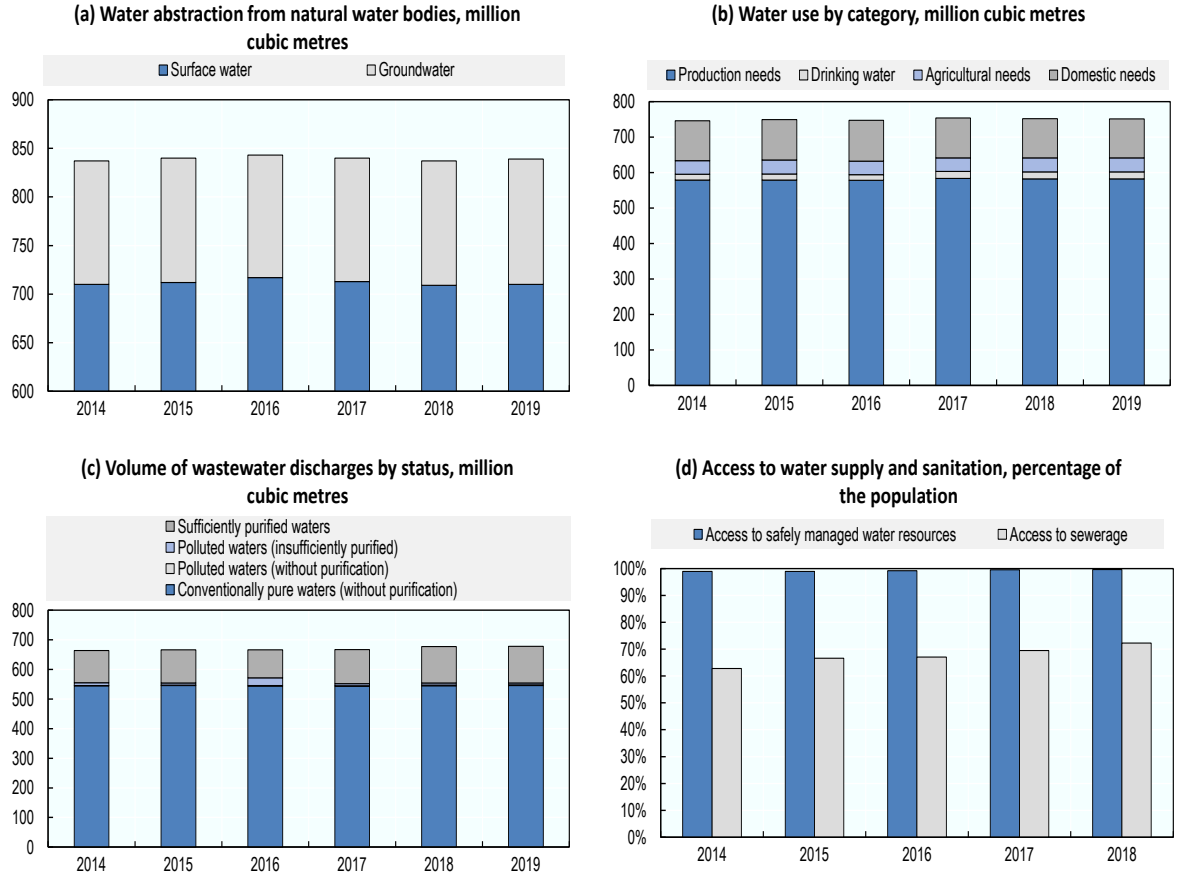
In Moldova, nearly 50% of rivers and streams are heavily polluted and 27% are polluted, which makes them unfit for swimming, fishing and drinking. Meanwhile, less than half of groundwater reserves meet the required quality for drinking water. Water pollution is caused by both point and diffuse sources. Point sources include wastewater, also known as effluent, legally or illegally discharged from a manufacturing or food-processing enterprise, refinery or wastewater treatment plant.

To reduce point source pollution, Regulation 950/2013 established requirements for collection, treatment and discharge of wastewater in the sewerage system or in water outlets for urban and rural localities. However, enforcement remains poor. Water quality differs significantly between the portions of rivers

upstream and downstream of urban areas. Inadequate treatment facilities, which are often equipped only for mechanical treatment, function poorly. Due to discharges of insufficiently purified wastewater, rivers downstream suffer from much higher concentrations of ammonia and other pollutants (European Environment Agency, 2020[4]).

In Moldova, where freshwater greatly depends on inflow from watercourses shared with neighbours (Ukraine and Romania), transboundary pollution is also a concern. Transboundary pollution can result from a disaster like an oil spill but more often from the downriver carriage of industrial, agricultural and municipal discharges. Cleaning surface water and especially groundwater from contaminants can be difficult, sometimes impossible, as well as costly. Therefore, precautionary measures should always be preferred to end-of-pipe solutions.

Figure 3.1. Water use in Moldova



Source: Author's elaboration based on Statistica Moldovei (2020[5]), *Statistics for Sustainable Development Goals*, National Bureau of Statistics of the Republic of Moldova, https://statistica.gov.md/public/files/SDG/docs/Statistics_for_SDGS_Moldova.pdf and Statistica Moldovei (2021[6]), « Environment », *Statistical Databank*, National Bureau of Statistics of the Republic of Moldova, https://statbank.statistica.md/PxWeb/pxweb/en/.

3.1.1.2. Moldova's water resources and river basins

The hydrographic network of Moldova consists of more than 3 000 rivers and streams, although only 8 are longer than 100 km. The network forms three hydrographic basins that were grouped into two river basin management districts (RBMDs) in 2013. The Dniester (Nistru) RBMD in the east and north-east covers 57% of the country's territory, while the Prut-Danube-Black Sea RBMD in the west and north-west spreads over 35%. Several small seasonal tributaries in southern Moldova cover about 8% of its territory and flow

into the Danube after crossing the border with Ukraine. Therefore, all river basins in the landlocked Moldova form part of the larger Black Sea Basin. The total renewable surface water resources in the country are estimated at 11 970 million cubic metres per year (m^3/year) (FAO, 2019[7]).

The largest surface water source is the Dniester River with a total annual discharge of about 10.7 cubic kilometres (km^3) (hereinafter multiannual average figures are presented for run-off). The river's total length is 1 352 km of which a 660-km segment flows through the territory of Moldova. The Dniester's main tributaries in Moldova are the Botna River (152 km), the Bic River (155 km) and the Raut River (286 km).

The country's second largest water source is the Prut River with an average annual discharge of around 2.9 km^3. Prut's total length is 967 km, about two-thirds of which (695 km) are on the territory of Moldova. All other inland rivers flowing within the country have an average annual discharge of about 1.22 km^3 (Climate Change Post, 2021[8]).

Moldova's hydrographic network also includes about 60 natural lakes and approximately 3 500 artificial reservoirs and ponds constructed for irrigation purposes, flow regulation and fishing pools. The two biggest reservoirs in Moldova are Costesti-Stinca on Prut (678 million m^3), jointly operated with Romania, and Dubasari (235 million m^3) on the Dniester River. Another trans-border reservoir is the Cuciurgan dam on the Cuciurgan River at the border with Ukraine. It has total capacity of 88 million m^3, which is shared between the two countries. The total storage capacity of water reservoirs in Moldova is estimated at 2.6 million m^3 (FAO, 2015[9]).

The main groundwater reserves are located in deep confined aquifers with total debit accounting for 1.3 km^3, including 0.7 km^3 of water that is drinking quality. According to the State Water Cadastre, the total volume of *operational reserves* of groundwater is 3 478.6 thousand m^3/day, while the *estimated resources* are 77.9 thousand m^3/day. These reserves belong to the main horizons of 10 water complexes, separated into 20 groundwater bodies – 8 within the Dniester River Basin and 12 within the Danube-Prut-Black Sea River Basin (UNECE, 2019[10]).

However, the natural recharge capacity of the confined aquifers is limited. The water is often too mineralised for domestic use or irrigation. Moreover, around 75% of the groundwater flow drains into the river system. Hence, it does not contribute much to the total renewable water resources (FAO, 2019[7]).

Climate change is projected to decrease surface flows in Moldova by 16-20% by 2030. More specifically, projections indicate continuous increase of annual average temperature by 2°C between 2010 and 2040. It will increase an additional 1°C every 30 years afterwards until the end of the century.

Regarding precipitation, the model projections indicate seasonal variability where the annual run-off is expected to decrease by 13%. Meanwhile, annual flows are expected to become more unstable with more frequent spring and flash floods. Climate models predict a decrease in water availability and resources unless adequate adaptation measures are taken on time.

Under climate change, there could be severe water shortages in the Raut Basin. The same is possible for the Upper and Lower Dniester (Nistru) basins, where irrigation demands are projected to increase by 10-15% until 2040. Areas with vulnerable, mainly rural, populations are already experiencing water shortages, as well as decreasing water depth in unconfined aquifers due to overexploitation. The Central region and Southern Transnistria are assessed as most vulnerable to changes in water availability (World Bank, n.d.[11]).

With respect to natural disaster risks, Moldova is considered prone to floods and droughts. Moldova is in the top ten countries worldwide with the highest proportion of people affected by climate disasters. In 2008, a flash flood matched historic highs in some places. The most affected regions were along the main Dniester and Prut rivers where total damages amounted to USD 120 million. Severe floods in 2010 affected more than 13 000 people in 60 villages, causing losses and damage exceeding USD 75 million. As a result,

flood waters reportedly contaminated about 500 of 3 500 shallow wells and 13 of 120 artesian wells (UNDRR, 2015[12]).

On the other hand, it is projected that droughts will become longer and more severe in Moldova. What were considered 100-year droughts are projected to return every 50 years, with the southern region being especially vulnerable. Severe droughts already took place in 2003, 2007, 2012 and, most recently, from autumn 2019 to late spring 2020. As a result of reduced precipitation, the surface water flow shrank by 30-50% compared to the multiannual average of Dniester and Prut rivers, and by 20-40% for smaller catchment areas.

3.1.1.2.1. River basin management plans

In 2013, to optimise management in line with IWRM principles, the three hydrographic basins in Moldova were merged into two RBMDs: Dniester (Nistru) Basin and Danube-Prut-Black Sea Basin. Accordingly, two river basin management plans (RBMPs) were developed along with two River Basin Committees to implement IWRM management principles. The country's water agency, Apele Moldovei, has begun to reform its functions and structure. It has become responsible for RBMP implementation and co-ordination at the national level.

Each management district has a defined number of sub-basins of small and medium rivers. In total, Moldova is divided into 39 sub-basins. With respect to water quantity, which is closely related to quality and concentrations of hazardous substances, the volume of the two largest rivers in the basin districts – Prut and Dniester – depends essentially on the territory of Ukraine, where around 80% of the rivers' flow is formed.

Each RBMP was developed in accordance with the requirements of the WFD and the country's Water Law 272/2011. The two RBMPs for Dniester and Danube-Prut-Black Sea districts are implemented in cycles and revised every six years (they are both under revision). They guide the implementation of measures that align with the WFD and national strategic objectives. These objectives set a framework for the protection of surface waters and groundwaters to achieve the overarching goal of achieving a "good" water quality status throughout the river basins.

Public and stakeholder consultations were organised throughout the RBMP process, making good use of the National Policy Dialogue platform. The active participation in discussions by a large variety of stakeholders demonstrates increasing public awareness of the river basins' sensitive issues and challenges, as well as a readiness to jointly develop solutions.

Danube-Prut and Black Sea District RBMP

The Danube-Prut and Black Sea District (DPBSD) RBMP was approved in October 2018. It had been initially developed with support from the EU regional project "Transboundary River Basin Environmental Protection" and the EUWI+ in 2016. The DPBSD was planned in co-operation with the Ministry of Agriculture, Regional Development and Environment (MARDE) and the water agency, Apele Moldovei. The second phase of the plan's development focused on transboundary aspects, encouraging active co-operation between Moldova, Romania and Ukraine in designing joint activities in the basin. A comprehensive Programme of Measures (PoM) for the revised RBMP for 2021-27 is undergoing a second round of public consultations. The process aims to define priority objectives for improving water quality and quantity in the basin and outline a timeline for their achievement.

Dniester River Basin District RBMP

The first Dniester River Basin District Management Plan 2017-22 was approved in October 2017. It was developed as part of activities under the Compact Program of the Millennium Challenge Corporation between 2010 and 2015. The objectives include prevention of deterioration of surface waters and groundwater status, and a gradual reduction of pollution and improvement of water bodies' status. Various

measures were proposed to achieve these objectives. These included systematisation of groundwater quality information, improvement of water quality monitoring, assessment of small river status, and reconstruction and building of water treatment plants. However, a lack of reliable data and poor monitoring information undermined the quality of the first RBMP.

Transboundary management plans

Co-operation with Ukraine is crucial for improving the status of the Dniester River and ensuring more sustainable management. Ukraine accounts for 73% of the basin's surface (Poland and downstream Moldova cover 0.6% and 26.4%, respectively). With this in mind, the new cycle of the plan (2022-27) is focusing on transboundary aspects. A team of Moldovan and Ukrainian experts jointly drafted the first part of the Transboundary River Basin Management Plan – "General characteristics and state assessment". Following the structure established by the WFD, the document contains a description of the basin; identification of surface water and groundwater bodies, the main transboundary problems and their causes; and an assessment of anthropogenic influences on each water body.

Based on a Transboundary Diagnostic Analysis, a Strategic Action Programme (SAP) for the Dniester River Basin has been developed and is undergoing public consultation. The SAP is developed for a 15-year period, to be revised every five years. The analysis and the SAP provide a good basis for the second cycle of the Dniester RBMP, and will be used to develop Moldova's country-specific PoM. However, they lack detail and monitoring data.

3.1.1.2.2. Water management issues and pressures in Moldova's river basin districts

Despite different geographic and demographic features, the two river basin districts share similar challenges deriving from climate change and natural disaster risks, and negative anthropogenic impacts (see Table 3.2).

Within the territory of the Dniester Basin in Moldova, 94% of water bodies are assessed at risk of "not achieving good ecological status". The remaining 6% are "likely at risk", and there are no water bodies at "no risk". In the DPBS district, results are roughly similar with 97.6% of surface water bodies "at risk of not meeting the environmental objectives" at the end of the 2022-27 cycle. According to the RBMP, even if urgent measures are taken, two additional cycles (until 2039) are needed to reverse this trend. Regarding groundwater in both river basin districts, only 3-4% of deep aquafers are identified as "at risk of not achieving good quantitative and chemical status" (although mineralisation and microbiological parameters have not been monitored).

Regarding achieving "good" chemical status, only 3% of water bodies in the Dniester Basin within Moldova are assessed "at risk", while the percentage of those "without risk" is 32%. However, "no information" is attributed to 65% of the water bodies subject to chemical status evaluation.

The Transboundary Diagnostic Analysis for the DRBD acknowledges these figures do not reflect the "true" state of the Dniester Basin. Rather, they indicate insufficient monitoring of priority pollutants. Data for only 4 metals of 45 priority pollutants were made available to assess the risk of achieving a "good" chemical status.

Impacts are primarily due to the high share of ploughed agricultural land, the significant hydromorphological changes along the rivers and the discharge of insufficiently treated wastewater from public utilities and industries.

Table 3.2. Water management issues within the RBDs

Key water management issue	Dniester RBD specifications	Danube-Prut-Black Sea RBD specifications
Biological and nutrient pollution from insufficient or absent wastewater treatment, as well as due to flushing from agricultural land. Countrywide, 63% of the wastewater is neither collected nor treated in Moldova, while in rural areas wastewater treatment is almost non-existent.		The dominance of home stock breeding (especially sheep herding) within the river basin causes degradation of the pastures' surfaces, salinisation of soils and shallow groundwater. This also contributes to the contamination of surface water through washing with precipitation.
Pollution from poor waste treatment, storage and disposal: • Over 3 000 unauthorised dumpsites are identified throughout Moldova, while most of the licensed landfills do not meet EU criteria for sound waste disposal. An absence of waste processing enterprises and consequently, unauthorised removal and waste storage.		
Point and non-point (diffuse) pollution from hazardous substances, deriving from municipal and industrial discharges, pesticides and other hazardous chemicals used in agriculture, and accidental pollution.	Within the Moldovan territory of the Dniester River Basin, 98 point sources of pollution have been identified (70 utilities, 11 industrial and 17 agricultural). The predominant part of organic pollution is generated by the two largest cities in the Basin with populations of over 100 000 (Chisinau and Balti). The major pollutants of the water bodies in the Moldovan part of Dniester River Basin are the food processing, and wine- and alcohol-producing industries.	657 settlements, 60 centralised wastewater discharge systems and 48 wastewater treatment plants were identified as point sources of pollution. However, agriculture is considered the main source of pollution in the basin. In 2005-17, the total quantity of used chemical fertiliser in the basin increased by a factor of 3.7.
Hydromorphological changes associated with river flow regulation, water retention for commercial purposes, hydropower and flood protection. The main hydromorphological changes identified in the RBMPs focus on the Prut riverbed in the lower course (because of large flash floods in 2008 and 2010) and a number of illegal embankments in small rivers along Prut.	The main activities leading to changes in hydrological regime, channel morphology and the adjacent part of floodplains are hydropower and flood protection. For tributaries, straightening and embankment of channels, and regulation of river flow (ponds and reservoirs), contribute to issues.	
Climate change and associated natural disasters. Both river basins in Moldova are vulnerable to predicted water alterations due to climate change. Floods and droughts aggravate water quality.	Considerable water shortages are predicted in the Raut sub-basin and in the Upper and Lower Dniester basins, where irrigation demands are projected to increase. The Central region and Southern Transnistria within the Dniester Basin are assessed as most vulnerable to water scarcity.	A decrease in the average flows of the Prut River by 25% (about 20 m^3/s) has already been observed in the last seven years. This has aggravated anthropogenic impacts within the entire basin.

Key water management issue	Dniester RBD specifications	Danube-Prut-Black Sea RBD specifications
Incomplete monitoring systems and reliable data to support decision making. • While water quality monitoring systems are in place in urban areas of the two basins, rural settlements are only covered by irregular control tests. The network of groundwater monitoring wells does not include all water bodies. Meanwhile, the methods of sampling, analysis and synthesis are not comprehensive. As such, they do not allow a consistent assessment of qualitative and quantitative trends, or sustainable management and use of groundwater resources.	Monitoring is undertaken in 68 hydrological sections, but many of those require manual operation with outdated equipment and protocols.	Information is collected from 58 surface water quality monitoring stations, while 13 provide continuous hydrological data.

Source: Author's own elaboration

3.1.1.2.3. Programme of measures

Responding to the challenges summarised above, the two RBMPs identify a series of environmental objectives and measures for 2022-27. These measures aim at achievement of good environmental status for surface water and groundwater bodies in both basin districts. Many measures proposed in the RBMPs are already envisaged in respective national or regional strategies and programmes. These include the WSS Strategy and the National Programme for the implementation of the Protocol on Water and Health in the Republic of Moldova, among others.

Programme of measures for the Danube-Prut-Black Sea Basin District RMBP

The first cycle of the DPBS Management Plan covers 2018-23, but its implementation time will be reduced until the adoption of the new RBMP. The latter will synchronise Moldova's second planning cycle with those of the other Danube countries (2022-27). Due to lack of funding, many planned measures have been excluded from the first RBMP and will be shifted to the next management cycle. The RBMP 2022-27 has recently undergone a second round of public consultations. Its adoption is foreseen for the middle of 2021.

Environmental objectives for surface water bodies (SWBs) within the DPBS RBD have been established for the categories of *natural*, *heavily modified* and *artificial*.

- 37 SWBs aim to achieve a "good ecological and chemical status" in the 2021-27 planning cycle.
- "Less stringent environmental objectives" are defined for 65 SWBs, which aim to achieve the 2028-34 planning cycle environmental objectives.
- For the 28 SWBs, where the highest pressures are recorded, environmental objectives may be addressed in the 2035-40 cycle.

Because many water bodies are forecasted to fall short of environmental objectives, derogation is envisaged for most water bodies during the next management cycle, as described below.

Environmental objectives for groundwater bodies (GWBs) aim to achieve both good quantitative and good chemical conditions, and a guarantee of non-deterioration. The following environmental objectives have been established in the second RBMP cycle 2022-27:

- achieving a good chemical status in two GWBs,
- achieving a good quantitative status in two GWBs,
- preventing or limiting discharge of pollutants from agriculture and point sources in two GWBs,

- assuring non-deterioration of condition in three GWBs,
- improving monitoring systems in two GWBs.

To achieve these targets, 50 measures are proposed in the second RBMP for the DPBS district, grouped into six priority areas (Table 3.3). They address point and diffuse sources of water pollution, improvement of WSS networks, hydromorphological pressures, and flood and drought risks. In the PoM, actions are prioritised and budgeted, which facilitate further investment planning for the basin. The selected measures include 52 actions (37 basic and 15 supplementary) costing an estimated MDL 3 billion (EUR 147 million).

Table 3.3. Measures proposed in the second RBMP for the DPBS district 2022-27

Priority area	Selected measures addressing the priority area
Reducing pollution from point sources (11 measures planned)	• Construction of new and rehabilitation of existing wastewater treatment plants (WWTPs) with modernisation of treatment technologies. • Construction of appropriate individual WWT systems in low population density areas. • Construction, extension and modernisation of sewage systems. • Inventories of wastewater discharge sources in rivers (point sources). • Regular and stricter control checks by the Environment Protection Inspectorate (EPI) at the WW discharge points. • Full implementation of the water quality monitoring programme by the Environmental Agency.
Reducing pollution from diffuse sources (8 measures planned)	• Implementation of the Code of Good Agricultural Practice for water protection against nitrate pollution (regulating the use of fertilisers in agriculture). • Delimitation of the riparian protection strips (according to provisions of Law 440-XIII/ 27.04.1995) and plant protection strips. • Elaboration of rules/standards regarding optimal livestock size in relation to certain areas of pasture (in accordance with the EU Nitrates Directive). • Implementation of the Action Plan for Nitrate Vulnerable Areas (designated in accordance with the EU Nitrates Directive). • Avoidance of grazing within the riparian water protection strips. • Implementation of the programme for monitoring water resources (by the Environment Agency) and regular controls carried out by the EPI.
Improving the water supply and sanitation system (11 measures planned)	• Construction of inter-municipal aqueduct systems (in six selected sub-basins). • Expansion and modernisation of the existing aqueduct network. • Creation and modernisation of regional WS systems (in five selected rayons). • Construction of communal WS systems (five selected rayons). • Construction of new and expansion of existing water supply and sewerage networks. • Creation of drinking water treatment/purification stations (five selected rayons).

Priority area	Selected measures addressing the priority area
Reducing pressures generated by hydromorphological alterations (10 measures planned)	• Establishment of ecological flow in rivers (e.g. controlled discharge from lakes and ponds for optimum ecological conditions downstream). • Proper regulation of sediment extraction and improved continuity of sediment transportation through proper management of dams. • Clearance of clogged wells, springs and lakes that supply water to the population. • Support of hydraulic engineering measures for morphological restoration of water courses.
Reducing pressures generated by flood risk (5 measures planned)	• Improvement of the status of protection dams (227 km of rebuilt dikes and 190 km of maintained dams). • Implementation of an early warning system. • Creation and restoration of wetlands (feasibility studies for 900 ha of wetlands). • Improvement of the status of aquatic and riparian habitats (re-naturalisation).
Reducing pressures generated by drought risk (5 measures planned)	• Afforestation and reforestation (5 250 ha forested). • Promotion of conservative agriculture and increasing water retention capacity in agricultural land (conservative measures applied on 20% of agricultural land). • Evaluation of the effects of climate change on water bodies (including financing of target programmes in research institutes to study the impact of climate change on different ecosystems and economic sectors).

Source: Author's own elaboration

Programme of measures for the Dniester Basin District RBMP

The RBMP for Dniester district (2017-22) prioritises key environmental issues relevant for both river basins, although it focuses on "softer" measures. Specific objectives were formulated for the first cycle of the Management Plan to improve the situation. They mainly targeted use of information technologies for digitising, collecting and processing information, revising data flows, modernising monitoring tools and defining new institutional competencies (Table 3.4). These, in essence, are being implemented by reengineering and optimising management processes.

The first RBMP identifies 71 actions for meeting its objectives, costing an estimated MDL 104 million (about EUR 5.2 million). However, this figure excludes required infrastructural investments in WSS systems for which feasibility studies have not been undertaken.

In all, 94% of water bodies in Dniester district are at risk of not achieving good ecological status during the next planning cycle. Therefore, the second RBMP must establish environmental objectives for all water bodies in the basin, with targeted actions and timeframes.

Table 3.4. Objectives of the first RBMP for Dniester River Basin District (2017-22)

General goals	Specific objectives addressing the general goals
Prevent deterioration of surface water and groundwater conditions by 2022	• Legal framework for surface water and groundwater management in the Dniester district. • Completing and updating information on the state of surface water and groundwater in the Dniester district and making it accessible in electronic form. • Strengthening the capacity for sustainable water management. • Raising public awareness of environmental and water objectives in the Dniester region.
• Measures include synchronising water quality data and indicators with Ukraine; strengthening water quality monitoring and establishing regular hydrological monitoring, including transboundary; digitising data collection and establishing electronic water information systems; developing flood and drought risk management plans; undertaking a study on Novodniestrovsk HPP; and updating the Agreement on its joint exploitation with Ukraine.	
Protection and gradual improvement of surface water and groundwater bodies, in view of achieving "good status" by 2030	• Improving conditions of surface water and groundwater bodies. • Greater protection and restoration of natural ecosystems.
• Measures include inventorying, assessing and classifying surface water and groundwater bodies in the basin; inventorying and assessing wells and ponds used for water supply; assessing hydromorphological alterations and pilot clean-up measures to restore ecological flow in rivers; inventorying wells used for water supply and closure of those not meeting drinking water standards; developing plans for afforestation and restoration of wetlands and other natural riparian belts; and establishing national park "Nistrul de Jos".	
Gradual reduction of surface water and groundwater pollution from point and diffuse sources	• Reducing pollution from point sources (mainly wastewater discharges). • Evaluating diffuse sources of pollution (mainly from agriculture).
• Measures include rehabilitating wastewater treatment plants (WWTPs) in (state-owned) wine production companies and certain enterprises; undertaking feasibility studies and preparation of technical documentation for WWTPs in selected settlements; implementing measures for final disposal of pesticide stocks; upgrading/rehabilitating WWTPs in Soroca and Chisinau; identifying point sources of pollution in selected sub-basins; evaluating diffuse pollution sources and awareness raising; and piloting possible uses of sludge from WWTPs.	

Source: Author's own elaboration

Transboundary objectives

The RBMP's objectives are taken up on a *transboundary level* for Dniester River Basin SAP. This was developed from a Transboundary Diagnostic Analysis (TDA) of the district.[2] The governments of Moldova and Ukraine were expected to adopt the SAP in 2021. Both the TDA and SAP are considered a good foundation for the second cycle of the Dniester RBMP and for development of Moldova's country-specific PoM.

In this context, the following elements represent a snapshot of expected priorities for both river basins in Moldova during the next planning cycle (2022-27):

- establishing norms for water use (prevention of overuse),
- enforcing norms for wastewater discharges,
- implementing the Code of Good Agricultural Practice (to prevent diffuse pollution),
- saving water, developing economic instruments for irrigation, reuse and recycling,

- investing in urban wastewater treatments (to prevent pollution from point sources),
- improving water quality monitoring programmes,
- implementing hydromorphological monitoring and from data, developing water balance restoration plans.

Implementation of actions will depend on the availability of funding and sustainability of the responsible institutions (e.g. River Basin Committees; subordinate bodies of MARDE, including the water agency Apele Moldovei, the Environmental Protection Inspectorate and the Environment Agency, and others). The actions will consequently contribute to achieving commitments under the Protocol on Water and Health and the SDG 6 objectives. Owing to this, well-coordinated planning and justified budgeting of interventions in the water management sector are key milestones of the 2021-27 programming period; national strategies and action plans will also be updated and donors' priorities defined during this period.

SAP activities are differentiated according to their estimated costs. The PoM involves 28 low-cost measures (each under EUR 100 000), 28 medium-cost measures (between EUR 100 000 and EUR 1 million), and 17 high-cost measures (over EUR 1 million). However, SAP does not distinguish between proposed activities per country. This means Moldova will need further planning and budgeting.

Financing the RBMPs

Financing for the second Danube-Prut-Black Sea Basin District RBMP (2022-27) is estimated at EUR 157.7 million (MDL 3.2 billion). Meanwhile, the first plan for the Dniester River Basin District (2017-22) requires an estimated EUR 5.2 million (MDL 104 million), without infrastructure investments.

3.1.2. Moldova's policy, legal and institutional framework

In 2016, Moldova made a concerted effort to reform its legislative, regulatory, institutional and policy environment to align with the WFD and associated directives. Broadly, Moldova is moving in the right direction in each area. However, the merging of large portfolios under a single management system, together with a drastic cut in staff of specialised water administration, has seriously impacted the targeted performance of key public water-related sectors.

Reforms have undoubtedly brought the needed economies of scale. At the same time, however, they have assigned more and new responsibilities to executive agencies. These entities do not always have the necessary knowledge, staff and financial capacities to implement them successfully. Consequently, they are unable to help ministries implement their goals effectively.

3.1.2.1. Policy framework

Policies guiding water management

The National Development Strategy "Moldova 2020" recognised the provision of clean, accessible and affordable water as one of the highest priorities in the country's development agenda. The National Environmental Strategy (NES) 2014-23 has partly addressed the water sector. However, it uses "soft" legal, institutional and awareness-raising measures. The NES was developed before a comprehensive needs assessment was completed for WSS. Therefore, the foreseen investment of EUR 177.7 million for WSS in its Action Plan is largely underestimated.

The WSS Strategy 2014-28 was recently revised and extended to 2030. It completed the national strategic framework in the sector by establishing ambitious targets to gradually ensure access to safe drinking water and proper sanitation in all settlements and for the entire population of Moldova by 2028. The national objectives are translated into four sectoral WSS programmes for the main development regions in Moldova, to be implemented between 2016-20.

The National Programme for the implementation of the Protocol on Water and Health in the Republic of Moldova for 2016-25 was revised in early 2021. It set new targets and deadlines under the Protocol on Water and Health covering water, sanitation, hygiene and health. The revision extended the programme until 2030.

With the view of contributing to overall sustainable development, the National Climate Change Adaptation Strategy aims to enhance the adaptive capacity and reduce the vulnerability of economies and societies. This follows the global goal on adaptation defined in the Paris Agreement (Articles 7 and 14).

Although policy improvements and efforts towards alignment are moving towards robust management, some shortcomings remain, including the following:

- *Inconsistency in setting policy goals and targets across various strategies and overlapping of strategic objectives*. Targets for delivering SDG 6 are adapted to national circumstances. However, some are missing from the policy framework. Others are present in all strategic documents but with inconsistent values.
- *Fragmented planning, lack of capacities for programming and budgeting investments in an equitable and inclusive way.* There is a lack of investment programmes for vulnerable and marginalised groups in rural areas. This results in a wide urban-rural gap in access to quality water services.
- *Insufficient data availability, quality assurance and control for evaluation of the SDG indicators.* There is a pressing need to improve and enhance water quality and service monitoring. This would provide reliable data to serve decision making and indicator-based reporting of progress towards goals and targets.
- *Poor control and enforcement of water use and discharge.* Monitoring on self-capture sites is inadequate or non-existent. Lack of on-the-spot metering devices for water abstraction causes high levels of data uncertainty, especially regarding the efficiency of utilities and commercial losses (non-revenue water) due to unauthorised water use.
- *Low level of public spending in the water management sector and disproportionally low investments in wastewater treatment compared to water supply.* If unresolved, this is likely to hinder achievement of the main targets under SDG 6 requiring universal access to safely managed water services.
- *Lack of consistent measures targeting adaptation to climate change and disaster risk reduction.* Floods and drought risk management and sectoral climate adaptation measures are limited in the strategic planning of water management until 2020, both on a national and river basin level.

Sectoral policies dedicated to water management

Two main sectoral policy documents guiding Moldova's water management and alignment with the European Union are noted below. They are the Action Plan for 2020-24 to Implement the Water Supply and Sanitation Strategy to 2030; and the National Programme on the Implementation of the Protocol on Water and Health in the Republic of Moldova in 2016-30.

Action Plan for 2020-24 to Implement the Water Supply and Sanitation Strategy to 2030

In 2020, the WSS Strategy was extended to 2030 and a new Action Plan was adopted to support its implementation in 2020-24. The initial strategy made progress in implementation between 2014 and 2018. However, there were discrepancies in the provision of WSS services to urban and rural areas. Further, there was a large gap between investment efforts in WSS infrastructure resulting in a "non-realistic" goal of ensuring urban wastewater treatment in accordance with Directive 91/271/EEC by the end of 2018. This was considered in the next planning cycle until 2025.

The general objective of the 2020-24 Action Plan in the WSS Strategy is to cover the above-mentioned gaps. It aims to ensure that 80% of the population in urban areas and 75% in rural areas are provided with safely and sustainably managed WSS infrastructure by 2025. This represents a 15% and 10% increase, respectively, compared to the Action Plan for 2014-18. Other more specific objectives include the following:

- improving management of public WSS services by developing guidance, norms, standards and respective trainings, improving water quality monitoring, metering water use and strengthening economic instruments to support national investment in WSS,
- planning and developing public WSS systems to expand the population's access to high-quality services by implanting 12 infrastructure projects to build WSS systems, completing the water security study by the World Bank, and developing a WSS investment plan (Master Plan) that covers both supply and sanitation in urban and rural areas,
- harmonising national WSS legislation with community standards and international commitments by revising norms and standards (for example, for wastewater discharge) and designating agglomerations according to the Urban Waste Water Treatment Directive and developing an implementation plan for the directive.

The above objectives are transposed to the level of river basin districts through respective RBMPs.

National Programme on the Implementation of the Protocol on Water and Health in the Republic of Moldova in 2016-30

The National Programme on the Implementation of the Protocol on Water and Health (2016) is instrumental for achieving the targets set under SDG 6 and the objectives set in "Moldova 2030". The programme includes measures to improve water security; ensure an adequate supply of good quality water; guarantee a balanced and equitable use of water resources; and ensure optimal conditions for the prevention of water-borne diseases. Initially, 34 targets and 12 specific objectives were set for all 20 areas of the Protocol, covering four main areas of intervention:

1. ensuring safe drinking water supply to all users by gradually reducing non-compliant samples with respect to basic chemical and microbiological parameters,
2. reducing the number of epidemic outbreaks and water-borne diseases,
3. ensuring universal access to safely managed drinking water systems,
4. increasing access to basic sanitation, sewage systems and wastewater treatment.

To achieve these goals, the PoM lists 77 actions, such as strengthening the legal framework; creating information and disease surveillance systems; improving water quality monitoring; creating regional operators of WSS systems; and developing infrastructure for safe drinking water supply, for sanitation and wastewater treatment.

The 2019 National Report of the Republic of Moldova pursuant to Article 7 of the Protocol on Water and Health acknowledges the following progress:

- introducing IWRM to the country's water policies and legislation in 2009-18,
- reducing outbreaks of water-related infections (with zero outbreaks recorded since 2015),
- decreasing water-related diseases per 100 000 inhabitants,
- slightly improving chemical parameters of drinking water sources and systems.

However, bathing water quality in the Dniester and Prut rivers, based on bacteriological indicators, does not comply with standards. In this sense, considerable efforts are still needed to improve water quality of all sources used for human consumption. In addition, access to clean water and safely managed sanitation has seen limited progress despite investments in water supply systems. Supply and sanitation services in rural areas are still lagging well behind urban settlements.

To address these issues, Moldova updated the National Programme in 2019. It now proposes 44 objectives for implementing the Protocol and 115 measures for achieving them with milestones for 2025 and 2030. The main targets set in the four intervention areas of the updated programme include the following:

- ensuring safe drinking water for all by gradual reduction of non-compliant samples with respect to chemical and microbiological parameters:
  - compliant drinking water quality in 100% by 2025,
  - reduction of 25% by 2025 and by 15% by 2030 of non-compliant drinking water samples for basic *chemical* parameters,
  - reduction by 10% by 2025 and 5% by 2030 of non-compliant drinking water samples for *microbiological* parameters.
- reducing the number of epidemic outbreaks and water-borne diseases:
  - establishing an integrated information system for surveillance of water-borne diseases by 2025,
  - implementing drinking water safety plans in settlements above 2 000 inhabitants by 2025 and for all water supply systems by 2030,
  - reducing, by 30%, by 2030, the number of epidemic outbreaks of infectious diseases and the occurrence of water-borne diseases.
- ensuring universal access to safely managed drinking water systems:
  - providing access to safely managed drinking water supply systems for 100% of schools and medical institutions by 2025,
  - providing access to safely managed drinking water supply systems for 95% of the urban and 75% of the rural population by 2030,
  - ensuring equal access to water supply services for vulnerable groups, with a legal framework by 2022 and financial mechanisms by 2025.
- increasing public access to basic sanitation, sewage systems and wastewater treatment
  - providing access to safely managed sanitation systems for 100% of schools by 2025 and 100% of medical institutions by 2030,
  - achieving a 50% reduction in the discharge of untreated sewage and storm water into natural reservoirs by 2025,
  - providing access to sustainable sanitation systems to 95% of the urban and 50% of the rural population by 2030.

3.1.2.2. Legal framework

Moldova embarked on a new approach to managing national water resources when it embraced IWRM principles. This move was in line with the country's international commitments and part of global efforts to improve the status of water resources. Table 3.5 identifies the legislation that underpins these efforts and highlights some shortcomings.

Table 3.5. Key legislation for water management in Moldova

National legal and implementing instruments	Stipulations and shortcomings
Water Law No 272/23.12.2011 (last amended in November 2018)	• Law responsible for implementing Directive 2000/60/EC establishing a framework for Community action in the field of water policy (WFD). • Establishes the legal framework for integrated water resources management. • Established the legal framework for protection and efficient water use. • Set up legal basis for efficient management, protection and conservation of surface water and groundwater. • Stipulates measures for preventing the deterioration of state of water. • Establishes water rights. • Regulates prevention of flood, erosion, drought and desertification, and water abstraction and supply. Shortcomings • Inefficient metering and monitoring mechanisms. • No alignment of surface water and groundwater quality monitoring with WFD requirements. • Lack of comprehensive analysis and assessment of groundwater quality. • Lack of regulation on the use of groundwater for irrigation and gaps due to permitting small-scale irrigators. • Gaps in collection, analysis and publishing of information on water resources status, and in measuring and keeping records on water uses. A need to operationalise both the Water Resources Information System "SIRA", including data on water-related permits, uses, infringements, etc., and the State Water Cadastre, including data on WSS systems, floods protection and other water-related infrastructure.
Law No 303/2013 on the public service of water supply and sewerage (last amended in 2019)	• Law responsible for implementing Directive 91/271/CEE concerning urban wastewater treatment. Shortcomings: • Agglomerations and sensitive areas under the UWWT Directive not yet defined. • Gaps in the records/registry of water uses and water-related permits. • Poor enforcement of the requirements for wastewater treatment and discharge. • Too much focus on supply without sanitation coverage in current investments. Need to emphasise sewage and wastewater treatment infrastructure in the next programming period (2021-27). • Need of planning and developing guidance on safe sludge management from wastewater treatment plants.
Law No 282/2019 on the quality of drinking water (in force from 03.01.2021)	• Law responsible for implementing Directive 98/83/EC on the quality of water intended for human consumption. Shortcomings: • Lack of well-equipped laboratories for regular monitoring of drinking water. • Lack of proper assessment and regular monitoring of groundwater sources used for human consumption. • Ongoing requirement to develop Water Safety Plans for all water supply systems serving over 2 000 people by 2025 to further reduce the health risks associated with drinking water.
Law on the public water supply and sewage services (No 303/13.12.2013)	• Provides the legal basis for implementing acts enforced to improve the service quality and efficiency of both operational and technical performance of the WSS systems. • Stipulates methodology for determining, approving and applying tariffs for water supply, sewage and wastewater treatment by public utilities under regulation (No 741/18.12.2014). • Stipulates regulation on public water supply and sanitation services.

Source: Author's own elaboration

Legislative gaps and issues vary according to alignment to the specific EU directive required. However, similar issues could be addressed to strengthen the legal framework. Broadly, gaps and issues include inefficiencies in monitoring and metering; lack of information sharing and publication; lack of analysis and assessment of water resources and their quality, particularly relating to groundwater; weak enforcement of legislation and regulations; and issues in funding priorities. Addressing these legislative issues could provide a more solid basis for regulation and institutions to undertake robust water management.

3.1.2.3. Regulatory framework

Table 3.6 considers the major regulatory acts that govern water sector management.

Table 3.6. Key water management regulation in Moldova

Regulation	Related EU directive and some stipulations/shortcomings
• Regulation on operation of the Water Resources Information System (SIRA), 672/30.05.2016 • Concept for the Automated Information System State Water Cadastre (SWC), 491/23.10.2019 • River Basin Management Plans – for Dniester Basin (August 2017) and for Danube-Prut and the Black Sea Basin (October 2018, under revision)	• Regulations pertaining to Directive 2000/60/EC establishing a framework for Community action in the field of water policy (Water Framework Directive).
• Regulation 950/2013 on the requirements for collection, treatment and discharge of wastewater in the sewerage system or in water outlets for urban and rural localities (as last amended 2020) • New technical norms for small-scale water supply systems formally adopted in 2018 and enforced by a Code of Practice approved on 1 September 2020 • Framework procedure for the organisation, conduct and award of contracts delegating management and operation of public WSS services (506/01.11.2019)	• Regulations pertaining to Directive 91/271/CEE concerning urban wastewater treatment. Shortcomings: • Agglomerations and sensitive areas under the UWWT Directive not yet defined. • Gaps in the records/registry of water uses and water-related permits. • Poor enforcement of the requirements for wastewater treatment and discharge. • Need of planning and developing guidance on safe sludge management from wastewater treatment plants.
• Sanitary Regulation for small-scale water supply systems (1466/30.12.2016) and an implementing ordinance (from 2017) • National Guidelines for the Development of a Water Safety Plan for drinking water supply systems, approved 2017	• Regulations pertaining to Directive 98/83/EC on the quality of water intended for human consumption. Shortcomings: • Lack of drinking water monitoring infrastructure. • No proper assessments and monitoring of groundwater sources for human consumption.
• Regulation on preventing water pollution from agricultural sources 836/29.10.2013	• Regulation responsible for implementing Directive 91/676/CEE concerning the protection of waters against pollution by nitrates from agricultural sources. Shortcomings: • No identification or mapping of nitrate vulnerable areas (although the methodology is under development). • Need to introduce the Good Laboratory Practice as a tool to prevent nitrate and other chemical pollution.
• GD 590/21.06.2018 approving the concept of a national system for flood risk management	• Regulation responsible for implementing Directive 2007/60/EC on the assessment and management of flood risks. Shortcomings: • No adoption of flood and drought risk management plans at river basin district level.

Source: Author's own elaboration

The major gap in water regulation involves a lack of direction in wastewater treatment. Specifically, a permit system for water use and wastewater discharge lacks implementation and enforcement. Overcoming these gaps would help resolve management issues stemming from the steadily increasing anthropogenic pollution of water resources and dually provide more equal treatment of water users.

3.1.2.4. Institutional framework

Sound and stable institutions in Moldova remain an important precondition for developing and implementing water policy. Regular vertical and horizontal co-ordination and joint planning involving different stakeholders is of utmost importance for good governance in this area. It is equally important that co-ordination is well organised and functions smoothly between various management levels from national to basin and sub-basin levels, as well as at local and service-related levels. However, institutional stability and weaknesses in institutions contribute to problems in implementing the new integrated water management policy introduced by Moldova for its approximation with the EU legal and regulatory framework. To assist in this co-ordination, it established a National Policy Dialogue (NPD) platform in 2006. The NPD aims to provide good opportunities for engaging and empowering stakeholders in the water management sector. The steering mechanism of the NPD process has become a valuable platform for providing the needed horizontal co-operation between different sectors.

The provision of WSS services has been decentralised to local public authorities (LPAs) pursuant to the Law on Public Services of Communal Management from 2002. An administrative territorial reform for consolidation of local governance structures was launched in 2016. However, the process is slow, influenced by political instability and still based on voluntary amalgamation. This reform should be closely followed as it is expected to affect local governance and, consequently, arrangements for local public services such as water and waste management.

Table 3.7 outlines the institutions undertaking main water resource management functions. It also provides a brief history of the reforms, mostly begun in 2014, that led to their creation.

Table 3.7. Major water management institutions in Moldova

Institution	Creation, stipulations and shortcomings
The Ministry of Agriculture, Regional Development and Environment (MARDE)	MARDE was formed in 2017 from the merger of three ministries: the Ministry of Agriculture and Food Industry, the Ministry of Regional Development and Construction (the construction portion of which was restructured into the new Ministry of Economy and Infrastructure) and the Ministry of Environment. **Stipulations** • Develops the regulatory and strategic framework of policy, including strategic planning based on integrated water resources management; transboundary aspects and agreements on water management; climate change adaptation and mitigation; planning in the WSS sector; and regulating water use for communal services, irrigation and industry. • Manages investments in its portfolio areas from three national funds, including the National Fund for Agriculture and Rural Development, the National Environmental Fund and the National Fund for Regional Development. • Manages over 60% of Moldova's commitments under the Association Agreement for some of the most investment-intensive sectors from a national and regional development perspective (e.g. WSS, waste management, agriculture, climate change, flood and drought risk management, etc.). **Shortcomings:** • Staffing shortages. The ministry has only 121 employees (including general administration), with 28-32 experts per policy area. An average department has five people, including the head. These numbers have been fixed on a random principle,

Institution	Creation, stipulations and shortcomings
	without a comprehensive analysis of the required *new functions*. The Integrated Water Management Directorate has only five staff for development of the vast strategic and legal framework, including its transboundary aspects.
Agency Apele Moldovei (AAM) Subordinate institution of MARDE	AAM was assigned new functions related to the EU directives in 2018. Reforms are ongoing. • Implements RBMPs; monitors and oversees activities of water user associations (related to irrigation); undertakes flood and drought risk management (implementation of the respective strategies and action plans); plans WSS; and manages water-related databases, information systems and cadastres. • Ensures management of the two river basin districts and organises their committees. • Identifies, classifies, delineates and manages water bodies at river basin level. • Co-ordinates the establishment of limits and quotas for water use in the process of issuing environmental permits by the Environment Agency. • implements provisions of international and bilateral treaties to which Moldova is a Party.
Environment Agency (EA) Subordinate institution of MARDE	In 2018, the Environment Agency clarified its role and responsibilities under new legislation approximating EU directives. • Handles key pillars of environmental governance, including assessments, permitting, monitoring and management of environmental information systems. • Provides permits for water abstraction and discharges in water bodies (from the Environmental Inspectorate). • Monitors surface quality and manages reference laboratories. • Handles water-related information – from the Hydrometeorological Service and groundwater monitoring from the Agency for Geology and Mineral Resources.
Environment Protection Inspectorate (EPI) Subordinate institution of MARDE	The EPI replaced the State Ecological Inspectorate after its functions were streamlined (e.g. no longer responsible for the issuance of permits). • Enforces environmental legislation and compliance with environmental permits, including for special use of water.
State Hydrometeorological Service (SHS) Subordinate institution of MARDE	• Monitors hydrological (quantity) of surface waters. • Provides meteorological and climate-related services and information. The Environment Agency has monitored surface water quality from 2019.
Four Regional Development Agencies (North, Centre, South, UTA Gagauzia) Subordinate institution of MARDE	• Contributes to programming and planning of infrastructural investments in WSS services and solid waste management. • Implements national programmes on regional and local levels.
Ministry of Health, Labour and Social Protection (MHLSP)	• Establishes norms and regulations on the quality of drinking water and waters suitable for bathing and recreation.
National Public Health Agency (NPHA)	Created in 2017, the Agency became the single authority to carry out, monitor and implement national policy in the area of health care. It replaced five separate agencies previously responsible for these roles. • Monitors drinking and bathing water quality, and wastewater effluent quality. • Partners with MARDE and AAM in implementing the National Programme for implementation of the Protocol on Water and Health in the Republic of Moldova.
Ministry of Economy and Infrastructure (MEI)	MEI was formed in 2017 from the merger of the Ministry of Economy, the Ministry of Transport and the construction-related divisions of the Ministry of Regional Development and Construction. • Develops specific technical regulations and standards for water-related infrastructure.

Institution	Creation, stipulations and shortcomings
Ministry of Finance	• Handles public finance management, preparation and execution of the state budget, and mid-term budgetary framework. • Co-ordinates bilateral and multilateral co-operation in public finance, including conclusion and implementation of financing agreements with international financial institutions, and bilateral and international donors. • Authorises tax authorities under the ministry to collect charges stipulated in the Law on Payments for Environmental Pollution (1540/1998, as amended by Law 281/16.12.2016).
Ministry of Foreign Affairs and European Integration	• Co-ordinates implementation of the Association Agreement. • Executes and finalises international and bilateral treaties.
National Energy Regulatory Agency (ANRE)	The Agency is managed by an administrative board with five directors appointed for six years. • Handles, among other responsibilities, water tariff reviews (since 2014).
National Bureau of Statistics (NBS)	• Collects, handles and disseminates statistical information on all economic and social areas, including water-related statistics (e.g. based on SDG indicators since 2018).
Local governments	Provision of water and sanitation services has been decentralised to municipalities, according to the Law on Public Services of Communal Management from 2002. However, there is a trend towards development of regional operators supplying services at the district (rayon) level. • Set up, manage and monitor public water supply and sanitation.

Source: Author's own elaboration

Institutional stability and weaknesses in institutions hinder implementation of the new integrated water management policy introduced by Moldova for its approximation with the EU legal and regulatory framework. Further, merging ministries and drastic cuts in specialised staff have seriously impacted the targeted performance of key public sectors (e.g. agriculture, environment, natural resources management, and regional and rural development). Although reforms yielded financial savings, they also gave additional and new responsibilities to executive agencies that sometimes lack the knowledge, staff and financial capacities to implement them successfully. This hinders the effective implementation of objectives.

3.2. Next steps: Scenarios for reform

3.2.1. Scenarios

The scenarios explored outline three broad strategic approaches that either fully or partially address the challenges posed by potential water scarcity or worsening water quality. The *missed opportunities scenario* envisages little improvement and failed national targets. The *business-as-usual scenario* foresees some improvements, although a failure to reach all targets. The *optimal scenario* envisions drastic improvements and either reaching or overshooting targets.

3.2.1.1. The optimal scenario

The optimal scenario achieves robust and sustainable water management, fully aligning with commitments in EU directives and reaching water-related goals by 2030. The scenario envisages increasing the amount of water allocated to environmental uses. It would also connect all urban and most rural households to safely managed water systems. Finally, it would achieve greater social equity and environmental protection through both carefully designed but steady reforms in the water sector and sound government action.

The scenario foresees reasonably higher prices for water and higher water-use efficiency than under the business-as-usual scenario, resulting in reduced consumption. Water would be dedicated to environmental uses, over time resulting in improved quantity and quality of water resources. This would increase reliability of supply for domestic needs, irrigation and production.

The scenario envisages improvements to domestic water supply through universal access to safely managed water systems for rural and urban households, while addressing affordability issues. In the scenario, investments are well balanced between water supply and wastewater treatment measures. It introduces economic instruments and social incentives to improve water-use efficiency, conserve water and generate revenues that are re-invested into the water system in an inclusive and transparent manner.

3.2.1.2. The missed opportunities scenario

Broadly, the missed opportunities scenario foresees a moderate worsening of trends in the water sector, water policy and targeted investments. In the scenario, the 2030 targets will not be achieved. This will be due to forgone opportunities to strengthen water management. The scenario is dire, with large amounts of available water being wasted. In the scenario, expanding the environmental use of water would require reduced consumption of irrigation, and/or domestic or industrial water. In the absence of sound policy and investment reforms, competition over water will increase between households and industries, and between farmers and environmental uses.

The scenario misses opportunities in adopting water-saving technology improvements, regulatory reforms, institutional strengthening and capacity building. This leads to a breakdown in domestic water services, a loss of wetlands and considerable reduction in agricultural food production. The conditions within the scenario do not enable sound water management policies that would steer the country towards achieving its water-related goals.

3.2.1.3. The business-as-usual scenario

In the business-as-usual (BAU) scenario, trends in water policy, management and investment continue. The scenario envisages some improvements in the IWRM system. However, they are not enough to achieve the 2030 targets set by national policy documents and EU commitments. Overall, the water sector development under the BAU scenario for water policy would leave Moldova ill-prepared to meet major challenges in the water sector.

Table 3.8. Comparative analysis of the proposed scenarios

Scenario alternatives	Scenario development	Scenario outcomes
Business-as-usual scenario	• Future governments and water users implement regulatory, institutional and management reforms in a limited and piecemeal way. • Water investments in rural areas and in appropriate sanitation and wastewater treatment are not prioritised in strategic planning. • Implementation and enforcement of regulations on wastewater treatment and discharge are not properly undertaken. • Climate change adaptation and flood and drought risk management measures are not streamlined in strategic development policies. • Public capital investments in water resources management remain under 1% of budgetary spending. • International donor funds remain focused primarily on supply infrastructure. • Economic incentives maintain political opposition. • The cost of supplying water to domestic and industrial users rises due to high water losses from deteriorated infrastructure. • Improved service delivery leads to some increases in the proportion of population connected to piped water. • Irrigation demand doubles following expansion of irrigated areas. Irrigation needs are not met. • The amount of water allocated to preserving wetlands, diluting pollutants, maintaining riparian flora and other aquatic species, increases due to political pressure. • Water monitoring is strengthened. • Information sharing and reporting systems lag. • Investment in monitoring stations and new technologies remain scarce.	• The integrated management of river basins becomes more efficient because of previously applied measures. No further advancements are made. • Point source and diffuse anthropogenic pollution continue to increase pressure on both surface water and groundwater sources. Water bodies do not achieve a "good" ecological and chemical status. • Users continue to place uneven demands on water supply and allocations. • Regulation of water-related permits and enforcement of permit conditions remain weak or underdeveloped. • Resilience against climate-related challenges and disasters is further weakened. • Pressure from discharges of untreated wastewater into water bodies increases. • Many households remain unconnected because of affordability issues. • Water allocated for environmental uses does not increase. • Provision of reliable data and comparable information does not inform decision-making processes.
Optimal scenario	• Current and future governments and international donors increase investments in technological change and reform of water management, boosting water productivity. • Policies improve and investments in rural infrastructure increase. • Climate adaptation options in the agricultural sector are streamlined. • Agricultural water prices gradually increase. A water market is gradually established due to purchasing and trading. • Incentive programmes provide farmers income for the water they save. • Technological improvements and effective economic incentives reduce water demand. • Domestic water use is subject to reforms in pricing and regulation. • Water prices for connected households and connection fees for newly connected users correspond to investments.	• A balance is ensured between capital investments in water supply and wastewater collection and treatment through co-ordinated strategic planning, targeted regulatory and institutional reforms. • Agricultural water prices stimulate water conservation. • Risks related to rain-fed farming reduce, linking more farmers to markets. • Industries respond to higher prices by increasing in-plant reuse and recycling of water, reducing consumption of water. • Pressure on water bodies, incl. wetlands reduce. • All households are connected to safely managed water supply systems by 2030. • Basin water management improves significantly, leading to overall improvement in status of both surface water and groundwater resources. • Higher funding and reduced conflicts over water facilitate effective, co-operative stakeholder participation.

Scenario alternatives	Scenario development	Scenario outcomes
	• Targeted subsidies support low-income and vulnerable households due to higher water prices. • Allocations of water for environmental uses increase due to political pressure. • Targeted reforms are undertaken in water intensive sectors. • Groundwater extraction policies introduce market-based approaches to assigning rights to groundwater based on both annual withdrawals and groundwater recharge. • Stricter groundwater regulations are established for water use and discharge, requirements for on-the-spot metering. These are supported by better enforcement. • Revenue from price increases is invested in reducing water losses and extending piped water to unconnected households. • An improved legal and institutional environment for preventing and eliminating conflicts better facilitates the allocation of water use rights. • River basin organisations are empowered to allocate mainstream water among stakeholder interests under clear and transparent rules.	

Source: Author's own elaboration

3.2.2. Risks and challenges for scenario implementation

Within each scenario, numerous challenges arise that may impede attainment of ambitious national targets. The low baseline, from where the country starts, is the major inhibitor, particularly for achieving targets in the optimal scenario. Moreover, Moldova has not recorded any progress in improving the status of water bodies in the last five years (nearly 95% of water bodies do not meet these standards). This means that spurring action will also require effort and pose challenges for meeting national targets.

Despite recent progress, Moldova has the largest urban-rural gap and the lowest level of access to WSS services among countries in the Danube region. Rural and urban populations had 72% and 97% access in 2018, respectively. This makes it difficult to connect all households to safely managed water supply systems by 2030.

Another challenge is the quality of drinking water. Water supply often fails to meet the established sanitary-chemical norms. In 2017, for example, 54% of samples by the National Public Health Agency did not meet standards. The problem is due to a combination of factors. First, rural water supply is sourced from shallow groundwater affected by natural or anthropogenic pollution. Second, rural localities and households have low budgets, limiting investments in water treatment plants or on-site sanitation. Third, investments would prompt price increases, further exacerbating affordability issues for rural populations.

Drinking water quality issues are compounded by the low share of the population with access to public sanitation services. In 2018, only 29.3% of the country's usual residents[3] were connected to centralised sewerage systems (of which 64% and 2.8% in urban and rural localities, respectively) and only 18.17% of wastewater was sufficiently treated before discharge into receiving water bodies.

Moreover, some investments in sewerage systems were ineffective because the population refused to pay to connect to the network. This reluctance stemmed from economic reasons, regulatory gaps and low

awareness around the need for proper wastewater management. These problems make it difficult to build and rehabilitate sewerage systems (including proper on-site sanitation) and treatment plants. They also limit the possible success of investments in wastewater treatment solutions.

Enforcement authorities largely ignore proper management of *industrial wastewater* and offer no economic mechanisms to stimulate more responsible behaviour. Despite regulations, enforcement and oversight of compliance with environmental legislation are weak. This fails to make industry accountable, jeopardising the operation of wastewater treatment processes that are the responsibility of local public authorities.

Ignorance around risks and vulnerabilities related to climate change further hinder Moldova's resilience, particularly in water resources management and agriculture. Despite adoption of the Climate Change Adaptation Strategy in 2015, streamlining adaptation measures in sectoral strategic planning is not common practice. The strategy estimates the total cost of inaction on climate adaptation in Moldova at USD 600 million. This figure is expected to more than double by 2050 to around USD 1.3 billion. This ignorance and inaction severely limit the capacities of other water management policies to function effectively, creating flow-on effects for attainment of national targets.

In this baseline context, both decision-making and oversight authorities should focus on increasing investment in the wastewater management sector and strengthening control over compliance with water legislation. These measures will significantly increase the quality of both surface water and groundwater. That, in turn, will improve the quality of water supplied to consumers, and make objectives and targets in national strategic documents more achievable. Climate change considerations must be streamlined in all key sectors' development planning and investments, especially in agriculture, forestry and water resources management. In this way, Moldova can avoid the costs of inaction and capture opportunities for more resilient and sustainable development.

3.2.3. Financing each scenario

Overall, there is a large gap between Moldova's level of investment and the investment needs of the water sector. According to a World Bank assessment from 2015, EUR 12 million was invested annually in the water sector between 2009-13, on average. Moreover, two-thirds of these investments have been financed by international donors and one-third by national and local public budgets.

For 2010-20, the National Ecological Fund (NEF) Council approved 2 366 new projects, amounting to MDL 3.1 billion (about EUR 154 million). Most NEF-financed projects are for WSS, although investments in sanitation are considerably lower. The balance between water supply and wastewater treatment should guide future investments. Otherwise, the quality of water resources will be further deteriorated.

No budget funding since 2016 has been allocated for flood protection infrastructure, watershed rehabilitation or river restorations. As such, RBMPs do not foresee acting on measures. However, the medium-term budget framework (MTBF) 2019-21 has additional measures and resources to maintain flood protection dams, as well as for operational monitoring and investment in some monitoring equipment.

Regarding investment planning, WSS is designated as a separate budget line in the 2019-21 MTBF. More than MDL 1 billion is allocated to WSS projects (through both NEF and the National Regional Development Fund [NRDF]). Nevertheless, as a share of GDP, this expenditure remains low at 0.9%.

Across water resource management, WSS and irrigation services, a strategic long-term financing framework for water is missing. The core functions of IWRM are underfunded; there are opportunities to reinvest fees for water use and pollution discharge into management. Furthermore, preliminary estimates of investments required in the water sector until 2030 far exceed the real volume of work financed and implemented annually since 2010. Investments must be carefully weighed against needs, and adequate programming and use of scarce resources. Improving or introducing economic instruments to ensure continuous investments should be prioritised.

The main sources of environmental and water-related financing at the national level are state budget allocations through the NFRD and the NEF, and funds from development partners. In 2017, NEF was established as a budget line. Since this inclusion, expenditures for environmental protection within the state budget vary between MDL 176-297 million (or 0.1-0.3% of GDP, respectively). Table 3.9 presents the estimated financing needs for the optimal and BAU scenarios.

Table 3.9. Financing needs of scenarios and other water management elements

Scenarios and other water management elements	Estimated cost of development and implementation
Optimal scenario – implementing the Water Supply and Sanitation (WSS) Strategy nationwide by 2030, achieving all targets	EUR 2.04 billion TOTAL of which: • EUR 998 million for *drinking water* • EUR 1.04 billion for *wastewater management*. Note: assessment documents supporting the strategy report this level of investment is unfeasible and unaffordable in the short term. This is both in terms of mobilisation of resources for implementation and recovery of operating and maintenance costs.
Business-as-usual scenario – implementing the WSS Strategy in a more realistic way, although without complete achievement of targets	EUR 705 million TOTAL has been earmarked between 2014 and 2028 of this: EUR 194 million was invested in the first five years (2014-18).
Action Plan for 2020-24	Estimated EUR 117 million (MDL 2.3 billion), EUR 64 million (MDL 1.3 billion) will be sought from external sources. To mitigate the negative effects of tariff increases, strategy supporting documents suggest an average annual increase of 5% in consolidated grants from national and local budgets, assuming a stable contribution from foreign funding sources (on average EUR 20 million annually).
Investments in restoring irrigation systems	Required EUR 135 million between 2021-26.
Implementation of measures combating water scarcity and restoring riparian protection belts for rivers and water basins	EUR 3 million (MDL 63.8 million) as estimated in the National Drought Plan of the Republic of Moldova (2019).
Flood risk management investment needs	EUR 70 million for short-term high priority investments.
National Program for implementing the Water & Health Protocol 2016-30	TOTAL EUR 542.5 million (MDL 11.1 billion) • National Program on W&H 2021-25: EUR 312.5 million (MDL 6.4 billion).
WSS Strategy 2014-30	TOTAL EUR 705 million (MDL 14.5 billion) WSS Action Plan 2021-24: EUR 117 million (MDL 2.3 billion).

Note: Exchange rates are as follows 1 EUR = 20.5307 MDL (Nov. 2020); 1 MDL = 0.0487074 EUR (Nov. 2020).
Source: Author's own elaboration

3.2.4. Progress monitoring indicators

Moldova has recently expanded national water monitoring with support from the European Environment Agency within the SEIS II East project. However, there is still some room for improving data quality and completeness and expanding monitoring to capture policy implementation more thoroughly. Further, despite recent developments in handling environmental (including water) data, indicators are not yet used as a tool for results-based management. This means they are not used to identify national priorities or define budget allocations.

Shortcomings in data completeness and quality can be overcome by targeted development of water monitoring and monitoring stations, which are envisaged in each RBMP. A systematic sector performance review based on policy-relevant indicators is needed. This should inform decision making for integrated water resources management and measure progress towards targets set in national programmes and plans.

Table 3.10 presents a proposed set of 15 indicators, intended for assessing progress from a baseline to the aspired future state of water management in Moldova. Moldova already reports on these indicators for various purposes (e.g. for SDG 6 and the UNECE Water Convention). Consequently, the sector performance review indicators may not be considered an additional burden. Rather, it is a systematic exercise that can support planning, management and investment decisions in the area of IWRM.

Table 3.10. Progress monitoring indicators

Category	Indicator	Data collection agency	Data sources	Serving which goals/targets
Water supply	Number and percentage of the total population benefiting from safely managed water supply services	NBS	Local-/district-level data from operators	SDG 6 (6.1) National Policy Protocol on Water and Health; WSS Strategy
	Drinking water quality	National Public Health Agency	Local/district level	SDG 6 (6.3) National Policy Protocol on Water and Health
Wastewater	Number and percentage of total population benefiting from safely managed sanitation service	NBS	Local-/district-level data from operators	SDG 6 (6.2; 6.3) National Policy Protocol on Water and Health; WSS Strategy
	Number and capacity of wastewater treatment facilities	Environmental Agency, AAM	Data from operators	SDG 6 (6.3) WWS Strategy
	Proportion of safely treated wastewater, percentage	Environmental Agency, AAM	Data from operators	SDG 6 (6.3) National Policy Protocol on Water and Health; WSS Strategy
Schools' and hospitals' water, sanitation and hygiene infrastructure	Access to safely managed WSS systems in educational and medical infrastructures	National Public Health Agency	Local/district level	National Policy Protocol on Water and Health
	Access to safely managed sanitation systems in educational and medical infrastructures	National Public Health Agency	Local/district level	National Policy Protocol on Water and Health
Aquatic ecosystem	Quality class of surface water bodies (I-very good; II-good; III-moderately polluted; IV-polluted; V- heavily polluted)	Environmental Agency	RBMD level (SW quality monitoring)	SDG 6 (6.3) National Policy Protocol on Water and Health; RBMPs
	Quality classification of groundwater bodies (quantitative condition; chemical status)	Environmental Agency	RBMD level (GW quality monitoring)	SDG 6 (6.3) National Policy Protocol on Water and Health; RBMPs
IWRM	Degree of IWRM implementation (0-100)	MARDE AAM	UN Questionnaire (SDG 6.5.1)	SDG 6 (6.5)
	Proportion of transboundary basin area with an operational arrangement for water co-operation	MARDE AAM	RBM districts	SDG 6 (6.5)

Financing the sector	Funds allocation to the water and sanitation sector, in MDL (equivalent in EUR)	MARDE	Ministry of Finance (MTBF; budget)	IWRM Policy WSS Strategy
	Budget of the water operators in value (MDL with equivalent in EUR)	Ministry of Finance Fiscal authorities	WSS operators, incl. rural and informal ones	WSS Strategy
Capacity building	Funds allocated to capacity building and skills improvement, in MDL (equivalent in EUR) and percentage of the national budget	MARDE	Ministry of Finance Development partners Water operators	IWRM Policy
	Percentage of stakeholders believing they have the skills to tackle challenges in the water sector	MARDE	Questionnaire to stakeholders in the sector	IWRM Policy WSS Strategy

Note: AAM = Agency Apele Moldovei; IWRM = integrated water resources management; MARDE = Ministry of Agriculture, Regional Development and Environment; NBS = National Bureau of Statistics; WSS = Water supply and sanitation.
Source: Adapted and updated from the Sector Performance Indicators report (IFP, April 2020).

References

Climate Change Post (2021), *Moldova*, https://www.climatechangepost.com/moldova/fresh-water-resources/. [8]

European Environment Agency (2020), *Water availability, surface water quality and water use in Eastern Partnership countries: An indicator-based assessment*, https://www.eea.europa.eu/publications/regional-water-report. [4]

European Union (2014), "Association Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and the Republic of Moldova, of the other part", *Official Journal of the European Union* L 260/4, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22014A0830(01)&from=EN. [1]

FAO (2019), *Computation of long-term annual renewable water resources (RWR) by country (in km3/year, average)*, https://storage.googleapis.com/fao-aquastat.appspot.com/countries_regions/factsheets/water_resources/en/MDA-WRS.pdf. [7]

FAO (2015), *Country profile - Republic of Moldova*, http://www.fao.org/3/ca0329en/CA0329EN.pdf. [9]

Statistica Moldovei (2021), *"Environment" - Statistical Databank*, https://statbank.statistica.md/PxWeb/pxweb/en/. [6]

Statistica Moldovei (2020), *Statistics for Sustainable Development Goals*, https://statistica.gov.md/public/files/SDG/docs/Statistics_for_SDGS_Moldova.pdf. [5]

UNDP (2017), *National Human Development Report 2015/2016*, http://hdr.undp.org/en/content/national-human-development-report-2016-moldova. [3]

UNDRR (2015), *The Human Cost of Weather Related Disasters (1995-2015)*, https://reliefweb.int/report/world/human-cost-weather-related-disasters-1995-2015. [12]

UNECE (2019), *National summary country report in accordance with article 7 of the Protocol on Water and Health, 2019 Reporting cycle*, https://unece.org/fileadmin/DAM/env/water/Protocol_reports/reports_pdf_web/2019_reports/Republic_Moldova_summary_report_4th_cycle_7May19.pdf. [10]

World Bank (2021), *World Development Indicators*, https://databank.worldbank.org/source/world-development-indicators. [2]

World Bank (n.d.), *Climate Change Knowledge Portal: Impacts: Water*, https://climateknowledgeportal.worldbank.org/country/moldova/impacts-water. [11]

Notes

[1] For the 2014 census, the national statistics data have been recalculated by applying the international definition of *usual residence* (defined as the place at which the person has lived continuously for most of the last 12 months, not including temporary absences for recreation, holidays, visits to friends and relatives, business, medical treatment or religious pilgrimage).

[2] Within the "Enabling transboundary co-operation and integrated water resources management in the Dniester River Basin" project financed by the Global Environment Facility and implemented by the Organization for Security and Co-operation in Europe.

[3] For the 2014 census, the national statistics data have been recalculated by applying the international definition of *usual residence* (defined as the place at which the person has lived continuously for most of the last 12 months, not including temporary absences for recreation, holidays, visits to friends and relatives, business, medical treatment or religious pilgrimage).

4 Options for Ukraine's water policy reform journey – challenges in developing a water policy outlook

This chapter considers Ukraine's ambitions and outlook for its water sector including water-related obligations under the Association Agreement with the European Union and targets under multilateral environmental agreements including the Sustainable Development Goals. Obligations under the EU Water Framework Directive and associated directives are discussed, including time-bound commitments concerning the identification of river basin districts and preparation of river basin plans. The chapter considers Ukraine's current state of play with regard to water resources and pressures facing the sector. Finally, the chapter considers the existing policy and legislative framework and considers scenarios for possible future reforms.

Ukraine's relationship with the European Union provides a framework for water policy reform

Over the past few decades, the European Union has intensified its co-operation with the countries of Eastern Europe and the Caucasus, including Ukraine. This co-operation has developed notably within the framework of the Eastern Partnership (EaP), which was launched in 2009. Closer bilateral ties culminated in the signing of the EU-Ukraine Association Agreement (AA) including a Deep and Comprehensive Free Trade Area (DCFTA) in 2014. After provisional application, the AA and DCFTA came into force in September 2017. The AA commits Ukraine to bring its legislative and regulatory frameworks into line with those of the European Union in several areas, including environment and water resources management.

The AA defines timeframes in which Ukraine is expected to align national practices with the EU directives related to water quality and resource management, including the marine environment. All provisions should be implemented by 2027, which will mark ten years of the AA's entry into force. Of these directives, the Water Framework Directive (WFD) is the most crucial legal act concerning water protection and regulation. It aims to ensure the viable, socio-economic management of resources; to protect the quantity and quality of water; and to promote sustainable water use.

The EU-Ukraine AA transcends the WFD, extending to commitments more broadly related to the water sector. Table 2.1 summarises the water-related EU directives, including provisions, timeframes for implementation as defined by the AA and status as of 2021. This assessment covers all water-related EU directives except the Floods Directive and the Marine Strategy Framework Directive.

Ukraine has assigned responsibility for implementation of EU directives to relevant institutions, but some problems persist. Institutional issues remain unresolved in management of both maritime protection and underground waters according to the basin principle. In terms of legislation, Ukraine has partially completed the approximation required by Ukraine's AA, notably through the 2017 amendment of the 2002 Water Code. However, legislative shortcomings persist, including a lack of definition for "ecological river flow" in water legislation. Pollution is insufficiently monitored and controlled. Sources include diffuse pollution of groundwater with nitrates and phosphorous compounds, as well as pesticides and persistent organic pollutants, discharge of polluted wastewater from municipal treatment facilities and pollution linked to the mining industry. In addition, there are persistent risks of inadequate access to drinking water and sanitation related to floods, droughts and health impacts. Water supply and sanitation (WSS) service delivery varies widely and is particularly inadequate in rural areas. Finally, ageing irrigation and drainage infrastructure leads to reduced agricultural yields and increases risk of desertification.

Table 4.1. EU directives on water quality and resource management and timeframes for their implementation in Ukraine

Directive	Provision	Timeframe (from entry into force in 2017)	Status (2021)
Water Framework Directive (Directive 2000/60/EC establishing a framework for Community action in the field of water policy as amended by Decision No 2455/2001/EC and Directive 2009/31/EC)	Adoption of national legislation and designation of competent authority/authorities	Within three years (i.e. 2020)	2002 Water Code updated in 2017. Ministry of Environmental Protection and Natural Resources responsible for implementation.
	Establishment of legislative definition of the country's territory hydrographic zoning unit	Within three years (i.e. 2020)	
	Development of appropriate national legislation (Regulation on Basin Directorate) making the "Basin Directorate" responsible for functions provided by art. 3 of Directive 2000/60/EC	Within three years (i.e. 2020)	

Directive	Provision	Timeframe (from entry into force in 2017)	Status (2021)
	Identification of river basin districts and establishment of administrative arrangements for international rivers, lakes and coastal waters	Within three years (i.e. 2020)	River basin districts have been established and basin councils have been introduced.
	Analysis of the characteristics of river basin districts	Within six years (i.e. 2023)	
	Establishment of programmes for monitoring water quality	Within six years (i.e. 2023)	
	Preparation of river basin management plans, consultations with the public and publication of these plans	Within ten years (i.e. 2027)	In development.
Floods Directive (Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks)	Adoption of national legislation and designation of competent authority/ies	Within two years (i.e. 2019)	Ministry of Internal Affairs and the State Service for Extraordinary Situations responsible for implementation.
	Undertaking preliminary flood assessment	Within four years (i.e. 2021)	
	Preparation of flood hazard maps and flood risk maps	Within six years (i.e. 2023)	
	Establishment of flood risk management	Within eight years (i.e. 2025)	
Urban Waste Water Directive (Directive 91/271/EEC of 21 May 1991 concerning urban waste water treatment as amended by Directive 98/15/EC and Regulation (EC) No 1882/2003)	Adoption of national legislation and designation of competent authority/ies	Within three years (i.e. 2020)	Ministry of Development of Communities and Territories responsible for implementation.
	Assessment of the status of urban wastewater collection and treatment	Within five years (i.e. 2022)	
	Identification of sensitive areas and agglomerations	Within six years (i.e. 2023)	
	Preparation of technical and investment programme for the urban wastewater collection and treatment	Within eight years (i.e. 2025)	
Drinking Water Directive (Directive 98/83/EC of 3 November 1998 on quality of water intended for human consumption as amended by Regulation (EC) No 1882/2003)	Adoption of national legislation and designation of competent authority/ies	Within five years (i.e. 2022)	Ministry of Health Care responsible for implementation.
	Establishment of standards for drinking water	Within five years (i.e. 2022)	
	Establishment of a monitoring system	Within five years (i.e. 2022)	
	Establishment of a mechanism to provide information to consumers	Within five years (i.e. 2022)	
Nitrates Directive (Directive 91/676/EC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources as amended by Regulation (EC) No 1882/2003)	Adoption of national legislation and designation of competent authority/ies	Within three years (i.e. 2020)	Ministry of Economic, Trade and Agrarian Development and Ministry of Environmental Protection and Natural Resources responsible for implementation.
	Establishment of monitoring programmes	Within four years (i.e. 2021)	
	Identification of nitrate vulnerable zones	Within three years (i.e. 2020)	
	Establishment of action plans for nitrate vulnerable zones	Within four years (i.e. 2021)	

Directive	Provision	Timeframe (from entry into force in 2017)	Status (2021)
Marine Strategy Framework Directive (Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy)	Adoption of national legislation and designation of competent authority/ies	Within two years (i.e. 2019)	Ministry of Environmental Protection and Natural Resources responsible for implementation.
	Development of a marine strategy in co-operation with relevant EU member state(s)	Within four years (i.e. 2021)	
	Initial assessment of marine waters, determination of good environmental status and establishment of environmental targets and indicators	Within four years (i.e. 2021)	
	Establishment of a monitoring programme for ongoing assessment and regular updating of targets	Within six years (i.e. 2023)	
	Preparation of a programme of measures to achieve good environmental status	Within seven years (i.e. 2024)	

Source: Author's own elaboration based on European Union (2014[1]), "Association Agreement between the European Union and its Member States, of the one part, and Ukraine, of the other part", *Official Journal of the European Union*, I. 161/4, 29 May 2014, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22014A0529(01)&from=EN

In addition to these directives, Ukraine is striving to implement environmental and water-related national legislation. It is also aiming to achieve the Sustainable Development Goals (SDGs) adopted at the 2015 UN Summit (6, 14 and 15). In addition, it wants to ratify the UN Economic Commission for Europe (UNECE) Convention on protection and use of transboundary water courses and international lakes (1999). Finally, it wants to implement the UNECE Convention on access to information to improve public participation in decision making and environmental justice.

Ukraine's international relations in the water sector relate to transboundary co-operation on water use and protection. Ukraine joined the Water Convention in 1999 and ratified the Water Protocol in 2003. International water co-operation under these treaties is carried out through basin agreements (for the Black Sea, and Danube and Dniester rivers). This is a new co-operation approach in Ukraine and co-exists with Soviet-era bilateral agreements on transboundary water co-operation with neighbours.

4.1. State of play

4.1.1. Water resources in Ukraine

4.1.1.1. Water use and main pressures on water resources

Ukraine is a relatively water-abundant country, but water use is intensive. Ukraine is the most populous country in the EaP by a wide margin with an economy heavily dependent on agriculture. Following a decrease in freshwater abstraction in Ukraine between 2000 and 2015, abstraction has begun to trend upwards in recent years [Figure 4.1(a)].

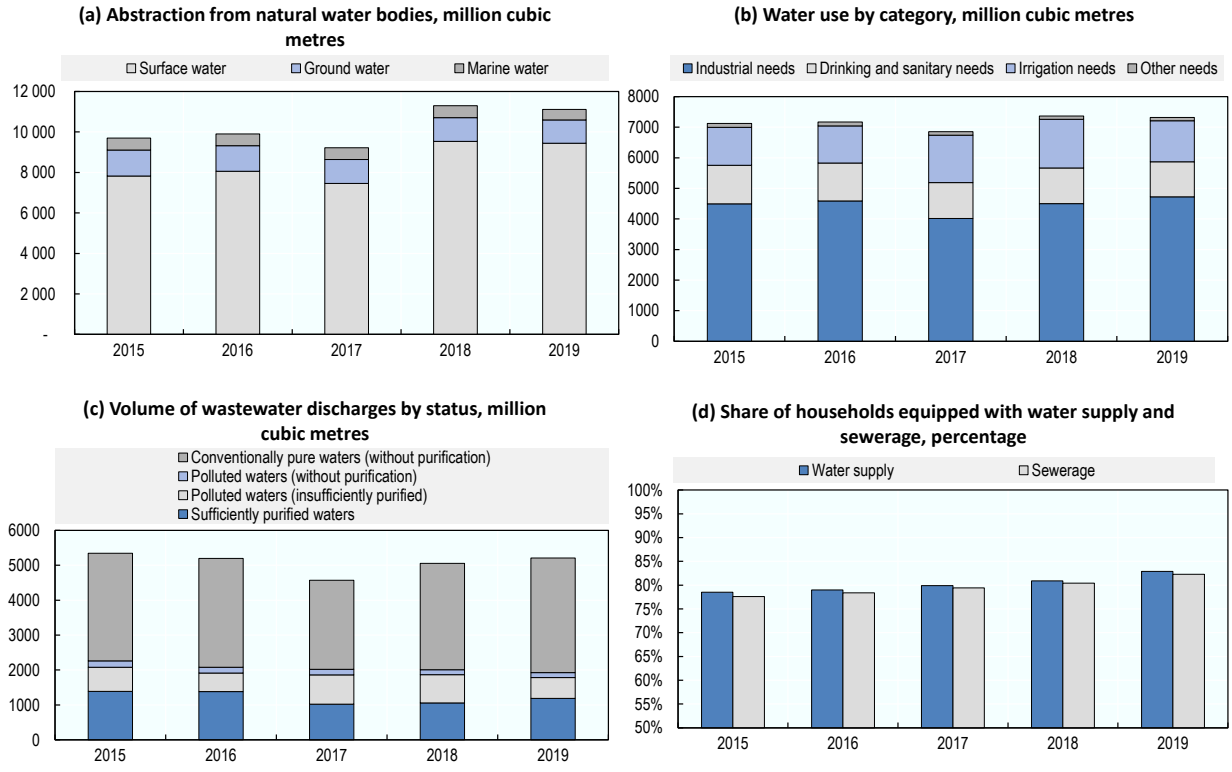
Only a fraction of Ukraine's water resources is formed locally. Most water flows into the country from Belarus, Romania and the Russian Federation (hereafter "Russia"). As such, water stress (defined as the ratio of abstracted water to renewable water resources) in 2018 was 18.8% (locally formed resources only) and 5.2% (all water resources). Per capita freshwater abstraction in 2018 was 253 cubic metres (m^3).

Ukraine faces water quality challenges caused by the discharge of untreated and insufficiently treated wastewater into water bodies [Figure 4.1(c)]. Urban treatment plants, which lack tertiary treatment facilities, have inadequate capacity and poor working conditions. In addition, rural areas have low access to sewerage (European Environment Agency, 2020[2]).

While Ukraine has consistently increased access to WSS services, access is still far from universal [Figure 4.1 (d)]. By 2030, Ukraine aims to overcome inequalities in access to water and sanitation. It aims to guarantee a social minimum of water (a certain number of litres per person per day) for drinking and sanitation purposes regardless of place of residence (rural or urban).

In accordance with international norms, Ukraine is required to pass legislation by 2025 that guarantees equal rights to water and sanitation. Water policy measures would follow to implement the legislation. By 2025, ensuring the right to drinking water and sanitation is likely to be considered as a priority for financing in the budgets of all levels (national-regional-local). Co-financing and attracting investment in the development of the water supply and sewerage sector and wastewater treatment will be required.

Figure 4.1. Water use in Ukraine



Source: State Statistics of Ukraine (2020[3]), *Environment of Ukraine 2019*, State Statistics of Ukraine, https://ukrstat.org/uk/druk/publicat/kat_u/2020/zb/11/Dovk_19.pdf; State Statistics of Ukraine (State Statistics of Ukraine, 2017[4]), *Enviroment of Ukraine 2016*, State Statistics of Ukraine, https://ukrstat.org/uk/druk/publicat/Arhiv_u/07/Arch_dov_zb.htm.

4.1.1.2. Ukraine's water resources and river basins

According to multi-year observations, the potential water resources of Ukrainian rivers amount to over 209.8 cubic kilometres (km^3), only 25% (52.4 km^3) of which are formed on the territory of Ukraine. The remainder (157.4 km^3) enters Ukraine from neighbouring countries, particularly Belarus and Russia. Projected resources of underground waters not connected to surface waters are 61.7 million m^3 per day, and their extraction volume is about 3.3 million m^3/day. Additionally, some sectors of the Ukrainian economy use about 1 km^3/day of marine water.

Ukraine's water resources are unevenly distributed across the country's territory due to climate conditions, topography and the geological structure of nine individual river basin districts. Five empty into the Black Sea (the Dnieper River Basin, the Dniester River Basin, the Danube River Basin, the area of the Southern

Bug River Basin, the Black Sea River Basin). Two empty into the Sea of Azov (the Don River Basin, the Priazovya River Basin). One empties into the Baltic Sea (the Vistula River Basin). Finally, one enters into both the Black Sea and Sea of Azov (the Crimean River Basin District).

The southern regions of Ukraine, where most agricultural and industrial water users are concentrated, suffer from water stress and insecurity. These regions rely on the Dnieper River for all their water resources. The Dnieper makes up 80% of all water resources in Ukraine, supplying drinking water to two-thirds of the country's population.

Ukraine has built more than 1 160 reservoirs with a cumulative volume of about 55 km^3 to improve water supply. These include the Kremenchukske and Kahovske reservoirs (part of the cascade of Dnieper reservoirs), which rank among the largest in the world with surface areas of 2.23 thousand km^2 and 2.15 thousand km^2 respectively. Ukraine also has an extensive network of canals (over 1 000 km) and water supply systems (over 2 000 km). This makes it possible to redistribute annually 3-12 km^3 of fresh water, respectively.

The long-term change in the hydrological regime has been pronounced in Ukraine over the last 20 years, leading to the shallowing and further disappearance of small rivers and streams. This problem is especially urgent for small rivers. Due to intensive agricultural activity, their run-off in the forest-steppe zone and in Polissya (a region in the country's north, primarily in the Pripyat River Basin, a sub-basin of the Dnieper River Basin District – see below) has decreased by 5% and in the steppe by 10%.

In some parts of the steppe zone, the volume of run-off decreased by 40%; in Polissya, it decreased by 15-20%. A considerable number of small rivers has been lost over the decades following independence. Although lack of data prevents exact quantification of these losses, evidence from the Dnieper River suggests the cumulative impact of decreased run-off from small rivers is considerable. Over the past three years, the Dnieper's run-off decreased by 11 km^3 according to measurements taken at the city of Kherson, on the Black Sea at the mouth of the Dnieper River.

Along with the significant climate change impact, other root causes of the negative impact on the hydrological regime include the following:

- high agricultural use of lands, especially in southern regions, and improper agricultural practices, including violations of water protection zones, ploughing of agricultural lands near the water edge of small rivers, burning and cutting of reeds and other coastal vegetation, and so on
- high water capacity of industrial and agricultural production
- systematic violations and failures in complying with legislation on water protection strips
- lack of clarity in the definition and application of the ecological water flow
- artificial modification of hydromorphological characteristics, which is straightening riverbeds, silting, shallowing and further disappearing water streams
- lack of funds and works, as well as lack of political will on the appropriate restoration of hydromorphological characteristics, including repair and restoration of hydraulic constructions that are important in the hydrological regime regulation (e.g. a flood in Western Ukraine in 2020 destroyed water dams everywhere).

4.1.1.2.1. River basin management plans

River basin management plans (RBMPs) in Ukraine are being developed to achieve specific environmental objectives for each of the nine river basin districts. The Ministry of Environmental Protection and Natural Resources and the State Water Agency are carrying out measures for the development of the plans and their implementation. Updates are foreseen every six years. All basins seek to achieve and maintain "good" ecological status of surface water and groundwater bodies, and "good" ecological potential of artificial or significantly altered surface water bodies. The plans are developed by the State Water Agency together

with the State Agency for Geodesy, central and local executive bodies, local governments and other stakeholders; they also consider decisions of the relevant basin councils. To date, RBMP implementation has begun only on the Dnieper River Basin.

The Dnieper River Basin Management Plan

The Dnieper Basin is the largest in Ukraine, covering twice the total land area covered by the other eight basins. It is thus divided into four smaller sub-basins, each with its own RBMP. Input at the local level helped determine how the ecosystems interact with human activities in each sub-basin and measures needed to develop each one sustainably. The plan was prepared in accordance with European requirements and developed based on best practice for implementation of the WFD. Plans contain a general description of the river basin, analysis of anthropogenic impacts and protected areas, environmental objectives and an economic analysis of water use within the basin. The plan's next cycle is expected to be supplemented by assessments of water monitoring results, further building a Programme of Measures (PoM) to achieve the relevant environmental objectives of the basin. The plan will serve as the basis for other RBMPs in Ukraine that are in development.

4.1.1.2.2. Water management issues and pressures in Ukraine's river basin districts

Key water management issues within the Dnieper River Basin relate principally to problems with pollution. They require management interventions to align with the WFD in the following areas:

- insufficient or absent wastewater treatment resulting in organic and nutrient pollution
- pollution from hazardous substances, particularly from the wastewaters of industrial and municipal enterprises, and pesticides, among others
- hydromorphological changes throughout the basin, which influence flood protection, hydropower, flow regulation and riverbed straightening
- insufficient data to determine the ecological status of water bodies, which means experts designate risk (EUWI+, 2020[5]).

Aligning with the WFD's environmental objectives means achieving "good" rating for ecological/chemical status of surface water bodies; ecological potential and chemical status of heavily modified and artificial water bodies; and chemical or quantitative status of groundwater bodies. Based on these objectives, the Dnieper RBMP identified more specific environmental objectives drawing on the delineation categories for water bodies within the basin (see Table 4.2).

Table 4.2. Environmental objectives of the Dnieper RBMP

Status of the water body in 2015	Environmental objective
Water bodies deemed as "high" or "good" status.	Maintaining the water status across all planning cycles up to 2032 and beyond.
Water bodies that are either at risk of failing the environmental objectives in 2015 or in moderate status in 2015.	By 2021, having Water Framework Directive compliant status assessment in place or achieving a "good" status by 2021.
Water bodies that are either at risk of failing the environmental objectives in 2015 or in poor status in 2015.	By 2021, having Water Framework Directive compliant status assessment in place or achieving a "good" status by 2027.
Water bodies that are either at risk of failing the environmental objectives in 2015 or in bad status in 2015.	By 2021, having Water Framework Directive compliant status assessment in place or achieving a "moderate" status by 2021, achieving a "moderate" or "good" status by 2027, or certainly achieving a "good status" by 2033.

Source: Information in this table was obtained from UNENGO 'MAMA-86' (2015[6]), *Draft River Basin Management Plan for the Upper Dnieper Pilot Basin of Ukraine*, http://blacksea-riverbasins.net/sites/default/files/RBMP_Upper%20Dnieper_UA_EN_final_1.pdf

4.1.1.2.3. Programme of measures

The PoM identifies actions that will help meet the environmental objectives set in the RBMP. Table 4.3 describes the major issues in the Dnieper River Basin and the aligned measures that contribute to overcoming them.

Table 4.3. Programme of measures in the Dnieper RBMP: Achieving the environmental objectives

Environmental issues	Programme of measures
Untreated wastewater causes organic and chemical pollution.	• Harmonising legislation with the EU Urban Waste Water Directive. • Making technical investments align wastewater systems with compliance stipulations in the directive. • Progressively introducing mechanisms to encourage adoption of best available technologies relevant to the industry.
Mineral fertilisers from agriculture result in nutrient pollution.	• Harmonising legislation with the EU Nitrates Directive. • Adopting good agricultural practices. • Developing action plans for vulnerable zones.
Hydromorphological changes from engineering projects can disrupt natural flow regimes and ecosystems.	• Creating an inventory of all artificial changes to water bodies. • Optimising the number of reservoirs, rivers' water balances and the number of gates regulating water levels.
Agricultural run-off can contain dangerous industrial substances and pesticides contaminating surface waters.	• Introducing technologies to ensure the environmentally safe storage of hazardous pollutants, including banned and obsolete pesticides. • Designing a water monitoring system to help identify and eliminate polluting sites.
Improperly sealed cesspools and septic tanks in areas where municipal sanitation services are lacking. Leaking contaminates surface water and groundwater, leading to health hazards.	• Developing community and individual sanitation systems. • Installing watertight storage tanks. • Setting up protection zones around drinking water sources.

Source: Information in this table was obtained from the Regional Environmental Centre for Central and Eastern Europe (2016[71]), *Upper Dnieper River Basin: Draft River Management Plan*, http://documents.rec.org/publications/4_UpperDnieper_Eng.pdf

4.1.2. Ukraine's policy, legal and institutional framework

The legal, regulatory, policy and institutional environment in Ukraine is becoming more robust in terms of alignment with the WFD. However, major pieces of legislation delegate responsibilities to sub-legal and normative-legal acts, creating inefficiencies in the legal system. Further, issues with corruption can obstruct effective management across regulations, policies and institutions. Streamlining and clarifying roles and responsibilities of water management actors and establishing long-term policy objectives would help align and strengthen water management direction within Ukraine and in relation to the WFD.

4.1.2.1. Policy framework

Broadly, Ukrainian water policy can be seen through two interconnected "policy avenues". The first revolves around the rational use of water resources and quantitative restoration. The second focuses on quality aspects combating and preventing pollution.

Until 2020, the Law of Ukraine "On basic principles (strategy) of the environmental policy of Ukraine till to 2020" served as the main prerequisite for obtaining EU Sectoral Budget Support. The strategy proposed strategic objectives including: introducing integrated water resource management (IWRM) according to river basin principles; reconstructing existing and constructing new municipal treatment plants; developing and implementing a PoM to reduce pollution of inland waters and the territorial seas; and ensuring compliance with regulatory requirements.

In 2020, the Ministry of Ecology and Natural Resources developed the Law of Ukraine "On basic principles (strategy) of the state environmental policy of Ukraine till to 2030". This stipulates water management objectives, including the following:

- ensuring the clear division of responsibilities in the field of environmental protection at the state, regional and local levels
- implementing principles of good environmental governance
- maintaining a permanent dialogue with stakeholders in strategic decision making
- strengthening institutional capacity for planning, monitoring and evaluating the effectiveness of environmental policy implementation
- strengthening capacity of environmental governance in conducting comprehensive environmental monitoring and state control in the field of environmental protection, rational use, reproduction and protection of natural resources
- defining functions on environmental protection and economic activity related to the use of natural resources.

These objectives more closely align Ukrainian and EU policy objectives. They have been further specified and reformulated in the draft Strategy for the Development of Water Policy of Ukraine till 2050. The Cabinet of Ministers is reviewing the draft strategy. In 2022, it will also review a draft Strategy of Maritime Environmental Policy of Ukraine till 2032.

Besides these draft strategies, Ukraine has developed the Concept of Water Sector Reform. This aims chiefly to establish a national water market. However, it also separates the economic functions of water service supply from state water governance. In addition, it establishes the National Water Council to undertake both guidance and supervision on the preparation and implementation of RBMPs and to regulate water tariffs for irrigation. Long term, it aims to do the following:

- Ensure equal access of the population to safe water and proper sanitation.
- Achieve and maintain the “good” ecological status of surface water bodies; ecological potential of artificial or significantly altered surface water bodies; quantitative and qualitative groundwater conditions; and ecological status of coastal and sea waters.
- Ensure water efficiency and the required amount of quality water resources for restoration of aquatic ecosystems and achieving sustainable abstraction and supply of fresh water for the needs of the population.
- Manage and minimise growing water risks of extreme floods, floods and droughts, as well as risks to human health related to lack of adequate access to safe water and sanitation.
- Introduce IWRM according to basin principles and achieve proper environmental governance in the districts of river basins, coastal and sea waters.

The uptake of the draft strategy and the Concept of Water Sector Reforming depends on the stability of the Ministry of Environmental Protection and Natural Resources, and funding.

Another key policy document is the National Action Plan for 2020-25. The plan was adopted in January 2020 and supports the preparation process for implementing the Strategy of the State Environmental Policy of Ukraine till to 2030. Its two stages (2020-25 and 2026-30) will be evaluated against indicators outlined in the strategy. An assessment of its predecessor is in preparation.

4.1.2.2. Legal framework

Ukraine’s natural resources are public property, with the rights of Ukrainian people being exercised by state bodies and local governments within limits defined by the Constitution and other laws. The Water

Code of Ukraine (2002) is the main piece of legislation driving Ukrainian water management. Updates to the Code in 2017 aligned large parts of legislation with EU directives.

Ukraine's Water Code legislates all types of water bodies including surface, underground and marine waters. In 2017, changes to the Code, in accordance with the WFD, defined legal provisions for moving towards IWRM. They also further established basin principles for water resource management. The main improvements relate to defining river basin districts and establishing river basin councils and procedures for RBMP development.

Table 4.4. Key legislation for water management in Ukraine

Legislation and relevant information	Stipulations
Water Code of Ukraine No.213/95-VR (1995)	• Ensures the conservation and rational use of water. • Stipulates measures for the restoration of water resources. • Details measures for the protection of waters from pollution, littering and exhaustion. • Details measures for the prevention of harmful effects of water and elimination of their effects. • Outlines the status of water bodies. • Classifies water users based on consumption. • Protects the rights of businesses, institutions, organisations and citizens to water use. • Outlines permits for special water use. • Establishes water quality standards. • Establishes norms and limits for technological regulation (water permits). • Establishes maximum permissible pollutants' discharge. • Addresses the responsibilities of relevant authorities and clarifies approaches to RBMP development. • Sets standards for environmentally safe water use. • Sets water quality ecological standards for surface and underground water bodies.
Law of Ukraine "on drinking water, drinking water supply, and wastewater drainage" (2017)	• Stipulates the constitutional requirement to provide drinking water in the necessary amounts and in accordance with established norms and standards. • Determines drinking water quality standards. • Provides guidelines for receiving wastewaters in centralised sewage systems, including stipulating penalties for exceeding norms. • Provides criteria for defining vulnerable and less vulnerable zones. • Stipulates licence conditions for economic activities in centralised water supply and drainage.
Law of Ukraine No. 1264-XII on environmental protection (1991)	• Delegates environmental responsibilities to other sub-legal and normative acts. • Defines relationships in the sphere of environmental protection. • Regulates the sphere of natural resources protection, use and management. • Established environmental monitoring and control, natural resources registers, environmental accounting, standardisation and environmental norms, and economic management mechanisms. • Ensures ecological safety. • Prevents negative environmental impacts of economic and other activities. • Conserves natural resources. The law is supported by Land, Water, Subsoil, Forest Codes of

Legislation and relevant information	Stipulations
	Ukraine, the Tax Code containing economic instruments of natural resources regulation, Laws on the Protection of atmospheric air and Protection of Lands, Laws of Ukraine on the plant world and the animal world, Law on Natural Reserved Fund of Ukraine, Law on Wastes and other legal acts. Shortcomings include: • Requires further development or renewal in terms of compliance. • Requires clearer identification of the legal status of water protective strips and zones.
Subsoil Code (No.132/94-VR of 1994)	• Mostly details general provisions on soil and deposits, stock and exposure of minerals. • Considers underground water as a mineral resource. • Contains some provisions for the protection of underground waters. The Code is under revision.
Law of Ukraine "on Environmental Impact Assessment" No. 2059-VIII (2017)	• Implements the EU Directive "On the Assessment of the Effects of Certain Public and Private Projects on the Environment". • Stipulates requirements for planned activities that interfere with the natural environment. • Establishes legal and organisational principles for environmental impact assessments. • Outlines rational use and reproduction of natural resources. • Stipulates processes of decision making related to economic activities that can have significant environmental impacts.
The Law of Ukraine "About the statement of the National target program of development of water management and ecological improvement of the basin of the river Dnieper for the period till 2021" (2013)	• Approves the national target programme. • Stipulates provision of information to provide to ensure implementation of the programme.
The Law of Ukraine "On Organisations of Water Users and Stimulation of Hydraulic Land Reclamation" (in preparation)	• Will define conditions for the establishment and operation of water user associations regarding the joint use and maintenance of reclamation engineering infrastructure facilities. • Will regulate relations between water users, primarily farmers, who use reclamation infrastructure and establish clear rules that allow investing in the development and modernisation of reclamation infrastructure. Introduces the concept of water user organisations as non-profit entities that ensure operation and maintenance of the reclamation system and provide water users with water for hydraulic reclamation.
The Law of Ukraine "On main principles (strategy) of the state environmental policy of Ukraine till 2030"	• Approves the main principles (strategy) of the state environmental policy of Ukraine for the period till 2030. • Stipulates reporting requirements for the strategy.

Source: Author's own elaboration.

Because Ukrainian legislation was developed according to former Soviet practices, it does not generally include specifics on action. These are typically delegated to lower legislative levels such as sub-legal and normative legal acts. Although high-level legislation may outline effective water management, subsequent lower-level legislation may thus distort or counteract its effectiveness.

4.1.2.3. Regulatory framework

The following table considers the major regulatory acts that govern water sector management.

Table 4.5. Key water management regulation in Ukraine

Regulation	Stipulations and shortcomings
Decision of the Cabinet of Ministers of Ukraine # 413 "On adoption of the Guidelines for development of normative on limit permissible discharge of pollutants into water bodies and a list of pollutants discharged into water bodies is regulated" (1996)	• Allows limits to be prepared by polluters and approved with the departments on environmental protection of oblasts' state administrations. • Stipulates how limits should be calculated.
Decision of the Cabinet of Ministers of Ukraine # 336 "On adoption of the Guidelines for development of the river basin management plan" (2017)	• Provides sub-orders for the Ministry of Ecology and Natural Resources of Ukraine to: ○ identify sub-basins and water management areas within the established river basin districts ○ approve methodologies for defining surface and underground water bodies ○ approve methodology for assigning classes of ecological and chemical states to surface water bodies.
Decision of the Cabinet of Ministers of Ukraine # 758 "On adoption of the Guidelines for carrying out the state water monitoring" (2018)	• Stipulates orders approving sectoral water monitoring programmes of the State Water Resources Agency, the Public Service on Geology and Subsoil and the Public Service of Emergency Situations (Service of Hydrometeorology). • Provides sub-orders for the Ministry of Ecology and Natural Resources to approve the list of pollutants for determining chemical statuses of surface water and groundwater bodies and the ecological potential of artificial or substantially modified surface water bodies.
Decision of the Cabinet of Ministers of Ukraine # 321 "On adoption of the Guidelines for issuing the permit for special water use" (2002)	• Provides sub-orders for approving the form of permits for special water use and forms of normative calculation of water use and wastewater discharge and methods for issuing permits for special water use.
Decision of the Cabinet of Ministers of Ukraine # 247 "On adoption of the Guidelines for development of the flooding risks management plan" (2018)	• Provides sub-orders for approving the methodology for assessing flooding risks and for developing maps of flooding threats and risks.
Decision of the Cabinet of Ministers of Ukraine # 1107 "On approval of Guidelines for development and adoption of standards for drinking water supply (2004).	• Provides sub-orders on approving state sanitary norms and rules and on guidelines for the development and approval of technological norms of drinking water use by enterprises that provide services of centralised water supply and/or drainage.

There are opportunities for strengthening Ukrainian regulation both in terms of its implementation. The effectiveness of Ukrainian water regulation is hindered by the wording of the regulation with multiple possible interpretations. This causes misunderstandings between central and local approaches to regulation implementation and impedes the overall effectiveness of the regulation.

4.1.2.4. Institutional framework

Table 4.6. Water institutional bodies and arrangements in Ukraine

Institution	Sub-bodies and agencies	Water-related functions
Ministry of Environment Protection and Natural Resources	• Central apparatus: Department of Protection of Land and Water Resources. • Since 2012, territorial bodies have been dismantled. • Natural Reserve Fund.	• Institutional body responsible for implementing the Water Framework Directive, 2000/60/EC and the Marine Strategy Framework Directive, 2008/56/EC. • Formulates water policy, including approaches for: ○ RBMP development and implementation ○ delegating water permits ○ water monitoring. • Establishes environmental water standards.

Institution	Sub-bodies and agencies	Water-related functions
		• Proposes new approaches for water pricing and water pollution (to be accepted by other ministries and adopted by the Cabinet of Ministers of Ukraine). • Developed the Automatic Information System (AIS), which manages data and information on air quality and water resources, and provides information services to display financial information on environmental issues, including water resources. • Produces the annual National Report on the State of Environment in Ukraine. However, the National Report has a five-year delay and is only available up to 2015. The Natural Reserve Fund does not relate to water management directly, although it provides protection over land and water regions. There is some crossover between the Fund's objectives and those of RBMPs.
State Agency of Water Resources • The 13 river basin councils (RBCs) were established as advisory bodies to SAWR and MEPNR. Interagency co-ordination body led by SAWR: Interagency commission on the regulation of work regimes of reservoirs of Dnieper and Dniester rivers.	• Central Apparatus: Department for water management. • 22 oblast sub-divisions (sectors) • 12 basin departments on water management • 14 regional offices • 4 departments managing water channels.	• The central apparatus implements water policy for surface freshwater bodies, including: o water permits o water monitoring o water reporting and accounting o support for water cadastres o water transporting o irrigation and drainage services. • Oblast sub-divisions represent SAWR at the oblast level, including issuing water permits, providing administrative services and other functions in the use and protection of water resources. • Basin departments develop RBMPs; co-ordinate work of RBCs and regional offices; monitor water, develop water economy balances, inter-basins water distribution and transboundary co-operation; and co-ordinate water reporting and accounting. • Regional offices provide water for industry and agriculture, and manage the engineering and amelioration of state infrastructure. • Water channel departments transport and distribute water between and within basins.
State Ecological Inspection (SEI) In the process of reform.	• Central apparatus: Division of the state supervision on water ecosystems and resources. • 17 oblast level territorial inspections, 1 marine inspection and 5 interregional (district) inspections.	• Implements environmental and water policy related to legislation compliance including supervision of water use and water pollution.
Public Service on Geology and Subsoil (PSGS) In the process of reform.	• Central apparatus: Department of geology; Division of hydrogeology and eco-geology • 6 territorial inspections.	• Implements geology and subsoil sector policy.

Institution	Sub-bodies and agencies	Water-related functions

	• 15 state enterprises.	• Explores and assesses underground water resources, underground water monitoring, and water use accounting.
		• Supports groundwater cadastres.
		• Territorial inspections monitor compliance to special permit for subsoil minerals use.
		• State enterprises:
		  ○ monitors groundwater
		  ○ provide geological exploration of underground water resources, their mapping, and assessment.
		• Manages water drilling.

State Agency of Forest Resources	• Central apparatus • 24 territorial bodies at the oblast level.	• Implements state forest policy. • Does not manage water directly; however, RBMP considers forest management as an important component of river basin management.
National Commission regulating in the sphere of Energy and Communal Services		• Defines tariffs for centralised drinking water supply and wastewater drainage through centralised sewage networks. • Defined tariffs for the 52 Vodokanals of Ukraine.
Ministry of Development of Communities and Territories	• Central apparatus: Department of communal services; Division of water supply and drainage economy • No subordinate territorial bodies.	• Institutional body responsible for implementing the Urban Waste Water Treatment Directive, 91/271/EC. • Formulates state policy in the sector of drinking water supply and wastewater drainage. • Provides legal, normative, methodological and scientific guidance under the Vodokanals' work. • Defines requirements for enterprises discharging wastewater into centralised municipal sewage networks. • Issues the annual National Report on the Drinking Water Quality and the State of Drinking Water Supply in Ukraine reflecting the state of water resources in centralised drinking water supply. The report is up to date until 2018.

Ministry of Economic, Trade and Agrarian Development	• Two central apparatuses:
	  ○ Directorate of Agrarian Sector Development and Agrarian Policy
	  ○ Department of Regulatory Policy and Entrepreneurship.
		• Institutional body responsible for implementing the Nitrates Directive, 91/676/EC. Note: since 2018, the responsibility for implementation of the EU Nitrate Directive passed between three ministries. This has impeded progress in approving draft methodologies for assessing zones vulnerable to nitrate compounds and best agricultural practices. Thus, regulation for diffuse pollution has experienced slow progression.
		• The directorate:
		  ○ formulates policy for the agrarian sector's development
		  ○ defines zones vulnerable to nitrate compounds

Institution	Sub-bodies and agencies	Water-related functions
		○ formulates best agricultural practices. • The Department of Regulatory Policy and Entrepreneurship formulates policy for market supervision of food quality (drinking water) and non-food products (the content of orthophosphates in washing detergents).
Ministry of Internal Affairs	• Central apparatus: Directorate of Civil Protection, Prevention of Emergencies and Elimination of their Consequences.	• Institutional body responsible for implementing the Floods Directive, 2007/60/EC with the State Service on Extraordinary Situations. • Formulates state policy on civil protection, prevention of emergencies and elimination of their consequences.
State Service on Emergency Situations	• Two central apparatuses: ○ Department of Prevention of Extraordinary Situations ○ Department of Hydrometeorology • Ukrainian Hydrometeorological Centre, which includes 27 territorial bodies at the oblast level (3 observatories of interregional importance).	• Institutional body responsible for implementing the Floods Directive, 2007/60/EC with the Ministry of Internal Affairs. • Central apparatuses: ○ provide flood risk management ○ monitor environment (air, surface water, marine waters, soils). • The Hydrometeorological Centre undertakes environmental monitoring (air, surface water, marine waters, soils).
Ministry of Health Care	• Central apparatus: Directorate of Public Health • Public Health Centre of the Ministry of Health Care.	• Institutional body responsible for implementing the Drinking Water Directive 98/83/EC. • Formulates state policy in health care, provides sanitary and hygienic supervision. • The Public Health Centre: ○ carries out functions of the main scientific-research and the scientific-methodological institution of the ministry concerning hygienic and microbiological problems caused by the state of the environment (water). • Provides hygienic monitoring of natural waters (surface, underground and marine).

Source: Author's own elaboration

Shortcomings hindering robust water management from an institutional standpoint include the following:

- Imposing clear roles and responsibilities in practice: Roles and responsibilities are clearly defined but tend to shift, particularly regarding RBMPs and environmental objectives.
- Lack of data exchange between authorities, particularly those responsible for water monitoring: Monitoring issues were once resolved by signing "regalements" dictating exchanges of information between monitoring institutions. However, regalements were inefficient as they had no continuity or longevity. Regalements have now ceased.

4.2. Next steps: Scenarios for reform

Three scenarios reflect the possibilities for alignment to the WFD. The baseline scenario reflects the current situation and efforts; the business-as-usual scenario envisages minimal alignment efforts; and the future scenario foresees a consolidated effort for achieving alignment.

Unsurprisingly, the future scenario yields the best results in relation to alignment. However, there are risks and challenges associated with each scenario. In all cases, corruption poses challenges to the transparent and efficient implementation and functioning of measures. The socio-economic situation underpinning each scenario will strongly depend on the war in the East of Ukraine. Table 4.7 provides an overview of each scenario and their alignment possibilities, while Table 4.8 compares scenarios and their activities.

4.2.1. Scenarios

4.2.1.1. The baseline scenario

The baseline scenario is developed based on the current proceedings and alignment efforts with the EU directives. In this sense, foundations for alignment exist, although there are various issues that hinder and delay alignment beyond 2030.

Issues with the baseline scenario include the following:

- changing and unstable roles and responsibilities within the Ministry of Environmental Protection and Natural Resources,
- lack of specific responsibilities assigned to agencies implementing RBMPs and lack of laws to govern procedure,
- unstable and weak financing for RBMPs and tariffs for water use, and low appetite for increasing water tariffs,
- delays in implementation due to low prioritisation of water and environmentally related issues.

4.2.1.2. The future scenario

In the future scenario, Ukraine will ensure efficient water resource and environmental management nationally by 2030 by developing and implementing institutional and legal reforms in 2024. However, the development of the scenario depends on the availability of strategic policy documents. In this scenario, amendments to the Water Code will provide a solid base for the WFD's provisions. Further, it will develop an appropriate organisational structure for integrated water resources management at both central and basin levels.

The future scenario is generally well aligned with the WFD. However, risks and challenges may slow down or impede full alignment. These include the following:

- lack of specific responsibilities assigned to agencies implementing RBMPs and lack of laws to govern procedure,
- failure to identify an agency as competent for achieving or maintaining the "good" ecological status of surface bodies and "good" chemical status of groundwater bodies,
- lack of full cost-recovery mechanisms for water and ecosystem services,
- lack of definition for financial mechanisms for RBMP implementation,
- lack of a system for managing growing risks, including floods, droughts and human health risks related to inadequate access to safe water and sanitation,
- risks that the ecological consciousness of Ukrainian citizens and territorial communities are insufficiently developed for addressing water management issues.

4.2.1.3. The business-as-usual scenario

The business-as-usual scenario presumes only marginal alignment with the WFD. The scenario foresees relatively long periods of political uncertainty in the post-election period. This is projected to obstruct robust water management. Within the scenario, gross domestic product is predicted to increase two-fold by increasing state budgets for water management and the environment. Although financing for water protection measures will approximately double in this scenario, this funding will not be enough to establish the nine RBMPs.

Potential risks in this scenario include the following:

- the required co-operation with Russia and Belarus due to agreements of the State Water Agency on protection and use of transboundary watercourses, which makes progress more difficult,
- likely political instability leading to the absence of environmental ministers and political decisions oriented towards environmental and water resource protection between 2000-21 and 2024-25,
- alignment with EU directives dependent on elected politicians and not on the system's functioning,
- priorities within the federal budget leading to spending cuts on environmental protection,
- integration of some strategies depending on others, hindering full implementation of some EU directives
- low priority for government of the National Water Council,
- control of basin councils by the State Agency of Water Resources, which prevents them from organising funds independently and implementing RBMPs,
- conflict zones preventing nation-wide implementation of EU directives,
- weak funding mechanisms for RBMPs that may possibly hamper success.

Table 4.7. Alignment of each scenario to the EU framework directives

<table>
<tr><th rowspan="2">Main policy issues</th><th colspan="3">Description of characteristic features and differences</th></tr>
<tr><th>Baseline scenario</th><th>Business-as-usual scenario</th><th>Future state scenario</th></tr>
<tr><td>Adoption and implementation of Water Strategy and Marine Strategy</td><td rowspan="2">Both prepared by 2019 but not adopted due to unsustainable situation in the Ministry of Environmental Protection and Natural Resources.
The Marine Strategy still requires the definition of Good Environmental Status descriptors.</td><td>Envisages Water Strategy adoption in 2022. A sustainable institutional basis will not be implemented due to lack of continuity in ministerial teams and lack of government understanding around the importance of water and environmental issues.</td><td>Envisages Water Strategy adoption in 2021. It will be reflected in RBMPs and relatively successfully implemented thanks to the growing global importance of water resources in combating climate change and the government's awareness of this situation.</td></tr>
<tr><td colspan="2">There are no differences between two scenarios concerning the Marine Strategy. This is due to the uncertainty around the status of the territorial Black Sea in connection with the annexation of the Autonomous Republic of Crimea by Russia and the consequential unpredictable policy and behaviour in the Sea of Azov region.
It is expected that Good Environmental Statuses will be defined in the framework of the EMBLAS III project until 2023. It is envisaged the Marine Strategy will be adopted in 2024, and the Marine National Action Plan (NAP) prepared and adopted in 2025. However, NAP implementation will be complicated due to the unclear juridical status of the Black and Azov Seas. The Marine Strategy Framework Directive doesn't consider the Azov Sea within EU jurisdiction. It is unclear whether Ukraine's National Marine Strategy will consider both Black and Azov Seas or pay attention to the Black Sea only.</td></tr>
</table>

Main policy issues	Description of characteristic features and differences		
	Baseline scenario	**Business-as-usual scenario**	**Future state scenario**
Implementation of the Strategy on irrigation and drainage in Ukraine on the period till 2030	Adopted by the Cabinet of Ministers of Ukraine's decisions #688 in 2019. The NAP, as the main implementation instrument, is in the final stages of preparation and acceptance.	Envisages NAP's adoption in 2021. The World Bank and the European Bank for Reconstruction and Development (EBRD) will not invest money until 2030 in the irrigation and drainage sector due to the unclear tariff situation. Implementation of the strategy will begin, thanks to national investments. However, it will be unstable and only partial.	Envisages NAP's adoption in 2021. The World Bank and the EBRD will consider the tariff situation as an acceptable risk thanks to land reforms. They may propose an investment portfolio for Ukraine in 2023/24. National investors will join the process, improving the investment environment.
Development of Organisations of Water Users	The draft Law "On organisations of water users (OWU)" is in the final stage of development. It should be proposed to stakeholders for discussion soon.	Envisages adoption in 2023/24. Will improve investment conditions for national investors. Inter-farm and internal farm irrigation and drainage structures and networks will be partly restored by 2030.	Envisages adoption in 2022. Will improve investment conditions for national investors. Inter-farm and internal farm irrigation, and drainage structures and networks will be restored by 2026.
Approximation to the Drinking Water Directive (98/83/EC) and its implementation, and implementation of SDG 6 (clean water and sanitation), SDG 14 (life below water) and SDG 15 (life on land).	The National Report "SDG: Ukraine" was prepared in 2015 and jointly adopted by the Cabinet of Ministers of Ukraine and the UNDP. Presidential Order #722 from 2019 envisages its implementation.	By 2030 implementation of: • SDG 6 by up to 70% • SDG 14 by 30% due to lack of institutional capacity in marine policy implementation. With respect to SDG 15, (reducing share of arable land), land will be reduced to 55% , falling short of required 47% .	By 2030 implementation of • SDG 6 by more than 90% • SDG 14 by 60% through the strengthening of institutional capacities in marine policy implementation. With respect to SDG 15 (reducing the share of arable land), land will be reduced to the required 47% .
Approximation to the Water Framework Directive (2000/60/EC) and its implementation	Despite successful approximation and implementation of most of the WFD, article 9 is still under question. Currently, cost recovery of water resources and services is not achievable.	Changes in social attitudes towards environment and water resources due to water shortages will lead to significant increases in water prices and prices for water pollution.	Environmental and economic revisions of water recourses and service pricing in alignment with the framework of National Water Policy Dialogue by 2024 will lead to a real increase of costs for first generation RBMP implementation.
Approximation to the Urban Wastewater Directive (91/271/EC) and its implementation	Delays due to the unpreparedness of the Ministry of Development of Communities and Territories and Vodokanals in meeting basic requirements.	No implementation by 2030. Potential partial and inconsistent implementation due to lack of financing for tertiary wastewater treatment initiatives and remaining problems with use of post-treatment sludge. These problems may be partially addressed in 2028-30.	Relative implementation success by 2030 thanks to establishment of a flexible finance policy for building tertiary wastewater treatment facilities, smart implementation of local treatments by enterprises, and proper regulation of post-treatment sludge use in the construction and agricultural sectors.

Main policy issues	Description of characteristic features and differences		
	Baseline scenario	**Business-as-usual scenario**	**Future state scenario**
Approximation to the Nitrates Directive (91/676/EC) and its implementation	Delays due to lack of action of the Ministry of Economic, Trade and Agrarian Development.	Expected adoption by 2024 with developed definitions of zones vulnerable to the accumulation of nitrate compounds and the Code of the best agricultural practice. First generation RBMPs will use vulnerable zones as recommendations, though they are not legally defined.	Expected adoption by 2021-22 with developed definitions of zones vulnerable to the accumulation of nitrate compounds and the Code of the best agricultural practice. Vulnerable zones will be included in first generation RBMPs as the regulatory norms for implementation in agriculture production between 2025-30.
Approximation to the Floods Directive (2007/60/EC) and its implementation	Relative success under the auspices of the State Service on Extraordinary Situations. Guidance on the development of the Flood Risk Management Plan was adopted by the Cabinet of Ministers of Ukraine in decision #247 in 2018.	Envisages development and adoption of Flood Risk Management Plans for every river basin district by 2024. Due to delays in development and adoption of these plans, they will not be reflected in RBMPs (final plans should be prepared and adopted in August 2024).	Envisages the development and adoption of River Basin Flood Risk Management Plans by 2022. In June 2021, draft plans should be published on the State Service on Extraordinary Situations' website and be reflected in every RBMP.

Source: Author's own elaboration

Table 4.8. Comparative analysis of the proposed scenarios' activities: Baseline scenario (BS), future scenario (FS) and business-as-usual scenario (BAU)

Objectives & measures	Responsible agencies, organisations	Scenarios
A. Formulation and implementation of policies, RBMPs and NAPs		
Preparation and adoption of the Water Strategy	MEPNR, MDCT, METAD, Ministry of Internal Affairs, SAWR, PSGS, State Service on Emergency Situations, Oblast State Administrations	BS: financed through MEPRN's annual budget (under the budget line of "staff wages").
Preparation and adoption of the Marine Environmental Strategy	MEPNR, Oblast State Administrations bordering seas	BS: financed through MEPRN's annual budget (under the budget line of "staff wages").
Preparation of RBMPs	MEPNR, SAWR and its territorial bodies, RBCs	BS: financed through SAWR and its territorial bodies' annual budgets (under the budget line of "staff wages").
Preparation and implementation of the NAP for the Marine Environmental Strategy	MENR, USCME, Oblast State Administrations bordering seas	BS: financed through MEPRN's annual budget (under the budget line of "staff wages").
Preparation and adoption of Flood Risk Management Plans for each RBD	MIA, MEPNR, State Service on Emergency Situations, SAWR	BS: financed through SSES and its territorial bodies' annual budgets (under the budget line of "staff wages").
Preparation of the national concept on drought risk management and respective NAPs for each RBD	MEPNR, METAD, Ministry of Internal Affairs, State Service on Emergency Situations, SAWR	BS: financed through MEPRN's annual budget (under the budget line of "staff wages").
B. Finalisation of public water management institutional reforms		
Establishment of the National Water Council	Cabinet of Ministers of Ukraine, MEPNR, Ministry of Finance	FS: biannual meetings (EUR 1 000 each) BAU: irregular meetings.
Strengthening the role of RBCs in decision making on RBMP preparation and implementation		FS: successful power transfers decrease the state budget and increases local governments' annual budgets. BAU: foresees delays power transfers and the continuation of the predominant funding of meetings by SAWR.

Objectives & measures	Responsible agencies, organisations	Scenarios
Establishing the National Joint Stock Company (NJSC) providing irrigation and drainage services	MEPNR, METAD, SAWR, Oblast State Administrations dealing with irrigation and drainage	FS: NJSC is established and is properly financed. BAU: NJSC is established but insufficiently financed.
Establishing Organisations of Water Users (OWU)	Related enterprises and organisations	FS: successful OWU formation involves an appropriate number of meetings. BAU: delays in OWU formation, thus, fewer meetings.
Establishing government institutions for marine environment protection	MEPNR, USCME, SEI, Oblast State Administrations bordering seas	FS: establishment of two state enterprises providing public management for the Black and Azov Seas, including monitoring labs; adequate financing from the state budget and possible increased international technical assistance. BaU: delays in establishment and unclear management situations; slight increase in state funding and same level of international technical assistance so the USCME can undertake functions of MEPNR.
Addressing groundwater management and monitoring issues Transferring functions from PSGS to SAWR	MEPNR, SAWR, PSGS	Possible redistribution of funds (between PSGS and SAWR) under existing budget programmes (at the expense of PSGS staff wages). FS: clear redistribution of responsibilities and transfer of groundwater management and monitoring to BDWR with appropriate transfer of financing from PSGS to SAWR BAU: delays in the transfer of functions and their duplication by territorial bodies without sufficient increase of financing.
C. Implementation of RBMPs		
Building new and reconstructing existing municipal water treatment facilities	MEPNR, SAWR, PSGS (Investments Stabilisation State Fund) Local government bodies (as a possible part of the Investments Stabilisation State Fund)	BS: real (capital and current) expenditures of the sector. FS: UkrVodokanalEcology funding requirements for initial municipal reform BAU: state pressures on businesses lead to relative increase in finances derived from public investments.
Addressing the issues of industrial pollution, including the mining industry	Investments Stabilisation State Fund, local government bodies (as a possible part of Investments Stabilisation State Fund), related enterprises and organisations	BS: current (2020) industry needs for environmental investments. FS: real needs of industry (particularly the mining industry) in initial environmental investments. BAU: slightly improved situation – investments caused by public pressure.
Definition of zones vulnerable to nitrate compounds and application of best agricultural practices	Investments Stabilisation State Fund, local government bodies (as a possible part of the Investments Stabilisation State Fund), related enterprises and organisations	FS: requirements of agricultural businesses in initial environmental investments (not related to zones vulnerable to nitrate compounds). BAU: slight improvements from the current situation with investments resulting from

Objectives & measures	Responsible agencies, organisations	Scenarios
		public pressure.
Implementation of the state water monitoring programmes	MEPNR, SAWR, PSGS, State Service on Emergency Situations, State Agency on Exclusion Zone Management, local government bodies, other sources (investments), international donors	BS: 2019 financing of water monitoring (accounting for creation of two laboratories for SAWR). FS: financing requirements for renovation of 13 laboratories for SAWR, 11 laboratories for SESS and 2 marine laboratories for monitoring at minimum 70% of delineated water bodies. BAU: partly improved water monitoring situation thanks to international technical assistance and increased state budget expenses.
Implementation of the anti-flooding measures	SAWR, local government bodies related enterprises and organisations	BS: shows the current (2019) financing of the SAWR according to budgetary requests. FS: shows possible needs could arise in Flood Risk Management Plans by links with the National Target Program for the Protection of Population and Territories from Emergencies of Man-Made and Natural Character for 2013-17. BAU: shows slightly improved situation in addressing the problem.
Costs required for flood prevention and management	Hydromet Service of State Service on Emergency Situations, State Service on Emergency Situations	BS: expenditures spent on prevention, management and consequences of floods FS: possible needs, derived from the National Target Program for the Protection of Population and Territories from Emergencies of Man-Made and Natural Characteristics for 2013-17. BAU: only marginal improvements in flood prevention and management.
Protection of rural settlements and agricultural lands against harmful effects of water	SAWR, local governments (through agreements)	BS: real expenditures of the last two years (2019, 2020). FS: expected finances required wetlands drainage. BAU: worst-case scenario relative to FS due to delays in water strategy implementation.
Costs required for irrigation and drainage	SAWR and Investments Stabilisation Fund, related enterprises and organisations	BS: real expenditure from the last two years (2019, 2020). FS: investment needs, requested by the Strategy on irrigation and drainage in Ukraine till 2030 (adopted by the CMU). BAU: slightly worse situation relative to the FS due to delays in strategy implementation.

Objectives & measures	Responsible agencies, organisations	Scenarios
Costs required to minimise the effects of droughts	Hydromet Service of State Service on Emergency Situations, State Service on Emergency Situations, private investments from impacted businesses	BS: real expenditures spent on prevention and consequences of droughts (separate resolutions of the CMU on spending costs for dotation of agricultural business from the special reserve fund of CMU). FS: possible needs, with the National Action Plan for combating land degradation and desertification. BAU: only marginal improvements on the current situation.
D. Integrated water resources and water basin management		
Scientific and applied research in integrated water resources management and staff training	SAWR	BS: real expenditure of the last two years (2019, 2020). FS: expected finances required for strengthening the water sector. BAU: worse-case scenario relative to the FS due to delays in water strategy implementation.
Protected areas	MEPNR	BS: real expenditure on maintenance of existing protected areas and creation of new ones. FS: finances required for protecting the area of 6 276.9 ha (current 4 082.2 ha). BAU: only slight improvements on the current situation.
Forestry	MEPNR and State Agency of Forest Resources	BS: real expenditures on maintenance of existing forests. FS: finances required increase the total area of forests from 16% to 20% of total land area. BAU: only slight improvements on the current situation.
Land policy	METAD and State GeoCadastr	BS: real expenditures on land withdrawal from agricultural circulation. FS: finances required to reduce the area of arable land from 53.9% to 47% . State budgets will need to compensate current landowners. BAU: only slight improvements on the current situation.

Note: MCTD = Ministry of Communities and Territorial Development; MEPNR = Ministry of Environment Protection and Natural Resources; METAD = Ministry of Economic, Trade and Agrarian Development; MIA = Ministry of Internal Affairs; SAWR = State Agency for Water Resources; SEI = State Environmental Inspectorate; USCME = Ukrainian Scientific Centre for Marine Environment.
Source: Author's own elaboration

4.2.2. Financing each scenario

The following section offers an overview of the major costs associated with the scenarios and presents the respective additional costs. The business-as-usual and baseline scenarios do not differ significantly in terms of their required funding. However, the future scenario requires a significantly larger amount of funding, which corresponds with more thorough and timelier implementation. The future scenario also dedicates more resources to preparation and implementation of both RBMPs and IWRM.

Table 4.9 summarises the funding required to develop each scenario, as well as some costs related to forecasted natural disasters.

The State Fund for development of the water economy

The State Fund for development of the water economy was created by the Cabinet of Ministers of Ukraine in 2018. Funds support measures to develop and maintain water management and increase the efficiency of water use. The main administrator is the Ministry of Environmental Protection and Natural Resources with implementation by the State Agency of Water Resources.

The Fund for Environmental Protection

The Fund for Environmental Protection was created in the Law on Environmental Protection. The fund is derived from environmental taxes, and costs relating to recovered damages arising from the violation of environmental legislation. In 2014, the fund became a consolidated part of the state budget. In 2018, the fund of UAH 506 million was mainly used for the sustainable functioning of Exclusion Chornobyl Zone facilities. Other expenditures were directed towards environmental measures. Targeted use of the fund's money is regulated by decisions of the Cabinet of Ministers of Ukraine in the resolution *"on approval of the list of activities belonging to environmental ones"*. However, the resolution does not ensure proper use of the fund due to ambiguous wording and the possibility of multiple interpretations. Of the 85 environmental measures listed in the resolution, 17 relate to protection and rational use of water resources.

In addition to this fund, local governments have created a special fund out of environmental taxes for implementation of environmental measures. However, like the national fund, environmental measures are sometimes used for non-environmental purposes. This mars the efficacy and transparency of environmental protection, indicating the low priority of environmental issues for the current government.

Table 4.9. Financial requirements for each scenario, in thousands of euros per year

Objectives & measures	Financing sources	Responsible agencies, organisations	Scenarios (thousand EUR/year)		
			Baseline	Future	Business-as-usual
TOTAL ANNUAL SPENDING FOR EACH SCENARIO (EUR 1 000)			**2 087 474**	**23 121 867.6**	**4 130 207.5**
A. Formulation and implementation of policies, RBMPs, and NAPs			**94 275**	**123 720**	**95 400**
Preparation and adoption of the Water Strategy	State budget	MEPNR, MDCT, METAD, Ministry of Internal Affairs, SAWR, PSGS, State Service on Emergency Situations, Oblast State Administrations (OSAs)	2 025	2 959	2 500
Preparation and adoption of the Marine Environmental Strategy	State budget	MEPNR, OSAs bordering seas	To be financed in MEPRN's routine annual budget (as staff time)		
Preparation of RBMPs	State budget	MEPNR, SAWR and its territorial bodies, RBCs	850	1 161	900
Preparation and implementation of the NAP for Marine	State budget	MENR, USCME, OSAs having access to seas	To be financed in MEPRN 's routine annual budget (at the expense of staff wages)		

Objectives & measures	Financing sources	Responsible agencies, organisations	Scenarios (thousand EUR/year)		
			Baseline	Future	Business-as-usual
Environmental Strategy					
Preparation and adoption of Flood Risk Management Plans for each RBD	State budget	Ministry of Internal Affairs, MENPR, State Service on Emergency Situations, SAWR	91 400	119 600	92 000
Preparation of the National concept on drought risk management and respective NAPs for each RBD	State budget	MEPNR, METAD, Ministry of Internal Affairs, State Service on Emergency Situations, SAWR	Financed through MEPRN's annual budget (at the expense of staff wages)		
B. Finalisation of institutional reforms in public water management			**0**	**1 223.6**	**745.5**
Establishment of the NWC	State budget	Cabinet of Ministers of Ukraine, MEPNR, Ministry of Finance	N/A	2	0.5
Strengthening the role of RBCs in decision making on RBMPs preparation and implementation	State budget	SAWR	Not yet possible	3	20
	Local budget	Local water management bodies		18	25
	Total	**MEPNR, SAWR, PSGS and local water management bodies**	N/A	**21**	**25**
Establishing the National Joint Stock Company (NJSC) providing irrigation and drainage services	State budget	MEPNR, METAD, SAWR, OSAs dealing with irrigation and drainage	**Not yet established**	**250**	**200**
Establishing Organisations of Water Users (OWU)	Related enterprises	Related enterprises and organisations	**0**	**48**	**20**
Establishing government institutions for marine environment protection	State budget	MEPNR, METAD, Ministry of Finance	159	543	250
	Possible international technical assistance	EU, GEF, UNDP	70	150	100
	Total	**MEPNR, USCME, SEI, OSAs bordering seas**	**229**	**693**	**350**
Addressing groundwater management and monitoring issues. Transferring functions from PSGS to SAWR	State budget	MEPNR, SAWR, PSGS	**149**	**209.6**	**150**
C. Implementation of RBMPs			**1 974 325**	**15 555 151**	**4 012 705**
C-1. Total expected costs required for liquidation of consequences of floods and droughts			**151 000**	**70 400**	**109 500**
C-2. Total expected losses caused by floods and droughts			**242 100**	**85 700**	**252 750**

Objectives & measures	Financing sources	Responsible agencies, organisations	Scenarios (thousand EUR/year)		
			Baseline	Future	Business-as-usual
Building new and reconstructing existing municipal water treatment facilities	State budget	MEPNR, SAWR, PSGS (Investments Stabilisation State Fund)	18 900	250 000	37 800
	Local budget	Local government bodies (as a possible part of the Investments Stabilisation State Fund)	56 700	750 000	114 000
	Related enterprises	Related enterprises and organisations	302 000	4 000 000	622 850
	Total		**377 600**	**5 000 000**	**774 650**
Addressing the issues of industrial pollution, including the mining industry	State budget	Investments Stabilisation State Fund	44 640	212 700	89 300
	Local budget	Local government bodies (as a possible part of Investments Stabilisation State Fund)	96 400	459 650	193 000
	Related enterprises	Related enterprises and organisations	1 287 480	6 135 000	2 580 000
	Total		**1 428 520**	**6 807 350**	**2 862 300**
Definition of zones vulnerable to nitrate compounds and application of best agricultural practices	State budget	Investments Stabilisation State Fund	N/A	15 000	500
	Local budget	Local government bodies (as a possible part of the Investments Stabilisation State Fund)		459 358	4 800
	Related enterprises	Related enterprises and organisations		2 884 643	96 155
	Total		**0**	**3 359 000**	**101 455**
Implementation of the state water monitoring programmes	State budget	MEPNR, SAWR, PSGS, State Service on Emergency Situations, State Agency for Exclusion Zone Management	490	5 600	1 200
	Local budget	Local government bodies	0	0	0
	Related enterprises	Other sources (investments)	0	0	0
	International technical assistance	International donors	400	800	400
	Total		**890**	**6 400**	**1 600**

Objectives & measures	Financing sources	Responsible agencies, organisations	Scenarios (thousand EUR/year)		
			Baseline	Future	Business-as-usual
Implementation of anti-flooding measures	State budget	SAWR	1 730	6 260	1 900
	Local budget	Local government bodies	Data n/a	Data n/a	Data n/a
	Related enterprises	Related enterprises and organisations	Data n/a	Data n/a	Data n/a
	Total		**1 730**	**6 260**	**1 900**
Costs required for flood prevention and management	State budget	Hydromet Service of State Service on Emergency Situations	3 500	9 500	3 700
	Total expected losses	**Losses caused by floods**	**17 100**	**5 700**	**42 750**
	State budget - Special reserve fund of Cabinet of Ministers of Ukraine	State Service on Emergency Situations	11 000	4 100	27 100
	Total		**14 500**	**13 600**	**30 800**
Protection of rural settlements and agricultural lands against harmful effects of water	State budget	SAWR	8 840	5 400	7 100
	Local budget	Local governments (through agreements)	5 390	3 290	4 200
	Total		**14 230**	**8 690**	**11 300**
Costs required for irrigation and drainage	State budget	SAWR and Investments Stabilisation Fund	70	3 050	3 000
	Local budget	As sources to Investments Stabilisation Fund	50	14 000	7 000
	Related enterprises	Related enterprises and organisations	235	280 000	140 000
	Total		**355**	**297 050**	**150 000**
Costs required to minimise the effects of droughts	State budget	Prevention: Hydromet Service of State Service on Emergency Situations	3 500	9 500	3 700
	Total expected losses	**Losses caused by droughts**	**225 000**	**80 000**	**210 000**
	State budget: the special reserve fund of CMU	State Service on Emergency Situations, private investments from impacted businesses	133 000	47 300	75 000
	Total		**136 500**	**56 800**	**78 700**
D. Integrated water resources and water basin management			**18 874**	**7 441 773**	**21 357**
Scientific and applied research in integrated water resources management and staff training	State budget	SAWR	237	1 040	340
Protected areas	State budget	MEPNR	16.7	33	17
Forestry	State budget	MEPNR and State Agency on Forestry Resources	17 800	28 000	20 000

Objectives & measures	Financing sources	Responsible agencies, organisations	Scenarios (thousand EUR/year)		
			Baseline	Future	Business-as-usual
Land policy	State budget	METAD and State GeoCadastr	820	7 412 700	1 000

Note: GEF = Global Environment Facility; METAD = Ministry of Economic, Trade and Agrarian Development; MEPNR = Ministry of Environment Protection and Natural Resources; PSGS =Public Service on Geology and Subsoil; RBD = river basin district; SAWR = State Agency for Water Resources; SEI = State Environmental Inspection USCME = Ukrainian Scientific Centre for Marine Environment; UNDP = United Nations Development Programme.

Source: Author's calculations.

4.2.3. Progress monitoring indicators

The progress monitoring indicators in water resource management and alignment with EU water directives show potential for improvement. In 2011, Ukraine developed and adopted indicators measuring the implementation of the Water Protocol of the Water Convention. According to international obligations, the Water Protocol indicators were revised in 2019; this work was performed under the auspices of UNECE in the framework of the EUWI+ Project. The indicators are waiting for approval. Some of the proposed indicators in encompass the SMART elements required for successful monitoring and evaluation (i.e. Specific, Measurable, Achievable, Realistic and Timely). However, in other cases, indicators such as "the degree of implementation of integrated water resources management" lack specificity, are difficult to measure and are not time-bound. Notably, there are no specific timeframes accompanying each indicator. In this sense, there are opportunities for strengthening the indicators to monitor and evaluate the success and impacts of aligning with EU directives more thoroughly. Table 4.10 presents the relevant progress monitoring indicators with their units of measurement.

The adoption of the Water Strategy is the first performance indicator in the framework of the future state scenario. Subsequently, evidence of incorporating Water Strategy provisions into RBMPs is considered a performance indicator.

Table 4.10. Progress monitoring indicators

Indicators	Unit of measurement
Indicators assessing the effectiveness of the water institutional framework and water governance mechanisms (baseline vs. future scenario)	
Degree of implementation of integrated water resources management (legal, institutional, regulatory and financial aspects)	Percentage
Awareness and accessibility of water information	According to the results of online surveys
Percentage of transboundary river basin districts for which appropriate (river basin-oriented) water co-operation mechanisms have been introduced	Percentage
Revenue for state and local budgets from rental fees for Special Water Users	Million UAH
Revenue for state and local budgets from environmental taxes for discharging pollutants into water bodies	Million UAH
Number of detected unauthorised water users	Physical or juridical entities
Monetary amount of recovered damages for violations of water protection legislation	Million UAH
Number of laboratories in the optimised system of ecological (water) monitoring that meet the Water Framework Directive requirements	Number of units
Evidence of practical use of automated information systems in making management decisions	Automated information system protocols
Budget allocated to the RBMPs at the national, oblast and local levels	Million UAH

Indicators	Unit of measurement
Indicators assessing water quantity management effectiveness (baseline vs. future scenario)	
Introduction into Ukrainian legislation of the definition of "ecological river flow" and its application in the water permitting procedure	Inclusion of "ecological river flow" definition and examples of practical application in the water permitting procedure
Water stress level: the share of the volume of fresh water taken in relation to the volume of available freshwater resources	Percentage
Water volume used for all economic activities, particularly agriculture, industry and the service sectors	Million cubic metres
The share of arable land in the total territory of the country	Percentage
Number of restored riverbeds of small rivers and swamps of Ukraine	Kilometres or hectares
Water capacity of GDP (per UAH 1 000 of GDP in real prices)	Cubic metres
Annual value added per volume (cubic metre) of water taken economic activities	USD
The amount of annual water losses during transportation	Million cubic metres
Number of annual violations of the legislation on water protection zones and coastal protection strips	Units
Indicators for water quality effectiveness and pollution prevention (baseline vs. future scenario)	
Share of treated wastewater discharges of total discharges to water bodies	Percentage
Share of polluted wastewater discharges in the total amount of discharges to water bodies (separately to for marine environments)	Percentage
Additional capacity of constructed or reconstructed wastewater treatment facilities in urban and rural areas	Thousand cubic metres/year
Number of enterprises that have introduced preliminary (local) wastewater treatment facilities	Units
Detection cases of water pollution	Units/year
Percentage of surface water bodies deemed in "good" ecological condition in relation to the total number	Percentage
Percentage of artificial or significantly modified surface water bodies deemed in "good" condition in relation to the total number	Percentage
Percentage of groundwater bodies deemed in "good" quantitative and qualitative status in relation to the total number	Percentage
Economic value of damage to aquatic ecosystems (particularly fisheries) due to thermal water pollution	UAH million/year
Damage to aquatic ecosystems, in particular fisheries, due to biological pollution of water	UAH million/year
Total area of zones vulnerable to the accumulation of nitrate compounds identified for each area of the river basin district	Thousand hectares
Share of the area of zones vulnerable to the accumulation of nitrate compounds (defined for each river basin district) in the total area of the river basin district	Percentage
Mass of dehydrated and utilized post-treatment sludge	Thousand tonnes
Volume of detergents sold in Ukraine that does not contain orthophosphate compounds	Thousand tonnes
Amount of funds received by the State Budget of Ukraine as part of the environmental tax for water pollution	UAH million/year
Facts (evidence) of BAT introduction in industrial and agricultural production	Facts (evidence) of BAT availability
Indicators for assessing the availability of appropriate (quantity and quality) drinking water (baseline vs. future scenario)	
Volume of daily water used by one urban resident (per capita water use)	Cubic metres/day
Proportion of the rural population with access to safe and affordable drinking water from the total	Percentage
Proportion of urban population with access to safe and affordable drinking water	Percentage
Share of the rural population connected to the centralised water supply	Percentage
Share of the urban population connected to the centralised water supply	Percentage
Length of urban water supply networks that have been repaired or replaced	Kilometre
Share of the rural population with access to improved sanitation	Percentage
Share of the urban population with access to improved sanitation	Percentage
Length of urban sewage systems that have been repaired or replaced	Kilometre

Indicators	Unit of measurement
Tariffs for water supply and sewerage	UAH/cubic metre
Existence of water supply, sewerage network and urban treatment facilities optimisation schemes in Master plans for development of cities or settlements	Fact of availability

Source: Author's own elaboration

References

European Environment Agency (2020), *Water availability, surface water quality and water use in Eastern Partnership countries: An indicator-based assessment*, https://www.eea.europa.eu/publications/regional-water-report. [2]

European Union (2014), "Association Agreement between the European Union and its Member States, of the one part, and Ukraine, of the other part", *Official Journal of the European Union* I. 161/3, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22014A0529(01)&from=EN. [1]

EUWI+ (2020), *Dnipro River Basin Management Plan: Significant Water Management Issues*, https://www.euwipluseast.eu/en/component/k2/item/1180-ukraine-summary-of-the-dnipro-rbmp-for-the-1st-consultation-main-issues-full-dnipro-basin-eng?fromsearch=1. [5]

Regional Environmental Centre for Central and Eastern Europe (2016), *Upper Dnieper River Basin: Draft River Management Plan*, http://documents.rec.org/publications/4_UpperDnieper_Eng.pdf. [7]

State Statistics of Ukraine (2017), *Environment of Ukraine 2016*, https://ukrstat.org/uk/druk/publicat/Arhiv_u/07/Arch_dov_zb.htm. [4]

State Statistics Service of Ukraine (2020), *Environment of Ukraine 2019*, https://ukrstat.org/uk/druk/publicat/kat_u/2020/zb/11/Dovk_19.pdf. [3]

UNENGO 'MAMA-86' (2015), *River Basin Management Plan for the Upper Dnieper Pilot Basin of Ukraine: Draft*, http://blacksea-riverbasins.net/sites/default/files/RBMP_Upper%20Dnieper_UA_EN_final_1.pdf. [6]

OECD Studies on Water

Developing a Water Policy Outlook for Georgia, the Republic of Moldova and Ukraine

The OECD has been working on water policy reform in the countries of Eastern Europe, the Caucasus and Central Asia for over 20 years. Three of the countries within the region, Georgia, the Republic of Moldova and Ukraine have signed Association Agreements with the European Union. These agreements provide a framework for deeper political ties and stronger economic links with the EU and include commitments for approximation towards EU legislation including the Water Framework Directive.

Georgia, the Republic of Moldova and Ukraine have ambitious long-term strategic plans for their water sectors, which include fulfilment of requirements under the Association Agreements and international commitments including the Sustainable Development Goals. The water policy outlooks baseline the country policy framework and current performance and then define the long-term vision and aspirations to 2030. The outlooks aim to demonstrate the likelihood of the current policy framework to achieve the long-term objectives and desired future state of the water sector, and include identification of opportunities for improving policy coherence and policies that have the opportunity to improve the likelihood of success.

Action funded by the EUROPEAN UNION

EUWI+
EU WATER INITIATIVE
FOR EASTERN PARTNERSHIP

PRINT ISBN 978-92-64-44504-8
PDF ISBN 978-92-64-82664-9



