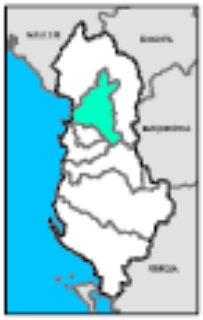
River Basin Management Plan for the Mati River Basin 2024-2029

Main Report



LIST OF ACRONYMS

ADA/ADC	AUSTRIAN DEVELOPMENT AGENCY/AUSTRIAN DEVELOPMENT COOPERATION
AKM	AGENCY FOR COASTLINE MANAGEMENT
AWB	ARTIFICIAL WATERBODY
CA	COMPETENT AUTHORITY
CWB	COASTAL WATERBODY
AWRM *AMBU*	AGENCY FOR WATER RESOURCES MANAGEMENT *AGJENCIA E MENAXHIMIT TË BURIMEVE UJORE*
DCM	DECISION OF THE COUNCIL OF MINISTERS
DWPA	DRINKING WATER PROTECTED AREA
EC	EUROPEAN COMMISSION
EO	ENVIRONMENTAL OBJECTIVE
EQS	ENVIRONMENTAL QUALITY STANDARD
EQSD	EU ENVIRONMENTAL QUALITY STANDARDS DIRECTIVE
ER	EXPECTED RESULTS
ERRU	AUTHORITY ON WATER SUPPLY, WASTEWATER TREATMENT AND DISPOSAL (ALBANIAN REGULATOR)
EU	EUROPEAN UNION
EUSIWM	EU SUPPORT TO INTEGRATED WATER MANAGEMENT
EUSWAM	EU SUPPORT TO WASTE WATER MANAGEMENT AND TREATMENT SERVICES
FD	EU FLOODS DIRECTIVE
GD	EU GROUNDWATER DIRECTIVE
GoA	GOVERNMENT OF ALBANIA
GWB	GROUNDWATER BODY
GWDTEs	GROUNDWATER DEPENDENT TERRESTRIAL ECOSYSTEM
HMWB	HEAVILY MODIFIED WATERBODY
IPA	INSTRUMENT FOR PRE-ACCESSION ASSISTANCE
IP-RBMPs	IMPLEMENTATION PLAN FOR RBMP
IU	IMPLEMENTATION UNIT
IWRM	INTEGRATED WATER RESOURCES MANAGEMENT
LIWRM	LAW ON INTEGRATED WATER RESOURCES MANAGEMENT – LAW N° 111/2012
MARD	MINISTRY OF AGRICULTURE and RURAL DEVELOPMENT
MAF	MEAN ANNUAL FLOW
MTE	MINISTRY OF TOURISM AND ENVIRONMENT
MFE	MINISTRY OF FINANCE AND ECONOMY
MIE	MINISTRY OF INFRASTRUCTURE AND ENERGY
ND	EU NITRATES DIRECTIVE – 91/676/EEC

NEA	NATIONAL ENVIRONMENT AGENCY
NPEI	NATIONAL PLAN FOR EUROPEAN INTEGRATION
NSPA	NUTRIENT SENSITIVE PROTECTION AREA
NVZ	NITRATE VULNERABLE ZONE
NWC	NATIONAL WATER COUNCIL
NWRC	NATIONAL WATER RESOURCES CADASTRE
PoM	PROGRAMME OF MEASURES (WFD terminology)
PMO	PRIME MINISTER'S OFFICE
RB	RIVER BASIN
RBC	RIVER BASIN COUNCIL
RBD(A)	RIVER BASIN DISTRICT (AUTHORITY)
RBM	RIVER BASIN MANAGEMENT
RBMP	RIVER BASIN MANAGEMENT PLAN
RBPA	RECREATIONAL OR BATHING WATER PROTECTED AREA
STPs	STANDARD TECHNICAL PROCEDURES (OF AWRM)
SUDS	SUSTAINABLE URBAN DRAINAGE SYSTEM
SWB	SURFACE WATERBODY
ToR	TERMS OF REFERENCE
UWWTD	EU URBAN WASTEWATER TREATMENT DIRECTIVE
WAFU	WATER AVAILABLE FOR USE (BY OPERATORS)
WBMO	WATER BASIN MANAGEMENT OFFICE
WFD	EU WATER FRAMEWORK DIRECTIVE – 2000/60/EC
WRA *ERRU*	ALBANIA WATER REGULATORY AUTHORITY ENTIT RREGULLATOR TË UJIT
WTW	WATER TREATMENT PLANT (PUBLIC WATER SUPPLY)
WWTP	WASTEWATER TREATMENT PLANT

CONTRIBUTORS

EUSIWM project implemented by the Austrian Development Agency (ADA)

The technical expertise was provided by National and International Experts, contracted by ADA.

Project Management, Coordination and Supervision was provided by the EUSIWM / ADA Project Team.

Water Basin Management Expert Group (WB MEG)

Based on the Prime Minister's Order no. 24, dated 09.02.2021 "On the establishment of the inter-institutional working group for the drafting of the legal package regarding the harmonization of all EU directives in the field of water resources management", two inter-institutional working groups on water resources have been established (for legal issues and water basin management issues). These groups operate under the direction of AMBU and represent the main stakeholders in the field of water resources: Ministry of Tourism and Environment (MTM), Ministry of Agriculture and Rural Development (MARD), Ministry of Finance and Economy (MFE) , Ministry of Infrastructure and Energy (MEI), Ministry of Defense (MoE), Ministry of Health and Social Protection (MoHMS) together with the Institute of Public Health (IPH) and Local Health Care Units (LHCU) that monitor the quality of drinking water and washing water, the National Environmental Agency (NEA), the Albanian Geological Survey (GAA), and the National Agency for Civil Protection. The highly coordinated and efficient work of these groups under the auspices of AMBU has been essential for the implementation of this document as well as for addressing the main challenges of the sector, including the development of monitoring of water resources according to the required standards. AMBU is leading the MIBU and implementing the water basin management, is chairing the working group for legal issues and that for expert issues of the MAF, as well as leading the decision-making process.

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Compliance Statement

This Document complies with the requirements of the Law on Public Consultation, Article 15 and Article 17.

This Document is intended to comply with the EU Directive 2000/60/EC – Article 14 – Public Consultation on the development of River Basin Management Plans and *Annex VII*

Foreword

Dear Colleagues, Water and Environmental Professionals, Stakeholders,

As you are aware, Albania is implementing the EU Water Framework Directive 2000/60/EC (EU WFD), as a very important link for membership in the European Union.

For this purpose, Water Resources Management Agency (WRMA), as the authority responsible for drafting and implementing River Basin Management Plan, under support of the EUSIWM project (European Union Support for Integrated Water Management), which is implemented by the ADA (Austrian Agency for Development), has drafted this **River Basin Management Plan for the Mat River** Basin, consisting of:

- Protection and improvement of water bodies;
- Comprehensive participation of the public in the development of the process, until achieving the good status of water bodies.

Water is our precious natural resource. As such, it is essential to the flourishing of wildlife, agriculture, and business. It is also one of the tools for promoting regeneration (structural and economic), recreation and tourism. Therefore, this effort is considered fair, as it will make it possible to identify pressures and impacts on water resources, contributing to improving the quality of our aquatic environment in the Ishem basin, through its sustainable management.

Following the rules established through the Decision of the Council of Ministers No.1015, dated 16.12.2020, for each designated river basin, the River Basin Councils (RBC) must ensure that all stakeholders have the opportunity to share their opinions from their professional point of view regarding with RBMP-s, through cooperation with various institutions, organizations, local communities. In this way, each of us can gain new knowledge regarding the management of water resources and, together, make it possible to formalize this plan.

Considering the above, based on your field of expertise, we would appreciate your engagement in identifying the issues that you consider important, as well as proposing possible measures to resolve them.
In the end, the last document, before its publication, should have taken into account the proposals of all water actors.

We call for your attention that a RBMP has a 6 years implementation cycle. In Europe currently, Member States have completed the second cycle of RBMPs (2016-2021) and have started the third implementation cycle (2024-2029). For this reason, your thoughts and suggestions are considered highly valuable, as they will show the commitment of each of us to the EU accession process, believing that the River Basin Management Plan for the Mat River Basin will be implemented in the period 2022 - 2027, in compliance with the third cycle of the EU RBMP.

Signed

General Director – WRMA

Gerta Lubonja

Executive Summary

The EUSIWM Project is co-financed by the EU under the IPA 2016 Action Programme for Albania for the Support to Integrated Water Management and the Austrian Development Cooperation (ADC). The Austrian Development Agency (ADA), under the Agreement No. 2017/393-187 signed between the European Commission and ADA on 21st December 2017, is the responsible body for the implementation of the project.

AMBU is the direct beneficiary of the EUSIWM Project based on the Agreement between the Government of Albania and ADA signed on 14th November 2018 (updated following the no-cost extension of 1 year granted to the current existing project). The overall objective of the Project is to enhance the implementation of the National Water Sector Reform and advance progress of the Albanian water sector towards EU water legislation requirements.

Highly interlinked with the technical work, the aim of the project itself was to enhance the role of AWRM and other Albanian water-related institutions not only in the drafting of a RBMP but in general in the implementation of integrated water resources management, under the EU approach/methodology. Such work flow has helped AWRM's leadership role to be gradually performed throughout the whole RBM process.

River Basin Management Plan (RBMP)

The drafting of Mat RBMP was carried out with support of the EUSIWM project, during 2019 – 2021. At the beginning of the program, but especially in 2019, 2020, the performing of key aspects and RBM activities was done with the support of ADA/EUSIWM project team and international and national experts.

In 2021, based on the recommendations of EUSIWM project team an inter-institutional expert group for RBM was established, under AWRM's leadership. Different institutions responsible for the water management in the country were represented and directly involved in all preparatory stages of RBMP preparation and in particular on data collection and validation.

The structure of the current RBMP for Mat RB is in full compliance with the requirements defined in Annex VII of the EU WFD 2000/60/EC[1]. Few adaptations were made in the internal chapters and content-wise of the plan as to better respond to the national conditions and operational systems available for the water resources management.

Working under a clear framework methodology for the RBM, having the AMBU staff fully trained under the EUSIWM project and moreover having established the inter-institutional dialogue at technical level through the RBM EG(s), it has shown guarantee that in the future the RBM planning process of new plans 2024-2029 followed by their implementation through defined, EU compliant Programme of Measures (PoM), shall be professionally performed under the leadership of AMBU and in strong cooperation with the water-related institutions.

Challenges encountered

The drafting of the RBMP is a challenging and complex process, and having regards to the conditions of Albania such difficulties are much more present and demanding. Although the preparation of the RBMP may be the responsibility of one or several institutions, its design itself is a complex undertaking involving all related stakeholders such as experts in various fields. Integrated management of water resources is a "must" process which relevant institutions should perform to better manage the available resources. A major requirement for the adequate implementation of the RBM process is data availability, and when (if) available their reliability. a huge question mark during the Mat RBMP preparation period was weather to wait until the full set of data was collected, a well-organized monitoring system was fully operational or to proceed with "what is available" approach and define the future Roadmap on how to solve the phased problems and challenges.

[1] https://eur-lex.europa.eu/resource.html?uri=cellar:5c835afb-2ec6-4577-bdf8-756d3d694eeb.0004.02/DOC_1&format=PDF

In overall, should AMBU wait for all such conditions to be met and afterwards start with the preparation of the RBMP or should the meeting of these conditions become integral part of the RBMP itself?

The RBMP context

In 2000, the EU WFD came into force, establishing a legal framework to protect and enhance the status of aquatic ecosystems, prevent their deterioration, and ensure the long-term, sustainable use of water resources throughout the EU. The objective was to achieve for all inland surface waters, transitional and coastal waters 'good chemical and ecological status (or potential)' – and for all groundwater to achieve 'good chemical' and 'quantitative status'.

'Clean water', not been put under pressure by the use of organic substances, nutrients and dangerous substances is essential. However, not enough in case the natural ecosystem including its flora and fauna is significantly damaged. That is why a holistic approach requires surface waters to be as well in 'good ecological status'; River bed and banks have to be well structured and enough water has to be ensured so that migration routes and natural habitats are provided for aquatic animals and plants.

Identification of Significant Water Management Issues (SWMI)

The preliminary stage was the identification of main SWMI as to offer an overview of main issues and pressure in the given RB. This Statement report presents the current issues in the river basin and proposes the main topics/aspects to be further addressed in the RBMP – indeed seeking for solutions. Few of the most significant issues are listed below:

1. Climate change and water resources
2. Hydrometeorological monitoring systems and data system
3. Protected areas and aquatic ecosystems;
4. Floods and droughts;
5. Morphology and continuity of canals and muds;
6. Ecological input
7. Use of water, water extraction and permits for water extraction;
8. Water discharges, water pollution and discharge permit;
9. Dams and hydropower plants;
10. Use, protection and monitoring of groundwater;
11. Coastal water quality and habitats
12. Coastal water level, danger and floods, erosion and floods.

For each issue, the statement included information on the:

- Importance of treatment;
- Current situation;
- Future complications and needs;
- Possible measures for implementation within the River Basin Management Plan.

Towards a RBMP framework for the country

Based on the analysis of the situation and the problems that were proposed to be addressed in SWMI, it was agreed that the next important step would be definition of an adequate and useful structure of the RBMP, which would fully comply with the requirements of the Annex VII of EU WFD, and at the same time would take into account the specifics of water resources and their problems in Albania. This structure was prepared mainly by EUSIWM international expert Brian Faulkner in June 2020.

The draft RBMP includes 13 chapters all in accordance with what is provided in Annex VII of the WFD, but the sequence of the chapters was slightly adapted to the national context. Few chapters are quite advanced and almost completed, and other ones are only considered. With regards to chapter 11 it took a longer period of preparation and consultation; economic analysis of water use represents a first time – pilot case for Albania, being conducted at river basin level.

The first draft RBMP took full shape in April 2021. From this moment onwards, the completion of the RBMP was conducted done under the leadership of AMBU with the support of the ADA-EUSWIM team and relevant international and local experts. The draft report and its contents were fully consulted with relevant stakeholders and related institutions through the RBM EG(s) meetings as well.
A continues update of the draft RBMP report took continuously, having the advanced draft RBMP in December 2021 as it was announced and introduced to all actors in a National Water Conference.

Programme of Measures

Based on the WFD requirements, for each RBMP prepared a PoM shall be defined in order to achieve the environmental objectives (WFD Article 11(1)[2]).
The measures identified in the Mat RBMP are designed based on the assessment of the current status of the water bodies designated, fed with information from the analysis of pressures and impacts affecting the water body. Each step of the planning process is, therefore, necessary to ensure that the correct measures are implemented in the appropriate location.
The measures were targeted in terms of their type "Key Types of Measures" (KTMs[3]) and to which extent they would ensure that such pressures are addressed. KTMs are groups of measures identified by the Member States in the PoMs which target the same pressure or purpose. A KTM may be one national measure but it would typically comprise more than one national measure. The measures had been designed based on the assessment of the actual status of water bodies, supplemented with the information from the analysis of pressures and impacts affecting the water bodies.
This RBMP sets out the PoMs that will be implemented during 2024-2029 to achieve 'environmental objectives' described fully under Chapter 3, in compliance with the WFD, Article 4[4]. Guidance on general pressure and measure indicators are provided under WISE 2016 Annex 3, with examples given. Specific measures (whilst falling within the framework of KTMs), should address the specific pressures (Key Type Pressure KTPs[5]) encountered at the water body level. The most effective way to reflect the relevant pressure(s) and consequent measure(s) is to summarise the individual elements that contribute to the waterbody overall status or potential.
Concerning the implementation of measures, the most generally applicable KTMs for the KTPs should be identified, and the indicator that will be used to quantify the progress of the measure. For example, the point pressure of urban wastewater (Key Type Pressure number 1.1) has to be most usually addressed through the construction of wastewater treatment plants (WWTPs) (a Basic Measure under EU Urban Waste Water Treatment Directive (91/271/EEC), Key Type Measure number 1).
It is of an outmost importance that the measure indicator is identified and quantified. In the case of urban wastewater, the most generally applicable measure indicator is the level of population equivalent (P.E.) requiring wastewater treatment to achieve the environmental quality standard of e.g. BOD5 < 4 mg/l in the receiving waterbody.

Main Measures defined:

- **Reducing pollution by organic substances**

Despite the huge investments already made in the wastewater infrastructure, additional measures should be taken in the future. 52% of the total PE of the basin need basic infrastructural development aiming to achieve connection to public sewer systems and at least biological treatment. Albania, as non-EU MS also intend to make efforts to achieve significant improvements by constructing a specific number of sewer systems and waste water treatment plants till 2027.

[2] Article 11 (1). Each Member State shall ensure the establishment for each river basin district, or for the part of an international river basin district within its territory, of a programme of measures, taking account of the results of the analyses required under Article 5, in order to achieve the objectives established under Article 4. Such programmes of measures may make reference to measures following from legislation adopted at national level and covering the whole of the territory of a Member State. Where appropriate, a Member State may adopt measures applicable to all river basin districts and/or the portions of international river basin districts falling within its territory.
[3] Summarised on Table 13-1 *(the EU WISE compliant Key Types of Measures (KTMs) that have been broadly adopted in this RBMP Report)*
[4] Article 4 : Environmental objectives
[5] Summarised on Table 10-1 *(the EU WISE compliant Key Types of Pressure (KTPs) that have been broadly adopted in this RBMP Report)*

- **Reducing pollution by nutrients.**

The measures under implementation have been substantially contributing to the reduction of nutrient inputs into surface waters and groundwater but further efforts are still needed. Continuation of measures implementation in urban waste water, industrial, and agricultural sectors is necessary.
In addition, introduction of phosphate-free detergents is considered to be a fast and efficient measure to reduce phosphorus emissions into surface waters. The EU Detergents Regulation has to be implemented in all countries and similar efforts are either already in progress or recommended to be made in Non-EU countries.
Diffuse pathways have a dominant share in the total nutrient emissions, therefore implementation of measures addressing land management has high importance. A key set of best agricultural practices to reduce nutrient inputs and losses related to farming and land management has been identified as appropriate management tools to be applied in agricultural areas.
Moreover, application of good agricultural practices is either ensured by regulatory actions (cross-compliance) or encouraged by economic incentives (rural development programmes) of the financial mechanism of the Common Agricultural Policy. Non-EU countries are also highly encouraged to implement similar best agricultural practices.

- **Reducing pollution by hazardous substances**

Appropriate treatment of urban waste water and application of Best Available Techniques (BAT) in the industrial plants and large agricultural farms are elementary measures and can significantly contribute to the mitigation of hazardous contaminations.
In Non-EU countries the efforts to be made in order to develop and improve the waste water sector and industrial technologies and to apply best agricultural practices will also have positive effects on water status related to hazardous substances pollution.
Further efforts are needed to identify which priority substances and other emerging chemicals are of basin wide relevance. Since only limited information is recently available on the emission sources contributing to hazardous substances contamination of the surface waters, this information gap should be narrowed. Compilation of the basin-wide inventory on discharges, emissions and losses has to be continued. In particular, diffuse emissions should be addressed by regionalized pathway modelling. To support these activities further information on in-stream concentrations and river loads via improved regular monitoring (enhanced devices and higher sampling frequency) and specific sampling campaigns (e.g. to sample point source effluents) is needed.

- **Improving the hydromorphological conditions**

From the evaluation of hydro morphological modifications, it is clear that only 2 water bodies are in poor condition. The measures proposed are those to facilitate the fish paths and the removal of obstacles to achieve a fuller continuity along the rivers.

- **Improving groundwater status**

<u>Groundwater quality</u>

Considering that contamination by nitrates is a key factor against achieving good chemical status of a significant portion of the GWBs of basin-wide importance, it is essential to eliminate or reduce the quantity of nitrates entering groundwater bodies. Prevention of deterioration of groundwater quality and any significant and sustained upward trend in concentrations of nitrates in groundwater has to be achieved primarily through the implementation of the EU Nitrates Directive and also the EU UWWTD.

<u>Groundwater quantity</u>

The over-abstraction of GWBs should be avoided by effective groundwater and surface water management. Therefore, appropriate controls regarding abstraction of fresh surface water and groundwater and impoundment of fresh surface waters (including a register or registers of water abstractions) must be put in place as well as the requirements for prior authorisation of such abstraction and impoundment. In line with the WFD, it must be ensured that the available groundwater resource is not exceeded by the long-term annual average rate of abstraction.

<u>Public Participation and Consultation</u>

AMBU is committed to active public participation in its decision making to achieve broader support for policies and increase efficiency in implementation efforts. The relevant stakeholders and all levels were fully consulted since the beginning of the drafting period for the Mat RBMP. In November 2019 the first kick-off/consultation meeting took place with relevant institutions to discuss and jointly identify/agree on the significant water management issues. Due to Covid-19 pandemic, during 2020 only one consultation meeting was held in October 2020 with representatives of Mat RBs. This advanced RBMP shall be published at AMBU official website as to comply with the requirements of Article 14 of EU WFD on public participation and involvement.

The Directive itself is gender-blind however AMBU with full extensive support of EUSIWM team have taken into full consideration the role of women, at all levels during the preparation phase.

1. Objectives, Administration and Coordination

1.1 Objectives

This document delivers the statutory requirements of the River Basin Management Plan for the Mati river basin ("the RBMP" or "the Plan"), as set out in the Government of Albania (GoA) Law on Integrated Water Resources Management, (LIWRM) especially Articles 17 and 24.[6] In parallel, the RBMP is also broadly compliant with the objectives and procedures of the European Union (EU) Water Framework Directive (WFD) (Directive 2000/60/EC), the over-arching legislation of the EU with respect to protection of national waters, and it's associated Directives. [7]

The overall purpose of the EU Water Framework Directive is primarily concerned with the quality of waters, broadly defined as 'status'. Control of water quantity (flows or volumes) is an ancillary element in securing good water quality and therefore measures on quantity serving the objective of ensuring good quality should also be established.

The River Basin Management Plan (RBMP) is the main tool for the management of surface and groundwater bodies within a specified River Basin District (RBD), in this case the "Tirana RBD" within Albania. With respect to water governance, the RBMP shall contain:

- a general description of the RBD or the river basin(s) if the RBMP applies at a subsidiary level within the wider RBD, incorporating principally: hydro-meteorology, land and water use;
- categorisation of water bodies into rivers, lakes, transitional and coastal surface water, groundwater bodies, their associated typology and reference conditions for all waterbodies;
- a technical evaluation of the baseline (current) condition of all waterbodies within the river basin in terms of their quality and quantity status;
- identification of protected areas within the river basin where water has a special use or importance that requires protection;
- a summary of the significant anthropogenic pressures and impacts on surface and groundwater bodies;
- a summary of the measures intended to mitigate the impacts identified for specific waterbodies if these are below the minimum required status of 'Good';
- an economic and/or technical justification for those waterbodies typically described as 'heavily modified waterbodies' (HMWBs) where achievement of 'Good Status' is not feasible;
- an economic analysis sufficient to identify the necessary recovery of resource and environmental costs of water services, taking account of long-term forecasts of supply and demand for water in the river basin;
- a register and summary of any more detailed plans proposed for sub-basins, sectors, management issues or water categories that may influence or be influenced by the environmental objectives and programme of measures of this Plan;
- a summary of public consultation measures taken and how these consultations have been taken into account in the formulation of the RBMP objectives and programme of measures;
- a list of the Competent Authorities that have obligations or are influenced by this Plan, including their relationship with other authorities co-ordinated within Albania, and where necessary, a summary of institutional relationships established to ensure co-ordination in international River Basin Districts;
- a register of abstractions and their permissions where those abstractions are likely to impact on waterbody status [8]

[6] Government of Albania, Law 111/2012, amended by Law no 6/2018 on Integrated Water Resources Management

[7] European Union, Directive 2000/60/EC – on establishing a framework for Community action in the field of water policy – "the Water Framework Directive", Annex VII, Annex IX

[8] European Commission, Directive 2000/60/EC – Article 11(3)

The defined period of the Plan is six years (2024-2029) in accordance with national legislation and the WFD, and represents the 3rd cycle of such Plans within the Member States of the EU with which Albania proposes to align. Once adopted at National Water Council and Council of Ministers level, the Programme of Measures (PoM) defined in the RBMP that delivers the stated environmental objectives devolving from LIWRM Article 25(1) are expected to be legally binding on the designated competent authorities, operators or other stakeholders as appropriate.

"Environmental objectives with regard to surface, groundwater bodies and protected areas shall be defined for the purpose of preventing the damage to water bodies, as well as protecting, increasing and rehabilitating the status of all bodies of water, both surface and groundwater ones." LIWRM. Article 25(1).

1.2 Legal Status of the Competent Authority

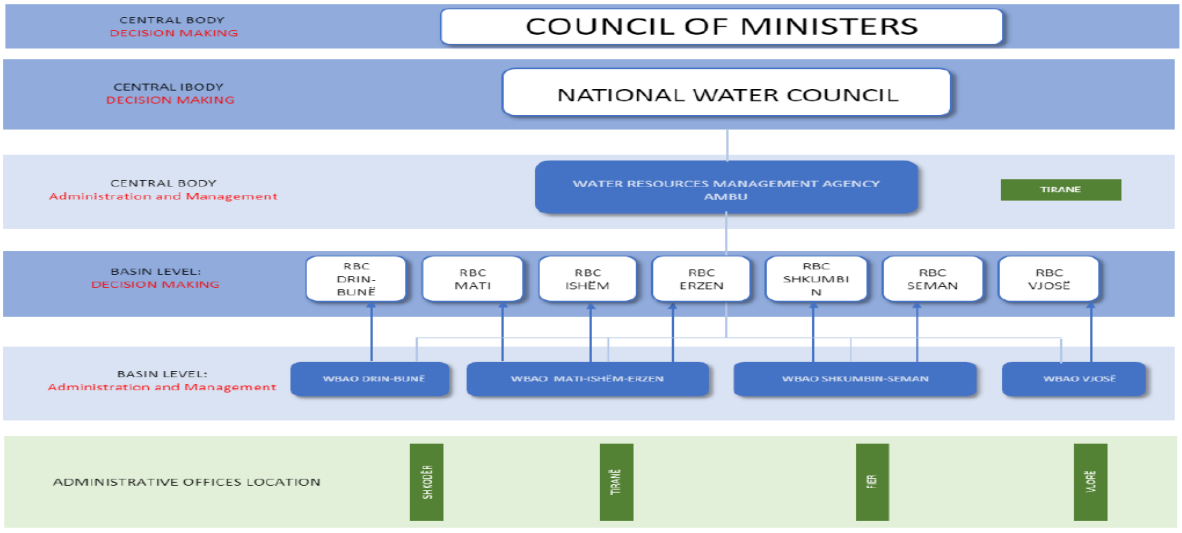
The water basin of Mat is delineated as independent (Map 1 1). For the purposes of this Plan, the Agency for Water Resources Management (AWRM) acts as the River Basin District Authority (RBDA) as defined in the LIWRM (Article 11). The specific competences of the WRMA are regulated by Article 11 of the LIWRM and the Decision of the Council of Ministers No. 221, dated 26.04.2018 on the organisation and functioning of the WRMA.

The RBDA has overall responsibility to ensure that the requirements of the LIWRM and the EU WFD, especially the environmental objectives and programme of measures as set out in the RBMP, are coordinated across all sectors and programmes within the river basin. [9]

1.3 Administrative Arrangements

The LIWRM defines the institutional framework, at national and local level, to ensure the management of water resources, and also aligns with the principal EU environmental and water related Directives including the UWWTD, the Drinking Water Directive (DWD) and partially the Groundwater (GD) and Floods Directives (FD). The governance structure of water management generally is set out in Figure 1-1. WRMA is the designated competent authority to develop and implement policies, strategies, plans, programs and projects aimed at the integrated management of water resources, including RBMPs. The RBCs are the responsible bodies at local level for integrated water resources management in the relevant basin, including the conservation and protection of water resources, as well as an equitable distribution of the water resources within the concerned river basin (LIWRM, Article 12).

Figure 1-1 – Administrative Arrangements for Water Governance



[9] European Commission, Directive 2000/60/EC – Article 3(2)

The Water Basin Administration Offices (WBAOs) are operational units of the AWRM/AMBU. Their main tasks include the development of the respective river basin water resources management plans and the maintenance of water resource inventories (Article 13, LIWRM).

1.4 Competent Authority Coordination and Institutional Relationships

WRMA acts as the principal responsible body for the development and coordination of the RBMP. However, RBMPs are necessarily highly complex initiatives, requiring extensive cooperation and consultation between Government Ministries, Agencies and regulators, so called "competent authorities".

Table 1-1 summarises the competent authorities relevant to this Plan, and their duties and obligations, and coordination mechanisms with the River Basin District Authority. This coordination routinely takes place through the Governance mechanisms.

The institutions in charge of drafting and implementing plans for its administration and organization of national bodies in Water Resources Management are: Council of Ministers, National Water Council, Agency for Water Resources Management, Council of River Basins and Water Resources Management Offices. (Article 7, LIWRM).

RBCs are assisted by the WBAOs, which function as a secretariat to the RBC. The WBAOs are responsible for technical assessment of water use applications (surface and groundwater) and provide recommendations for approval by RBC, support municipalities in resolving related issues water resources and are responsible for supervising (controlling) all activities related to the use of water resources. However, the WBAOs have limited authority to enforce legal and regulatory procedures.

Prime Minister's Order no.129 dated 21.09.2015 'On taking institutional and operational measures for the implementation of the sectoral approach and the establishment of integrated policy management groups' institutionalizes for the first time the sectoral approach within the Integrated Planning System (IPS) which is the main decision-making system that determines the strategic direction and distribution of the country's resources. The Integrated Sector Management mechanism was set up with the aim of developing, implementing and monitoring sectoral reforms in Albania. This would be achieved through the design of national sectoral programs and the creation of a single list of priority projects for strategic investments. The mechanism was based on the establishment of four Integrated Policy Management Groups (GMIPs) in four priority areas:

- Integrated Water Management;
- Employment and Social Sector;
- Competitiveness and Innovation:
- Good Governance and Public Administration.

Through the Order of the Prime Minister no. 157, dated 22.10.2018 'On taking measures for the implementation of the wide sectoral / cross-sectoral approach, as well as the establishment and functioning of the integrated sectoral / cross-sectoral mechanism', the GMIP mechanism is reorganized and consolidated in support of taking organizational measures, inter-institutional and operational for the implementation of the sector-wide / cross-sectoral approach. In the new organization, GMIPs aim to operate in the function of integrated sectoral and cross-sectoral approach in priority areas. In this regard, a cross-sectoral perspective has been added in contrast to the first organization that emphasized only the sectoral one. In addition to GMIPs, a new form of organization is added: Sectoral Steering Committees (SCCs) divided into five. It is important to specify the role that this mechanism has in the process of using and implementing the Financial Instrument of Sectoral Budget Support. The Prime Minister's Order 2015 specifies that: 'this mechanism aims to develop, implement and monitor sectoral reforms in Albania through the drafting of national sectoral programs and the creation of a single list of priority projects for strategic investments, in accordance with the membership process in the EU and Albania's international obligations'.

All stakeholders within the river basin from end-users to local and national authorities (government institutions), are represented by different subjects that operate in the water sectors; such as: agriculture, industry, urban, energy providers, to NGOs, scientific community, donors and civil society at large.

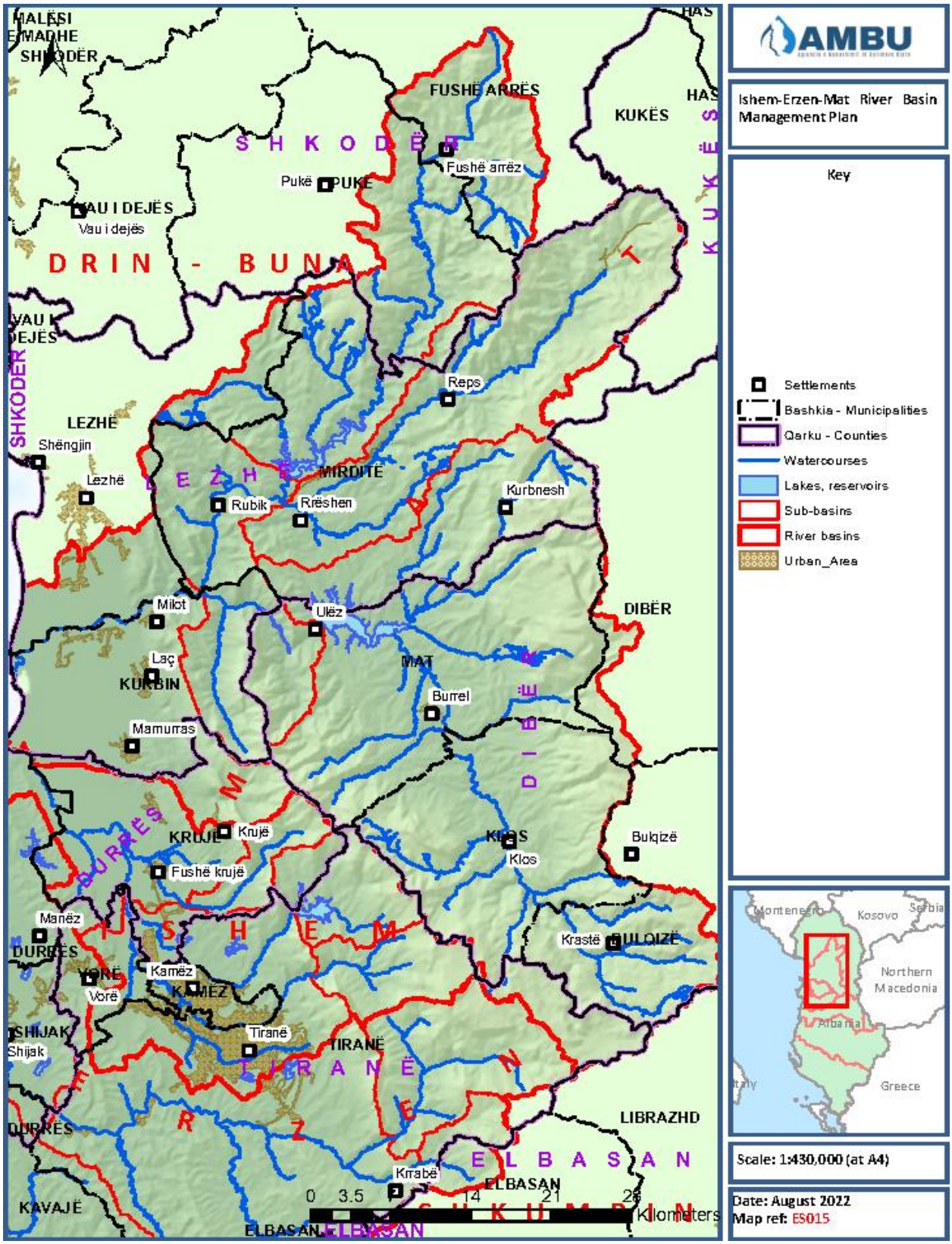
Table 1-1 – Register of Competent Authorities Relevant to the Plan

COMPETENT AUTHORITY & LEGAL AUTHORITY	MAIN ACTIVITIES CONTRIBUTING TO WFD	COORDINATION MECHANISMS WITH OTHER CAs
Water Resources Management Agency (WRMA) (Office of the Prime Minister) Law No. 111/2012 as amended by Law no. 6/2018 on ''Integrated water resources management'' DCM No. 221 dated 26.4.2018 on ''Establishment of WRMA''	Implementation and coordination of the Law on Integrated Water Resources Management Implementation and coordination of the EU Water Framework Directive Preparation of River Basin Management Plans Preparation of Water Resource Management Plans Preparation of Flood Risk Management Plans Preparation of Drought Risk Management Plans Holder of the Register of Water Abstractions (in NWRC)	Publication of River Basin Management Plans and Subsidiary Plans Implementation of National IWRM Strategy Maintenance of the register of water resources operators Maintenance of the National Water Resources Cadastre
National Environmental Agency (NEA) Law No. 10431 date 9.6.2011 on '' Environmental Protection'' DCM No. 568 date 17.7.2019 on ''Establishment of NEA''	National Environmental Monitoring of River Waterbodies National Environmental Monitoring of Lake Waterbodies National Environmental Monitoring of Coastal Waterbodies Environmental Permits issued for all industrial activities in the country EIAs and SEA assessed regularly	Publication of the National Environmental Monitoring Programme (yearly exercise) Maintenance of Register of Environmental Permits Maintenance of the Register of Pollutant release and discharges
Department of Climate and Environment, Institute of Geosciences, Energy, Water and Environment (IGEWE) Law No. 8485 dated 12.5.1999 on ''Code of administrative procedures'' DCM No. 490 dated 6.7.2011 on ''Establishment of IGJEUM / IGEWE (merging previous existing different institutions).	Data collection, verification and distribution of meteorological data (precipitation monitoring) Data collection, verification and distribution of hydrological data (flow monitoring)	Publication of Climate Monthly Bulletin via website
National Agency for Protected Areas Law No. 81/2017 on ''Protected areas'' DCM No. 102 dated 4.2.2015 on ''Establishment of national agency for protected areas'', as amended on 2016.	Management of Protected Areas Implementation of the EU Birds and Habitats Directives	Publication of management plans for protected areas, all types Maintenance of register for protected areas – GIS based Maintenance of the national Inventory of flora and fauna

National Coastline Agency (NCA) Law No. 93/2015 on ''Tourism'' DCM No. 569 dated 17.7.2019 on ''Establishment of national coastline agency''	Protection and development of sustainable environment in coast Monitoring and control of illegal touristic-based activities in coast (beaches)	Maintenance of national inventory of coastline Monitoring implementation of territorial planning instruments
National Territorial Planning Agency Law No. 107/2014 on ''Territorial development and planning''. DCM No. 427 dated 8.6.2016 on ''Establishment of national agency for territorial planning''	Preparation of territorial management plans in a coordinated manner – through local governments Preparation of integrated plans thematic-wise (including infrastructure, floods, water, agriculture, urban development, etc).	Publication of National Development Plan Coordinate preparation of local governments territorial management plans Publication of Integrated Cross-Sectorial Coastline Plan – GIS based Publication of Integrated Cross-Sectorial Coastline Plan for Tirana-Durres Region – GIS based (including Tirana, Durrësi, Kamza, Vora, Shijaku and Kruja municipalities). Maintenance of an Integrated Planning Database.
Albanian Geological Survey (AGS) Law No. 111/2015 dated 15.10.2015 on ''Albanian geological survey''	Study and monitoring of groundwater, aquifers, geological layers, hydrogeology	Publication of reports on groundwater quality Maintenance of database – GIS based – on geology, hydrogeology and groundwater aquifers. Member of EuroGeoSurveys, since 2007
National Agency for Nature Resources (NANR/AKBN) Law No. 7/2017 on ''Use of renewable resources'' DCM No. 547 dated 9.8.2006 on ''Establishment of AKBN) as amended in 2017	Maintenance of database – national – on Energy sector use / capacity Monitoring and inspection of energy sector + fuels, oils, and all other natural resources Preparation of national action plan on use of renewable resources for energy production – every 2 years Hydropower plants monitoring Analysis of minerals	Publication of Bulletin on hydropower potential / investments in the country Maintenance of GIS based system on energy
National Agency for Water Supply, Sewerage and Waste Infrastructure (AKUM) Law No. 8102, dated 28.3.1996 on ''water supply and sewerage'', as amended by law no. 9915 dated 2008. (The new draft law is prepared – not yet adopted). DCM No. 431 dated 11.7.2018 ''on establishment of AKUM''	Implementation of policy and strategy on water supply and sewerage (Master plan for WSS and Waste) Wastewater treatment Planning infrastructure for waste Planning investment needs for water supply/ wastewater and waste management	Maintenance of national GIS platform on water supply and sewerage assets Publication of reports / statistics on performance of water utilities

Regional Directorates for Irrigation and Drainage Law No. 24/2017 on ''Irrigation and drainage" DCM No. 437 dated 17.5.2017 on ''Establishment of 4 regional directorates for irrigation and drainage''	4 Directorates established: in **Lezhe, Durres**, **Fier** and **Korçe**. Inventory of irrigation, drainage and flood protection infrastructure Planning needs / water demand for irrigation sector Planning rehabilitation interventions in irrigation, drainage and flood protection infrastructure	Maintenance of integrated system for forests
National Forestry Agency (NFA) Law no. 5/2016 dated 04.02.2016 "On the announcement of the Moratorium on forests" DCM No. 570, dated 17.7.2019 "On the establishment of the NFA". Order no. 24, dated 03.02.2020 "On the approval of the structure and organizational chart of the National Forest Agency" Law no. 57/2020 "On Forests" dt.30 / 04/2020	Prepare inventory of forestry Preparatory of GIS based maps Implementation of yearly monitoring programme for forestry, biodiversity, habitats, etc. Monitoring / control / inspection	Maintenance of integrated forest system (registry, database, GIS system). Establishes and maintains the National Register of the Forest Fund. Develops the methodology for forest inventory, organization and management of work at the national level. Publication of forest status reports and other relevant data / information.
National Agency for Civil Protection (former General Directorate for Civil Emergencies) Law No. 45/2019 dated 18.7.2019 on ''Civil Protection'' DCM No. 747 , dated 20.11.2019"On the Organization and Functioning of the National Civil Defense Agency"	Preparation of national strategy for remediation of risk from disasters Preparation of national plan for civil emergencies Interventions in infrastructure in the damaged areas	Maintenance of database of information on losses and damages Establishment of the Fund for Solidarity
State Authority for Geo-Spatial Information (ASIG) Law No. 72/2012 dated 28.6.2012 on ''organisation and functioning of the state infrastructure for geo-space information"	Implementation of INSPIRE Directive requirements Preparation of National Standards for geo-Spatial information Preparation of all thematic-wise maps, at GIS system	Publication of all typology / sector maps at local/region/country level Maintenance of National GIS system for all types of information Maintenance of the National Geo-Portal (website) with information thematic-wise and available for public
Institute of Public Health Law No. No.10 138, dated 11.5.2009 on ''public health''	Quality assessment of drinking water (analysis of surface water, groundwater and water treatment facilities) Monitoring drinking water quality Analysis of drinking water quality monitoring data carried out by Local Health Care Units	Publication of reports on health issues / status Publication of health medical Journal Publication of Bulletin of Health via website Publication on the website of the Annual Drinking Water Quality Report.

Map 1-1 – River Basin Districts in Albania and Extent of the Mati River Basin



1.5 Overall Structure of the RBMP Framework and Documentation

1.5.1 Core Components

Within the context of the Water Framework Directive (WFD), the River Basin Management Plan (RBMP) should give a detailed account of how the environmental objectives to be set for the river basin (ecological status, quantitative status, chemical status and protected area objectives) are to be reached within the timescale required [10]. Broadly:

- Measures to protect the quality and quantity of all waters, including aquatic ecology and valuable habitats
- Measures to protect sources of water used for potable water, both surface and groundwater
- Measures to ensure the long-term sustainability of waters in terms of both environmental and economic needs
- Measures to protect bathing waters and other waters of economic importance

These objectives must be integrated for each river basin. Broadly, program of measures are divided to:

i. 'Basic measures' incorporating the key compliance requirements of various EU Directives, set out under Part A, WFD Annex VI.
ii. 'Supplementary measures' at the discretion of the RBDA as required, to achieve environmental objectives, set out under Part A, WFD Annex VI.

In parallel, an economic analysis of water use within the river basin must be carried out. Adequate water pricing and cost recovery acts as an incentive for the sustainable use of water resources and thus helps to achieve the environmental objectives under the Directive. Additionally, the economic analysis facilitates rational discussion on the cost-effectiveness of the various possible measures listed above.

1.5.2 Secondary Components

At the scale of the river basin, comprehensive and best practice integrated water resources management requires broader considerations than the limited range of 1.5.1 above. [11] In its core formulation, the WFD makes only very limited explicit reference to management of water resources, flood management, drought management and coastal management.

These activities have significant potential to impact on the measures of 1.5.1, and indeed, within the foreseen additional component subsidiary strategies or plans (water resources, flood risk and drought risk management), these sectoral strategies should be reporting specifically on the impacts of those strategies on river basin environmental objectives and waterbody status where relevant.

But they also require significant and technically complex strategies and/or Plans in their own right, far beyond the narrower scope of 'quality of waters' originally envisaged under the WFD.

In accordance with best international practice, the RBMP framework for Albania envisages additional subsidiary strategies and/or Plans coordinated with but distinct from the core RBMP document (the measures of 1.5.1.). Specifically, where necessary:

- A Water Resources Management Strategy or Plan
- A Flood Risk Management Strategy or Plan
- A Drought Risk Management Strategy or Plan
- A Coastal Zone Management Strategy or Plan
- A Strategic Environmental Assessment (SEA) of the RBMP Proposals

[10] European Commission - https://ec.europa.eu/environment/water/water-framework/info/intro_en.htm
[11] The World Bank – Integrated River Basin Management – From Concepts to Good Practice, Briefing Notes 1-15, 2006.

The content and objectives of these supportive strategies is explained further under Chapter 9. If these Strategies or Plans are not yet developed for the river basin in question (or are not applicable) this is clarified in the relevant sub-section.
In summary, it should be understood by all regulators, competent authorities and operators contributing to any of the above strategies and/or Plans that ultimately the over-arching environmental objectives of the LIWRM Article 25 and WFD Article 4 set the pre-eminent guiding principles for the environmental compliance of these subsidiary strategies. These strategies should fully take account of and coordinate with the stated environmental objectives of the RBMP, OR fully comply with the derogation requirements as set out under WFD Article 4(7).

1.5.3 Supportive Elements

Primary national legislation and the EU Directives cannot in themselves provide sufficient guidance as to how River Basin Management Plans should be prepared. In particular, specific technical issues or procedures will usually require the provisions of secondary legislation, Decisions of the Council of Ministers (DCM 1015/2020) or Standard Technical Procedures (STPs) prepared by the AWRM, evidence and procedures provided by the EU Common Implementation Strategy. [12] International best practice is also highly relevant, as not all such practices have yet been enshrined in EU policy or implementation strategy.
These supportive elements are too numerous to list individually, but the most relevant are summarised under Table 1-2. The list is not exhaustive.

1.5.4 The RBMP Reporting Framework Illustrated

The illustrative overview of the RBMP framework in Albania, which acts as the current default template for all future RBMPs is set out under Figure 1-2.

[12] https://ec.europa.eu/environment/water/water-framework/objectives/implementation_en.htm

Table 1-2 – Supportive Elements to the RBMP Framework

PRINCIPAL DIRECTIVES RELATED TO THE WATER FRAMEWORK DIRECTIVE	
Directive 2000/60/EC	Establishing a framework for Community action in the field of water policy
Directive 2006/118/EC	On the protection of groundwater against pollution and deterioration
Directive 2013/39/EU	Amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the Field of water policy
Directive (EU) 2020/2184	On the quality of water intended for human consumption
Directive 91/676/EEC	Concerning the protection of waters against pollution caused by nitrates from
Directive 2006/7/EC	Concerning the management of bathing water quality
Directive 2010/75/EU	On industrial emissions (integrated pollution prevention and control)
Directive 2001/42/EC	On the assessment of the effects of certain plans and programmes on the environment
Directive 91/271/EEC	Concerning urban waste water treatment
Directive 97/62/EC	On the conservation of natural habitats and of wild fauna and flora
PRINCIPAL GUIDANCE DOCUMENTS OF THE WFD COMMON IMPLEMENTATION STRATEGY	
Guidance Document 2	Identification of Waterbodies
Guidance Document 3	Analysis of Pressures and Impacts
Guidance Document 4	Identification and Designation of Heavily Modified Waterbodies
Guidance Document 7	Monitoring under the Water Framework Directive
Guidance Document 13	Overall approach to the classification of ecological status and ecological potential
Guidance Document 19	Guidance on Surface Water Chemical Monitoring under the Water Framework Directive
Guidance Document 27	Technical guidance for deriving environmental quality standards
Guidance Document 31	Ecological flows in the Implementation of the Water Framework Directive
Guidance Document 34	On the application of water balances for supporting the implementation of the WFD of water balances for supporting
Guidance Document 35	Water Framework Directive Reporting Guidance 2016 – 6.0.6

GOVERNMENT OF ALBANIA – LEGAL ACTS	
Law no.111/2012	On the Integrated Water Resources Management
Law no.10431/2011	On Environmental Protection
Law no.44/2015	On administrative Procedures
Law no.81/2017	On Protected Areas
Law no.93/2015	On tourism
Law no.107/2014	Territorial Development and Planning
Law no.111/2015	On Albanian Geological survey
Law no. 7/2017	On use of renewable resources
Law no.8102/1996	On water supply and sewerage
Law no.24/2017	On Irrigation and drainage

Law no.90/2012	On public Administration
Law no.45/2019	On civil protection
Law no 72/2012	Organisation and functioning of the state infrastructure for geo-space information
Law no.10138/2009	Public health
Law no. 57/2020	On forests
GOVERNMENT OF ALBANIA – DECISION OF COUNCIL OF MINISTERS	
DCM no.221/2018	On Establishment of WRMA
DCM no. 1015/2020	On The Content, Development and Implementation of National Water Strategies, of River Basin District Management Plans and of Flood Risk Management Plans
DCM no.568/2019	On Establishment of MEA
DCM no.490/2011	On establishment of IGEWE
DCM no.102/2015	On establishment of National Agency for protected areas
DCM no 427/2016	On establishment of National Agency for territorial planning
DCM no 547/2006	On establishment of National Agency of Natural Resources
DCM no.431/2018	On establishment of AKUM
DCM no.437/2017	On establishment of 4 regional directorates for irrigation and drainage
DCM no.570/2019	On establishment of National Forest Agency

Figure 1-2 – Illustrative Layout of the RBMP Reporting Framework for Albania

Initiation Phase and Consultation

Document Statement of Consultation

Document Overview of Significant Water Management Issues

River Basin Management Plan – Core Document (Draft to Final)

Annexes

Annex I - Hydrology
Annex II – GIS
Annex III – Dataset
Annex IV – Pressure
Annex V – Hydrobiology
……
Annex XI – Programme of measures
Annex XII – Training and Public Consultation

Technical Mapping

Supporting Plans and Strategies

Document Economic Analysis

Document Environmental Impact Assessment

Document Water Resources and Abstraction Strategy

Document Flood Risk Strategy

Document Drought Risk Strategy

2. Expert and Public Consultation Measures

2.1 Legal Context

It is a broad requirement of the EU Water Framework Directive to promote the active encouragement of the public and other stakeholders ("interested parties") in the production, review and updating of River Basin Management Plans. [13]

2.1.1 Albania

General provisions and procedures with respect to public consultation on water management issues are transposed in the Law on Integrated Water Resources Management (LIWRM) [14] and the Law on Public Consultation (LPC). [15]

The as yet un-adopted draft DCM on "The Content, Development and Implementation of National Water Strategies, of River Basin District Management Plans and of Flood Risk Management Plans" includes provisions to ensure a record of public consultation measures and changes made to the plan as a consequence (in alignment with WFD Annex VII).

2.1.2 European Union

Under European Commission best practice, relations with stakeholders should be governed by four general principles [16]:

- Participation: adopt an inclusive approach by consulting as widely as possible.
- Openness and accountability: make the consultation process and how it has affected policy making transparent to those involved and to the general public.
- Effectiveness: consult at a time where stakeholder views can still make a difference, respecting proportionality and specific restraints.
- Coherence: ensure consistency of consultation processes across all groups, sectors, and services as well as adequate evaluation, review and quality control.

In the development of RBMPs specifically, WFD Article 14 sets out a clear progression of consultation steps:

1. A Statement of Consultation Measures, incorporating a timetable, work programme and list of interested parties to be consulted and by what methods, to be issued by the RBDA three years before the onset of the proposed Plan.
2. An interim Overview of Significant Water Management Issues identified by the RBDA two years before the onset of the proposed Plan.
3. A draft River Basin Management Plan issued one year before the onset of the proposed Plan.

In each case a full six-month consultation period should be allowed in order to allow active involvement of interested parties. These minimum requirements do not preclude other ad hoc consultations with expert groups or significant operators, providing these consultations are transparently recorded.

2.2 Main Consultation Measures for the Mati River Basin

2.2.1 Statement of Consultation

The Statement of Consultation for the Mati River Basin Management Plan was issued by the AWRM (the RBDA) on 21 July 2020, and posted for public dissemination via the Agency website. [17]

[13] Water Framework Directive – Article 14, Annex VII (9)

[14] Government of Albania – Law on Integrated Water Resources Management, Chapter XVII, Article 91.

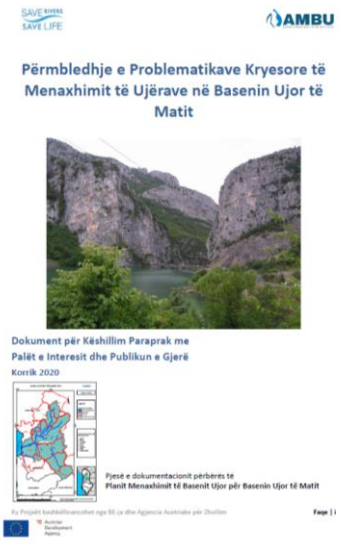
[15] Government of Albania – Law on Public Consultation, Article 15 and Article 17.

[16] European Commission – Better Regulation Guidelines, SWD (2017) 350, 2017

[17] http://www.ambu.gov.al/public/IDENTIFICATION%20paraprak%20i%20problematikave%20kryesore%20ne%20Basenin%20e%20Matit.pdf

Due to resource and capacity limitations, it was not possible to issue this Statement fully in accordance with the three-year rule (target January 2019).

2.2.2 Overview of Significant Water Management Issues (OSWMI)



The Overview was published to the AWRM website 21 July 2020 (target January 2020). Due to resource and capacity limitations and the 2020 COVID-19 pandemic, it was not possible to issue this Overview fully in accordance with the two-year rule (target January 2020).

The Overview was formulated in two stages:

i. an outline draft of the Overview was circulated for comment to a select list of key Agencies, institutions and regulators ('the Expert Group'), in order to ensure that the Overview contents adequately represented the key issues for the river basin. The list of contributors is summarized in the Table of Contributors in Appendix XII.

ii. The finalised Overview of Significant Water Management Issues was published for general consultation via the AWRM website on 21 July 2020.

The OSWMI document is not intended to be a technical document. Rather it should provide the general public and other interested parties with a general insight as to the main water related deficiencies and problems that need to be addressed in order to protect valuable ecosystems and sources of water and ensure sustainable water quality and quantity in the long-term.

Predominantly the OSWMI document should be sufficiently informative so as to stimulate responses and opinions from a wide range of interested parties. Accordingly, the Overview was structured according to a range of easily recognisable 'themes', summarised in Table 2-1. Within the document, the AWRM suggested possible management and operational measures to mitigate perceived unsustainable or damaging water use practices.

The consultation responses and a summary of how these views have been considered in the RBMP Programme of Measures are provided under RBMP – Annex 2.

2.2.3 Draft River Basin Management Plan

The RBMP Report (draft) was published on the AMBU website in November 2022. The consultation period will last 6 months. Comments during the consultation and a summary of how these views have been taken into account in the PMBU Program of Measures are presented in Technical Annex XII.

2.2.4 Public Meetings, Road-shows and Workshops

The preparation of RBMP has a number of steps that have been identified, and the workshop/training activities will be structured around these steps. The steps used here are:

- Initiating RBMP process
- Characterisation
- Pressure-Impact assessment
- Protected areas
- Monitoring assessment
- Environmental objectives
- Economic evaluation
- Programme of Measures
- River Basin Management Plan
- Consultation

These steps are based on the EU WFD and the EU Common Implementation Strategy for the WFD with a number of guidance documents.

In addition to the modules linked directly to the RBMP process some modules has been developed for general background, legal transposition and implementation after the RBMP.
Each module has a series of events (Training Workshops, Practical examples, Field Work, On the Job Training) depending on the module. Implementation of all events involved can take several months as it follows the progress in working with the RBMP process.
The product of the RBM process is the RBMP, which includes 10 key Sections.
Each Workshop/Training Module is directly linked and supports at least one section of the RBMP and sometimes it supports more than one.
Participation in various workshop/training activities should include all institutions involved in preparation of RBMP, such as WRMA, and other related institutions either directly or indirectly involved such as National Environmental Agency (NEA).

2.2.5 Final River Basin Management Plan

The final PMBU was published on the AMBU website in November 2022. The Program of Measures, presented in the PMBU (Chapter 13) is the main product aimed at achieving the environmental objectives in the water basin, as defined in Chapter 3 of this document.
The PoM must be included within the period of the Plan 2024-2029 and within the framework of the national legislation, the measures must be considered as mandatory by law for the designated authorities.

Table 2-1 – Summary of Significant Water Management Themes

MAJOR THEME	COMMENTARY ON MAIN PRESSURES, STATE OR IMPACTS
ENVIRONMENT	**POSSIBLE ISSUES**
Climate Change and Water Resources	• Expected -8% reduction in precipitation by 2025 • Expected -20% reduction in precipitation by 2050 • Substantial impacts expected on water availability for all uses
Hydro meteorological Data & Monitoring Systems	• Collapse of the surface water monitoring system since 2000 • No recent data for climate change or water resource analysis available for surface or groundwater
Protected Areas & Aquatic Ecosystems	• Drinking water sources not demarcated or protected • Natural protection areas are not respected and many potential Natura 2000 habitats not defined • Very limited data available; monitoring system not fit for the purpose
Floods and Droughts	• No Flood Risk Management Plans developed • No Drought Risk Management Plans developed
Channel and Floodplain Morphology & Continuity	• Illegal excavation of gravels and destroyed habitats • Barrages, weirs and hydropower installations acting as barriers to river continuity
Environmental Flows	• Environmental flows not properly defined for any rivers • Numerous aquatic ecosystems severely degraded in terms of species diversity
WATER USE	**POSSIBLE ISSUES**
Water Use, Water Abstraction and Abstraction Permitting	• Inefficient use of municipal water, with real losses at +60% • Costs of water use and impacts not fully recovered from Operators
Water Discharges, Water Pollution and Discharge Permitting	• Sampling of urban wastewater in urban and rural areas with high population intensity and industrial activity. • Degradation and high pollution of the main rivers from untreated discharges and without obtaining a permit for these activities. • Possible failure to meet the required environmental quality standards from discharge permits.
Dams & Hydropower	• Interruption of ecosystem continuity and water flows from dams and dams.
Groundwater Use, Protection and Monitoring	• Uncontrolled excess groundwater abstraction. • Insufficient quality and quantity monitoring system. • Risk of coastal water intrusion into freshwater and groundwater as a result of overuse.
COASTLINE MANAGEMENT	**POSSIBLE ISSUES**
Coastal water quality, bathing waters, habitats	• Risks to human health due to upstream pollution • Degraded coastal habitats due to solid waste deposition
Coastal management, flood risk and erosion	• Projections of 0.2 – 0.3m sea level by 2050 may create significant flood risk from sea floods and a reduction in the discharge capacity of the rivers in their deltas. • Sea level rise may increase intrusion pressure to groundwater

3. Environmental Objectives for the River Basin

3.1 Overview

All River Basin Management Plans implementing the Water Framework Directive in the European Union have as their overriding purpose the maintenance and protection of the aquatic environment. This is achieved through measures to ensure that all waters (surface and groundwater) are of sufficient and sustainable quality and quantity for both environmental and economic needs. Quality and quantity both have complex characteristics that are explained below.

This Chapter serves to explain the main definitions and principles by which quality and quantity are assessed, and is the only Chapter of this Report that may be regarded as 'non-specific' to the Mati basin. However, the concepts and procedures set out below closely control the aquatic environment protection strategy for the Mati basin through a) general environmental policies b) remedial or protective measures for specific waterbodies.

3.1.1 Albania

Environmental objectives with regard to surface, groundwater bodies and protected areas shall be defined for the purpose of preventing the damage to water bodies, as well as protecting, increasing and rehabilitating the status of all bodies of water, both surface and groundwater ones." LIWRM, Article 25(1).

The requirements of the GoA LIWRM broadly follow the EU legislation.

3.1.2 European Union

WFD Article 4 defines the core concept of the WFD and the specific purpose of RBMPs, namely to implement measures as appropriate to:

- Prevent deterioration of the status of all surface water and to achieve good ecological status or good ecological potential;
- Progressively reduce pollution from priority substances and river basin specific pollutants so as to achieve good chemical status for surface waters;
- Prevent or limit the discharge of pollutants generally to groundwater and reverse negative trends;
- Prevent deterioration of the status of all groundwater, determined by quantitative status and chemical status, and to achieve good chemical status for all groundwater bodies;
- Ensure a sustainable balance of groundwater abstraction against annual recharge.

3.2 The Concept of Waterbody Status

3.2.1 Ecological Status

Ecological status is an assessment of the quality of the structure and functioning of surface water ecosystems. It shows the influence of pressures (e.g., abstraction, pollution or habitat degradation) on the identified quality elements.

Ecological status is determined for rivers, lakes, and transitional and coastal waters based on biological quality elements (BQEs) (phytoplankton, macrophytes, phytobenthos, benthic invertebrate fauna and fish). Supporting physico-chemical are oxygen condition, temperature, nutrients, transparency, salinity and river basin specific pollutants (RBSPs) and river basin specific pollutants. Hydromorphological quality elements include flow regime, connectivity to groundwater, river continuity and morphological conditions (Figure 3-1).

3.2.2 Chemical Status

European Union legislation provides for measures against chemical pollution of surface waters. There are two components *a)* the selection and regulation of substances of EU-wide concern (the 'priority substances' and 'priority hazardous substances') *b)* the selection by Member States of substances of national or local concern ('river basin specific pollutants') for control at the relevant level.

For surface waters, good chemical status means that no concentrations of 'priority substances' [18] exceed the relevant environmental quality standards (EQS) established in the Environmental Quality Standards Directive (EQSD) 2008/105/EC (as amended by the Priority Substances Directive 2013/39/EU). EQSs aim to protect the most sensitive aquatic species from direct toxicity, and to protect human health. The standards for river basin specific pollutants (RBSPs) are defined by the national competent authority.

For groundwater to meet the aim of good chemical status, hazardous substances should be prevented from entering groundwater, and the entry of all other pollutants (e.g. nitrates) should be limited below defined levels.

3.2.3 Quantitative Status

Whereas water quantity was regarded as an ancillary element to overall ecological status in the WFD at publication, water quantity in terms of flow regime is now seen as one of the primary elements of good ecological status.[19] [20] For rivers especially, specific assessment should be made to identify the 'environmental flow regime' and to quantify the degree of impact on the waterbody resulting from changes to the flow regime. Environmental flow is poorly regulated in Albania at this time, and for example, current legislation defining Q97 as the single 'minimum ecological flow' is not fit for purpose. A best practice method is proposed (see section 3.3.5).

For groundwater, quantitative status is determined by a comparison of the rate of annual recharge of the groundwater stock against consumption of the groundwater. Abstractions exceeding recharge even in the short-term will negatively impact on local groundwater level with consequences for *a)* surface water flows and ecosystems *b)* availability of groundwater for economic uses generally.

3.2.4 Levels of Status

The concept of waterbody status is central to the environmental deliverables of the GoA LIWRM and WFD generally and RBMPs specifically. Status is seen as a relative concept, relative to the 'reference condition' which is always type specific (section 5.2.2).

Reference conditions (RC) do not necessarily equate to totally undisturbed, pristine conditions. They may include very minor disturbance which means that some anthropogenic pressure is allowed providing there are no or only very minor ecological effects. RCs are always aligned with high ecological status.

Typically:

- High Status -  - No or very minor anthropogenic alterations to the biological quality, physico-chemical and hydro morphological elements of the waterbody
- Good Status -  - Slight levels of distortion of the composition and abundance of biological quality elements, with physico-chemical and hydro morphological conditions consistent with the achievement of good biological quality
- Moderate Status -  - Modest deviation of biological quality elements relative to High Status, with physico-chemical and hydro morphological conditions consistent with the achievement of moderate biological quality

[18] European Commission – Water Framework Directive, Article 16, and Annex X replaced by EQSD, Annex II.

[19] European Commission – CIS Guidance No 31 – Ecological Flows in the Implementation of the WFD

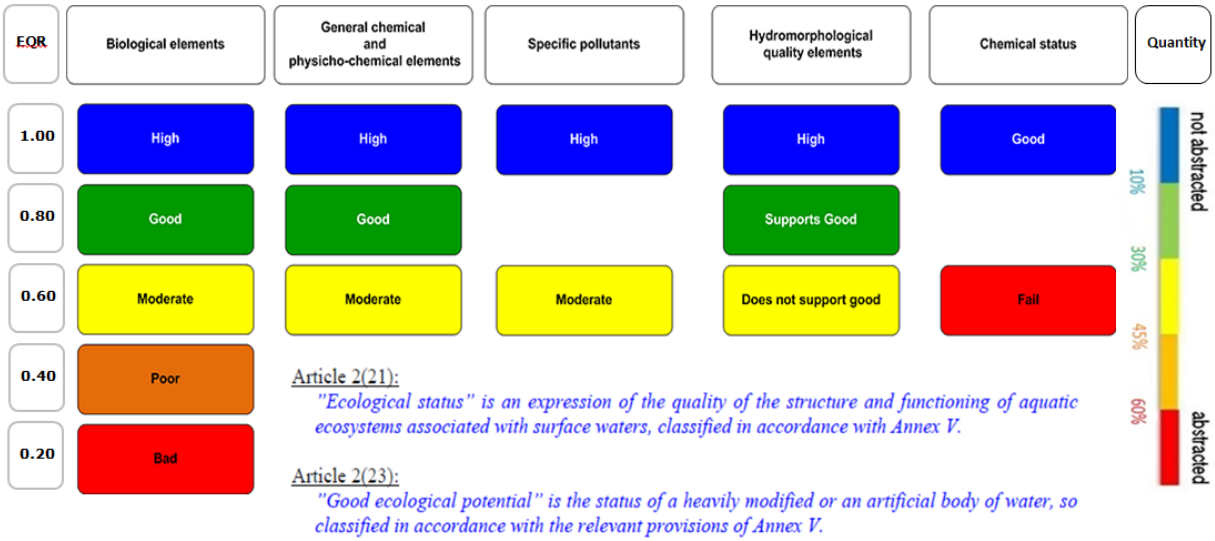
[20] European Commission - Environmental Flows as a Tool to Achieve WFD Objectives - Discussion Paper, 2012

- Poor Status - - Waters showing evidence of major alterations to the values of the biological quality elements
- Bad Status - - Waters showing evidence of severe alterations to the values of the biological quality elements

For groundwater, status is defined only by the lesser of quantitative status and chemical status, thereby being either:

- 'Good' -
- or 'Fail' –

Figure 3-1 – Quality Elements in Waterbody Ecological Status



Source: CIS Guidance - amended

Figure 3-1 illustrates various components associated with an ecological status assessment generally. The comprehensive list of all quality elements is shown in Technical Annex 3. Biological assessment results need to be expressed using a numerical scale between 0.00 and 1.00, the 'Ecological Quality Ratio' (EQR).[21] An EQR value = 1.00 represents type-specific reference conditions (i.e. fully natural conditions). Values close to 0.00 = Bad Ecological Status (BES).

The objective of the EQR is to ensure comparability between different assessment methods i.e. to provide a common scale of ecological quality between different river basins. The EQR intervals shown in Figure 3-1 are indicative only, and may vary depending on the BQE under assessment.

Flow abstraction has a direct impact on ecological status, even in modest quantity. Figure 3-1 shows that typically, permanent or very extended abstraction quantities > 30% of the mean flow are likely to result in the hydro morphological quality element achieving only Moderate status.[22] Due to the importance of flow regime generally, it is probable that the ecological status of the waterbody would also be classed as Moderate.

[21] European Commission – Water Framework Directive, Annex V, 1.4.1

[22] European Commission – CIS Guidance No 31 – Ecological Flows in the Implementation of the WFD

3.3 Environmental Objectives for Surface Waterbodies

In order to progress the determination, the status of individual waterbodies, the current status must be compared to a 'type specific reference condition'. Waterbody typologies are explained more fully under section 5.2 and 6.2

For each surface waterbody type, type-specific biological, hydro morphological and physic-chemical conditions should be established representing the values of the elements specified for that surface waterbody type at high ecological status. [23] 'Status' is therefore a condition relative to the reference condition, generally defined as the waterbody type in 'high status'.

Determination of the biological reference condition for each waterbody type is a matter for national procedures, although some EU standard criteria are fixed, especially with respect to 'priority substances' as set out in Directive 2013/39/EC. [24]

3.3.1 Reference Conditions for Biological Quality Elements

Numerous approaches have been used in Europe to assess surface water biological quality conditions by evaluating taxonomic data. The general approach is to use the composition (defined as diversity + abundance) of the community at each site to infer waterbody quality conditions. Some macro-invertebrates tend to be tolerant of poor water quality conditions e.g., some species (but not all) of the order *Diptera* and the class *Oligochaeta*. Other organisms—for example, some species (but not all) of the orders *Ephemeroptera, Plecoptera,* and *Trichoptera* —are more sensitive to pollution.

Specific to the type of waterbody (see section 5.2) the relative presence and abundance of sensitive taxa are expected to be higher at sites with 'good water quality', varying according to specific national conditions. In the same way the relative presence and abundance of tolerant species for poor water quality conditions are expected to be higher in disturbed sites. The ecological quality is expressed as the Ecological Quality Ration (EQR), which indicates the similarity between the actual status and the RC. It can be generally inferred that if any of the specific 'biology supporting quality elements' of waterbody status i.e. physical-chemistry, specific pollutants, and/or hydro-morphology are significantly adverse, then the BQEs can be expected to show a lower EQR.

The RCs and standards for lower quality classes for BQEs can be expressed in an index, e.g. the Biotic Index, BMWP, ASPT, EPT, etc. The standards of these indices for the ecological quality classes however, must be type specific and also ecoregion specific. This means that standards used in other EU countries cannot be used as such. As almost no biological data of Albanian surface water bodies are available (data should be available of all water types and within each water type all quality classes), no description of Biological RCs of Albanian water types can be given at this moment. An option would be to use Greece standards (because Greece is situated in the same Ecoregion as Albania; the Hellenic Wester Balkan), but Greece also has no standards, due to lack of data.

The preferred method to set up a biological assessment method for Albania is first to sample a lot of water bodies (covering all types and within each type all expected quality classes) and then to analyse the data, using multivariate analysis techniques, like (Detrended) **Canonical Correspondence Analysis**. (Reference for more information in Annex V on Hydrobiology).

3.3.2 Reference Conditions for General Physic-Chemical Quality Elements

As explained in previous sections: the General physic-chemical quality elements are *supporting* the hydro biological quality elements. The concept of – type-specific – reference conditions applies also to the general physic-chemical quality elements. For example, a calcareous geology affects water quality parameters such as alkalinity and pH.

[23] European Commission – Water Framework Directive, Annex II, 1.3

[24] European Commission – Directive 2013/39/EC – The Environmental Quality Standards Directive

It is not yet possible to apply WFD-compliant classification schemes for General physic-chemical quality elements, because of:

- the lack of – type-specific – RC and EQRs of hydro biological quality elements;
- the lack of monitoring/field data for substantiating – type-specific – reference conditions of General physic-chemical quality elements.

However, NEA applies a classification scheme for rivers, which is adequate for the interim period, while anticipating fine-tuning of the requirements of the hydro biological quality elements. This scheme is included in Table 3-1.

Table 3-1 - NEA classification scheme for assessment of physic-chemical parameters in rivers [25]

Parameter	Unit	Very Good	Good	Moderate	Poor	Bad
Dissolved oxygen	mg/l	>7	>6	>5	>4	<3
BOD_5	mg/l	<2	<3.5	<7	<18	>18
pH (acid)	-	-	>6.5	>6	-	-
pH (alkaline)	-	-	<8.5	<9	-	-
NH_4	mg N/l	<0.05	<0.3	<0.6	<1.5	>1.5
NO_2	mg N/l	<0.01	<0.06	<0.12	<0.3	>0.3
NO_3	mg N/l	<0.8	<2	<4	<10	>10
PO_4	mg P/l	<0.05	<0.10	<0.2	0.5	>0.5
P-total	mg P/l	<0.1	<0.20	<0.4	<1	>1

BOD_5: biochemical oxygen demand (five days); NH_4: ammonium; NO_2: nitrite; NO_3: nitrate; PO_4: orthophosphate; P-total: total phosphorus.

3.3.3 Reference Conditions for 'Priority Substances and certain other pollutants'

The 'Priority Substances and certain other pollutants' of the Directive 2013/39/EU include both synthetic (man-made), and non-synthetic substances. By definition, there are no – natural – reference conditions for synthetic substances. Non-synthetic substances include heavy metals, and certain polycyclic aromatic hydrocarbons (PAH).

Directive 2013/39/EU mentions the following as regards cadmium (Cd), lead (Pb), mercury (Hg), nickel (Ni):

> *Member States may, when assessing the monitoring results against the relevant EQS, take into account: (a) natural background concentrations for metals and their compounds where such concentrations prevent compliance with the relevant EQS; (b) hardness, pH, dissolved organic carbon or other water quality parameters that affect the bioavailability of metals, the bioavailable concentrations being determined using appropriate bioavailability modelling.'*

Considering the (heavy) metal mining in Albania, one might expect certain specific elevated natural (geogenic) background concentrations in various regions. However, there is lack of monitoring/field data for substantiating – type-specific – RCs for the priority substances.

3.3.4 Reference Conditions for River Basin 'Other Specific Pollutants'

WFD Annex V.1.1. mentions Specific synthetic and non-synthetic pollutants, comprising:

- Pollution by all priority substances identified as being discharged into the body of water.
- Pollution by other substances identified as being discharged in significant quantities into the body of water.

The priority substances meanwhile became part of the 'Priority substances and certain other pollutants' included in the Directive 2013/39/EU, used for determining the chemical status.

There is no prescribed list with 'Specific pollutants', although Annex VIII of the WFD gives some indications about which pollutants might be concerned (referred to in Annex V with information tables) This, while noticing that several WFD Annex VIII pollutants are already included under the 'Priority substances and certain other pollutants' and the 'General physic-chemical quality elements'. A list with

[25] In: State of the Environment Report 2015, Regulated Annex.docx; http://www.akm.gov.al/assets/rgjm-2015per-botim.rar

'Other specific pollutants' has not yet been compiled for the Albanian basins. Only BOD_5 and COD_{Cr} are routinely monitored by NEA. These data are not suitable though for establishing – type-specific – reference conditions for BOD_5 and COD_{Cr}.

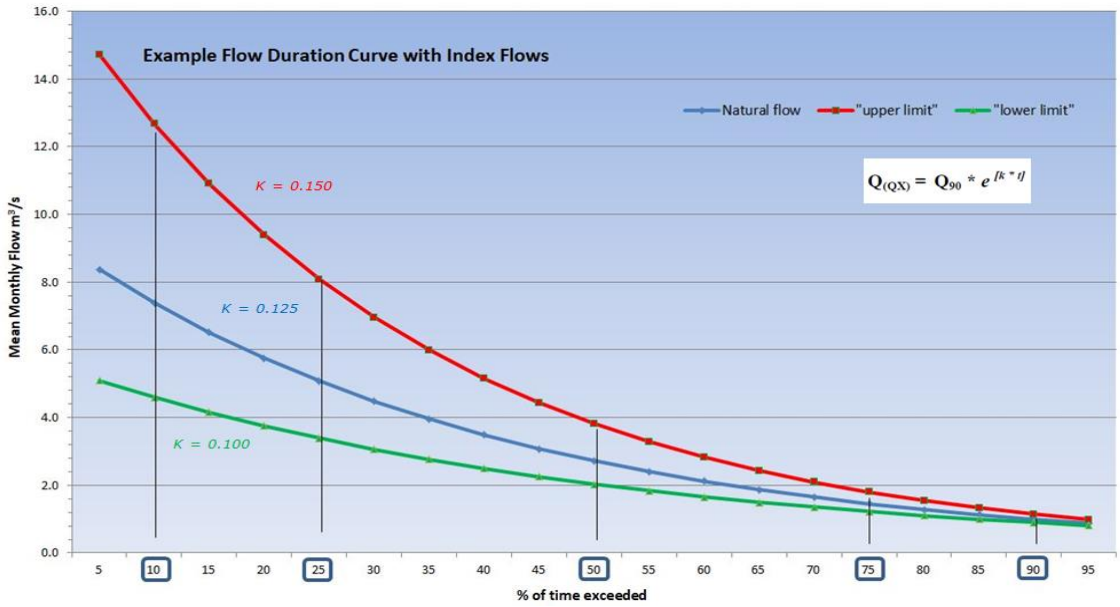
3.3.5 Reference Conditions for Environmental Flow

The correct identification and maintenance of environmental flow (the flow needed to support aquatic ecosystem function(s) throughout a typical year) is vital to waterbody status. Many national legislations, technical procedures and/or studies wrongly infer that there is a single 'minimum' flow throughout the year, which if allowed to remain in the waterbody, will satisfy ecological needs. For example, the single flow derived from the Q_{97} value of the annual flow duration curve is defined in legislation and used in Albania. This is completely incorrect as a concept.

As Figure 3-2 illustrates, environmental flow is a continuum throughout the flow regime range (shown by the annual Flow Duration Curve, FDC). At any particular flow exceedance (e.g. Q50), the environmental flow is synonymous with the undisturbed (natural) flow of the river (blue line). There are many values of environmental flow, depending on the position on the FDC, and typically the FDC positions of Q_{10}, Q_{25}, Q_{50}, Q_{75} and Q_{90} are used as 'index flows' to check the level of deviation of measured flow (artificially influenced) from the fully natural flow.

Some deviation from the fully natural flow growth curve is permissible, but typically this will not be more than about +/- 30% before Good Status will be impacted. Hence, for all environmental flow growth curves, there is associated a lower and an upper limit by which the natural flow can be altered before the waterbody degenerates from GES.
Figure 3-2 illustrates that at high, infrequent flows e.g. Q10, environmental flow is correspondingly higher but so is the absolute level of abstraction or discharge that can be permitted without compromising GES. At the opposing end e.g. Q90, environmental flow is correspondingly small but so are the permitted abstraction levels, typically less than 10% for sensitive waterbodies.

Figure 3-2 – Best Practice Concept of Environmental Flow Curves



Source: www.waterconsultant.com

The precise +/- % limits of the environmental index flows will be ecosystem specific and will require detailed ecological surveys to confirm the level of sensitivity to abstraction, and hence the base value

and curvature of the growth curve(s). The value of this approach is that consistent environmental flow curves (and values at any point on the FDC) can be generated according to mathematical rules.

$Q_{(QX)} = Q_{90} \times e^{[k \times t]}$

where $Q_{(QX)}$ = the environmental flow value at FDC X; Q_{90} is the naturalised baseflow value from the FDC

e = base of natural logarithms; k = growth constant; t = number of 5% FDC steps from Q90

3.3.6 Reference Conditions for Flow Regim

The leading edge methodology now used in the current RBMP framework in Albania attempts to make an objective quantification of hydrological and/or morphological impact (where data exists) according to a well-established but little used European Technical Standard. [26] Various objective scoring systems are provided in the Standard for physical alterations. For flow alteration (Category 5b) the simple look-up Table shown under Table 3-4 is particularly important.

Table 3-2 – Hydro morphological (Flow Alteration) Impact Scoring – EN 15843

% days flow different from natural in spring, summer, autumn or winter (worst)	< 20	20 to < 40	40 to < 60	60 to < 80	≥ 80
< 5 % decrease or < 10 % increase in flow	1	1	1	2	2
5 % to < 15 % decrease in flow or 10 % to < 50 % increase in flow	1	2	2	3	3
15 % to < 30 % decrease in flow or 50 % to < 100 % increase in flow	1	2	3	3	4
30 % to < 50 % decrease in flow or 100 % to < 500 % increase in flow	1	2	3	4	5
≧ 50 % decrease in flow or ≧ 500 % increase in flow	2	3	4	5	5

The objective method proposed above can be utilised for any form of flow regime change, for example abstraction by agriculture or hydro-peaking (increase in flow) due to uncontrolled hydropower operations. The impact scoring implied in Table 3-4 is consistent with current international best practice methodologies.

For example, it is indicated that an abstraction quantity of only 30% of the mean flow (of any time period) for say 40% of the time may result in a status class of 3 i.e. moderate status. This is irrespective of the status of any other biological or physico-chemical quality element.

Standard EN 15843 (reference Anex VI of hydromorphology also indicates another extremely important feature of quantitative status, namely that increases in flow over and above the natural regime can be equally damaging to aquatic ecosystems. This aspect is ignored in many RBMP status assessments. This condition arises especially from the impacts of hydropower due to inappropriate releases from hydropower plants, especially during natural low flows periods. The released flows can be several orders of magnitude greater than the natural flow, creating significant and often irreparable damage to downstream ecosystems.

For example, an increase of 100% of the mean flow (i.e. double) for only 40% of the time will result in a waterbody of moderate status, irrespective of the status of any other biological or physico-chemical quality element. Many hydropower plants in Albania, especially HPPs with off-line storage, frequently operate at these destructive levels without any adequate assessment or regulation.

3.3.7 Reference Conditions for HMWBs and AWBs

According to WFD Article 2(9), there are two components to the definition of a HMWB. To be a HMWB a water body must be (i) physically altered by human activity, (ii) substantially changed in character. A waterbody may only be designated as heavily modified if it has passed through the designation procedure involving both tests as specified under WFD Article 4(3) (a) & (b). The tests are designed to

[26] European Standard EN 15843 - Water quality - Guidance standard on determining the degree of modification of river hydromorphology

ensure that HMWBs are only designated where there are no reasonable opportunities for achieving good status within a water body and are therefore waterbody specific. The designation and the reasons for it must be specifically mentioned in the RBMP.
As for natural waterbodies, the environmental objectives for HMWBs and AWBs are defined relative to a reference condition, which is the maximum ecological potential (MEP) of the waterbody. The MEP is the state where the biological status reflects, as far as possible, that of the closest comparable surface waterbody taking into account the modified characteristics of the waterbody. With regards to its biological status, Good Ecological Potential (GEP) accommodates "slight changes" from the MEP.
Once designated as HMWB or AWB, the environmental objectives are "good ecological potential" (GEP) and good chemical status. GEP is a less stringent objective than GES because it makes allowances for the ecological impacts resulting from those physical alterations that are necessary to support a specified use e.g. flood protection, hydropower.

3.3.8 Hydro morphological Impacts of Hydropower and HMWB Designation

The proliferation of small to large hydropower installations in Albania, the perceived lack of adequate environmental impact assessment, inadequately designed Permit criteria, damages to ecosystems and disruption of flow regimes has been the subject of increasing international concern. [27] [28]
The objective determination of the extent of potential hydro morphological impact from HPPs is highly relevant with respect to waterbody status. The hydro morphological condition of the waterbody is integral to its overall status. As confirmed by EU CIS Guidance 31 [29], flow regime has a preeminent controlling effect on ecosystem health, and therefore waterbody status.
The relevance of hydropower operation is that very frequently, the downstream flow regime is entirely disrupted, either in terms of the magnitude of the flow abstracted relative to the mean flow at the point of abstraction, and/or the duration of time that the flow abstraction takes place. This flow regime disruption is additional to the mainly morphological (physical) impacts implied by EU CIS Guidance 4.
An objective test to determine the level of impact of hydropower is essential within the context of Heavily Modified Waterbody (HMWB) designations.
Clearly, construction of major weirs, barrages or dams have a substantial physical impact on the waterbody, totally disrupting the longitudinal continuity and ecosystem integrity. The ambivalence of EU CIS Guidance 4 [30] (2003) with respect to whether or not alteration of flow constitutes a substantial change in character *(3.1.1 - In cases of temporary or intermittent substantial hydrological changes the waterbody is not to be considered substantially changed in character)* is utterly incorrect and has in any case been superseded by the implications of EU CIS Guidance 31 (2016).
As all hydropower engineers know (and as evidenced by EN 15843), persistent changes to flow regime alone potentially have a catastrophic impact on ecosystem sustainability.[31] Diversion of 75%+ of river flow during critical dry periods is typical for many HPPs in Albania, as is the tendency to construct offline systems that create many kilometres of 'depleted reach'. The depleted reaches are frequently entirely devoid of any river flow during low flow months e.g., Photograph 3-1.
The hydropeaking of turbine releases typically increases river flows by several orders of magnitude over and above what would normally be expected, equally damaging to biological quality elements, especially fish and macroinvertebrates. The deficient status of the waterbody (due either to too little

[27] CSO-Help - Identification of water related conflicts linked to hydro power projects in Albania, 2017
[28] Western Balkans Hydropower - Who pays, Who profits?, CEE Bankwatch & WWF, 2019
[29] EU Common Implementation Strategy – Guidance Document 31 - Ecological Flows in the Implementation of the Water Framework Directive, Technical Report 2016-086
[30] EU Common Implementation Strategy – Guidance Document 4 - Identification and Designation of Heavily Modified and Artificial Water Bodies
[31] EU Common Implementation Strategy - WFD and Hydro morphological Pressures Technical Report, 2006.

flow or too much flow depending on the HPP operation) is therefore extended along the entire length of the waterbody.

For the majority of historical HPPs in Albania, the lack of adequate provision of longitudinal continuity, intermittent zero environmental flow, and the magnitude and time disruption of the flow regime means that even Good Ecological Potential (GEP) (the target status for HMWBs) is unlikely to be ever achieved for many installations, as the Operators typically have legally binding energy production compliance targets with the Ministry of Infrastructure & Energy, and the (fixed) Permit concession period typically runs for 20-30 years. Environmental flow regimes downstream of the HPP installations have rarely been correctly determined by the competent authorities.

Arguably, many HPP historical installations in Albania could have been implemented in a more ecologically sustainable way (and therefore NOT liable to an Article 4(3) (a) & (b) test) had proper assessment and mitigation of hydro morphological impacts been utilised at the design stage.

Section 10.6 presents an objective summary of potential hydro morphological impacts and consequent status on waterbodies affected by HPPs within the river basin. The same methodology, based on determination of modified status through EN 15843 could be used in future in order to determine more environmentally sustainable operational regimes for current and future HPPs.

Photograph 3-1 – HPP Maximum Flow Diversion and Depleted Reach

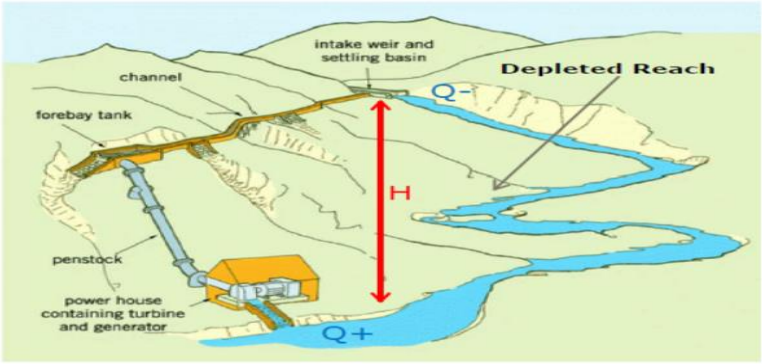
The length of the depleted reach for offline HPP systems is a critical factor in ecosystem impacts. A depleted reach is defined as the length of the river waterbody between the point of abstraction and the point of flow discharge (Figure 3-3). Long depleted reaches arise when the hydropower Operator is seeking to maximise the hydraulic head (H) operating at the turbine, thus maximising the power output. If the HPP system is offline, then this maximisation of Head invariably means excessively long depleted reaches, a common feature of Albania HPPs.

The deficient hydro morphological status will apply for the full length of the depleted reach, albeit on a 'reducing balance' basis. At the point of hydropower discharge, the river flow is restored and for 'run of river' systems, equilibrium is restored.

However, for the worst-case design of a major Dam + an offline HPP system (i.e. HPP not at the Dam), then at the point of discharge (where turbine operation is a function of storage, not of river flow), the disrupted regime may then continue for a further significant distance downstream, as the turbines discharge significantly in excess of the expected natural flow, the degree of impact depending on the downstream hydrology. Such examples are common in Albania.

A single large storage based offline HPP system may therefore significantly impact on e.g., 20 km+ of waterbody, depleting flow in the upper reaches, and over-compensating in the lower reaches, and thoroughly disrupting if not completely destroying the aquatic ecosystem.

Figure 3-3– Concept of Depleted Reach Due to Hydropower



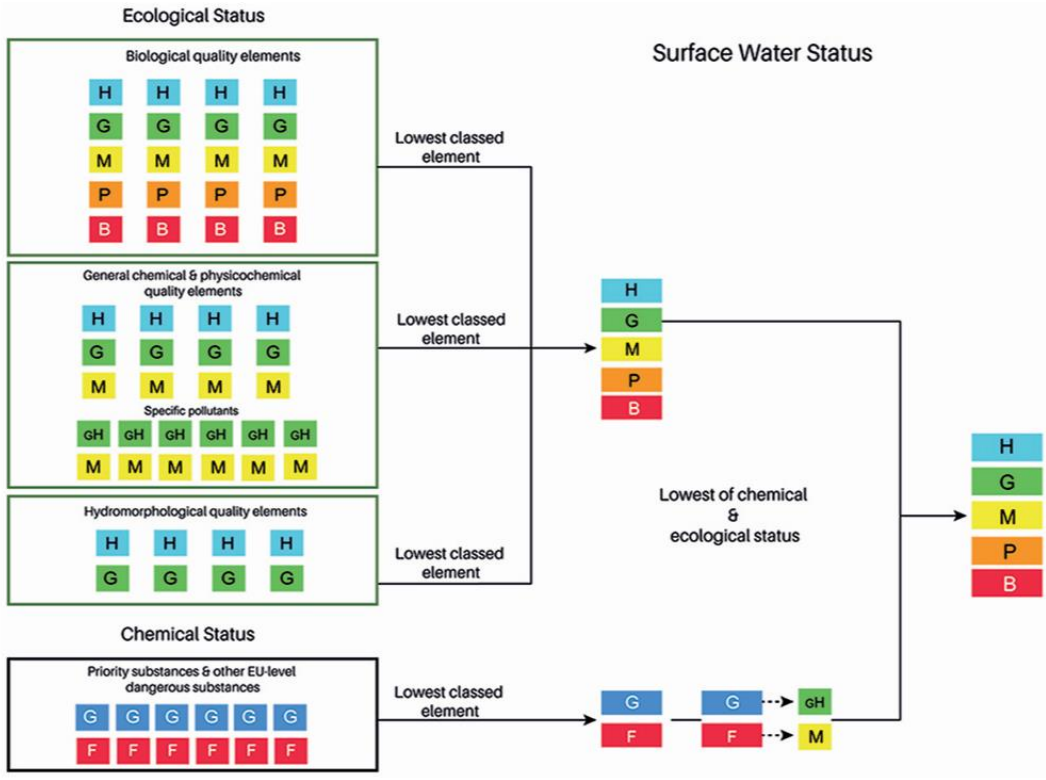
3.3.9 Other Forms of HMWBs and AWBs

Other more conventional forms of HMWBs are applicable in the Mati river basin, subject to the same designation test of WFD Article 4(3) (a) & (b), and the same GEP objective. Specifically, these typically include hard canalisation of urban centre rivers for erosion control and flood protection, or the provision of flood defences. Provisionally identified HMWBs and AWBs are listed in the Pressure Status assessment of Chapter 10.

3.3.10 Final Status Determination of Surface Waterbodies

The final or overall status of each delineated waterbody is derived through a complex evaluation of elements shown in Figure 3-4. According to WFD CIS guidance[32], the final status of the waterbody should derive from the lowest classed element in each group.

Figure 3-4 – Procedure for Determination of Waterbody Overall Status



[32] European Commission – CIS Guidance 13 - Overall approach to the classification of ecological status and ecological potential

3.4 Environmental Objectives for Groundwater Bodies

The WFD requires Member States to designate separate groundwater bodies and ensure that each one achieves 'good chemical and quantitative status' (WFD Article 2(24) (25)). Determination of groundwater status is not as complex as those for surface water bodies. However, groundwater protection is the subject of numerous interacting Directives, including principally Directives 2006/118/EEC and 291/676/EEC. [33] Primarily through Directive 2006/118/EC[34], a management regime should be established which sets groundwater quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater. Member States should establish standards at the most appropriate level and take into account local or regional conditions. [35]

3.4. 1 Reference Conditions for Groundwater Quantity

Groundwater level is typically used the main measure of quantitative status. To achieve good groundwater quantitative status, the available groundwater resource (i.e. the long-term average rate of groundwater recharge less the annual rate of groundwater discharge required to achieve the ecological quality objectives for associated surface waters) is not exceeded by the long-term annual average rate of abstraction (WFD Article 2(27)).

For this reason, the annual recharge quantity as described in section 4.2.3 and 4.2.6 is a profoundly important number for correct utilisation of groundwater resources. Abstraction of groundwater resource over and above the annual recharge rate compromises *a)* long-term available resources *b)* surface water flow regimes and associated ecological status.

Determination of annual groundwater recharge rate is a technically challenging exercise, requiring widespread and accurate monitoring networks of groundwater level. However, as a very approximate indicator, international best practice widely accepts that the naturalised Base flow Index (BFI) of the river basin is a good indicator of annual groundwater discharge to the surface water system.[36] [37] The BFI is determined from the appropriate Flow Duration Curve as the ratio Q90 / Q50. In the long-term, assuming the river basin to be in hydrodynamic equilibrium, groundwater discharge must equal groundwater recharge.

It is probable that the current groundwater monitoring network in the Mati basins is of insufficient quality and extent to determine groundwater recharge by water balance or modelling techniques.

The second element of reference groundwater quantity is the extent to which groundwater abstraction redirects groundwater flow paths such that normal discharge to surface streams is disrupted. Groundwater discharge is a significant component of most streamflow, and in sub-basins with extensive wetlands or where the streamflow BFI exceeds 0.5 for example, it is very likely that the terrestrial ecosystems are heavily dependent on this flow being maintained. Abstraction of groundwater alters hydraulic gradients such that discharge rates to rivers are reduced, so directly impacting the environmental flow. In extreme cases, excessive abstraction may create reverse flow gradients such that river flow negatively discharges to the groundwater, also known as 'induced recharge' (Figure 3-5). [38]

Precise impacts of groundwater – surface water interactions are typically localised but highly technical, requiring modelling assessments. However, as a very general approximation, it can be stated that e.g. a 10% reduction in the groundwater resource (e.g. due to consumption) will generally result in a

[33] European Commission – Directive 91/676/EEC - concerning the protection of waters against pollution caused by nitrates from agricultural sources

[34] European Commission – Directive 2006/118/EC - on the protection of groundwater against pollution and deterioration

[35] European Commission – Groundwater legislative framework https://ec.europa.eu/environment/water/water-framework/groundwater/framework.htm

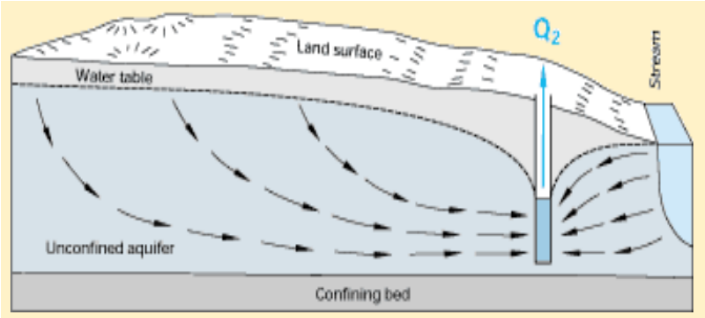
[36] UK Institute of Hydrology - Low Flow Studies Report no.1 Research Report, NERC, 1980.

[37] "Naturalised Flow" = Recent Actual Flow + (Abstractions + Exports) – (Returns + Imports)

[38] United States Geological Survey – Ground Water and Surface Water – A Single Resource – USGS Circular 1139, 1997.

comparable 10% reduction in groundwater discharge somewhere in the surface water system on a mean annual basis.
For many rivers, including those in Albania, since the groundwater component is often of the order of 30%+ of mean annual flow, it follows that a 10% reduction in groundwater net recharge will likely create a 3% reduction in streamflow on a mean annual basis. However, during seasonal low flow periods e.g., summer when the BFI may be typically be at 0.9+, the same 10% recharge reduction will result in a 9% reduction in seasonal streamflow. Such reductions are likely to impact adversely on the aquatic ecosystem.[39]

Figure 3-5 – Example of Surface Flow Depletion due to Groundwater Abstraction



3.4.2 Reference Conditions for Groundwater Quality

The Groundwater Directive (GWD) provides certain flexibility to Member States in the establishment of threshold values by requiring the consideration of the different receptors of the groundwater body as well as the risks and functions, the characteristics and behaviour of pollutants and the hydrogeological characteristics represented by the background levels. The consideration of these different requirements, potentially adapted to each individual groundwater body, leads to different approaches followed by Member States.
Broadly, the quality of groundwater is determined through its chemical status, principally sub-defined through:

- Degree of saline intrusion, indicated mainly through the parameter of electrical conductivity
- Environmental quality standards (EQS) for general physico-chemical parameters primarily dissolved oxygen, pH, conductivity, nitrate, chloride and ammonium, Pesticids and other main pollutants, as stipulated by the GWD Annex I.
- Degree to which groundwater chemical status adequately supports the ecological status of surface water

Environmental quality standards for groundwater are explicitly stated in EU Directive 2006/118/EEC for the parameters of *a)* nitrate – 50 mg/l b*)* Total Pesticids – 0.5 µg/l).
Drinking water standards are most frequently used as the basis of chemical status threshold values, either as laid down in the EU Drinking Water Directive 98/83/EC, WHO international standards or environmental quality objectives set out in the EU EQS Directive 2008/105/EC.[40] It should be noted that under the GWD, chemical status provisions do not apply to high naturally-occurring levels of substances or ions or their indicators due to specific hydro-geological conditions which are not covered by the definition of pollution. Because background levels can be very high for some parameters and some types of groundwater body it is important to identify these background levels as a first step in the status and trend assessments. EQSs adopted for groundwater bodies in Albania are presented in Technical Annex VII. The GWD also requires establishing Threshold Values, which are set at

[39] European Commission – Groundwater as a resource - https://ec.europa.eu/environment/water/water-framework/groundwater/resource.htm
[40] European Commission – Directive 2008/176/EEC – Annex I (Priority Substances), Annex II (replacing WFD Annex X) identifying Priority Hazardous Substances

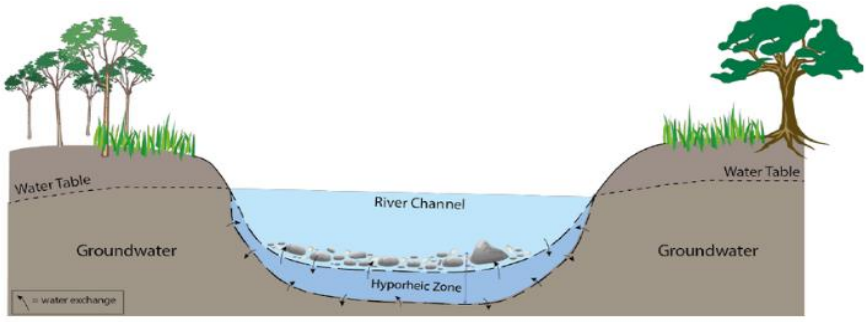
concentrations below the water quality standards as described in Chapter 10, and determine the trigger points for corrective action before standards are exceeded.

3.4.3 Reference Conditions for Groundwater Dependent Terrestrial Ecosystems

Groundwater dependent terrestrial ecosystems (GWDTEs) represent a special case of groundwater characterisation and associated reference conditions. [41]

GWDTEs are part of the status assessment for groundwater. Therefore, they are relevant in characterisation and risk assessment of GWBs. (see Figure 3-7). The relevance of GWDTEs with respect to groundwater waterbody status is that in addition to the basic tests of groundwater quantity (3.4.1) and quality (3.4.2), a GWB may fail the test of 'good status' if it can be determined that the dependant surface water ecosystem is in some way compromised through deficient quality or quantity of the contributing groundwater. Many surface water aquatic ecosystems are highly adapted to and dependent on groundwater discharge, usually in the form of 'base flow' as part of the total flow in the river. This is because, by definition, base flow (perennial) is usually present throughout an entire hydrological year, whereas surface runoff is intermittent with short-term and transient influences on water quality and quantity. Groundwater most usually discharges to the surface water system through the hyporheic zone (Figure 3-6), and the hyporheic zone has considerable importance with respect to chemical and biotic interactions between surface water and groundwater, providing habitats for benthic invertebrates, reduction of pollutant concentrations, and stabilisation of pH, oxygen and water temperature.

Figure 3-6 – Illustration of the Hyporheic Zone



Source: Biddulph, M. Environmental Science 2015.

It is not easy to determine which terrestrial ecosystems are directly dependent on a GWB, and there will be a continuum of ecosystems between those that are dependent on groundwater from a GWB and those that are dependent on other water sources.

Typically, specialist ecological surveys will be required to confirm the presence of typically adapted species due to the distinctive natural chemistry of groundwater compared to surface waters. These surveys will be necessary to determine the threshold values (TVs) of pollutants or indicators of pollution (i.e. chemical status) that may adversely impact on GDTEs.[42] It is a specific requirement of the Groundwater Directive (GD 2006/118/EC, Annex II, Part A) that threshold values take account of the extent of interactions between groundwater and associated aquatic and dependent terrestrial ecosystems.

A second useful practical test derived from surface water hydrology is to ascertain the Base flow Index (BFI) of the flow regime. The BFI is defined as the long-term mean annual Q90 / Q50. The greater the proportion of base flow as part of total flow, the more likely is the surface water ecosystem to be dependent on groundwater contribution. BFI values > 0.5 indicate that 50%+ of the total flow is derived from groundwater discharge, and therefore it is highly likely that ecosystems will be highly adapted to and dependant on discharged groundwater properties.

[41] European Commission – CIS - Technical Report on Groundwater Dependent Terrestrial Ecosystems, Technical Report 6, 2011

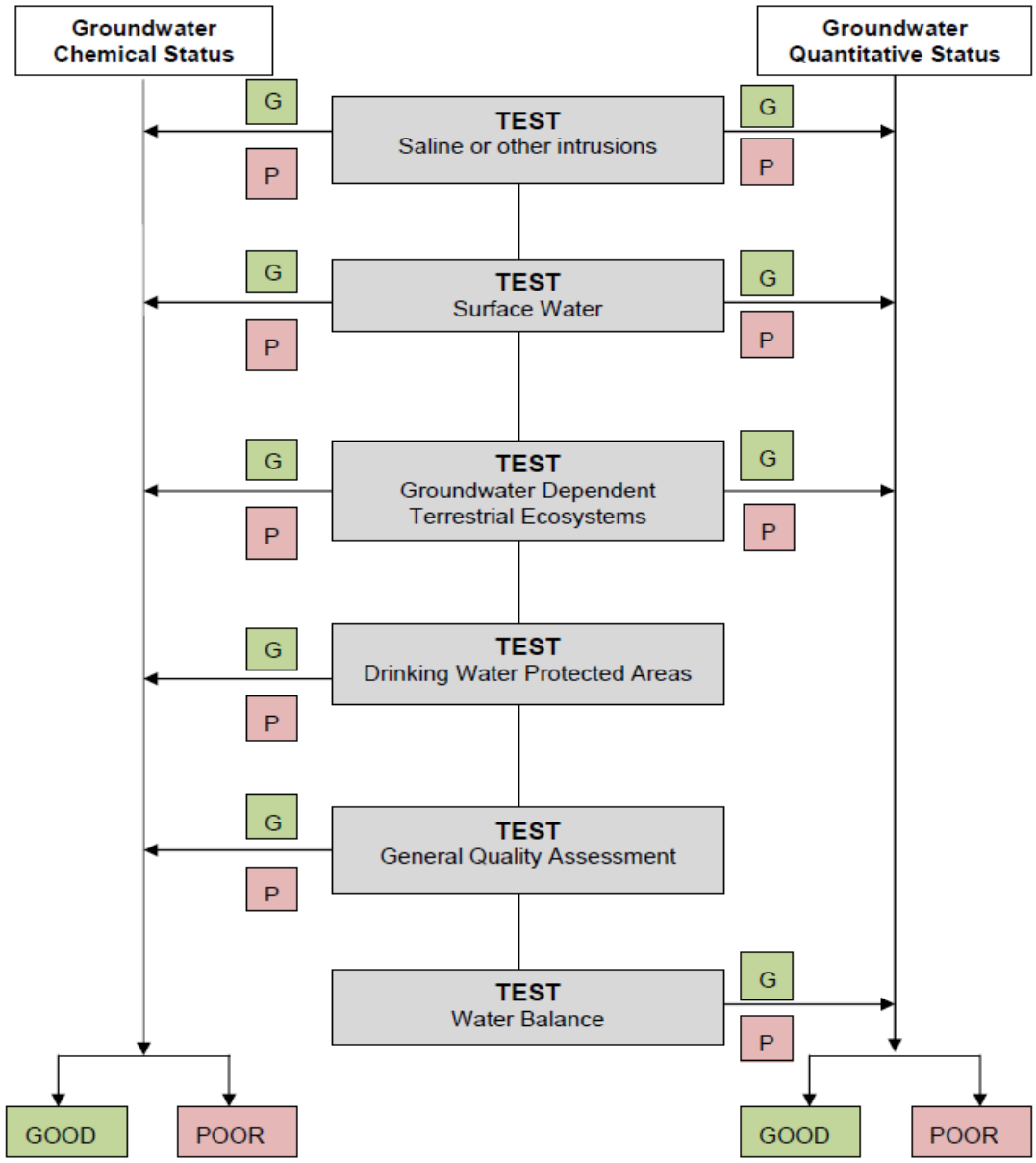
[42] European Commission – CIS Guidance 18 - Guidance on Groundwater Status and Trends Assessment.

The total lack of reliable recent actual flow data since 1992 in the majority of rivers in Albania, together with a significant absence of monitored and reported abstraction and discharge data from operators means that naturalised flows (observed flow + abstractions – returns) and hence naturalised Q50s and Q90s cannot be established at this time for any GWDTEs.

3.4.4 Step-wise Tests for Groundwater Quantity and Quality Status

The formal procedure for Groundwater status determination adopted in Albania follows the standard CIS guidance, as per Figure 3-7. [43]

Figure 3-7 – Standard Procedure for Determination of Groundwater Overall Status



[43] European Commission – CIS Guidance Document 18 - Guidance on Groundwater Status and Trend Assessment

3.5 Environmental Objectives for Protected Areas

According to Article 6 and Annex IV of the WFD, Member States shall ensure the establishment of a register or registers of all areas lying within each RBD which have been designated as requiring special protection under specific Community legislation for the protection of their surface water and groundwater, or for the conservation of habitats and species directly depending on water, including the protection of Natura 2000 sites and economically significant aquatic species (e.g. shellfish).

A summary of the register of Protected Areas should be part of the RBMPs, including maps indicating the location of each protected area and a description of the Community, national or local legislation under which the protected areas have been designated. For those water bodies designated as protected areas, the environmental objectives set are typically beyond good status, as more stringent objectives have been set for those areas in the relevant Community legislation.

Annex VII (7)(1) of the WFD requires that the RBMPs contain 'a summary of the measures required implementing Community legislation for the protection of water'. The additional measures for protected areas should be an integral part of the RBMPs in order to ensure that the requirements of those Protected Areas are included in the overall management of the river basin and to ensure the coherence of the entire water planning with the objectives already established by other Community and national legislation.

Monitoring programs should include specific sub-programs for the areas included in the Register of protected areas. Beside requirements for surface and groundwater status Article 8 of the WFD sets out the requirements for the monitoring of protected areas. This specific monitoring should ensure the assessments with the standards and objectives defined for particular protected area type.

Article 4, Par. 1, c WFD determines the objectives for protection areas: Member States shall "achieve compliance with any standards and objectives at the latest 15 years after the date of entry into force of this directive unless otherwise specified in the Community legislation under which the individual protected areas have been established". For these objectives, mainly the adaptation possibilities offered by the WFD apply. Thus, two kinds of objectives must be achieved for protected areas: the specific objectives of the directive concerned and which were decisive for the designation of an area (see WFD Annex 4) and the individual national standards of implementation and objectives of the WFD. Some protected areas correspond to water bodies. The register should cover areas identified by the WFD or other related EU Directives.

These include five general types of PAs:

- Water bodies used for the abstraction of drinking water;
- Areas important for the protection of habitats and/or species where the maintenance or improvement of the status of the water is an important factor in their protection (Natura 20008, sites subject to the Birds Directive 79/409/EEC and the Habitats Directive 92/43/EEC);
- Areas where measures have been implemented to protect economically significant aquatic species (PA under Directive 2006/44/EC (freshwater fish directive); Shellfish Directive 79/923/EEC);
- Bathing waters (PA under Bathing Water Directives 2006/7/EC);
- Nutrient sensitive areas (PA under Nitrates Directive 91/676/EEC; Urban Wastewater Treatment Directive 91/271/EEC).

As applicable national legislative in non-EU countries is not fully harmonized with EU standards, a complete inventory of PA as required by the WFD cannot currently be drawn up for the basin as a whole. Therefore, a modified approach could be applied, which takes into consideration:

- National standards for the delineation of PA;
- A different status within Bern Convention implementation and NATURA 2000 network design within the country;

- The different level of adaptation of national legislation to EU legislation and standards in non-EU countries;
- The general lack of registers and/or effective databases of PA in country;
- Shared responsibility regarding maintenance and the protection of drinking water zones between national and sub-national level competent authorities;
- Shared responsibility for the monitoring of drinking water protection areas.

The Mati RBMP PA register should include:

- A register of areas important for the protection of habitats and/or species that are protected under the relevant international conventions;
- A register of areas important for the protection of habitats and/or species protected by national legislation;
- A preliminary register of areas used for the abstraction of drinking water - groundwater.

To characterise river basin districts in terms of pressures, impacts and economics of water uses, including a register of protected areas lying within the river basin district.

3.5.1 Areas Designated for Drinking Water Abstraction

The relevant EU legislation for the protection of drinking water with more stringent objectives includes the DWD as amended by Directive (EU) 2020/2184 and potentially the ND. The objectives for Drinking Water Protected Areas (DrWPAs) are to:

- Ensure that, under the water treatment regime applied, the drinking water produced meets the requirements of the DWD;
- Ensure necessary protection in the DrWPA with the aim of avoiding deterioration in water quality in order to reduce the level of purification treatment required in producing drinking water.

The first objective will be achieved by meeting the requirements of the DWD.
The second objective will be achieved by putting in place actions that aim to ensure that there is no deterioration in water quality at abstractions used for drinking water supply. In many cases it may take some time for actions to become effective and either halt or reverse deterioration. Providing sufficient actions are in place, the objective is met.

3.5.2 Areas designated for the protection of economically significant aquatic species

In December 2013 the Shellfish Directive was repealed by the EU WFD. Article 4.9 of the WFD sets out that it offers a level of protection at least equal to any directive which it repeals. The 2003 Regulations transpose many of the WFD obligations and impose most of the water quality standards and obligations which were required by the Shellfish Directive. These amending Regulations make additional amendments to the 2003 Regulations to ensure shellfish waters can continue to be identified, protected and monitored.
The objective for shellfish waters designated under the Shellfish Directive was to protect and, where needed, improve the quality of shellfish waters in order to support shellfish (bivalve and gastropod molluscs) life and growth, and thus contribute to the high quality of shellfish products directly edible by man. Areas designated for the protection of economically significant aquatic species are areas with the protection of inland surface waters, transitional waters, coastal waters and groundwater, which: prevents further deterioration and protects and enhances the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems. These areas are connected with coastal and wetlands areas, as well the transitional water bodies where live the economically significant aquatic species.
Wetland ecosystems are ecologically and functionally parts of the water environment, with potentially an important role to play in helping to achieve sustainable river basin management. The Water Framework Directive does not set environmental objectives for wetlands. However, wetlands that are

dependent on groundwater bodies, form part of a surface water body, or are Protected Areas, will benefit from WFD obligations to protect and restore the status of water. Pressures on wetlands (for example physical modification or pollution) can result in impacts on the ecological status of water bodies. Measures to manage such pressures may therefore need to be considered as part of river basin management plans, where they are necessary to meet the environmental objectives of the Directive.
Wetland creation and enhancement can in appropriate circumstances offer sustainable, cost-effective and socially acceptable mechanisms for helping to achieve the environmental objectives of the Directive. In particular, wetlands can help to abate pollution impacts, contribute to mitigating the effects of droughts and floods, and help to achieve sustainable coastal management and to promote groundwater recharge. Some of these PAs will include wetland habitats and species directly depending on surface water or groundwater. A crucial part of the development of the Protected Areas Register will therefore be the identification of those habitats and species within the Natura 2000 network which qualify under WFD criteria.

3.5.3 Bodies of water designated as recreational waters

This section refers to areas designated under Directive 2006/7/EC under the management of Bathing Water Quality (repealing Directive 76/160/EEC). This Directive lays down provisions for:

(a) the monitoring and classification of bathing water quality;
(b) the management of bathing water quality; and
(c) The provision of information to the public on bathing water quality.

The purpose of this Directive is to preserve, protect and improve the quality of the environment and to protect human health by complementing Directive 2000/60/EC. This Directive shall apply to any element of surface water where the competent authority expects a large number of people to bathe and has not imposed a permanent bathing prohibition, or issued permanent advice against bathing (hereinafter bathing water). It shall not apply to:

(a) swimming pools and spa pools;
(b) confined waters subject to treatment or used for therapeutic purposes;
(c) Artificially created confined waters separated from surface water and groundwater.

The ‘management measures’ means the following measures undertaken with respect to bathing water:

(a) establishing and maintaining a bathing water profile;
(b) establishing a monitoring calendar;
(c) monitoring bathing water;
(d) assessing bathing water quality;
(e) classifying bathing water;
(f) identifying and assessing causes of pollution that might affect bathing waters and impair bathers' health;
(g) giving information to the public;
(h) taking action to prevent bathers' exposure to pollution;
(i) Taking action to reduce the risk of pollution.

The identification and characterization of bathing waters in Albania is not done according to the requirements of the bathing waters Directive. There are some efforts on the monitoring of bathing waters use as beach areas or recreational waters but their classification is not done through a process related to the EU requirements.
The Bathing Directive aims to prevent and reduce pollution in bathing waters to levels that are no longer harmful to human health and the environment, and is the EU’s main tool to protect the health of humans when bathing. The definition for recreational water refers to rivers, lakes and coastal waters that are used for recreational purposes.

3.5.4 Nutrient-sensitive Areas

The general objective of the Nitrates Directive is to:

- reduce water pollution caused or induced by nitrates from agricultural sources and
- prevent further such pollution.

This objective will be achieved through designating Nitrate Vulnerable Zones (NVZs) and action programmes being implemented within them. NVZs comprise all land draining to "polluted waters" as defined by the Directive. A Code of Good Agricultural Practice has also been published, which provides advice to all farmers on how to reduce nitrate losses to the environment. The enrichment of waters by nutrients (especially from phosphates and nitrates) leading to eutrophication of waters is one of the major issues for waterbody status. There are three European Directives that deal with nutrient discharges into waterbodies:

- Water Framework Directive (WFD) (2000/60/EC)
- Urban Waste Water Treatment Directive (UWWTD) (91/271/EEC)
- Nitrates Directive (ND) (91/676/EEC)

Areas designated as vulnerable zones fall under Directive 91/676/EEC and areas designated as sensitive areas under Directive 91/271/EEC.

Council Directive 91/271/EEC deals primarily with the management actions required to protect waterbodies from domestic sewage, industrial waste and surface water run-off. WFD nutrient and ecological standards are used to first identify potentially eutrophic water bodies which can then be controlled under UWWTD or ND standards.

If discharges from qualifying Wastewater Treatment Works (WWTWs) – (those serving a population equivalent (p.e.) of greater than 10,000) - either directly or indirectly are found to cause (or may cause) eutrophication, or result in excess total phosphorous level (i.e. > 2.0 mg/l P), excess total nitrogen levels (i.e. > 15 mg/l N) [44], or > 50 Mg/l NO_3 in drinking water supplies, the receiving water bodies are identified as sensitive, and a further level of treatment than secondary is required to protect these areas. ND covers the protection of waters caused by nitrates from agricultural sources. Given the diffuse nature of this type of pollution, it is usual to adopt a "total basin" approach to the implementation of the Nitrates Directive where an Action Programme under the ND applies to all farmers.

3.5.5 Areas designated for the protection of habitats or species

This section refers to the areas where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites designated under Directive 92/43/EEC and Directive 79/ 409/EEC.

A "Protected area" is a land, water, sea and coastal space, clearly defined geographically, known, with clear physical boundaries and managed through legal or other effective means, to achieve long-term conservation / protection of nature, related to ecosystem services and cultural values. Under EU legislation, a protected area is a clearly defined geographical area that is dedicated to achieving the long-term conservation of nature. IUCN protected area management categories classify protected areas according to their management objectives.[45] At the EU level, through the Birds and the Habitats Directives, the Natura 2000 network is under establishing. Its purpose is primarily to ensure the conservation of targeted species and habitats of European interest.[46] The EU Emerald Network is an ecological network made up of Areas of Special Conservation Interest. The objective is the long-term survival of the species and habitats of the Bern Convention requiring specific protection measures.[47]

The objective for Natura 2000 Protected Areas identified in relation to relevant areas designated under the Habitats Directive is to:

"Protect and, where necessary, improve the status of the water environment to the extent necessary to achieve the conservation objectives that have been established for the protection or improvement

[44] Total Nitrogen (TN) = Σ (inorganic nitrogen + organic nitrogen). Inorganic nitrogen = ammonium (NH_4) + nitrate (NO_3) + nitrite (NO_2)
[45] https://www.iucn.org/theme/protected-areas/about/protected-area-categories
[46] European Commission - https://ec.europa.eu/environment/nature/natura2000/index_en.htm
[47] Council of Europe - https://www.coe.int/en/web/bern-convention/emerald-network

of the site's natural habitat types and species of Community importance in order to ensure the site contributes to the maintenance of, or restoration to, favourable conservation status".

Where a Natura 2000 Protected Area forms part of a water body or where a water body lies within a Natura 2000 Protected Area, the WFD objectives apply in addition to the requirement to maintain at favourable conservation status or restore it to that status. Some water bodies that coincide with Natura 2000 Protected Areas have been designated as artificial or heavily modified; in these cases, the aim to achieve good ecological potential applies in addition to the objective of favourable conservation status. Annex B sets out the status objectives for each water body and indicates where the water body coincides with a Natura 2000 Protected Area. The protected area objectives are independent of the water body status objectives in Annex B but all objectives have to be met in accordance with each of the EC Directives that underpin them. It is important to note that water body status objectives in Annex B will not always fully reflect the Natura 2000 Protected Area objectives in this Annex even where the element is the same, for example phosphate.

It is possible for a water body to meet the objectives for 'good status' but fail the Natura 2000 Protected Area objective of maintenance of, or restoration to, favourable conservation status. It is also possible to meet favourable conservation status (for example for salmon) but fail to achieve 'good status' in a coincident water body (for example for fish since the WFD requires action to protect and restore a wider range of fish species). Although the objective to restore or maintain favourable conservation status in Natura 2000 sites is mandated by the EC Habitats and Birds Directives, there is no specific date for achieving it. The WFD introduces the 2015 deadline, which applies to the Natura 2000 Protected Areas (water dependent SACs and SPAs (refer to Annex V).. If the protected area is also a 'water body', or forms part of a 'water body', the deadline for restoration to favourable conservation status may be extended where the conditions in Article 4.4 of the WFD are met. If the protected area is not a water body, for example fens and bogs, the deadline for achievement of favourable conservation status cannot be extended. Only recently the work has commenced on managing Natura 2000 sites.48 In framework of the project NaturAL the potential distribution of the Natura 2000 Sites of Community Interest (SCIs) was identified, resulting in the preliminary list of 43 proposed sites in all country. According to this list there are three protected areas identified as Natura 2000 site of community interest in Mati river basin (Table 3-3).

The National Agency for Protected Areas (NAPA) is the competent authority for managing the national system of protected areas in Albania. Only recently the work has commenced on managing Natura 2000 sites.[49] In framework of the project NaturAL the potential distribution of the Natura 2000 Sites of Community Interest (SCIs) was identified, resulting in the preliminary list of 43 proposed sites in all country. According to this list there are three protected areas identified as Natura 2000 site of community interest.

Table 3-3 – Protected areas according in Mati Basin

Area Name	PA	Map of habitat
Managed Nature Reserve "Kune-Vain-Patok - Fushëkuqe - Ishëm" (category IV of protected areas)	Yes	Yes
"Ulza Lake" Natural Park (category IV of protected areas)	Yes	Yes
PA of Zall Gjoçaj	Yes	No
Protected area of managed resources "Bjeshket e Oroshi" (category IV of protected areas)	Yes	No
Natural Park "Mali me Gropa-Bizë-Martanesh" (category IV of protected areas)	Yes	Yes

[48] EU - Strengthening National Capacity in Nature Protection – Preparation for Natura 2000 Network, March 2019

[49] EU - Strengthening National Capacity in Nature Protection – Preparation for Natura 2000 Network, March 2019

The Managed Nature Reserve "Berzane" (category IV of protected areas) proposed to be reduced in category and declared a municipal natural park.	No	Yes
National Park "Lure-Mali i Dejes" (category II of protected areas)	Yes	Yes

4. River Basin Overview

The purpose of the river basin overview is to give a general summary of the hydro-meteorological, topographical, geological, population, land-use and principal water-use features of the basin in so far as they are likely to influence the typology and status of waterbodies. These elements may be typically considered as the 'driving forces' in the river basin.

4.1 Division to Sub-basins

River basin districts and even river basins are rarely homogenous in character, and are not effectively analysed or managed as single entities. Division to smaller more homogenous sub-units (basins and sub-basins) within the river basin district is permitted within the WFD [50] and accords with international best practice. For example, management issues of diffuse pollution are best analysed and managed at the scale of the sub-basin, not the individual waterbody.

The approach in Albania has been to sub-divide each river basin into a maximum of five further sub-basins, based predominantly on a single over-riding feature (e.g., major Dam, dominant geological type, predominant land-use type), or a combination of other influential characteristics, including but not limited to:

- Distinct boundaries of major geological formations e.g. carboniferous to siliceous
- Changes in ecologically significant altitude or land-cover e.g. < 200 m or > 800 m, forest to urban etc.
- Natural breakpoints created by major tributaries, infrastructure or river modifications e.g. major Dams, river canalisation etc.
- Concentrations of anthropogenic influence e.g. urban or agriculture dominated areas

It will be noted that these broad differentiations coincide generally with the same typology delimitations as used for waterbodies. Therefore the sub-basin characteristics should generally be reflective of the waterbody characteristics. The division to sub-basins is useful to further refine more targeted policies or strategies particularly regarding land-use pressures such as urban growth or diffuse pollution issues from agriculture.

4.2 Climate and Hydrometeorology

Climate generally, and annual and seasonal precipitation specifically (comprising snow and/or rainfall) is the over-riding driver of all water-based interactions in the river basin. An evaluation of basin hydrometeorology is relevant to a subsequent understanding of the pressures, state/status and impacts imposing on the otherwise natural state of waterbodies in the river basin.

A full technical evaluation of hydro-meteorology and its detailed influences on the basin is generally presented in the Water Resources Management Plan or similar subsidiary strategy. The hydro-meteorology is only relevant to the environmental objectives of the river basin in order to correctly establish:

The annual renewable resource of surface water and groundwater i.e. the resource that can be annually exploited or consumed without compromising future sustainability

The seasonal natural flow regime (with zero anthropogenic influence) comprising: timing, magnitude and durations of specified flows

The naturalised environmental flow regime (the proportion of full natural flows that is the minimum required to sustain aquatic ecosystems). Environmental flow is not a single minimum value; rather it is the continuum of all-natural flow throughout the year.

Significant and uncontrolled anthropogenic influences on any of the above that do not have mitigation measures are very likely to result in a reduced ecological status of the impacted waterbody, and

[50] European Environment Agency - Water Framework Directive reporting resources, EIONET Central Data Repository, (Schema SWB: EUSubUnitCode). http://cdr.eionet.europa.eu/help/WFD/WFD_521_2016

therefore fail the primary tests of the WFD, namely 'waterbodies to be in Good Status' and 'no deterioration of status below the present level'. Therefore the 'baseline' hydrometeorology forms an important reference condition for ecological status.

4.2.1 Climate and Meteorology

Albania has a variety of climate systems according to the Köpen climate classification. With its coastline facing the Adriatic and Ionian seas in the Mediterranean and the highlands backed upon the elevated Balkan landmass. The coastal lowlands have typically a Mediterranean climate while the high uplands have a continental climate.

The area-weighted annual precipitation for the entire Mati river basin of 2809 km² is 1592 mm. This is spatially distributed as shown in Map 4-1 from representative Stations. These data derive from 20+ precipitation monitoring stations sited in or peripheral to the basin. Monthly climate statistics are shown in Table 4-1 for specific locations. As for most of western Albania, the precipitation gradient declines from east to west in accordance with decreasing altitude. The river basin is drained by the principal river of the Mati (sub basins MAT4, MAT1 and MAT0), with significant tributaries formed by the Fani i Madh (MAT2), Fani Vogël (MAT3) and Urakë tributaries. The MAT2 and MAT3 sub-basins of the Fani Madh and Fani i Vogël however constitute 534 km² (19%) and 417 km² (15%) respectively of the entire river basin and are therefore comparable in size to the upper part of the Mati river basin (MAT4, 1229 km², 44%) upstream of the Ulza Dam and reservoir.

The annual meteorological regime across the basin is summarised in the study for one representative Station (Simon), annual precipitation 1736 mm. Across all stations, the same meteorological regime is encountered, typically with 30%+ of the annual rainfall total falling in the seasonal period October-November-December. The driest 2 months are July and August typically comprising < 10% of the annual total.

Table 4-1 – Main Climatic Variables – Mati Basin

PARAMETER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Σ
MEAN TEMPERATURE	0.81	0.37	4.02	8.44	13.37	17.19	19.81	20.05	15.21	10.09	5.37	0.74	9.49
PRECIPITATION [51]	166	162	162	148	111	71	66	45	131	155	229	214	1661
EVAPOTRANSPIRATION [52]	18	26	51	74	110	146	168	141	90	55	24	17	920
EVAPOTRANSPIRATION [53]	12	21	48	72	102	140	146	47	78	45	18	12	741

4.2.2 Hydrology

At the most downstream flow gauging station of the river basin (River Mati at Milot, incorporating discharge from both the Mati and Fani main rivers), there are no available reliable records, so mean annual flow (MAF) for the entire basin in the period 1968-1992 [54] cannot be established. Combining the mean annual averages of flow at Mati (Shoshaj) and Fani (Rubik) would suggest a mean annual flow at Milot of not less than 70 m³/s.

It is reported in Hydrology of Albania 1984, that the mean annual flow of the Mati River at Station Shoshaj (non-functional, 41.607528°, 20.028472°, area = 646 km²) was 25.5 m³/s. The mean annual flow of the Fani i Madh river at Station Rubik (includes Fani i Vogël, non-functional, area = 1014 km²) was 45.1 m³/s.

[51] At Meteorological Station 'Simon'.

[52] Defined as Reference Evapotranspiration ET_0. Source is Laska, A. et al. "Evapotranspiration and Its Evaluation in Albania", BALWOIS 2010. Utilising FAO 56, Penman-Monteith at Burrel.

[53] Defined as Actual Evapotranspiration ET_A. Source is Laska, A. et al. "Evapotranspiration and Its Evaluation in Albania", BALWOIS 2010. Utilising Thornthwaite at Burrel.

[54] Data are from 1968-1992 and are NOT representative of current conditions. Data are only useful to show the relative magnitude of Individual River flows (which may also have changed since 1992).

Flow hydrographs for three representative river regimes (Mati at Shoshaj, Fani i Vogël at Nderfan, Fani i Madh at Rubik) are presented in Figure 4-7 for the period 1960-2000, based on flow data files provided to the Project from IGEWE (full data are supplied in Technical Annex 4). The mean values of these stations vary from those presented in the Hydrology of Albania 1984. For example, the Mati at Shoshaj reports 25.5 m^3/s mean annual flow from the HoA 1984 report, whereas the IGEWE data suggest a MAF of 24.4 m^3/s. The mean annual flow of the Fani i Vogël at Nderfan is reported as 11.7 m^3/s (HoA 1984), whereas the processed IGEWE data gives a value of 14.4 m^3/s. Without a comprehensive audit of historical data, it is not possible to establish if these significant differences are due to data errors OR possibly, influences of climate change. Due to the collapse of the flow gauging system after this period there is virtually no reliable flow data available within the river basin at the current date. [55] Furthermore, due to poor records at IGEWE, even the precise location of most of these flow stations could not be established. In addition to annual flow regimes, the river basin hydrology is most usefully characterised by Flow Duration Curves, which represent the proportion of time that any given flow is equalled or exceeded. Of particular importance are the 'indicator flows' of Q10, Q25, Q50, Q75 and Q90. Q50 is the more reliable measure of most probable flow (by supressing extreme values from the record), and this value should be used for long-term planning of water resource allocations, not the mean value.

The ratio Q90/Q50 is generally a good indicator of the proportion groundwater discharge as part of measured total stream-flow, the so-called 'Baseflow Index' (BFI). On a mean annual basis, the absolute minimum 'environmental flow' should never be less than Q95, and in groundwater influential systems (BFI ≥ 0.35+) should at least equal or exceed Q90. Comparison of meteorological profiles (Figure 4-6) and hydrological profiles (Figure 4-7) shows that the precipitation peak occurs in April for the Mati and Fani i Vogël sub-basins. However, the peak flow for the Fani i Madh at Rubik occurs in December. The delayed response of the Mati and Fani i Vogël sub-basins may possibly be due to the extensive limestone geological formations in those sub-basins, in which groundwater storage is recharged before groundwater levels are sufficient to discharge to the river systems in the form of baseflow. By comparison, the Fani i Madh sub-basin comprises predominantly basic, ultra-basic and volcanic formations, and is less likely to utilise groundwater storage and hence is more responsive to rainfall events. Flow Duration Curves for the same three flow gauging stations are tabulated in Table 4-2. The total absence of reliable flow data since 1992 compromises significantly many aspects of the environmental objectives for the river basin since flow is a critical component of waterbody ecological status and is the basis of many volumetric indicators of pressure.

Recent actual flows, levels of recharge, water resource availability, and groundwater contribution to surface water, environmental flow values and the chemical load component of surface waters cannot be reliably calculated at this time.

Table 4-2 – Flow Duration Curves for Mati River Basin Flow Gauging Stations [56]

FLOW GAUGING STATION	RIVER	LATITUDE WGS84 [57]	LONGITUDE WGS84	Q10	Q25	MAF	Q50	Q75	Q90	Q95
Klos	Mati	41.489389°	20.095028°	14.5	12.7	10.1	9.7	7.7	6.2	5.35
Shoshaj	Mati	41.607528°	20.028472°	33.9	30.6	25.5	25	20.9	17.9	16.1
Bruç	Uraka	41.691328°	19.998670°	5.8	5.12	5.07	3.98	3.28	2.69	2.35
Nderfan	Fani i Vogël	41.785639°	19.892167°	15.3	13.8	11.7	11.1	9.20	7.90	7.10
Rubik	Fani i Madh	41.763965°	19.781742°	64.3	57.4	45.1	43.8	34.6	27.8	24.2

[55] World Bank - On the Establishment of Institutional and Regulatory Platform for Governance and Functioning of the National Water Resources Cadastre in Albania, Assessment Report WRIP/WMA/3/CS/006, 2019.

[56] Hydrometric (flow) data for the river basin are not available post-1995. FDCs are based on the values given in Hydrology of Albania 1984. These data are therefore totally outdated and cannot be used to infer current hydrological conditions. Coordinates are not generally accurate, and have not been verified. Station Shoshaj is however coordinate validated.

[57] WGS84 coordinate system. Gauging Station coordinates supplied by IGEWE have not been field-verified and may not be accurate.

Milot	Rubik	-	-	-	-	-	-	-	-	-

4.2.3 Summary Water Balance of the Mati River Basin

Determination of a reliable river basin water balance is a technically challenging exercise, requiring accurate recent data on measured inflows, outflows and levels of consumption. However, an understanding of the primary sources of inflow to the basin, and how the water is consumed or transferred between sources (surface water and groundwater) and ultimately discharged to the outlet (sea or trans-boundary downstream basin) is absolutely critical to correct understanding of the basin hydrodynamics and sustainable water management. A full and detailed appraisal of water resources supply and demand is the subject of the more technical report which is currently not covered in this RBMP framework.

The innovative standard river basin water balance [58] newly applied in Albania promotes a useful understanding of several key issues:

- The inter-linkage between surface water and groundwater. Although frequently managed and reported separately, they are in fact closely aligned and connected[59]. The groundwater recharge volume in particular is a critical value with respect to aquatic ecosystems and abstraction licensing, and is frequently misreported in IWRM evaluations.
- Natural losses (evaporation, transpiration and trans-boundary groundwater outflows) must be subtracted from the total natural inflows (precipitation, trans-boundary surface water inflows and groundwater inflows) in order to arrive at the Annual Renewable Resource (ARR).
- If the ARR of the surface water or groundwater (or both) is exceeded continually through excessive abstraction and consumption,[60] this is a totally unsustainable position for the river basin, and will result in declining river flows and/or groundwater levels. In both cases the environmental objectives of the river basin will be impacted.
- Specific economic sectors should be broadly evaluated to identify which sectors are responsible for the highest levels of consumption.[61] Almost invariably this is the agricultural sector, due to high levels of transpiration of intensively irrigated crops and inefficient irrigation practices, but municipal water is also often responsible for significant 'losses' of surface water to groundwater, and vice-versa. Hydropower schemes may divert large quantities of water between sub-basins. These water transfers can be significantly damaging to environmental objectives without appropriate mitigation.
- It is a fundamental objective of sound water resource management to determine and to control the key 'water exploitation indices' for surface water and groundwater in order to protect environmental flow requirements and to ensure long-term quantities for economic uses.[62]

4.2.4 Global Climate Change Evaluation and Impacts

Specific to Albania, three national communications [63] have been prepared under the United Nations Framework Convention on Climate Change implemented by the Ministry of Environment and the United Nations Development Program. As indicated by Figures 4-1 – 4-5, based on the Inter-governmental Panel on Climate Change (IPCC) precipitation changes for a 'worst-case' scenario (Representative Concentration Pathway (RCP) 8.5), south-east Europe is likely to be particularly

[58] The best practice River Basin Comprehensive Water Balance complies with the general concepts set out in the UN System of Environmental-Economic Accounting for Water (UN SEEAW), UN DESA, 2012

[59] Ground Water and Surface Water - A Single Resource, U.S. Geological Survey Circular 1139, 1998

[60] CONSUMPTION – defined hydrologically as: (Abstractions + Exports) – (Returns + Imports).

[61] CONSUMPTION in this context complies with the UN SEEAW definition whereby: Total Abstraction = Total Returns + Water Consumption

[62] EUROSTAT – Water Exploitation Index - https://ec.europa.eu/eurostat/web/products-datasets/-/t2020_rd220

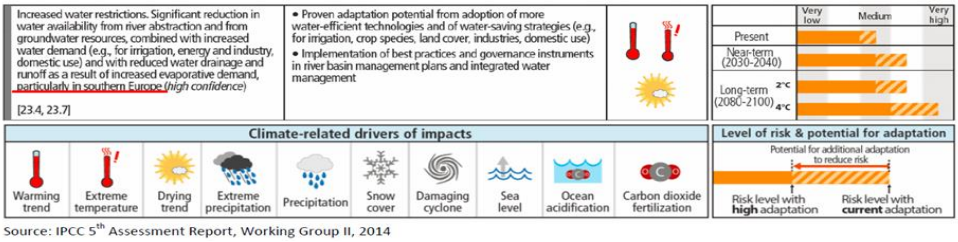
[63] 1st (2002), 2nd (2009), 3rd (2016) National Communication of the Republic of Albania on Climate Change

impacted by significant increases in temperature and reductions in precipitation. [64] Typically, for S.E. Europe, annual precipitation may reduce by as much as 20% by 2100 compared to a 1990 base level. Such meteorological changes will have massive and potentially catastrophic impacts for aquatic ecosystems adaptation, [65] droughts, [66] water resources [67] and agriculture across all river basins in Albania. Detailed analyses of these impacts are left to the specific sub-strategy Reports covering water resources, flood and drought supporting elements of the River Basin Management Plan.

With respect to the objectives of this RBMP Report, climate change is relevant in so far as it will impact on the future status of waterbodies. Climate change therefore represents one of the most critical pressures on the aquatic environment, manifested through:

- Increased evapotranspiration of land surfaces, so reducing surface water and groundwater recharge and increasing water losses (shifts in the water balance).
- Reduced precipitation, so reducing water resources generally and increasing need for summer irrigation and depleting environmental flows
- Reduced runoff, so depleting groundwater recharge and restocking of reservoirs and volumes available for hydropower
- Reduced river flow, so reducing flows below ecological minimums and increasing concentrations of pollutants

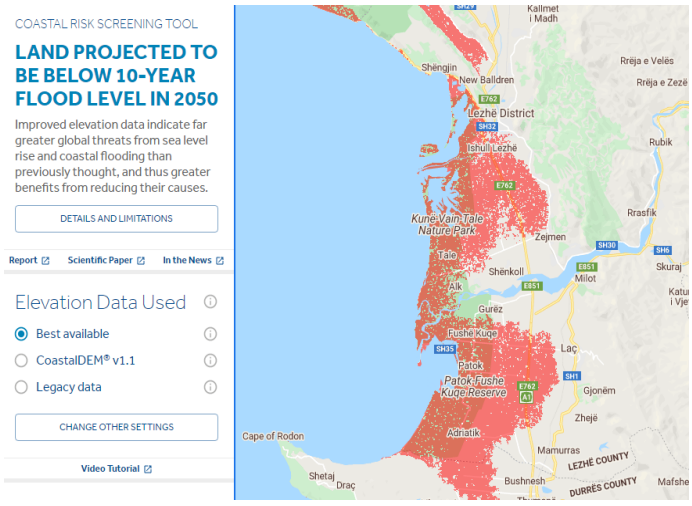
Figure 4-1 - Indications of Climate Change Impacts for Southern Europe



Source: IPCC 5th Assessment Report, Working Group II, 2014

Sea level rise is also projected to be extremely hazardous for many low-lying coastal areas, threatening many ecologically valuable habitats as well as groundwater resources, coastal infrastructure and agriculture. Figure 4-2 indicates possible inundation areas on a 10% annual exceedance probability for the Mati coastline based on an RCP 8.5 scenario within 30 years. [68]

Figure 4-2 - Projected 1 in 10 Year Probability Coastal Flood Inundation Zones by 2050



[64] IPCC – Assessment Report 5 (AR5) - Climate Change 2014: Impacts, Adaptation, and Vulnerability, WGII, IPCC 2014.
[65] BioScience, 2019, Vol. XX No. X, "World Scientists' Warning of a Climate Emergency"
[66] IPPC – Special Report – Global Warming of 1.5°C, IPCC 2018
[67] World Bank – 'Quality Unknown – The Invisible Water Crisis', WB Group 2019
[68] Climate Central - FLOODED FUTURE: Global Vulnerability to Sea Level Rise Worse than Previously Understood, 2019

Figure 4-3 – IPCC Multi-model Global Precipitation Changes – RCP8.5 [43]

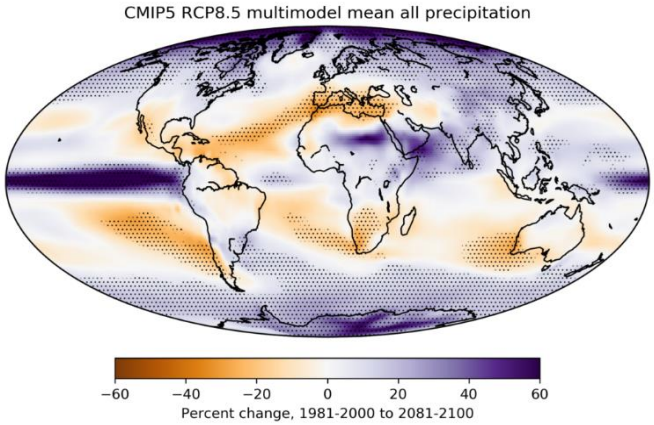


Figure 4-4 – Indicative % Changes to Global Temperature – IPCC – Base 1990

Years	2030	2050	2080	2100
Annual	1.0 (0.7 to 1.2)	1.7 (13 to 2.2)	2.8 (2.0 to 3.5)	3.2 (2.4 to 4.1)
Winter	0.8 (0.7 to 0.9)	1.2 (1.0 to 1.4)	2.8 (1.7 to 2.3)	2.4 (1.9 to 2.7)
Spring	1.0 (0.8 to 1.12)	1.5 (1.3 to 1.8)	2.6 (2.2 to 3.0)	3.1 (2.6 to 3.6)
Summer	1.6 (0.5 to 1.8)	2.5 (2.1 to 2.8)	4.3 (3.8 to 4.9)	5.3 (4.6 to 6.0)
Autumn	1.0 (1.0 to 1.1)	1.6 (1.5 to 1.8)	2.8 (2.7 to 3.0)	3.5 (3.2 to 3.7)

Figure 4-5 - Indicative % Changes to Global Precipitation – IPCC – Base 1990

Years	2030	2050	2080	2100
Annual	3.84 (-35.4 to 27.7)	-8.46 (-56.0 to 47.4)	-14.37 (-78.6 to 81.1)	-18.13 (-89.7 to 94.9)
Winter	-5.96 (-15.9 to 4.0)	-10 (-27.9 to 7.7)	-14.3 (-44.6 to 16.1)	-18.1 (-55.8 to 19.6)
Spring	-2.45 (-11.9 to 7.0)	-7.26 (-25.3 to 10.75)	-14.26 (-45.1 to 16.6	-17.7 (-55.3 to 19.8)
Summer	-10.4 (-12.8 to -7.9)	-19.7 (-24.1 to -15.3)	-41.9 (-49.2 to -34.5)	-50.4 (-59.4 to -41.3)
Autumn	0.5 (-10.1 to 11.1)	-2.5 (-21.3 to 16.3)	-6.9 (-38.1 to 25.2)	-9.5 (-48.1 to 29.1)

4.2.5 Local Climate Change Test – Mati River Basin

Whilst Global Climate Models (GCM) and IPCC Reports provide a general overview of possible future scenarios, there is no substitute for an analysis of local data, particularly if long records exist. The single most useful analysis to carry out is a statistical 'significant difference test' of two long-term precipitation mean annual values. For this test to be valid, at least 40+ years (2 x 20) of annual mean data is required from a reliable meteorological station that has remained in the same place throughout the evaluation period.

A long-term meteorological Station has existed in Burrell since the 1950's. The meteorological record (precipitation) should be simply divided to two equal WMO climate normal periods, (1961-1990) and (1991-2020), and a significant difference test [69] is carried out for the two long-term means (Table 4-3). A P value ≤ to the confidence level (α) means that there is a statistically significant difference between the two period means. This difference is therefore attributable to climate change effects. The magnitude of the difference of the precipitation means is a direct indicator of the change in available water resources since precipitation is the driving force of all water resources.

[69] EXCEL – t-Test: Paired Two Sample for Means

Table 4-3 – Statistical Difference Test – Long-term Precipitation Means

DATA PERIOD	LONG-TERM MEAN (mm)	N	VARIANCE	STANDARD DEVIATION	ALPHA CL α (5%)	t-STAT	P (T≤t) (1-tail)	P (T≤t) (2-tail)
1961-1990	1836	30	115.21	121.23	0.05	2.9395	0.0014632	0.0029265
1991-2020	1604	30	137.32					

Due to the virtual collapse of an effective surface water flow monitoring system since 1992, the AWRM is not currently able to quantify accurately any water resource availability changes in the Mati basin for the period 1991 – 2020.[70]

The only flow data made available to the RBMP team was for the period 1960-1990, and such data are so old as to be probably wholly unrepresentative of current conditions. Furthermore, the precipitation data provided to the project was for an entirely different period, 1991-2018, and consequently since the two datasets do not match, no meaningful water balances representative of current conditions can be prepared.

[70] Data requested for the climate change significance test could not be provided by the competent authority IGEWE.

Table 4-4 – General Water Balance of the Mati Basin

WATER BALANCE (ACTUAL FLOWS)	DATA PERIOD:			WATER BALANCE OF THE MATI BASIN (all units are Million m³)		SUB-BASIN: SEASON: Annual	ROW TOTAL
NATURAL INFLOWS BY SOURCE	Transboundary Surface Inflows			Direct Precipitation to the River Basin 2,416.49		Transboundary Groundwater	
ANNUAL GROSS INFLOW	From Upstream [71]			Precipitation to SW	Precipitation to GW [72]	From Groundwater [73]	
RECHARGE OF SOURCES	Annual Recharge of Surface Water 2,384.59				Annual Recharge of Groundwater 31.897		
NATURAL LOSSES	Actual Evapotranspiration (ET_A) [74]				Outflows to Transboundary Groundwater		
ANNUAL RENEWABLE	Annual Renewable Resource (ARR: SW)				Annual Renewable Resource (ARR: GW)		
PRIMARY ECONOMIC WATER USE SECTORS	IMPORTS	MUNICIPAL	INDUSTRY	AGRICULTURE	ENERGY	EXPORTS	IMPORTS	MUNICIPAL	INDUSTRY	AGRICULTURE	ENERGY	EXPORTS	
WATER SUPPLIED TO SECTOR [75]		0.995	0.008	181.18	2292.996			31.54	0.311	0.09	0		
CONSUMPTION BY SECTOR [76]													
SURFACE RETURNS TO GROUNDWATER [77]													
GROUNDWATER RETURNS TO													
NET CONSUMPTION BY SECTOR													
NET CONSUMPTION TOTALS BY SOURCE	Annual Consumption of Surface Water						Annual Consumption of Groundwater						
ANNUAL NET OUTFLOW (A – B)	Surface Net Discharge (including Baseflow)						Groundwater Net Discharge (as Baseflow) [78]						
WATER EXPLOITATION INDICES	Surface Water Exploitation Index ($SWEI^+$)						Groundwater Exploitation Index ($GWEI^+$)						

[71] Trans-boundary natural inflows from rivers. Trans-boundary includes other basins in Albania.

[72] Precipitation reaching the phreatic zone through deep percolation

[73] Trans-boundary groundwater transfers into the basin across the surface watershed boundary

[74] Actual evapotranspiration (ET_A) from all land surfaces, excluding the net difference attributable to agriculture

[75] Water supplied for economic use is assumed to equal abstraction + supply-side losses

[76] Water supplied to the sector and NOT returned to either surface water or groundwater. Same for groundwater

[77] Water supplied from surface sources but returned to groundwater. Vice-versa for water supplied from groundwater

[78] The quantity of groundwater reaching the surface water system and discharging from the river basin

4.3 Hydrogeology and Groundwater

4.3.1 Overview

The most authoritative source on hydrogeology and groundwater potential is derived from the 1:200 000 Hydrogeological Map of Albania.[79] This assessment recognises seven principal hydrogeological types, derived principally from the aquifer productivity potential. The aquifers are further classified by their lithology, typically into unconsolidated rock (sands, gravel, clay formations) and consolidated rock, in the form of sedimentary rocks (sandstone, conglomerates, shale, limestone, flysch and dolomite occurring most prevalently), and magmatic and metamorphic rocks (basic and ultrabasic, volcanic and metamorphosed conglomerates and sandstones).

In terms of hydrogeological formations, the Albania classification system is not fully aligned with the WISE reporting system [80], but approximations between these systems have been summarised in Table 4-8.

4.3.2 Geological Formations and Properties

Table 4 5 and Map 4 2 present a hydrogeological overview of the Mat River Basin.

The geology of the Mat watershed, according to the Geological Map of Albania 2002, consists of formations of the Triassic, Jurassic, Cretaceous, Paleogene and Quaternary periods. These formations are classified into five lithological groups: igneous, carbonate formations, flysch formations, sandstone formations and Quaternary Formations.

Igneous Formations are the oldest in the basin and are represented by ophiolites of the Middle Triassic to Late Jurassic period, basic and ultrabasic rocks, ultrabasic rocks and volcanic rocks.

Carbonate Formations are represented by limestones of the Late Triassic to Early Jurassic period, as well as limestones and dolomitic limestones of the Late Cretaceous period (Cr2) and Eocene limestones (Pg2).

Limestones of the late Cretaceous period are found in the Makareshi anticline on the surface and

Volcanic Formations are represented by:

Paleogene formations (Pg). They are found in the eastern part of the Ише basin, separating the structures of the Makaresh anticline, Dajti Mountain, Gropa Mountain and the basin in the south.

Flysch lithology is represented by :

Neogene Formations (N) of the Miocene and Pliocene period. They are found in the southern and southwestern part of the Mat basin and are represented by limestone, siltstone, clay, marl, conglomerates and coal in the Burrel depression and the Rreshen area. They are spread from the south to the north of the depression. The lithology is dominated by clay, limestone, conglomerate, siltstone and coal in the Burrell depression.

Quaternary Formations lie in the center of the Mat River basin along the main rivers and streams at the foot of the hills, as well as on the slopes of the mountains. They are represented by: Proluviones, alluviums and swamp formations.

Mat Basin Hydrology

The Quaternary formation catchment of the Mat River is represented by the depression filled mainly with gravel deposits. They are the product of the consolidated alluvial material of the Mat River and partly of the Drin River. The depression is bordered to the east by the non-aquifer formations, to the southwest by the limestones and conglomerates of the Ishem River, and to the west by the Adriatic Sea.

Widespread gravel deposits start from the shingle terraces of the Mat River. They continue with the joining of the two branches of the Big Fan and the Little Fan in Milot to Fushe - Milot, Laç, Fushe - Kuqe, Patok and Bregu i Mati.

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[79] Harta Hidrogjeologjike e Shqipërisë, Ministry of Energy & Industry, Albanian Geological Service, 2015

[80] WISE 2016, EU CIS Guidance 2016 Reporting schema element: <GeologicalFormation>

After Shkopet, the water-bearing gravels of the Mat river emerge on the surface of the land in Milot. From here, they sink into the sub-shale, sub-limestone and limestone layer thus forming pressure aquifer gravel layers.

Thus, rivers are the main source that feeds the groundwater aquifers, followed by the waters of the rocks of the river beds, such as the limestones T3-J1, Cr2, Pg 1-2 in the north and the limestones and conglomerates of the Ishem River in the south- west of the basin.

As the groundwater moves from the recharge zone to the drainage zone, it gains pressure. Thus, most of the wells and boreholes are artesian, except for the area near the Mat River with a width of 1.5-2.0 km that serves as a hydrogeological window and the groundwater has no pressure.

The thickness of the clay varies from 1 to 3 meters in the vicinity of the river to 60-65 meters in the Lezha plain and 35-40 meters in Fushe-Kuqe, while in the maritime belt the thickness reaches more than 80 m.

Table 4-5 – Summary of Main Geological Formations and Groundwater Potential

HYDRO-GEOLOGICAL DESCRIPTION [81] PREVALENT LITHOLOGY	ALBANIA TYPE CODE	EU TYPE CODE	AREA (km²)	AREA %	TRANSMISSIVITY (T) (m²/DAY) [82]	GROUNDWATER POTENTIAL [83]
Inter-granular porosity. Extensive aquifers, with very high to medium productivity. Sand + gravel, sand + gravel + mud/silt	1	1			1000-2000	Porous – Highly productive
Inter-granular porosity. Extensive aquifers, with very high to medium productivity. Clay + sand + silt + gravel	2	2			$10 – 10^{-1}$	Porous - Moderately productive
Porous/fissured porosity. Extensive aquifers, with medium to very low productivity. Sandstones, claystones, conglomerates.	3	2			10^2 - 10	Porous - Moderately productive
Fissured/karstified porosity. Extensive aquifers, strongly alternating, with very high productivity. Limestones, dolomites.	4	3A			100 – >10,000	Fissured - Highly productive
Fissured porosity. Extensive aquifers, alternating, with medium to low productivity. Basic rocks, ultrabasic	5	4B			$10^2 – 10^{-1}$	Fractured - Moderately productive
Practically non-aquiferous rocks. Clay formations, flysch, evaporite	6	5			$< 10^{-1}$	Insignificant aquifers. Limited groundwater
Porous/fissured porosity. Localised aquifers, with low to very low productivity. Sandstones, siltstones.	7	5			$< 10 – 10^{-1}$	Insignificant aquifers. Limited groundwater

[81] Derived from Legend of Harta Hidrogjeologjike e Shqipërisë, Ministry of Energy & Industry, Albanian Geological Service, 2015. Albania Type Code corresponds to the GIS .shp file categories

[82] Transmissivity (T) is the rate of flow through unit width of aquifer, defined as hydraulic conductivity (K, m/day) x aquifer saturated thickness (b, m), hence T = m²/day

[83] Corresponds to the EU CIS Guidance 2016 Reporting schema element: <*GeologicalFormation*>

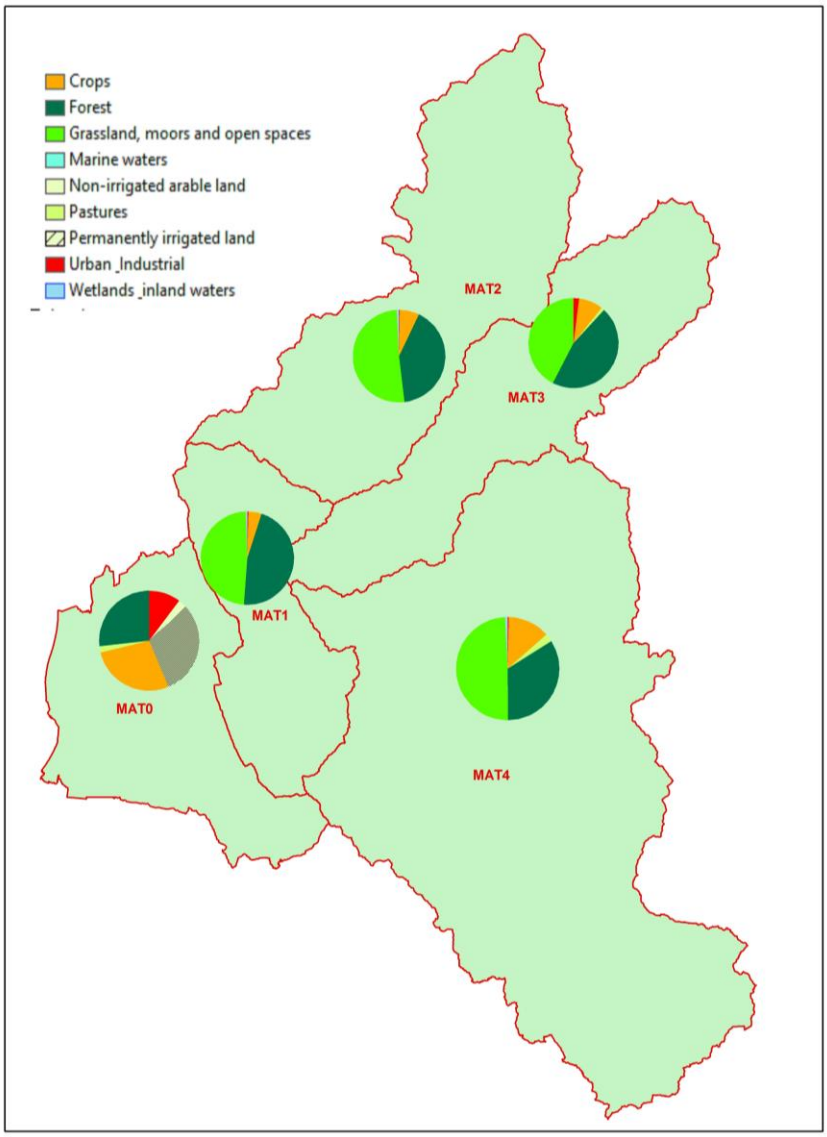
4.4 Topography and Land-use

4.4.1 Principal Land Use Types by Sub-basin

Figure 4-9 and Map 4-5 summarises the principal sub-basins and land uses in the Mati river basin, derived from the EU CORINE land-cover database (2018). [84] The rationale for the sub-basin delineation has been described in the Overview of Significant Water Management Issues report.

Table 4-12 summarises key land-use statistics at sub-basin level, including population, the key index flows of Q50 and Q90 where it is possible to calculate them[85], and a % breakdown of principal land-use types according to the CORINE Land Cover Dataset (2018). [86] [87] Irrigated areas have not been ground-truthed, and are believed to be substantial under-estimates of land actually irrigated.

Figure 4-6 – Principal Land Use Types by Sub-basin



[84] https://land.copernicus.eu/pan-european/corine-land-cover

[85] Hydrometric flow data not available after 1995. These values approximated from gauging station data 1960-1995, and applied to sub-basins by simple area correction. These data are not reliable, indicative only.

[86] https://www.eea.europa.eu/publications/COR0-landcover

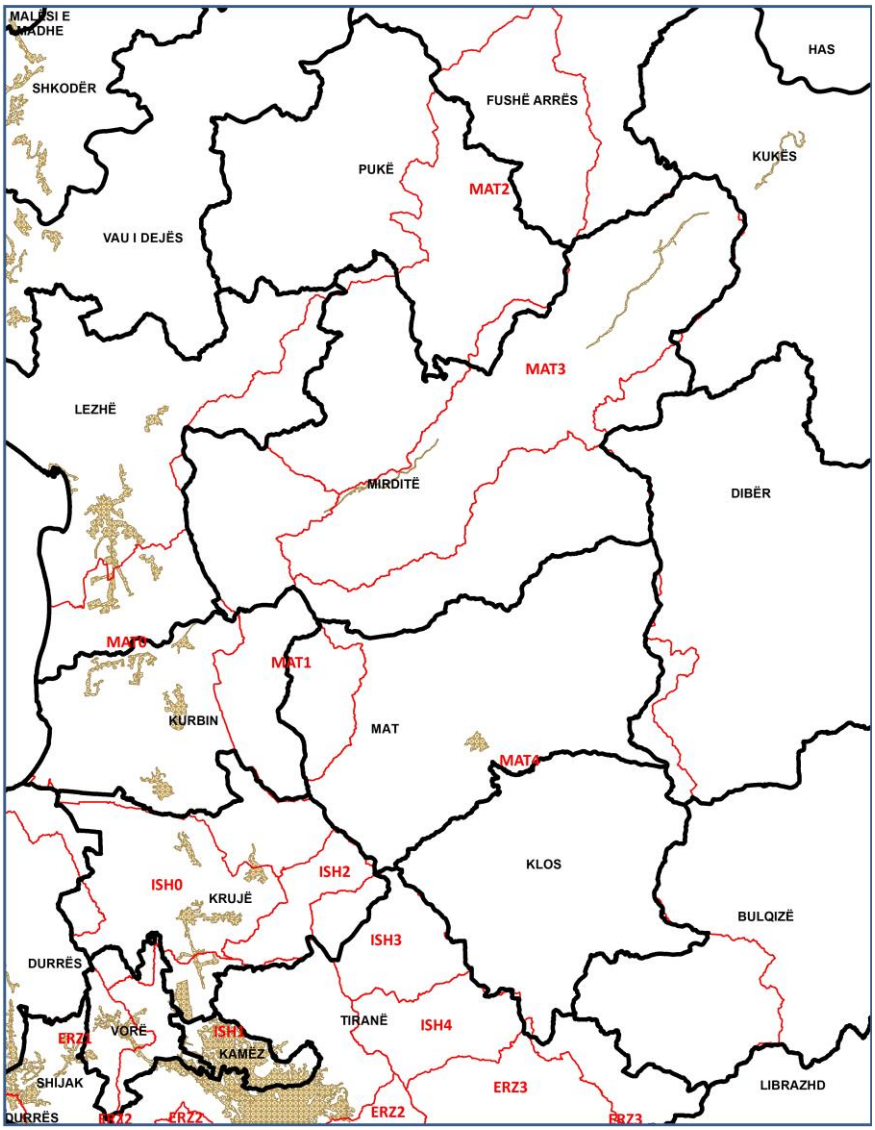
[87] https://www.eea.europa.eu/data-and-maps/data/copernicus-land-monitoring-service-corine

4.5 Municipal Districts and Population Distribution

4.5.1 Municipal Administrative Units and Population

Figure 4-10 and Map 4-5 show the administration districts and main agglomerations of the river basin. An approximation of population distribution is provided in Table 4-12. Predictably, the river basin sub-unit boundaries do not coincide with municipal administration boundaries, therefore requiring municipalities to cooperate across topographical watersheds to achieve river basin plan objectives.

Figure 4-7 – Principal Municipal Authorities and Urban Areas



4.6 Principal Water Uses, Operations and Infrastructure

4.6.1 Overview

The purpose of this section is to summarise existing major activities or operations ('artificial influences' or 'drivers') that may have an impact on environmental objectives generally, or the status of specific waterbodies. The extent to which these operations act as pressures at sub-basin level or directly influence status at waterbody level is addressed in Chapter 10.

Of particular importance is infrastructure associated with either large abstractions or transfers of water, since these are likely to be impacting on environmental flow and/or water resource availability at local scale. The overview is not intended to be exhaustive. A detailed assessment of water use infrastructure, water allocation and water abstraction should be provided under the subsidiary Water Resources Management Plan.

Broadly, principal drivers that are likely to influence waterbody characteristics and/or status are defined by the WFD WISE reporting enumeration lists.

4.6.2 Summary of Water Services

Under WFD definitions, 'water services' means all water related operations which provide for households, public institutions or any economic activity and which may have a significant impact on the status of water:

abstraction, impoundment, storage, treatment and distribution of surface water or groundwater

wastewater collection and treatment facilities which subsequently discharge into surface water

Table 4-7 provides an overview water balance of the main sectors as required by WFD Article 9(1). Of particular importance with respect to environmental impacts of 'water services' and cost-recovery of environmental and resource costs specifically is the parameter of 'consumption', which in simple terms is the volume permanently lost from the river basin due to economic activity. Water services also potentially fundamentally impact on the internal water balances of water sources, whereby abstracted surface water may be transferred to groundwater after use, and vice-versa.

Table 4-6 – Summary of Main Sectoral Abstractions, Uses of Water and Consumption, Mat River Basin

SECTORAL DATA	SURFACE ABSTRACTED [88] (million m³)	GROUNDWATER ABSTRACTED [89] (million m³)	RETURNED TO SURFACE [90]	RETURNED TO GROUNDWATER [91]	Σ RETURN (MCM)	CONSUMPTION (MCM) [92]	EXPLOITATION INDEX WEI (%) [93]	WATER SERVICE UNITS [94]	GVA € M
HOUSEHOLDS [95]	0.879	34.869						Population	
INSTITUTIONAL	-	-						Units	
COMMERCIAL	-	-						Megawatt Hours	
INDUSTRIAL [96]	0.0087	0.2501						Units	
AGRICULTURE [97]	90.5907	0.0457						Hectares	
HYDROPOWER	2207.113							MWh	
OTHER		0.0147							
TOTAL	2298.59	35.18							

[88] Defined as water abstracted for use internal to the basin or exported to an adjacent basin from rivers, reservoirs and springs (but based on production data)
[89] Defined as water abstracted for use internal to the basin or exported to an adjacent basin from below ground sources (but based on production data)
[90] Defined as the total water quantity (whether from surface water and/or groundwater) that is returned or imported to the surface water system. Estimate only.
[91] Defined as the total water quantity (whether from surface water and/or groundwater) that is lost, returned or imported to the groundwater system.
[92] Defined as the difference (Σ water abstracted – Σ water returned) and conforms to UN SEEAW definition that "Total abstraction = Total returns + Consumption"
[93] Defined as Water Exploitation Index (WEI+) = [(Abstractions + Exports) – (Returns + Imports)] / Annual renewable water resource
[94] Defined as the number of service units supplied with water: population, population equivalent, irrigated hectares, megawatt hours
[95] Based on published water utility data for Tirana, Kruje water utilities - Enti Rregullator I Ujit (ERRU), Raport Bilanci i Ujit i Shoqërive UK 2018.
[96] Defined as major activity generally utilising own sources of water
[97] Agricultural consumption includes transmission losses by evaporation and evapotranspiration demands of irrigated crops

4.6.3 Infrastructure or Operations Related to Drinking Water Abstraction

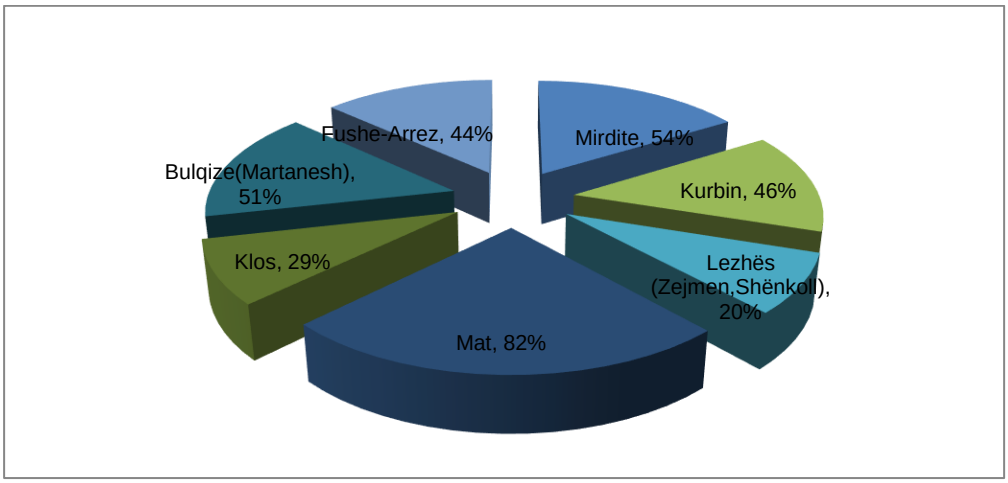
The water supply is one of the sectors of a particular importance and high sensitivity, as it directly affects the quality of life of the citizens.

There are 7 UK public companies operating in the Mat river basin that supply drinking water to a part of the population living in the basin. Of them, 4 companies (UK Kurbin, UK Mat, UK Mirdite, UK Klos) operate within the territory of the Mat basin, while 3 other companies (UK Lezhe, UK Fushe-Arrëz, UK Bulqize) operate partially in the territory of the water basin of Mat River and partly in the territory of the Drin River water basin. In particular for Bulqize only a part of the area (Kraste-Martanesh) is included in Mati RB. Similarly, only a small share of customers of Lezhe are located inside Mati RB since the major customers belong to Drini RB. Meanwhile in the case of Fushe-Arrëz, only a minority of its customers (about 20%) are situated outside the Mati RB, the remaining percentage falls within its territory.

These water utilities are subject to monitoring by the AKUM, through performance assessment of the services provided against technical and financial key performance indicators. Additionally, utilities have signed performance contracts with their respective municipalities to show as such their accountability on the service provided.

Recent data indicate that about 56% of the population of the basin is connected to a water supply network. The service continuity is significantly higher in urban areas in comparison to the rural areas nevertheless the values are quite low across the river basin.

Figure 4-8 - The percentage of population served with water supply for each Municipality - Mati RB.



The population compensate for low values of the “continuity of service” by purchasing and installing water pumps and water storage tanks that fill up when the distribution system is under pressure. The main factors that cause this low continuity of water supply are the loss of water from un-metered over-consumption, illegal connections, and technical losses in the networks due to leakages / aged infrastructure.

The safety of water supply is affected by the protection of sources, which are largely wells and natural springs in the Mati RB, and the chlorination of supply entering the distribution systems. There is national policy (laws and regulations) addressing the natural spring protection, and well head/well field protection. The final aim of these regulations is that no water source contamination has occurred at the sources.

Despite the safety measures applied at the sources, all water utilities in Albania apply continuous chlorination treatment to eliminate contamination from micro-organisms that could find their way into the distribution network. The safety of the water supply is monitored by the Local Health Care Units (LHCU).The IPH tests for residual chlorine at various points of use, as well as for faecal coliform bacteria.

Table 4-7 - Water supply in Mati River Basin District[98]

County	Municipality	Administrative Unit	Urban/ Rural	Population	Population served with water supply	Water Connections	Coverage	Continuity of Water Supply Service (hours/day)	Water Utility
LEZHE	**Lezhe**	Zejmen, Shenkoll	**R**	9,750	**1,908**	**424**	**20%**	**16**	Sh.a U.K Lezhe
	Kurbin	Laç, Mamurras, Milot, Fushe-Kuqe	**U+R**	66,442	**30,678**	**7,561**	**46%**	**4.0**	Sh.a U.K Kurbin
	Mirdite	Rreshen, Rubik, Orosh, Kthella, Selita, Fani	**U+R**	37,500	**20,348**	**3,040**	**54%**	**15.0**	Sh.a U.K Mirdite
DIBER	Mat	Burrel, Ulez, Mancukull,Lis, Baz, Rukaj, Komsi, Derjan	**U+R**	38,440	**31,688**	**6,578**	**82%**	**18.0**	Sh.a U.K Mat
	Klos	Klos, Gurre, Xibër, Suç	**U+R**	20,578	**5,870**	**1,528**	**29%**	**9.0**	U.K Klos
	Bulqize	Kraste-Martanesh	**R**	2,142	**1,250**	**350**	**58%**	**12.0**	Sh.a U.K Bulqize
SHKODER	Fushe-Arrez	Fushe-Arrez, Qafe Mali	**U+R**	9,945	**4,800**	**735**	**48%**	**24.0**	Sh.a U.K Fushe-Arrez

Drinking water supply system for households, companies and institutions includes (i) Abstraction, (ii) Storage, (iii) Treatment, and (iv) Distribution. The only used source of water both for human consumption and industrial uses is groundwater (captured at springs or pumped from wells).
Groundwater is subject to climatic, morphological, hydrological, geographical and anthropogenic factors. The most important factor, on which groundwater levels rely, is precipitation. Water is in good quality and does not require any secondary treatment: disinfection (by chlorination) only is sufficient. Therefore, industrial activities also benefit from the good water quality at a low cost, even if provision of lower quality of water would often be more than enough for their purposes.
For each well, a protection zone is usually identified by water utilities. However, these protection zones are usually too small, and the average distance of the wells from residential houses is too little for establishing a reliable protection.

4.6.4 Infrastructure or Operations Related to Wastewater Treatment

At present most of the water utilities which supply water to customers in the Mati-RB have a sewage network, at least in urban areas, and also collect some of the wastewater in the area. The coverage of the sewage network is more restricted than the coverage of the water supply network.
In urban areas, wastewater is mostly collected by public sewers. Sewer systems are combined ones, hence collecting together wastewater and storm water.

[98] Source: Water Regulatory Authority (Performance Report of Water Supply and Sewerage Companies for 2019 and 2020)

In rural areas extensive dispersed settlements are found. Every house uses its own means of wastewater discharge, usually collecting them to septic tanks, and using private trucks for removing them away from the settlements.
In the entire Mat River basin is no sewage treatment plant, so all sewer pipes discharge directly into the closest water body without treatment.
The Wastewater Treatment Plant situated in Lezhe, currently serves only of the city Lezha and Shengjini area (part of Drini River Basin Area).
The table below provides a snapshot of the current situation in relation to wastewater collection in the basin.

Table 4-8 - Current situation in relation to wastewater collection in the Mati river basin area

Prefecture	Region	Municipality	Administrative Unit	Comment
LEZHE	Kurbin	Kurbin	Mamurras	Wastewater are collected from the public network and then discharged at two point in the river, without treatment,
		Kurbin	Milot	The existing wastewater collection system is a combined sewerage system for the drainage of mixed domestic wastewater and storm water and then discharged in the river Mati without treatment.
		Kurbin	Laç	Partial sewerage connection (65%) . Wastewater are collected from the public network and than discharged at 4 point in the open channels, without treatment, creating environmental problems.
		Kurbin	Fushe-Kuqe	No sewerage connection.
	Mirdite	Mirdite	Rubiku	The wastewater system cover only the area of the city Rubik. Wastewater are collected from the public network and then discharged in the river Fan, without treatment.
		Mirdite	Kthella	No sewerage connection.
		Mirdite	Rrësheni	The wastewater system cover only the area of the city Rreshen. Wastewater are collected from the public network and then discharged at one point in the river Fani i vogel, without treatment.
		Mirdite	Selita	No sewerage connection.
		Mirdite	Oroshi	The wastewater system cover only the area of the city Reps. The existing wastewater collection system is a combined sewerage system for the drainage of mixed domestic wastewater and storm water.
		Mirdite	Fani	No sewerage connection.
	Lezhe	Lezhe	Shenkoll	No sewerage connection.
		Lezhe	Zejmen	No sewerage connection.
		Lezhe	Ungrej (partial)	No sewerage connection.
DIBER	Mat	Mat	Ulëz	Wastewater are collected from the public network and then discharged in the lake, without treatment
		Mat	Rukaj	No sewerage connection.
		Mat	Baz	No sewerage connection.
		Mat	Burrel	The existing wastewater collection system is a combined sewerage system for the drainage of mixed domestic wastewater and storm water and then discharged in the river Mati without treatment.
		Mat	Komsi	No sewerage connection.
		Mat	Derjan	No sewerage connection.
		Mat	Macukull	No sewerage connection.
		Mat	Lis	No sewerage connection.
		Klos	Suç	No sewerage connection.

SHKODËR		Klos	Gurre	Partial sewerage connection. The wastewater system cover only the area of the Shulbater village and then discharged in the river Mat, without treatment.
		Klos	Klos	The wastewater system cover only the area of the city Klos and Benje village. Wastewater are collected from the public network and then discharged in the river Mat, without treatment.
		Klos	Xiber	No sewerage connection.
	Bulqizë	Bulqize	Martanesh	The wastewater system cover only the area of the city Kraste. The existing wastewater collection system is a combined sewerage system for the drainage of mixed domestic wastewater and storm water and then discharged in the river Mati without treatment.
	Pukë	Puke	Gjegjan	No sewerage connection.
		Puke	Rrape	No sewerage connection.
		Fushe Arrëz	Qafë Mali	No sewerage connection.
		Fushe Arrëz	Fushe Arrez	The wastewater system cover only the area of the city Fushe Arrëz. The existing wastewater collection system is a combined sewerage system for the drainage of mixed domestic wastewater and storm water.

4.6.5 Infrastructure or Operations Related to Irrigation

The total area of agricultural land in Albania is 657,000 ha[99], which covers 23% of the country, where 80% of which is under private ownership and 20% is state owned. The main crops are vegetables, fruit trees and vineyards, grains and olive groves.

Agriculture in Albania requires additional water for irrigation in summer since rainfall during this season is only about 20% of the total annual precipitation. Water deficits between June and August vary between 400 and 500mm, making irrigation necessary for effective crop production. On the other hand, drainage is important during winter, to alleviate flooding, erosion and water logging.

A considerable irrigation and drainage systems disintegrated due to lack of investment together with insufficient budget for operation and maintenance. Moreover, land privatization generated, at national level more than 400,000 small farms (between 0.5 and 3.0 ha). These small private farms have fundamentally changed the character of agriculture and complicated the agriculture services including irrigation process. In response, the Government of Albania adopted a policy allowing for the transfer of the operational responsibilities of secondary irrigation canals to the water users.

Currently, the State is the owner of the irrigation schemes, meanwhile the operation and maintenance of the schemes is delegated to the municipalities. But the law 24/2017 provides room for the transfer of this right to the Water User's Associations, Agricultural Collaborative Associations, or other means of transfer that can be done through a Decision of the Council of Ministers.

The Water Users' Associations (WUA) are farmer's voluntary associations, which are established and carry out activities according to the provisions of law 24/2017 "On Irrigation and Drainage Administration". The WUA is a legal entity, self- financing, for non-profitable purposes.

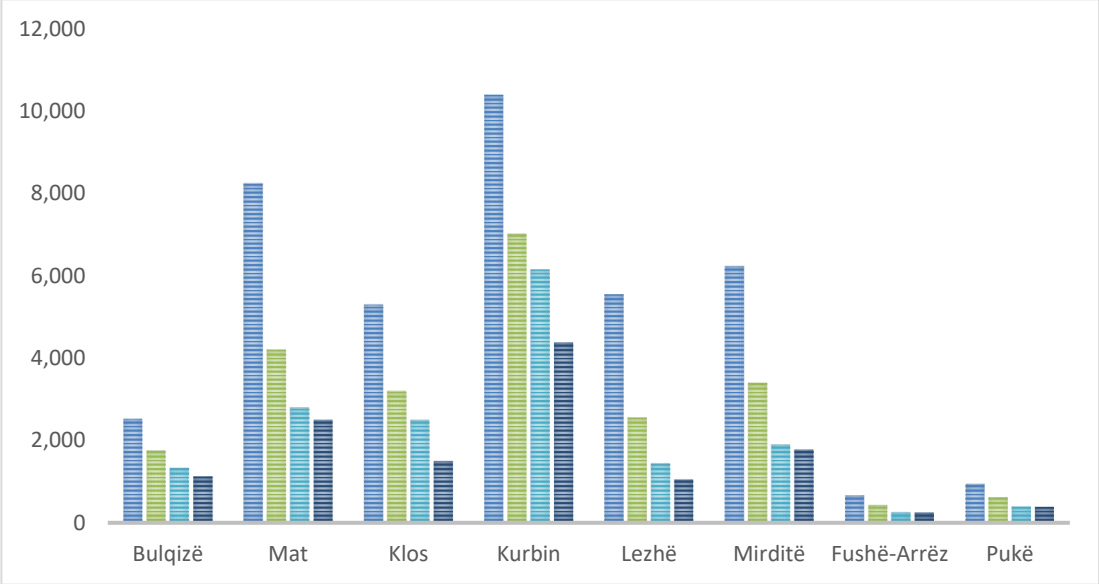
Till now, according to the above-mentioned law, no water user's associations have been formalized yet. The farmers are currently supplied with water provided through irrigation schemes and public water resources managed by the municipalities. There are also farmers who irrigate outside of these irrigation schemes. There is no information available for these ones.

In the Mat River basin area, the irrigation management is performed by 8 municipalities (Kurbin, Mirdite, Lezhe, Mat, Klos, Bulqize, Fushe-Arrez and Puke), where some of them are entirely located within the territory of the basin, while the rest only partly, because they do not fall fully within the

[99] Source: MARD, 2021

given river basin. The Directorate of Irrigation and Drainage of Lezha operates in the Mat River Basin, with 2 main canals under its management.
The agriculture land in Mati river basin, according to the MARD is about 40,000 ha, irrigated mainly from irrigation dams and local rivers.
In the Mat River Basin, the area where the farmers have access to irrigation is about 17000 ha, against the irrigation potential area which is about 23000 ha. In 2020 the area of irrigated lands in this basin is approximately 13000ha.
At River Basin level, approximately 58% of agriculture land is irrigation potential area and 42% of agriculture land is irrigated land. Figure 13 below shows the situation for each municipality in the Mati River Basin.

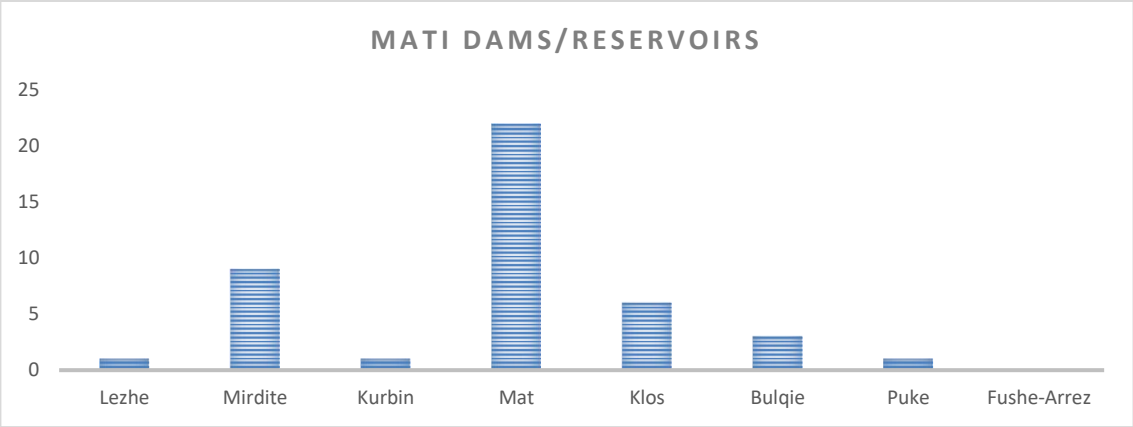
Figure 4-9 - Total of arable land, Irrigation potential and Irrigated land in 2020 for each municipality in the Mati River Basin



Due to rapid infrastructure development during the last decades, currently only part of arable land can now be irrigated or used permanently for agriculture production. Figure 13 shows that the percentage of irrigated land in the Mati River Basin varies from 20%-75%.
The water sources of irrigation are irrigation reservoirs, rivers or groundwater using pumping stations. The type of irrigation is either by gravity or pumping stations, or sometimes a combination of both. The main method of irrigation in country and in Mati River Basin is irrigation by open canals or furrow irrigation, which distributes water thorough a secondary and tertiary network.
In Mati River Basin there are about 877 km main irrigation canals (616 km primary canals and 261 km secondary).
Large scale irrigation is mainly practiced in the flat coastal areas in Lezhe and Kurbin districts, where 2 major irrigation schemes are operated, respectively: Mat-Lezhe with a capacity of 5 m3/s and Mat-Kurbin with a capacity of 15 m3/s.
One major irrigation scheme is located in the upper part of the Mati basin, in Mat-Klos with a capacity of 2 m3/s. There are many minor irrigation schemes in the higher parts of the Mati basin, but most of them are currently not operational.
In general surface water is used as source for irrigation, with the Mati and Fani Rivers as major sources. In the upper part of the Mati basin several reservoirs have been constructed for irrigation purposes in order to meet the demand.
There is a total of 43 irrigation dams (reservoirs) in Mati River Basin. Based on the data reported by the Ministry of Agriculture and Rural Development the initial designed capacity of irrigation reservoirs,

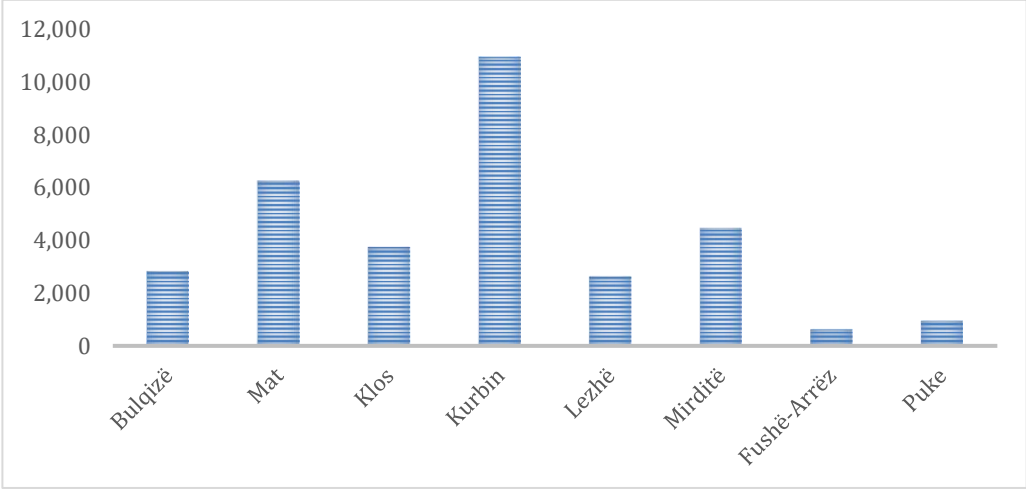
after more than 40 years of life operating is reduced about 50%. The location of the irrigation dams with their locations is presented in Figure 14.

Figure 4-10 - Irrigation dams for each municipality in the Mati River Basin



For the last irrigation season (2020) based on the planted areas and the applied irrigation norms (water in the plot for surface irrigation), at national level, there is approximately 473 million m3 of water available for about 182 000 ha irrigated area. [100]
While in the Mati River Basin the total water volume used for irrigation is approximately 32 million m3 for about 13,000 ha irrigated area (season 2020). Figure 15 below shows the situation for each municipality in the Mati River Basin.

Figure 4-11 - Water volume used for irrigation in 2020 for each municipality in the Mati River Basin



One critical factor contributing to the vulnerability in the agricultural sector is the excess of water during floods events, which is the case for the Mati River Basin, is causing damage to agriculture production by limiting crop growth or destroying the plants.
The drainage service is built mainly before 1990s. Due to rapid infrastructure development during the last decades, the drainage service currently covers only a part of the agriculture land. In Mati River Basin there are about 1065 km main drainage canals and about 21,755 ha of drainage network system. Drainage Pumping Stations (hidrovore) are used for drainage purposes, and are distributed on coast area. A part of them are now at the end of their lifespan due to damage, high electricity costs and poor maintenance. For the tertiary canals it has been assessed as being heavily silted and in need of considerable financial support for the silt to be removed. This situation creates over saturation of

[100] Source: MARD, 2021

agriculture plots and premises for flooding on rainy conditions. In the Mati River Basin there are 3 Drainage pumping operational stations, one in Lezhe (Tale) and two in Kurbin (Sllinza and Droje).
Based on the water resources and irrigation infrastructure in the Mati River Basin, measures have to be taken to decrease vulnerability and so increase flexibility of agriculture. These measures are mainly related to modernisation of agriculture (adopting Best Practices), improvement of irrigation and drainage infrastructure and introducing the new method of irrigation (spring and drip irrigation).

4.6.6 Infrastructure or Operations Related to Hydropower

There are 73 hydropower plants in the Mati river basin have water resource use permits from the Water Resources Management Agency (information from the Permit Register for April 2022). The total set power is approximately 161.5295 MW. The installed flow is approximately 317.7165 m3/sec. The mean annual flow is approximately 194.5706 m3/sec. (see Table 10-9 in Chapter 10 and Technical Annex III for more informaation).

4.6.7 Infrastructure or Operations Related to Installations under the IPPC Directive[101]

Directive 2010/75/EU on industrial emissions (IED) applies to the operations-installations from different industrial sectors and introduces set of rules in order to prevent, reduce and as far as possible eliminate pollution arising from industrial activities in compliance with the 'polluter pays' principle and the principle of pollution prevention. Operations of the installations shall be based on the best available technology (BAT) which is developed for specific industrial sectors.
Directive 2010/75/EU on industrial emissions (IED) is transposed only partially by a large number of legal acts which cover different parts of the directive. The legal framework for industrial pollution includes the following main acts:

- Law no. 10448, dated 14.7.2011 "On environmental permits", as amended, is partially aligned with the Industry Emissions Directive 2010/75 / EU, thus further actions are needed for its transposition.
- Law no. 10431 dated 9.6.2011 "on the Protection of Environment", as amended
- Law no. 10463, dated 22.09.2011 "on Integrated Waste Management", as amended
- DCM no. 419, dated 25.6.2014 "On the approval of special requirements for the examination of environmental permit applications of types A, B and C, the transfer of permits from one entity to another, the conditions for the relevant environmental permits, and the detailed rules for their scrutinizing by the competent authorities until the issuance of these permits by the National Licensing Centre", partially transposes Directive 2010/75/EU, of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control).
- DCM no. 178 of 6.3.2012 "on Waste Incineration".

The main problems are related to the BAT and the Emission Limit Values regarding their transposition and implementation. However, permitting of the installations which are under the scope of this directive is not integrated and still the same installation should receive several permits in order to be able to operate. Permitting is not fully compliant with all legal requirements and there is no independent monitoring of industrial pollution. The limited data on industrial pollution relies on companies' self-monitoring and declaration. There is in place a procedure to apply, deliver and control the permitting process from the central level to the local level, by three levels of application - national (MTE and NEA), regional branches of NEA and the Inspectorate and requirements of self-monitoring reports prepared by the operators themselves. However, implementation of BAT or referring to it is missing.
It is estimated that about installations under the scope of the IED, thus, installations equipped with environmental permits of type A, referring to the definitions of national legislation in force, however there is no register of these installations, nor their level of implementing the directive's requirements

[101] European Commission – Directive 96/61/EC - concerning integrated pollution prevention and control

is assessed. NEA is responsible for monitoring implementation and compliance with the environmental standards during the permitting process (issuing Type A & B environmental permits). Furthermore, a map with relevant coordinates is missing where all industrial installations equipped with environmental permits are located, at least those of type A, which makes it difficult to identify them and assess the pressure they exert on water basins and to identify their cumulative impact on Mati river basin. In addition, data on pollutant discharges from these installations into surface or groundwater are missing.

4.6.8 Infrastructure or Operations Related to Ports and Navigation

Harta 3.4 Transporti detar dhe ajror

Inhabited coastal centres are accessible by land in the most of their parts. Numerous tools of road transport exceed almost always their carrying capacity and consequently trigger a number of issues, from which the two most important are the quality of life (loss of time in traffic, psychological disturbance, multiple accidents) and quality of air that affects the quality of life as well. Local flows are intertwined during the season with visitor flows and often photography national connecting axes is not the postcard that we want to promote.

Sea transport

Albania's border to its extent 1/3 is washed by sea and therefore our country is considered with favourable natural conditions for the development of maritime sector. Maritime transport infrastructure requires funding for the construction and the maintenance of ports, as starting and ending points of the sea route and as the connection nodes of sea transport with land transport. We have to set up the infrastructure for six seaports, four of which are used for passenger and freight transport and are administered by the state, while the other two operate under the concessionaire regime for the transport of hydrocarbons.

The closest port to the Mat River Basin is Shengjin Port, which is the most northern seaport of Albania. In addition to processing goods and passenger transport, this port also serves for fishing boats.

4.7 Basin, Waterbody and Database Unified Coding System Proposed for Albania

Implementation of a logical national coding system for Albania is beyond the scope of this RBMP; however, by way of necessity it has been necessary to impose a workable coding system for all water management related objects within the river basin, and the coding system, innovative and powerful, may serve as a useful model for other river basins. The approach used logically harmonises river basins (at EU level), waterbodies, monitoring locations, pressures and measure in a consistent numerical coding system and is summarised in Technical Annex 4.

In summary, the numerical coding system used for the Mati River Basin Management Plan is based on the European wide Catchment Characterisation and Modelling (CCM) datasets, within which every major river and catchment in Europe has a unique reference code.[102] [103] River basins are identified in a clockwise rotation relevant to the receiving ocean (Mediterranean, M) and sea (Eastern Mediterranean, 4).

With respect to the identification of specific waterbodies, the more technically competent Member States are generally using the Pfafstetter coding system. This system has been recommended by the GIS Working Group under the CIS and is described technically in this reference.[104]

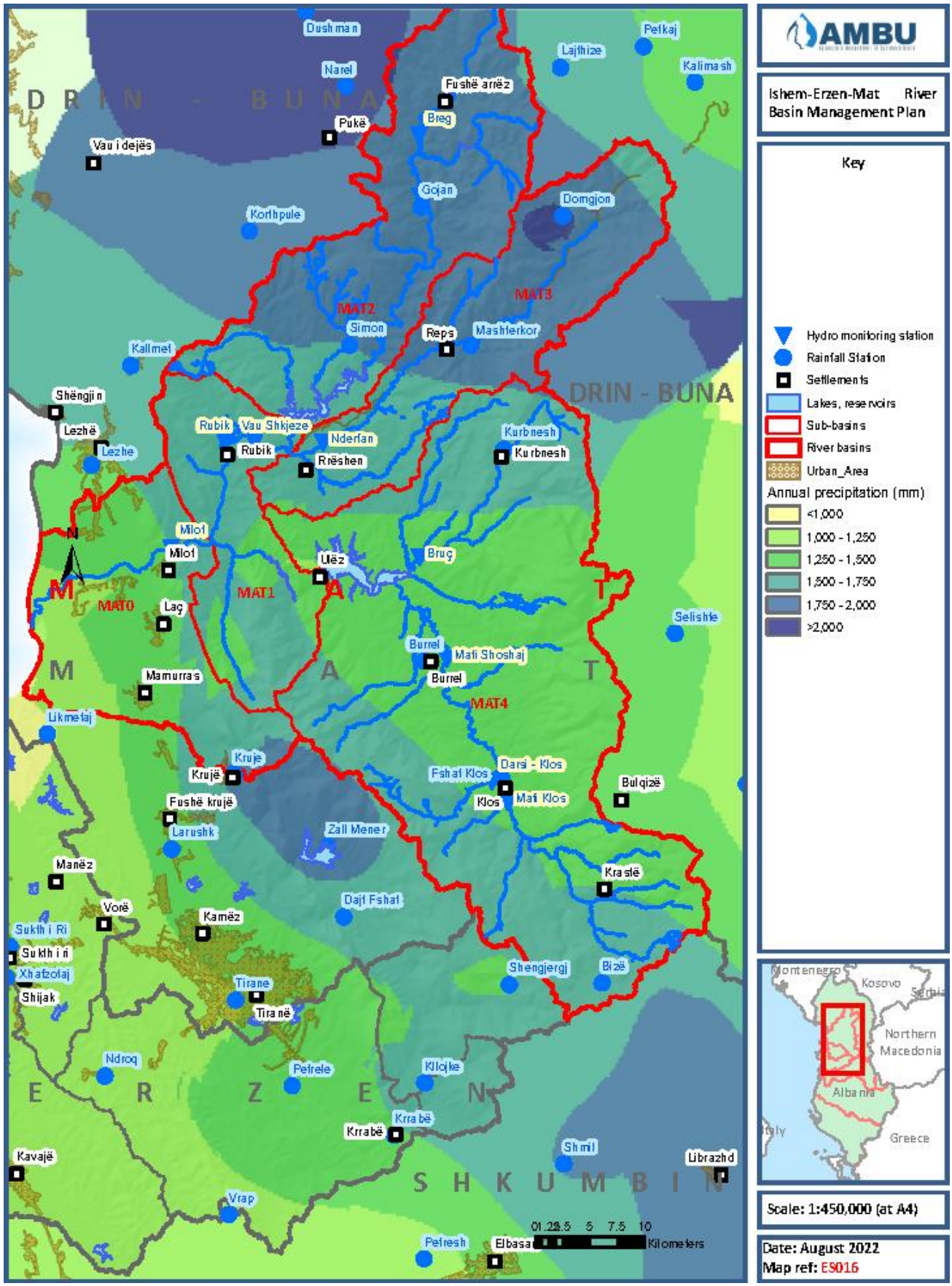
The European commencement code for the Mati river basin has been determined from GIS analysis to be **3512**.

[102] https://ec.europa.eu/jrc/en/publication/reference-reports/pan-european-river-and-catchment-database

[103] European Commission - A pan-European River and Catchment Database, JRC 2007

[104] De Jager, A.L. & Vogt, J.V. (2010) - Development and demonstration of a structured hydrological feature coding system for Europe, Hydrological Sciences Journal, 55(5) 661-675.

Map 4-1 – Precipitation Distribution, Main Rivers and Hydrometric Networks



Map 4-2 – Principal Hydrogeological Formations

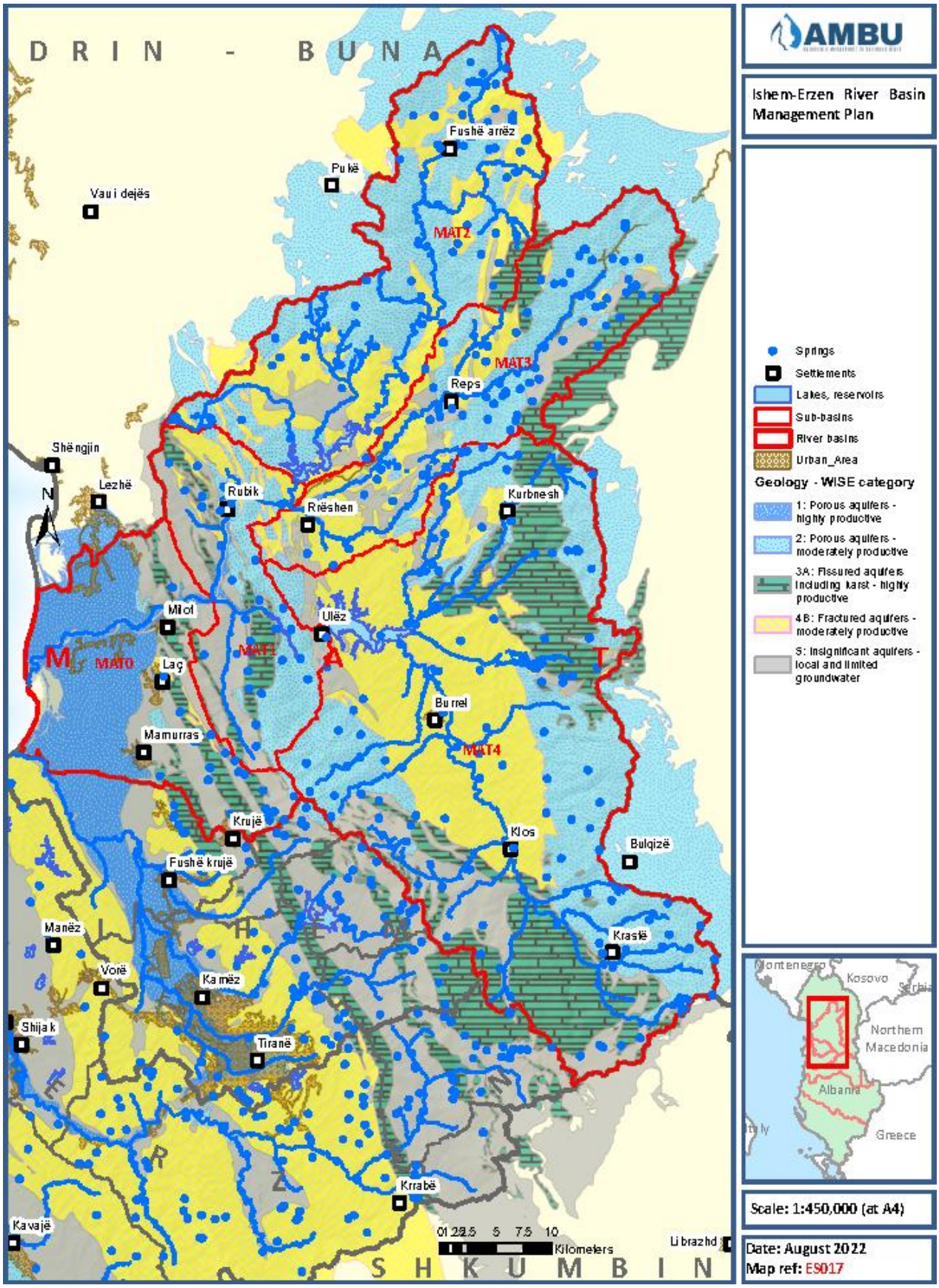
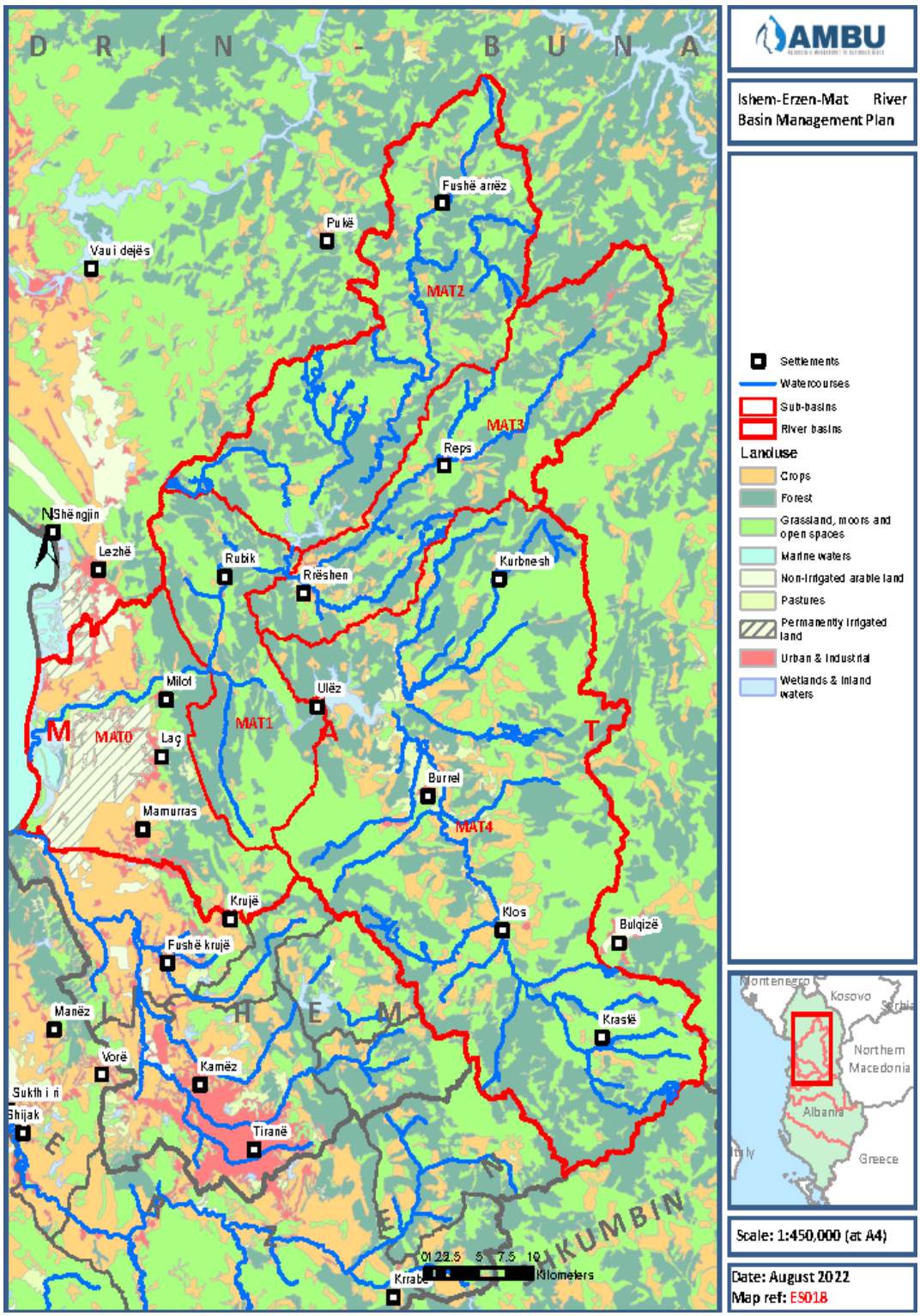


Table 4-9 – Summary Key Statistics for the Mati Sub-basin

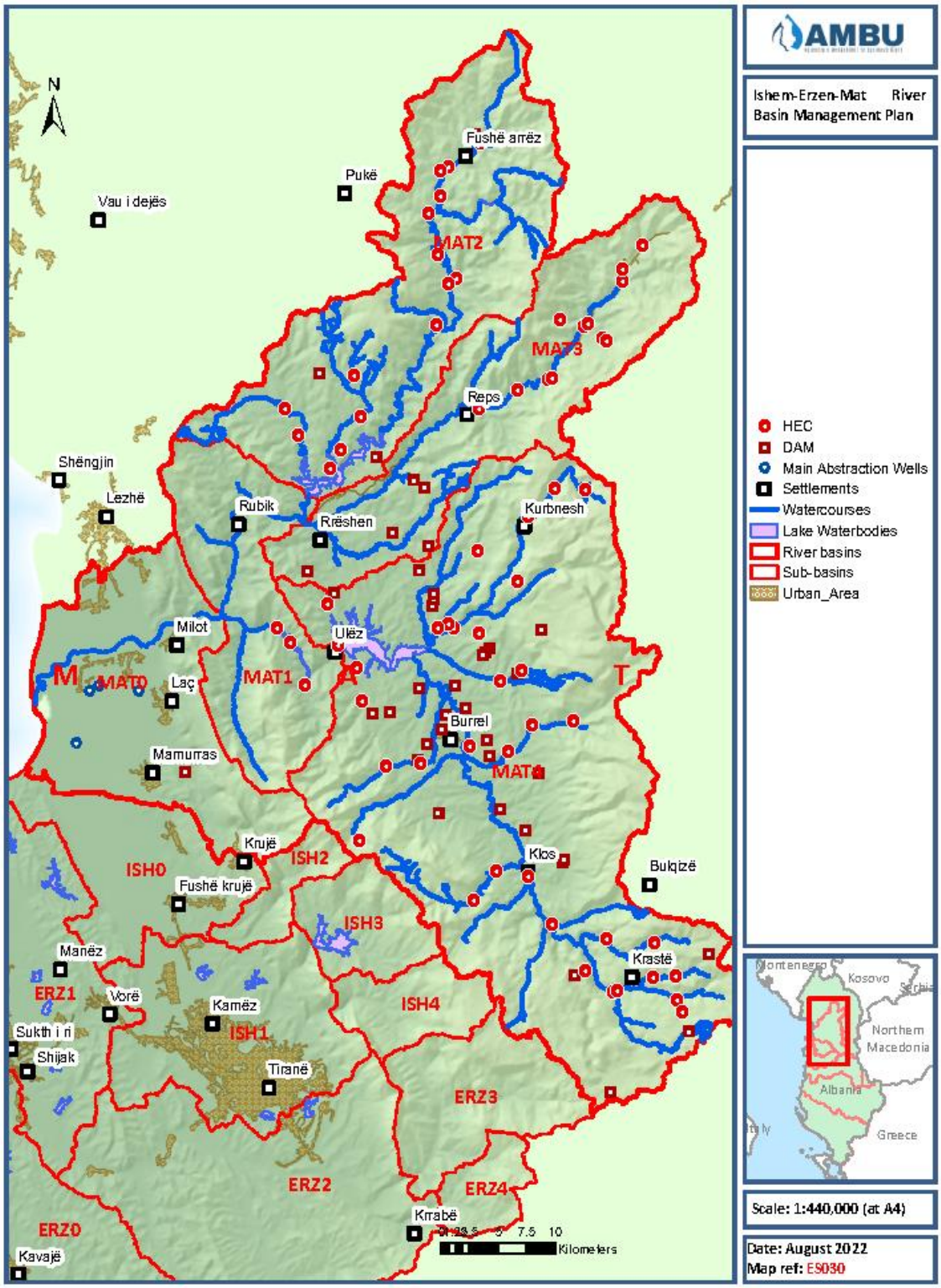
MATI	Local Area Name	Area (km²)	Annual P (mm)	Q50	Q90	Population [105]	Urban Area (%)	Arable Area (%)	Irrigated Area (%)	Permanent Crops (%)	Pasture (%)	Forests (%)	Natural Areas	Water Bodies	Marine Waters
MAT0	Milot	357	1394	98.74	54.19										
MAT1	Ulez	270	1554	96.76	53.22										
MAT2	Fushe Arrez	534	1847	24.43	12.05										
MAT3	Reps	417	1796	13.64	8										
MAT4	Kraste	1229	1477	46.98	26.98										
Total	-	2809	1592												

[105] Based on Census 2011 data and INSTAT 2019 forecast at Bashkia level, and GIS derived weighted approximation of urban v rural populations within sub-basins

Map 4-3 – Sub-basins and Land Use



Map 4-4 – Principal Water Use Infrastructure



5. Delineation and Characterisation of Surface Water Bodies

5.1 Overview

5.1.1 European Union

Directive 2000/60/EC establishes a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater. The success of the application of the Directive in achieving this purpose and its related objectives will be mainly measured by the status of "waterbodies". Waterbodies are therefore the fundamental units that must be used for analysis, reporting and assessing compliance with the Directive's principal environmental objectives.[106]

Each waterbody should be a coherent sub-unit in the river basin (or river basin district) to which the environmental objectives of the Directive apply. Hence, the main purpose of identifying waterbodies is to enable the status to be accurately assessed and compared to environmental objectives i.e. a waterbody must be capable of being assigned to a single ecological status class with sufficient confidence and precision through the monitoring programmes.

5.2 Categorisation and Typology of Surface Waterbodies

5.2.1 Surface Waterbody Categories

The procedure for waterbody characterisation is clearly defined in the WFD. [107] The surface waterbodies within the river basin district must be identified as falling within either one of the following surface water CATEGORIES: RIVERS, LAKES, TRANSITIONAL WATERS OR COASTAL WATERS - OR AS ARTIFICIAL WATERBODIES OR HEAVILY MODIFIED WATERBODIES. Each of these categories must be identified and reported separately within the framework of the RBMP.

River water bodies are defined under WDF Article 2(4) as internal water bodies that flow mainly on the surface of the earth, but that part of its length can also flow underground.

Lakes are defined under WDF Article 2(5) as stagnant inland waters

Transitional waters are defined under WFD Article 2(6) as bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their proximity to coastal waters but which are substantially influenced by freshwater flows in terms of flow regime or salinity. Transitional waters are usually characterised by their morphological and chemical features in relation to the size and nature of the inflowing rivers.

Coastal waterbodies are defined under WFD Article 2(7), and extend 1 nautical mile (1852 m) from the landward edge. [108] All Transitional and Coastal waterbodies in Albania lie within Ecoregion 6 (Mediterranean Sea).

Artificial and heavily modified waterbodies are defined under WFD Article 2(8) and (9). Under certain conditions the WFD permits Member States to identify and designate artificial water bodies (AWB) and heavily modified water bodies (HMWB) according to WFD Article 4(3). Such designations and the reasons for them shall be specifically mentioned in the river basin management plans.

The relevance and importance of these designations with respect to the environmental objectives of the RBMP are that HMWBs are discrete bodies of water which, as a result of physical alterations by human activity, are substantially changed in character and cannot therefore meet "Good Ecological Status" (GES). The assignment of less stringent environmental objectives to these waterbodies (derogations) is set out under WFD Articles 4(4) and 95).

[106] European Commission – CIS Guidance Document No 2 - Identification of Water Bodies

[107] European Commission – Directive 2000/60/EC – Annex II

[108] Along highly indented coastlines the baseline can be drawn as a straight line. WFD CIS Guidance Document No 5

5.2.2 Surface Waterbody Types

For each surface water category, the relevant surface waterbodies within the river basin district should be further differentiated according to TYPE. These types are those defined using either 'System A' or 'System B' of the WFD (Annex II). In the 2024-2029 Plan, the RBDA has applied the System A procedure. The type coding of waterbodies is at the conceptual core of the 'ecological status' approach of the WFD. The prime objective is to achieve at least 'Good Status' (defined as ecological + chemical status) for each waterbody (Section 8). It follows that in order to establish the actual or current status of waterbody X, it must be compared to a 'reference condition' for that waterbody type. Fundamentally, different TYPES of waterbody even within the same CATEGORY (e.g. rivers) have different reference conditions. The greater the deviation of the waterbody condition from the reference condition defines its relative status.

The fully natural (reference) condition of most waterbodies has been determined through expert judgement to most significantly depend on three primary hydro-ecological descriptors:

- Altitude – this parameter most significantly affects diurnal, seasonal and annual temperature regimes of aquatic ecosystems.
- Size – this parameter (e.g. the catchment area of a river waterbody or the surface area of a lake waterbody) has complex influences, but most obviously influences the quantity of water within the aquatic ecosystem (flow or storage magnitude), the seasonal flow or storage regime, and possibly the extent of the ecosystem habitat and its continuity.
- Geology – this parameter most significantly influences the chemistry of receiving waters, and thereby has a direct and profound influence on aquatic species specifically adapted to those physic-chemical conditions. Principal geochemical influences can be separated to calcareous (carbonate), siliceous (silica) or organic (humic) geological formations.

To ensure consistency of analysis and reporting of ecological status reference conditions across Member States, the process of 'inter-calibration' has been in progress for many years (using both System A and System B). The most definitive recent work on this issue to redefine broad typologies for European rivers and lakes better aligns with the European wide inter calibration types and has therefore been adopted within the remit of this RBMP.[109]

Table 5-1 summarises the typology descriptors and codes for European rivers. Table 5-2 summarises the typology descriptors and codes for European lakes.

According to WFD Annex II, 1.1.v, the typology differentiation for artificial (AWB) and heavily modified waterbodies (HMWB) should be undertaken in accordance with the descriptors for whichever natural surface water category most closely resembles the AWB or HMWB concerned. Similarly, the quality elements should be those applicable to whichever natural surface water category most closely resembles the AWB or HMWB (WFD Annex V, 1.1.5). This means that reservoirs made by damming rivers may be categorised as heavily modified rivers but should be typified and assessed using the elements and tools for lakes, as lakes is the natural surface water category which reservoirs most closely resemble.

5.2.3 Surface Waterbody Typology Affecting Delineation

Waterbody delineation (determination of precise geographic divisions within rivers, lakes, groundwater's to smaller elements) is described in section 5.4, and forms the third stage of the characterisation process.

With respect to typological classes, since a change in the waterbody typology is very likely associated with a change in reference conditions, and the reference conditions must be uniformly applicable to that single waterbody, it follows that a change of waterbody type must also result in a delineation boundary for that waterbody.

[109] Science of the Total Environment - A new broad typology for rivers and lakes in Europe: Development and application for large-scale environmental assessments, Elsevier, 2019

For example, for an otherwise similar river waterbody of the same catchment area class and geology, the transition from high altitude (> 800 m) to mid-altitude (> 200 < 800 m) would necessitate a division to two waterbodies to reflect potentially different reference conditions (and possibly, current status). In simple terms, a delineated waterbody should not cross a major typological boundary, as defined by the altitude, size and geology classes of WFD Annex II.

In respect of the special case of artificial waterbodies (AWBs) or heavily modified waterbodies (HMWBs), typological boundaries equally apply to these categories. According to WFD Annex II, the typology differentiation should be undertaken in accordance with the descriptors for whichever natural surface water category most closely resembles the AWB or HMWB concerned.

5.2.4 Surface Waterbody Pressures and Impacts Affecting Delineation

Sufficient delineation must take place so as to result in accurate determination of status of each individual waterbody, without creating innumerable sub-divisions of ever-smaller waterbodies that do not contribute meaningfully to the purposes of the Directive. Providing they are of the same TYPE (section 5.2.2), contiguous elements of surface water with the same status can be combined to a single waterbody, for example numerous small tributaries in the basin headwaters.

However, where the waterbody is subjected either to a significant diffuse or point pressure e.g. concentrated wastewater discharge, then it is likely that a disaggregation is required to separate at least the waterbodies upstream and downstream of the pollutant discharge, since the status will be different.

5.3 Waterbody Coherence and Delineation Methodology

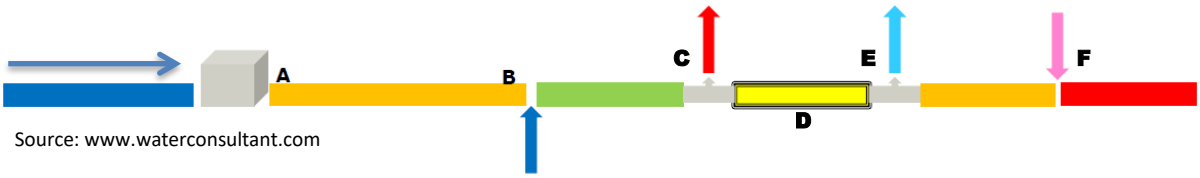
The aggregation-disaggregation principles covered in section 5.2.4 should take account not only of current status, but possible changes to status within an otherwise single waterbody due to future expected pressures and impacts. For example, urban expansion, flood-protection works, provision of wastewater treatment, hydropower installations or new water supply intakes or outfalls are all likely to impact on status at various points along a river.

These point or diffuse pressures may mean that the currently aggregated waterbody has to be disaggregated into several smaller waterbodies in the future so that the status of each is still correctly identified. For reasons of efficient database management and avoidance of reassignment of the unique waterbody codes (*EUSurfaceWaterBodyCode*)[110] it is preferable in some cases not to over-simplify some waterbodies initially even though their current characteristics and status may be uniform. This caveat applies increasingly as the waterbody length increases.

A second practical issue of relevance in Albania is that the surface water and groundwater surveillance monitoring programmes are generally insufficient to cover all waterbodies i.e. the status of many delineated waterbodies is simply unknown. This remains the case for the 2024-2029 Plan. Consequently, judgement is required as to where a change in status may be likely now or in future as a result of natural characteristics or anthropogenic pressures.

Figure 5-1 illustrates the delineation methodology applied. It is assumed that this is initially a single river waterbody of contiguous type of 'High Status'. However, proceeding left to right, a hydropower installation at (**A**) will impact markedly on the hydro morphological elements downstream, with a consequent deterioration in status. This impact may be offset to some degree by a natural inflow tributary at (**B**), depending on the relative proportions of flow. Water abstractions for industry (**C**), flood protection works (**D**), municipal water supply (**E**) and urban wastewater discharge (**F**) all impact in a highly complex sequential way resulting in several changes of status within the waterbody.

Figure 5-1 – Example Waterbody of Contiguous Type with Varied Status due to Pressures



Source: www.waterconsultant.com

In this example six waterbodies should be delineated so as to correctly fulfil the requirements of the Water Framework Directive. In practice waterbody delineation may not always be as complex as this example, but it serves to demonstrate that current and/or future potential pressures, status or impacts are all factors of waterbody delineation, beyond the simpler delineations that arise from geographical, hydro morphological or typological boundary conditions.

5.4 Surface Waterbodies in the Mati Basin

5.4.1 River Waterbodies

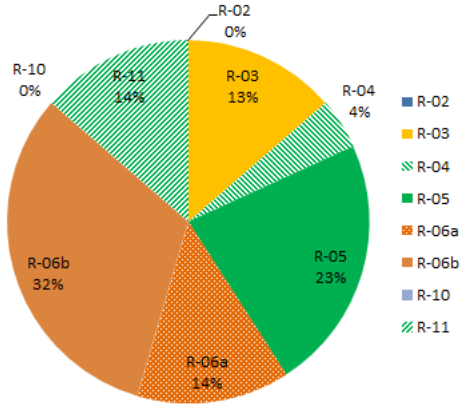
As for all waterbodies, the rivers in the Mati basins must be first sub-divided to varying type and then to discrete and significant elements such that the status of that waterbody is accurately described. All River and Lake Waterbodies in Albania lie within Ecoregion 6 (Hellenic Western Balkan).

[110] European Commission - WISE GIS Guidance on the Reporting of Spatial Data to WISE, Version 6.0.6, 2016

55 River waterbodies (RWs) and one Transitional waterbody (TWs) have been determined for the Mati river basin. The characterisation of these waterbodies follows System A of the WFD Annex II, and is given in Table 5-1. Numbering follows the Pfafstetter system and is shown in Map 5-1.[111]
The Type codes to be used for reference condition determination have been listed in Table 5-1. The proportional breakdown of the waterbody typology for the basin is shown below in Figure 5-2.

Figure 5-2 – Proportions of River Waterbody Types by Frequency – Mati

Type	Altitude	Size	Geology
R-02	<200	Medium-Large	Siliceous
R-03	<200	Small	Siliceous
R-04	<200	Medium-Large	Calcareous/mixed
R-05	<200	Small	Calcareous/mixed
R-06a	<200	Small	Organic/siliceous
R-06b	<200	Medium-Large	Organic/siliceous
R-10	200-800	Medium-Large	Calcareous/mixed
R-11	200-800	Small	Calcareous/mixed



The characterisation procedure used in Albania recognises the importance of river flow regime as a critical element of the reference condition of varying waterbody types. Accordingly, where data is available, Table 5-1 also presents a summarised 'annual flow regime', describing 'indicator flows' of Q10, Q50, Q90, indicating high, median and low flow values respectively.[112] The median flow describes the long-term flow with a 50% probability of occurrence, and is the most representative indicator of 'average flow'. Q10, Q50 and Q90 are all 'environmental flow indicators'. Significant variation of these flows from the natural condition (e.g. due to storage, diversion or excessive abstraction) will therefore be an indicator of pressure on the waterbody and a likely reduction of ecological status.
Q90 is of extreme importance with respect to reference conditions for environmental flow. The ratio Q90/Q50 value from the relevant Flow Duration Curve is typically representative of the groundwater contribution to river flow, known as the 'Base Flow Index' (BFI). In the Albanian river basins, groundwater typically contributes at least 30% of the total river flow on an annual basis.[113] During summer low flow periods, groundwater is likely to be the predominant component of flow. In these periods therefore the groundwater contribution accounts for the entire environmental flow and should be protected as such. Groundwater discharge and its % contribution will vary throughout the year but the annual Q90 serves as an approximate reference value.

5.4.2 Lake Waterbodies

Lake Waterbodies in the Mati basin are also characterised using WFD Annex II System A. Broadly these follow the same typology descriptors as for Rivers, namely altitude, geology, size of lake, and also depth. The normal minimum reporting lake area is 0.5 km² (WFD Annex II, 1.2.2).

[111] As of 2020, the general coding system of hydrological features in Albania (basins, sub-basins, waterbodies, monitoring stations etc.) is unfit for purpose. The principal monitoring Agencies (AMBU, AGS, NEA) do not use a logical or consistent system between Agencies. This RBMP has defaulted to the European-wide river basin numbering system derived from the EC JRC "Catchment Characterisation and Modelling (CCM) coding system. Typically, waterbody codes will take the first 4-6 digits of the river basin (the so called 'commencement code'), followed by a sequential number. For river waterbodies, the Pfafstetter coding system has been rigorously applied. Further systematic work will be required by AMBU to introduce a logical and WISE compliant feature coding system into the National Water Resources Cadastre.
https://www.eea.europa.eu/data-and-maps/data/external/ccm-v.2
[112] Flow values are derived from the Flow Monitoring Stations data described in Section 4.2, factored by Area. These values are however based on data from the period 1965-1995, and are therefore totally unreliable for current analysis.
[113] Science Academy of Albania, Institute of Hydro-meteorology – "The Hydrology of Albania", Tirana, 1984

Since many 'lake' waterbodies in Albania operate as hydropower storage reservoirs, the System A reporting for Albania includes a Δ depth parameter, which describes the typical annual fluctuation of water level, a significant influence on habitat morphology.
Four Lake Waterbodies (LWs) have been determined for the Mati river basin. The delineation and characterisation of these waterbodies is given in Table 5-2 and Map 5-1. All of the Lake waterbodies in the Mati basin are in fact artificial reservoirs created from Dams for the production of hydropower. All of the LWs in the Mati basin (hydropower reservoirs) are not monitored or reported so the inflow regime is not known. However, it is highly likely that the HPP operator in each case has detailed records of energy production levels and associated turbine inflows. AMBU does not routinely collect or assess this data at present. With regard to ecological status or potential, these will require a sampling/monitoring review in the period 2024-2029 to determine if they have any special ecological characteristics.

5.4.3 Transitional Waters

Transitional waters are bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their proximity to coastal waters but which are substantially influenced by freshwater flows (WFD Article 2(6)). In Albania, transitional waters have not been previously delineated within RBMPs, and no specific reference condition currently exists. In the Mati RBMP the boundary between the River waterbody and its downstream Transitional waterbody has been approximated by measurements of river electrical conductivity indicating salinity level made during the RBMP reconnaissance survey (see section 8.3). One Transitional waterbody has been determined for the Mati river basin (TW351211). The characterisation of these waterbodies follows System A of the WFD Annex II, and is given in Table 5-3 and Map 5-1. Transitional waters are not sampled by NEA at this time, and increased investigative monitoring may be required as part of WFD compliance.

5.4.4 Coastal Waterbodies

When assigning a stretch of coastal water to a River Basin District, the objective is to ensure that coastal waters are assigned to the closest possible or the most appropriate natural management unit and to minimise any unnecessary splitting of coastal stretches.
Coastal lagoons, (which are present in the Mati river basin) may be either coastal waters or transitional waters, depending on whether the lagoon fits the definition of transitional waters in the Directive under WFD Article 2(6).
Three Coastal waterbodies have been determined for the Mati river basin. The characterisation of these waterbodies follows System A of the WFD Annex II, and is given in Table 5-4 and Map 5-1.
In addition to the two standard coastal waterbodies, (CW351202 and CW351205), the coastal lagoon of Patok (CW351206) is a designated Protected Area and may have some ecological importance. The invertebrate fauna of the lagoon and its catchment basin—including surrounding freshwater bodies, canals, marshes, estuaries and shores—are characterized by a variety of groups and species, from molluscs to mammals to crabs and insects. Many fish species are of economic interest. Amphibians and reptiles are found more in forests, swamps and canyons around the lagoon. Many Caretta water turtles live on the shore near the lagoon and the green turtle Chelonia mydas is also present.

5.4.5 Heavily Modified and Artificial Waterbodies

In accordance with WFD Article 4(3), HMWBs are natural bodies of water which, as a result of physical alterations by human activity are substantially changed in character and cannot therefore meet the objective of 'good ecological status' (GES). AWBs are artificial waterbodies created by human activity e.g. diversion channels, irrigation canals. Instead of 'good ecological status', the environmental objective for HMWBs and AWBs is 'good ecological potential' (GEP).

Conventionally, AWBs are distinguished from HMWBs in that the waterbody is created in a location where no waterbody previously existed. Minor elements of surface water (ephemeral ponds, streams etc.) can be discounted. [114]

WFD Article 2(9) defines HMWBs as:

- Physically altered – e.g. dams, reservoirs, canalisation, flood protection works
- Substantially changed in character – importantly this would also include significant alterations to the flow regime
- Qualifying under the criteria of WFD Article 4(3) – i.e. alterations to the waterbody to achieve GES would adversely affect the activities for which the HMWB is designed, or the beneficial objectives served by the modifications cannot for reasons of technical feasibility or disproportionate cost be achieved by other environmentally superior means.

8 AWBs or HMWB s have been identified for the Mat river basin. These water bodies are characterized in accordance with DKU System A, Appendix II, and the summary of HMWB s is presented in Table 5-5 and Table 5-2 in Appendix II. The codes are assigned according to the Pfafstetter system and are shown in Map 5-1. 4 of these HMWBs were formed by the construction of dams in the respective rivers for hydropower purposes and should be ecologically evaluated as LAKES. Four water bodies (RW351231, 3512331, 3512231 and 3512225) were originally RIVERS, but the flow regime has been significantly affected by the permanent diversion of the flow for hydropower purposes. There is no likelihood that these fluvial water bodies will in the future achieve good ecological status (SME) without significantly compromising the operational purpose of the modification and as such should be assessed for their ecological potential (PME).

HMWBs and AWBs are also included in the Characterization Tables for the water bodies they most closely resemble, as this is how the ecological potential of the HMWB/AWB is determined (Chapter 10).

[114] European Commission – CIS Guidance Document 4 - Identification and Designation of Heavily Modified Waterbodies (3.1.2)

Table 5-1 – Waterbody Characterisation and Typology – Category RIVERS [115]

RIVER NAME	LOCAL SUB-BASIN	WATERBODY EU CODE (RW)	ALTITUDE mASL	AREA km²	GEOLOGY TYPE	TYPOLOGY EU CODE	RIVER FORM	LENGTH km	WIDTH m	ACTUAL FLOW REGIME			
										Q10	**Q50**	**Q90**	**BFI**
Mati	MAT0	TW351211	-1-0	2491.9	Organic & siliceous	R-06b	Transitional	8	153	164.05	98.74	54.20	54.89%
Mati	MAT0	351213	0-26	2484	Organic & siliceous	R-06b	Natural	16	353	163.47	98.40	54.03	54.91%
Mati	MAT1	3512211	26-33	1075	Organic & siliceous	R-06b	Natural	4	361	73.66	43.43	22.70	52.28%
Mati	MAT1	3512213	33-138	1054	Organic & siliceous	R-06b	Natural	21	103	72.02	42.49	22.24	52.34%
Fani i Vogël	MAT3	3512221	72-76	416.44	Siliceous	R-02	Natural	1	54	21.71	13.64	8.00	58.68%
Fani i Vogël	MAT3	35122221	76-115	85.56	Siliceous	R-03	Natural	9	25	4.46	2.80	1.64	58.68%
Zmeja e Madhe	MAT3	35122223	115-746	30.33	Siliceous	R-09	Natural	20	13	1.58	0.99	0.58	58.68%
Fani i Vogël	MAT3	3512223	76-154	328.79	Siliceous	R-02	Natural	9	59	17.14	10.77	6.32	58.68%
	MAT3	3512224	154-962	8.40	Siliceous	R-09	Natural	10	3	0.44	0.28	0.16	58.68%
Fani i Vogël	MAT3	3512225	154-245	302.33	Siliceous	R-02	HMWB	11	31	15.76	9.90	5.81	58.68%
	MAT3	3512226	254-1459	17.34	Siliceous	R-14	Natural	16	9	0.90	0.57	0.33	58.68%
Fani i Vogël	MAT3	3512227	254-572	232.64	Siliceous	R-08	Natural	22	25	12.13	7.62	4.47	58.68%
Fani i Madh	MAT4	3512231	72-135	540.70	Siliceous	R-02	HMWB	3	95	42.60	24.43	12.05	49.34%

[115] In compliance with WFD Annex II, 1.2 System A – includes AWBs and HMWBs appropriate to the classification. For clarity, AWBs and HMWBs are also summarised under Table 5-9.

#N/A	#N/A	3512233	#N/A	38.17	#N/A	#N/A	HMWB	#N/A	#N/A	42.05	24.11	11.90	49.34%
Ungrajt	MAT2	35122413	136-639	27.36	Siliceous	R-09	Natural	30	6	2.02	1.20	0.67	49.34%
Shperdhazes	MAT2	35122613	151-1168	62.75	Siliceous	R-09	HMWB	50	2	4.94	2.84	1.4	49.34%
Fani i Madh	MAT2	35122713	141-167	343.56	Siliceous	R-02	Natural	5	55	27.07	15.52	7.66	49.34%
Fani i Madh	MAT2	35122715	167-254	334.31	Siliceous	R-08	Natural	12	48	26.34	15.11	7.45	49.34%
Fani i Madh	MAT2	35122717	254-272	303.72	Siliceous	R-08	Natural	2	60	23.93	13.72	6.77	49.34%
	MAT2	3512272	272-1331	14.19	Siliceous	R-14	Natural	11	10	1.12	0.64	0.32	49.34%
Fani i Madh	MAT2	3512273	272-421	282.12	Siliceous	R-08	Natural	18	60	22.23	12.75	6.29	49.34%
	MAT2	3512281	421-599	66.34	Siliceous	R-09	Natural	7	14	5.23	3.00	1.48	49.34%
	MAT2	3512283	599-1586	53.40	Siliceous	R-14	HMWB	16	10	4.21	2.41	1.19	49.34%
	MAT2	3512285	627-1126	49.85	Siliceous	R-14	Natural	12	10	3.93	2.25	1.11	49.34%
Fani i Madh	MAT2	3512291	421-538	120.19	Siliceous	R-08	Natural	9	68	9.47	5.43	2.68	49.34%
Fani i Madh	MAT2	3512293	538-566	69.62	Siliceous	R-09	Natural	2	61	5.49	3.15	1.55	49.34%
Fani i Madh	MAT2	3512295	566-1477	61.39	Siliceous	R-14	Natural	12	15	4.84	2.77	1.37	49.34%
Mati	MAT1	351231	26-29	1372.3	Organic & siliceous	R-06b	HMWB	3	148	86.94	53.33	30.52	57.22%
Hurdhes	MAT1	351232	29-606	68.72	Calcareous + Mixed	R-11	Natural	16	14	5.07	3.01	1.68	55.70%
Mati	MAT1	3512331	29-74	1298.9	Calcareous + Mixed	R-04	Natural	3	397	81.52	50.11	28.72	57.32%

Mati	MAT1	3512333	74-233	1285.2	Siliceous	R-02	HMWB	16	87	80.51	49.51	28.39	57.34%
#N/A	#N/A	3512335	#N/A	1227.5	#N/A	#N/A	HMWB	#N/A	#N/A	76.25	46.98	26.98	57.43%
#N/A	#N/A	3512341	#N/A		#N/A		Natural	#N/A	#N/A				
Kurvajt	MAT4	3512342	127-1468	62.86	Siliceous	R-09	Natural	29	7	4.64	2.76	1.53	55.70%
#N/A	#N/A	3512343	#N/A		#N/A		Natural	#N/A	#N/A				
Urakes	MAT4	3512344	128-1241	88.06	Siliceous	R-09	Natural	32	124	6.50	3.86	2.15	55.70%
Urakes	MAT4	3512345	127-1715	168.39	Calcareous	R-09	Natural	49	11	12.43	7.38	4.11	55.70%
Mati	MAT4	351235	127-164	793.59	Siliceous	R-02	Natural	9	81	44.22	27.96	16.39	58.61%
Zalli i Germanit	MAT4	3512411	129-260	36.97	Siliceous	R-03	Natural	8	33	2.73	1.62	0.90	55.70%
Mati	MAT4	351251	129-161	708.94	Siliceous	R-02	Natural	9	70	37.97	24.25	14.32	59.05%
Ljusës	MAT4	351261	161-545	103.22	Calcareous + Mixed	R-10	Natural	15	12	6.16	4.20	2.65	63.07%
Mati	MAT4	351271	161-164	572.99	Siliceous	R-02	Natural	0	60	34.18	23.34	14.72	63.07%
Stanes	MAT4	351272	164-880	33.06	Siliceous	R-09	Natxural	16	22	1.97	1.35	0.85	63.07%
Mati	MAT4	351273	164-245	539.86	Siliceous	R-08	Natural	16	63	32.20	21.99	13.87	63.07%
Darsit	MAT4	3512741	245-285	40.60	Siliceous	R-09	Natural	2	15	2.42	1.65	1.04	63.07%
Darsit	MAT4	3512743	285-1361	37.93	Calcareous + Mixed	R-15	Natural	27	10	2.26	1.55	0.97	63.07%
Mati	MAT4	351275	245-262	344.63	Siliceous	R-08	Natural	2	63	16.24	9.41	4.96	52.71%
Zalli i Mashnurit	MAT4	351276	262-885	31.23	Organic & siliceous	R-12a	Natural	10	19	1.47	0.85	0.45	52.71%

Mati	MAT4	3512771	262-342	279.18	Calcareous + Mixed	R-10	Natural	5	30	13.16	7.62	4.02	52.71%
	MAT4	3512772	342-1569	21.84	Calcareous	R-16	Natural	12	5	1.03	0.60	0.31	52.71%
Mati	MAT4	3512773	342-358	234.59	Calcareous + Mixed	R-10	Natural	1	26	11.05	6.41	3.38	52.71%
#N/A	#N/A	351278	#N/A	20.12	#N/A	#N/A	Natural	#N/A	#N/A	0.95	0.55	0.29	52.71%
#N/A	#N/A	351279	#N/A	213.99	#N/A	#N/A	Natural	#N/A	#N/A	10.08	5.84	3.08	52.71%
Mati	MAT4	351281	411-1487	37.14	Siliceous	R-14	Natural	16	12	1.75	1.01	0.53	52.71%
Mati	MAT4	351291	411-576	94.92	Calcareous + Mixed	R-11	Natural	6	20	4.47	2.59	1.37	52.71%
Mati	MAT4	3512921	576-703	54.51	Calcareous + Mixed	R-11	Natural	2	12	2.57	1.49	0.78	52.71%
Thekres	MAT4	3512922	703-1416	15.03	Siliceous	R-14	Natural	9	5	0.71	0.41	0.22	52.71%
Mati	MAT4	3512923	703-1307	29.49	Organic & siliceous	R-16	Natural	9	12	1.39	0.81	0.42	52.71%
	MAT4	351293	576-1672	28.56	Calcareous + Mixed	R-15	Natural	26	6	1.35	0.78	0.41	52.71%

Table 5-2 - Waterbody Characterisation – Category LAKES

LAKE NAME	LOCAL SUB-BASIN	WATERBODY EU CODE	ALTITUDE mASL	AREA km²	GEOLOGY TYPE	TYPOLOGY EU CODE	DEPTH m	LENGTH km	Δ LEVEL m	ACTUAL INFLOW REGIME			
										Q10	**Q50**	**Q90**	**BFI**
Ulza	MAT4	LW351202	127	11.861	Silicor	L-02							
Lezhe	MAT2	LW351204	170	6.226	Silicor	L-02							
<name?>	MAT2	LW351206	625	0.989	Silicor	L-07							
Shkopetit	MAT1	LW351208	74	0.73	Silicor	L-02							

Table 5-3 - Waterbody Characterisation – Category TRANSITIONAL Waters

TRANSITIONAL NAME	LOCAL SUB-BASIN	WATERBODY EU CODE	FORM	LENGTH	MEAN ANNUAL SALINITY	ELECTRICAL CONDUCTIVITY	MEAN TIDAL RANGE	MEAN WATER TEMPERATURE	TURBIDITY	
Mati	MAT0	TW351211	Transitional							

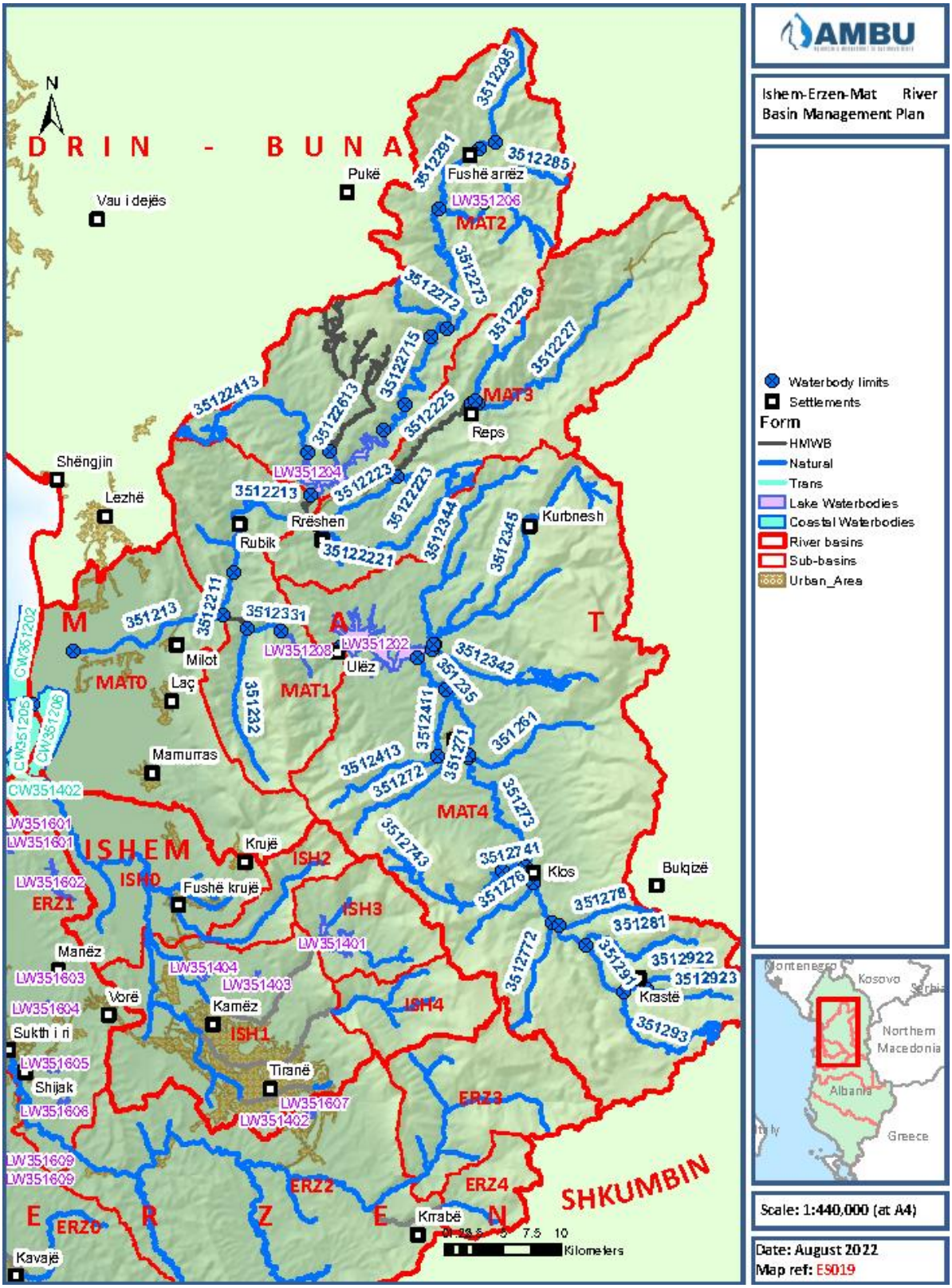
Table 5-4 - Waterbody Characterisation – Category COASTAL Waters

COASTAL NAME	LOCAL SUB-BASIN	WATERBODY EU CODE	FORM	LENGTH	MEAN ANNUAL SALINITY	MEAN DEPTH	MEAN TIDAL RANGE	MEAN WATER TEMPERATURE	TURBIDITY	
Tale	MAT0	CW351202	Coast	8.0						
Patok	MAT0	CW351205	Coast	7.8						
Patok Lagoon	MAT0	CW351206	Lagoon	7.8						

Table 5-5 - Waterbody Characterisation – Category HEAVILY MODIFIED WATERBODIES (HMWB) and ARTIFICIAL (AWB)

AWB or HMWB NAME	LOCAL SUB-BASIN	WATERBODY EU CODE	ECOSTATUS CATEGORY	FORM	TYPOLOGY EU CODE	HMWB/AWB ALTERATION	HMWB/AWB USE
Ulza	MAT4	LW351202	Lake	HMWB	L-02	Weirs – Dams – Reservoir	Energy – hydropower
Lezhe	MAT2	LW351204	Lake	HMWB	L-02	Weirs – Dams – Reservoir	Energy – hydropower
<name?>	MAT2	LW351206	Lake	HMWB	L-07	Weirs – Dams – Reservoir	Energy – hydropower
Shkopetit	MAT1	LW351208	Lake	HMWB	L-02	Weirs – Dams – Reservoir	Energy – hydropower
Mati	MAT1	RW351231	River	HMWB		Flow regime	Energy – hydropower
Mati	MAT1	RW3512331	River	HMWB		Flow regime	Energy – hydropower
Fani Madh	MAT1	RW3512231	River	HMWB		Flow regime	Energy – hydropower
Fani Vogël	MAT3	RW3512225	River	HMWB		Flow regime	Energy – hydropower

Map 5-1 – Surface Waterbody Delineation and Identification – Mati Basin



6. Delineation and Characterisation of Groundwater Bodies

6.1 Overview

The River Basin Management Plan should deliver an initial characterisation of all groundwater bodies to assess their uses and the degree to which they are at risk of failing to meet environmental objectives, namely the achievement of good quantitative and good chemical status.
Those groundwater bodies that have been identified as being at risk of failing environmental objectives require a further characterisation and investigation in order to establish a more precise assessment of the significance of such risk and identify any measures required.

6.1.1 Albania

The principal competent authority in Albania to identify and report on groundwater resources, trends and impacts is the Albanian Geological Survey (AGS). [116] The AGS carries out annual surveillance monitoring at national level on behalf of the National Environment Agency. The activities of the AGS are therefore closely connected to those of the NEA (via monitoring and reporting), and the AWRM (via Permitting and allocation of resources).

6.1.2 European Union

A key purpose of the WFD is to prevent further deterioration of and enhance the status of aquatic ecosystems, and with regard to their water needs, terrestrial ecosystems directly depending on aquatic ecosystems. The objective of protecting and restoring good groundwater status is designed to help achieve this purpose.
The requirements for groundwater identification and assessment are closely aligned to the objectives of supporting Directive 2006/118/EC and Directive 91/676/EEC. [117] [118] This Directive establishes a regime which sets groundwater quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater.

6.2 Categorisation and Typology of Groundwater Bodies

6.2.1 Groundwater Body Categories

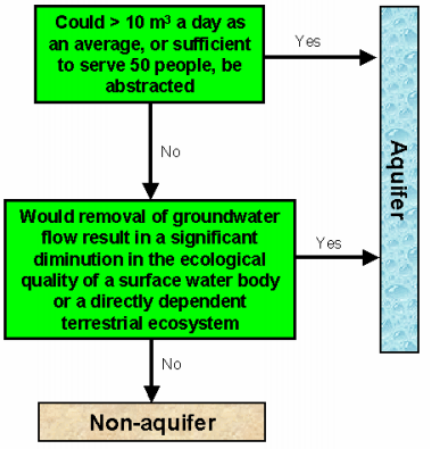
Groundwater is not 'categorised in the same way as surface water', as it is considered a single entity. However, important distinctions are drawn between general groundwater (all water below the land-surface), aquifers (strata of sufficient permeability to allow significant quantities of abstraction), and groundwater bodies (being distinct or delineated volumes or zones of groundwater within recognised aquifers).
The Water Framework Directive test for whether or not a groundwater body is of sufficient potential to act as an aquifer depends on two criteria:

- Is the resource sufficient to provide > 10 m^3/day or for 50 persons?
- Would abstraction of the groundwater resource impact on the ecological status of a surface waterbody or dependent ecosystem?

[116] XXX *DCM or legal duties of AGS required*
[117] European Commission – Directive 2006/118/EC - On the protection of groundwater against pollution and deterioration – and as amended by Directive 2014/80/EU
[118] European Commission – Directive 91/676/EEC - concerning the protection of waters against pollution caused by nitrates from agricultural sources

The minimum size of a groundwater body is normally 10 km², set to correspond with the minimum catchment area of surface water body as set out in WFD Annex II (1.2.1). Smaller units are feasible if the groundwater body requires specific management in terms of protection of a dependent ecosystem or localised supplies of potable water for > 50 people.

Figure 6-1 – WFD Definition of Aquifer



6.2.2 Groundwater Body Types and Basic Delineation

International best practice conventionally distinguishes aquifers according to their resource potential. Typically this divides to *a)* principal aquifers *b)* secondary aquifers *c)* unproductive strata

These distinctions are broadly recognised in the WFD typology for groundwater, where groundwater is classified according to eight principal types, see Table 6-1.

In common with the principles of unique status for surface waterbodies, a groundwater body should be a coherent sub-unit within the river basin to which the environmental objectives of the Directive can be uniformly applied.

It is feasible and permissible that an entire aquifer could also form a single groundwater body, but only if it is entirely homogenous in terms of its hydraulic properties, natural chemistry variations and pressures and impacts. Below the high level criteria of the groundwater body resource potential, further delineation of aquifers into discrete groundwater bodies should generally take account of:

- Groundwater flow divides, using surface water catchments and geological boundaries as proxies where information is limited.
- Natural chemistry variations, where they impose a limit on the value of the resource for potable abstraction, or where they influence the susceptibility to, and management of pressures.

Table 6-1 – Principal Groundwater Types in Albania Reporting

ALBANIA CODE	ALBANIA REPORTING GEOLOGICAL FORMATION [119]	EQUIVALENT WISE REPORTING GEOLOGICAL FORMATION [120]
1	Intergranular porosity – high productivity	Porous – highly productive
2	Intergranular porosity – medium productivity	Porous - moderately productive
3	Fissured porosity – medium to low productivity	Fissured aquifers – moderately productive
4	Fissured/karstified porosity – high productivity	Fissured aquifers including karst – highly productive
5	Porous/fissured porosity – medium productivity	Unclassified [121]
6	Practically non-aquiferous rocks	Insignificant aquifers – limited groundwater
7	Porous/fissured porosity - medium to low productivity	Unclassified
8	Not available or Unknown	Unknown

[119] Albanian Geological Service – 1:200 000 Hydrogeological Map of Albania, 2015. Tabulations of aquifer Types in Albania reporting is inconsistent between the 1:200 000 map and the GIS .shp files. The GIS .shp Type definitions have been used as the delineation type.

[120] WFD – WISE GIS Reporting Guidance 2016 – schema GWB – schema element – *GeologicalFormation*

[121] The Albania definition of "porous/fissured porosity" does not coincide with EU WISE categories.

6.2.3 Delineation Influenced by Groundwater Body Horizons

Table 6-1 illustrates that aquifers with significantly different water bearing characteristics (mainly porosity and permeability) will require a delineation boundary purely in terms of their resource potential. This is a relatively simple exercise for homogenous, unconfined aquifers.

However, geological formations (including aquifers) exist in 3-dimensions, and frequently comprise complex geological characteristics which may influence *a)* the yield of individual waterbodies *b)* vulnerability to pollution pressures *c)* connection to surface water systems.

Figure 6-2 – Illustration of Multiple Waterbodies within Single Aquifers

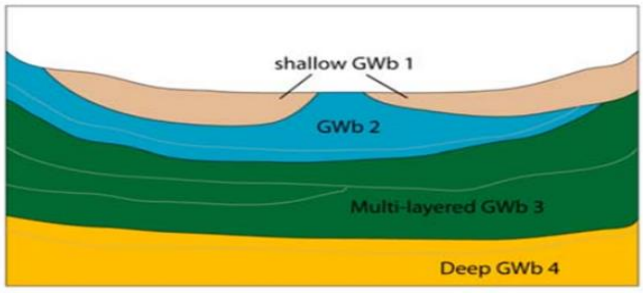


Figure 6-2 illustrates the potential 3-dimensionality of some aquifers. Where the properties of each vertical horizon are significantly different with respect to *a) to c)* above, then potentially each horizon or strata should be identified as a separate groundwater body. Conventionally, horizons are numbered in increasing sequence from the surface.

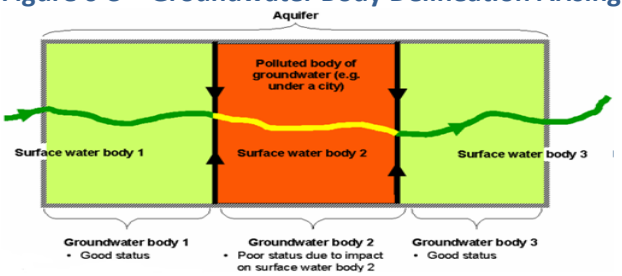
6.2.4 Delineation Influenced by Groundwater Body Pressures and Impacts

As for surface water, delineation of the groundwater bodies should ensure the accurate determination of the quantitative and chemical status of each waterbody. In the example of Figure 6-3, a single aquifer may encounter significant localised pollution from overlying influences, resulting in different chemical status across the aquifer.[122] In this case three groundwater bodies would need to be delineated to accurately reflect change in status.

The same criteria would apply for zones of intensive abstraction which may be creating localised pressures on groundwater level. In the case of Figure 6-4, pumping creates a 'cone of depression' and possibly a significant change to the quantitative status of the local groundwater. The 'area of influence' would therefore be delineated as a separate groundwater body even though it is part of a contiguous aquifer. In this example, induced recharge from the adjacent surface waterbody is also occurring, which creates additional criteria for delineation if the surface water ecosystem is significantly dependent on groundwater discharge.

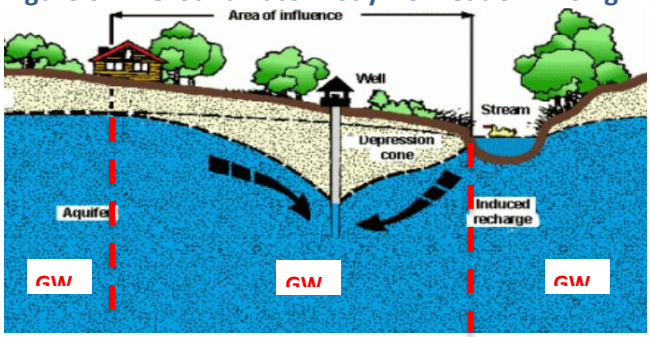
Therefore, the final stage of waterbody delineation is an iterative process, in which the anthropogenic pressures and impacts also need to be assessed across single aquifers in order to distinguish differing degrees of status within the aquifer.

Figure 6-3 – Groundwater Body Delineation Arising from Change in Chemical Status



[122] European Commission – CIS Guidance - Technical Report on Groundwater body Characterisation, 2004.

Figure 6-4 - Groundwater Body Delineation Arising from Change in Quantitative Status



Source: Oregon State University – Well Water Program

6.3 Previous Assessments of Groundwater Bodies

6.3.1 Principal Hydrogeological formations

Principal hydrogeological formations in Albania derive from data provided by the Albanian Geological Service (AGS). Generally, groundwater in Albania is present in different formations ranging from the Quaternary to Palaeozoic periods. The geological structure of the Albanian mountains typically exhibits carbonate based karstic sediments (e.g. limestone formations). These and the highly permeable gravel aquifers in the lowland areas both form highly productive aquifers. Both types are extensively present in the Mati basins.

Table 6-2 – National Summary of Hydrogeological formations [123]

ALBANIA CODE	TYPE OF AQUIFER	INDICATIVE LITHOLOGY	NUMBER OF GW BODIES	FEASIBLE YIELDS l/s
ALG1	Carbonate aquifers	Limestone, dolomite	18	4500 - 6100
ALG2	Porous aquifers	Alluvium	12	1200 - 1300
ALG3	Magmatic aquifers	Basic and ultrabasic intrusive rocks	6	345 - 630
ALG4	Conglomerate/sandstone	As stated	9	430 -570
ALG5	Low permeability aquifers		10	< 300

6.3.2 Preliminary Identification of Groundwater Bodies in Albania

Preliminary work on aquifer characterisation and groundwater body delineation was carried out by the AGS and international experts in 2008. This work identified five major hydrogeological formations throughout Albania, with 55 discrete groundwater bodies delineated (Table 6-2).

However, the CEMSA 2008 characterisation was deficient in a number of areas:

a) No account was taken of the importance of sub-dividing the major regional aquifers to smaller GWBs on the criteria of pressures and impacts of abstraction, pollution status or dependent terrestrial ecosystems at local scale. These are all fundamental 'tests' to distinguish a specific GWB from the wider aquifer.

b) The groundwater body numbering system, although usefully related to 'type' as per Table 6-2, was extremely coarse in scale (55 GWBs for the whole of Albania based predominantly on the hydrogeological formations).

c) The groundwater numbering system was based on an arbitrary national sequence, without reference to the river basin within which the groundwater occurs. Whilst many groundwater bodies are 'trans-boundary', in practice the hydrogeological boundary often mirrors the surface topographic divide.

[123] Albanian Geological Service - Inventory of Groundwater Resources and their Utilisation Patterns – CEMSA Project, 2008

d) The groundwater bodies in different river basins are often managed by different competent authorities, and therefore it is an administrative convenience to allocate a groundwater numbering system that recognises the river basin in which the GWB predominantly occurs (whilst recognising the importance of ensuring consistent management across trans-boundary bodies).

However, this initial work has been superseded by a much greater level of detail on hydrogeological formations with the publication of the 1:200 000 scale Hydrogeological Map of Albania, 2015. This comprehensive assessment now provides the basis for a more detailed identification of potential individual groundwater bodies in the Albania new RBMP reporting framework.
In the new phase of RBMPs in Albania, identification and reporting of all waterbody attributes is intended to align much more closely with the EU WISE reporting schema than was carried out by previous studies. [124] This means that the principal hydrogeological types as defined in Table 6-1 are the ones that have been used, as opposed to that of the CEMSA 2008 project which did not use standard definitions.

6.4 Groundwater Bodies in the Mati Basin

Since there is a significant lack of reliable detail and data about water quality, quantitative status, pressures and impacts on most groundwater bodies in Albania, this first pass delineation (2024-2029) has inevitably relied substantially on expert judgement. However, the breakdown to further smaller waterbody units based on anticipated abstraction pressures, pollution levels, and dependent terrestrial ecosystems is a significant step forward in a more structured and analytical approach to future groundwater management generally. Chapter 10 (section 10-8) more fully reports on groundwater body pressures, current status and impacts on these specific waterbodies.

6.4.1 Revised Numbering System for Groundwater Bodies

The numbering system adopted for delineated groundwater bodies in the Mati basin adopts the same general approach as for Rivers, Lakes and Coastal waters (identified by the appropriate WISE category prefix)[125] adopting the protocol that GW represents a groundwater body. It is useful to retain some indication of the aquifer potential within the code system, based on the Albania categories referenced in Table 6-1. Hence: GW + CCM Basin Commencement Code (4 digits) + Aquifer Potential Type (1 to 7) + Unique Serial Number (2 digits). Aquifer potential type is derived from the seven types identified in the AGS 1:200 000 Hydrogeological Map of Albania (Table 6-1). The serial number is a subset of the aquifer potential type i.e. for aquifer type 04 (highly productive karstic aquifer), there may be 01, 02, 03 individual groundwater bodies of Type 4 within the river basin, e.g. GW 3512 04 09 represents the ninth discrete groundwater body of Type 4 in the Mati basin (3512). There is no fixed logic to the sequential numbering, other than as a general arbitrary rule, the higher the number, the further distant is that GWB from the surface outlet of the river basin. This system allows for 99 specific groundwater bodies to be therefore identified in any one river basin, in any flexible sequence.

6.4.2 Delineated Groundwater Bodies in the Mati Basin

18 discrete groundwater bodies have been established in the Mati basin. These are reported under Table 6-3 and Map 6-1. As for many groundwater systems, it is noted that several of the groundwater bodies are trans-boundary between adjacent river basins. Groundwater management regimes must therefore take account of these trans-boundary connections. The GWB name in each case is an arbitrary allocation, indicating only approximately the locale of the GWB for local recognition. By preference, the delineation code should be used to identify and locate each GWB.

[124] Water Framework Directive Reporting Guidance - http://cdr.eionet.europa.eu/help/WFD/WFD_521_2016
[125] WFD – WISE GIS Reporting Guidance 2016 – schema GWB – schema element – SurfaceWaterBodyCategory – RW, LW, TW, CW

Table 6-3 – Mati River Basin Groundwater Bodies Reporting Groups

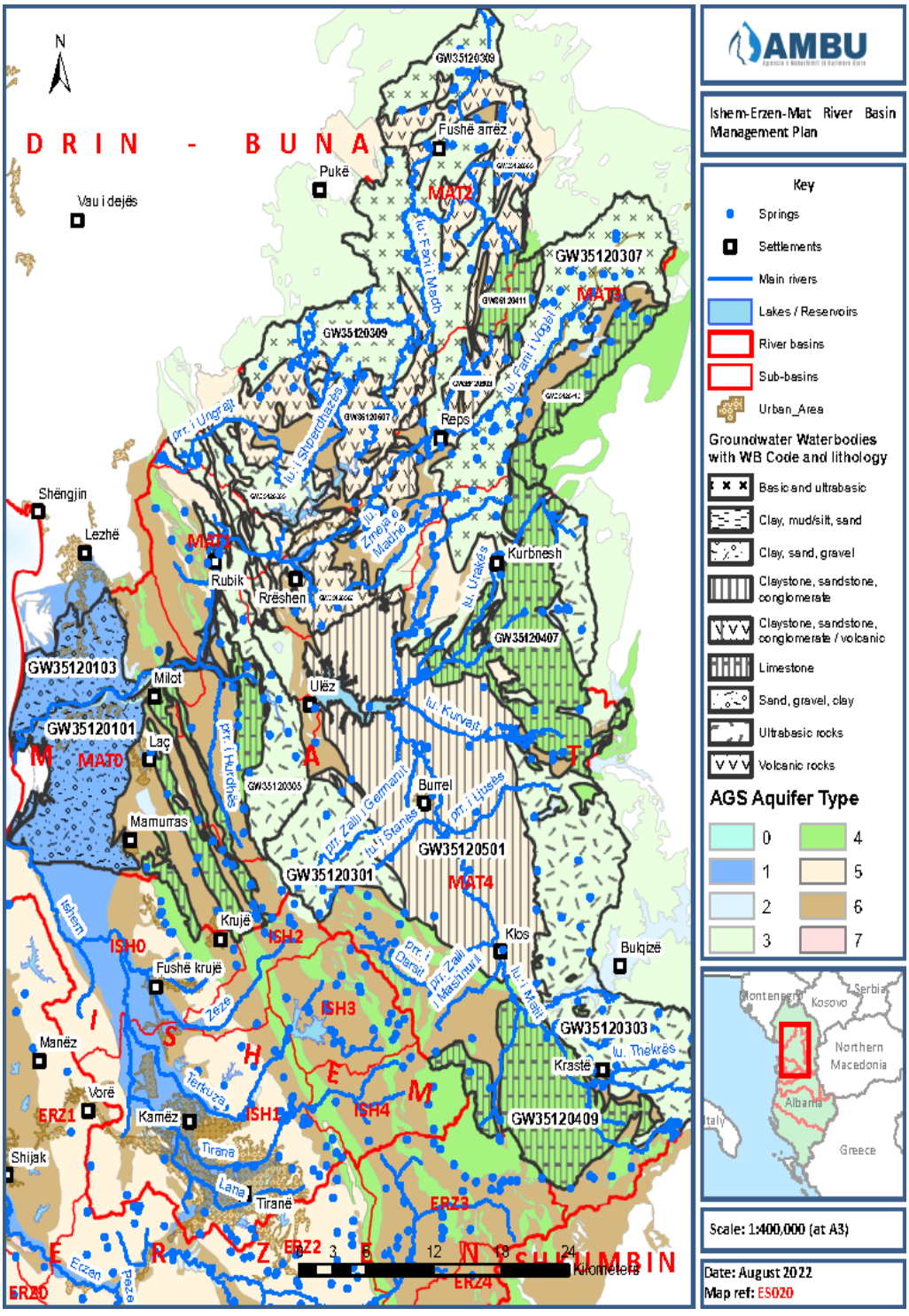
Group	TYPE OF AQUIFER	LITHOLOGY	GROUP NAME	GWB CODE	NAME OF GWB	AREA Km^2
A	T3: Fractured aquifers - high and variable medium to low productivity	Ultrabasic igneous and metamorphic rocks	Western ultrabasic rocks	GW35120301	Kombesi	71
				GW35120305	Shkopet	105
B	T3: Fractured aquifers - high and variable medium to low productivity	Basic and ultrabasic igneous and metamorphic rocks	North-east basic and ultrabasic rocks	GW35120307	Thirrë	165
				GW35120309	Gjegjani	260
C	T4: Fissured karst aquifers - high to very high productivity	Limestone	The northern massif of Dajt	GW35120403	Selita	44
D	T4: Fissured karst aquifers - high to very high productivity	Limestone	The northeastern karst massifs	GW35120407	Macukull	138
				GW35120411	Gojan	28
				GW35120413	Arrën	38
G	T4: Fissured karst aquifers - high to very high productivity	Limestone		GW35120405	Mëllez	23
E	T5: Porous / fractured porous aquifers - medium to low productivity	Conglomerates, sandstones and mudstones	Sandstones and conglomerates	GW35120501	Burrel	344
				GW35120503	Rrëshen	97
F	T5: Porous / fractured porous aquifers - medium to low productivity	Conglomerates, sandstones and mudstones	Northern volcanics	GW35120505	Kryeziu	89
				GW35120507	Kaçinar	104

Table 6-4 – Mati Basin – Delineation and Characterisation of Groundwater Bodies

UN CODE	GROUP	LITHOLOGY	TYPE OF AQUIFER AND PRODUCTION	UPPER LAYER	HORIZONT	LIMITED	AREA km²	DEPTH 80	H SY %	H K m/d	H T m²/d	NDËR KUFITAR	EKOSISTEM I VARUR
GW35120101		Alluvium	Type 1	Sandy clay	YES	1,2	108				4000-8000	y	
GW35120103		Alluvium	Type 1		YES	1,2	62.5				4000-8000	Po	
GW35120105		Alluvium			N	1							
GW35120301	A	Ultrabasic magmatics	Type 3		N	1	71.3						
GW35120303		Ultrabasic magmatics	Type 3		N	1	211						
GW35120305	A	Ultrabasic magmatics	Type 3		N	1	105						
GW35120307	B	Basic/ultrabasic magmatics	Type 3		N	1	165						
GW35120309	B	Basic/ultrabasic magmatics	Type 3		N	1	260						
GW35120401	-	Limestone	Type 4		N	1	10.3						
GW35120403	C	Limestone	Type 4		N	1	44.4						
GW35120405	G	Limestone	Type 4		N	1	22.5						
GW35120407	D	Limestone	Type 4		N	1	138						
GW35120409	-	Limestone	Type 4		N	1	120						

GW35120411	D	Limestone	Type 4		N	1	28.1						
GW35120413	D	Limestone	Type 4		N	1	38.1						
GW35120415	C	Limestone	Type 4		N	1							
GW35120417	-	Limestone	Type 4		N	1							
GW35120419	G	Limestone	Type 4										
GW35120501	E	Limestone and Conglomerates	Type 5			1	344						
GW35120503	E	Limestone and Conglomerates	Type 5			1	96.7						
GW35120505	F	Volcanic	Type 5			1	89.0						
GW35120507	F	Volcanic	Type 5			1	104						

Map 6-1 – Groundwater Body Delineation, Identification and Typology



7. Delineation and Characterization of Protected Areas

7.1 Overview

7.1.1 Albania

The importance of delineation of Protected Areas is to build on previous efforts and illustrate a comprehensive scientific methodology for delineating the boundaries of the ecosystems encompassing individual protected areas. In particular, identifying the zone around each protected area wherein human activities may influence important ecological processes as well as the viability of populations of native organisms within the protected areas. This larger zone becomes the logical focus of monitoring, research, and collaborative management needed to maintain protected area function and condition. We refer to these zones as protected area–centred ecosystems.

7.1.2 European Union

Under WFD Article 6 and Annex IV, it is a requirement to a establish a Register of all areas within each river basin district which have been designated as requiring special protection under specific Community legislation for the protection of surface water and groundwater or for the conservation of habitats and species directly depending on water. Maps indicating the location and extent of each protected area and a description of the national or Community legislation under which they have been designated are also required.

7.2 Areas Designated for Water for Human Consumption

7.2.1 Overview

Under WFD Article 7 (derived from EU Directive 98/83/EC)[126] all bodies of water that supply > 10 m^3/day or 50 persons require delineation, so called Drinking Water Protected Areas (DWPAs). CIS guidance directs that in the case of groundwater, DWPAs should apply to the whole of the delineated groundwater body, as opposed to a subsidiary part of it. [127] Therefore for a contiguous aquifer supplying potable water not separated into discrete waterbodies (see section 6.2.4) the entirety of the aquifer would be designated as a DWPA.

However, DWPAs should be clearly distinguished from 'safeguard or protection zones' (WFD Article 7(3)). Safeguard zones are demarcated zones within the DWPA specifically intended to directly restrict harmful operations or activities that may pollute the groundwater or surface water source. Under international best practice typically there will be three designated zones surrounding a well-field or reservoir, with regulations becoming more restrictive the closer to the source, Figure 7-1.

The outer zone is typically described as the 'source catchment' or the DWPA as defined above. General policy and protection measures will be required in these areas such as limitation of untreated wastewater from upstream villages in the case of a reservoir supplying drinking water. In the case of groundwater abstraction underlying agricultural areas, the entire area of the DWPA may be declared a Nitrate Vulnerable Zone (NVZ) [128] (see section 7.5).

Outer Zone 2 is typically a buffer zone in which risks of contamination from priority hazardous substances and river basin specific pollutants (RBSPs) should be strictly controlled. In both surface water and groundwater sources, the extent of the outer zone is predominantly determined through the hydraulic properties of the medium i.e. average river velocities draining to the reservoir, or the hydraulic conductivity (*k*) of the geological formation(s). These identify the minimum travel time for a

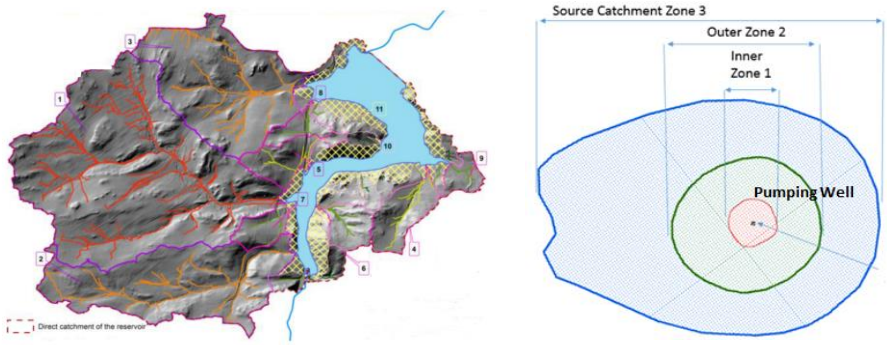
[126] European Commission – Directive 98/83/EC on the quality of water intended for human consumption

[127] European Commission – CIS Guidance Document 16 - Guidance on Groundwater in Drinking Water Protected Areas

[128] European Commission – Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources

hazardous substance to reach the source. Inner Zone 1 is generally a security area around the well-head or abstraction point.

Figure 7-1 – Example of Surface Water and Groundwater Protection Zones



7.2.2 Drinking Water Protection Areas in Mati

There are significant deficiencies in the current management of Drinking Water Protection Areas (DWPAs) throughout Albania at present. Many major abstraction sources do not have Abstraction Permits, and their locations are not accurately mapped. Relatively few have source protection zones identified, especially for groundwater sources.

The Register of Drinking Water Sources presented by Water Utility is presented in Technical Annex 7. There remain many inconsistencies and missing data due to poor quality of data reporting. Currently, it is reported that all the monitored pumping stations have one protection zone with radius 10-15 m, and occasionally up to 25m, which is circled with a metal fence, or brick or stone wall.

In the first phase of the RBMP development for Mati 2024-2029, it may be sufficient for most DWPAs to demarcate a simple boundary defining the source catchment e.g. for major reservoirs or an arbitrary buffer zone of e.g. 500 m around all groundwater sources as per Figure 7-1. Such maps are easily prepared via the GIS, but may require further secondary legislation to enforce such buffer zones. Principal DWPAs that can be defined at this interim stage (but not necessarily protected in legislation) are presented in the DWPA Register, Table 7-1. A Map overview of either legally identified or provisionally identified DWPAs is shown in Map 7-1.

An urgent priority for the AWRM as part of the Programme of Measures is to identify, register and enforce all Permits of such abstractions and delineate and publish the source protection zones. These Maps should be made available to all competent authorities engaged in water utilisation or land-use activities that may impact on DWPAs, including especially water utilities that have the primary responsibility to protect and restrict harmful practices within the DWPAs.

7.3 Areas Designated for Economically Significant Aquatic Species

7.3.1 Overview

Some areas of estuarine and coastal waters are to be designated as shellfish waters. Shellfish waters are areas requiring protection or improvement to support shellfish life and growth in order to contribute to the high quality of shellfish for people to eat.

Fish is at the very top of the aquatic ecosystem food chain and is widely used as a water quality indicator organism. Rich fish diversity contributes to not only the provision of social-economic services, but also to the maintenance of the ecological balance of natural resources The restoration of fish habitats and the increases in populations of endangered fish can, thus, contribute to an improved provision of various ecosystem services .On the contrary, a decrease in fish biodiversity may have an adverse impact on the value of cultural services of aquatic ecosystems such as recreation, ecotourism, and education. Once the cultural value is distorted it can never be replaced. Therefore, fish biodiversity

conservation confers wider environmental benefits and also protects aquatic biodiversity for future generations.

7.3.2 Economically Significant Protection Areas in Mati

The objective for shellfish waters designated under the Shellfish Water Directive is to protect and, where needed, improve the quality of shellfish waters in order to support shellfish (bivalve and gastropod molluscs) life and growth, and thus contribute to the high quality of shellfish products directly edible by man.
This objective will be achieved by meeting the imperative standards and endeavouring to observe the guideline standards of the Shellfish Water Directive.

Table 7-1 – List of economically significant protection areas

NAME OF THE WATER LINE	Outline	COMPLIANCE STATUS
Mat River	*Cyprinidae, Cyprinodontidae, Salmonidae*	In survival conditions
Great Fan River	*Cyprinidae, Cyprinodontidae, Salmonidae*	In survival conditions
Little Fan River	*Cyprinidae, Salmonidae*	In difficult conditions for survival
Ulza Lake	*Cyprinidae, Cyprinodontidae, Salmonidae, Blenniidae, Sparidae*	In survival conditions
Shkopet lake	*Cyprinidae, Cyprinodontidae, Salmonidae, Blenniidae, Sparidae*	In survival conditions

A Map overview of either legally identified or provisionally identified economically significant areas (ESPA) is shown in Technical Annex VIII.

7.4 Areas Designated for Recreational and Bathing Water

7.4.1 Overview

The relevant authority on Recreational and Bathing Water areas designation are Ministry of Tourism and Environment, Ministry of Infrastructure and Energy, National Coastal Agency, National Environment Agency, National Tourism Agency and National Agency for Territory Planning. The areas for Recreational and Bathing Water will be defined in the map of Integrated Cross-sectorial Plan for the Coast. According to VKM no. 797, dated 29.9.2010 for the adoption of the hygiene-sanitary regulation "On the administration of the quality of washing water", washing water is any surface water body (element) where the competent authority expects a large number of people to wash of people and where there is no permanent prohibition or recommendation not to wash.
The criteria are designed to protect the public from exposure to harmful levels of pathogens while participating in water-contact activities, such as swimming, wading and surfing, in all water bodies designated for such recreational uses.
The assessment of a beach or water should take into account several key considerations, including:

- the presence and nature of natural or artificial hazards;
- the severity of the hazard as related to health outcomes;
- the availability and applicability of remedial actions;
- the frequency and density of use; and
- the level of development.

Integrated coastal area management (ICAM) and integrated river basin management (IBM) are usually initiated in response to issues relating to one or more of the following: fisheries, recreation/tourism, hazards and mangrove depletion. Therefore, recreational water hazards are just one of a wide range

of issues, interests and constraints that affect the planning and management of coastal areas or river basins. Decisions relating to management of hazards should be made with reference to all relevant government policies and other factors that affect coastal/river basin amenity and use. Social, economic, aesthetic, recreational and ecological factors all need to be considered.
ICAM and IBM provide umbrellas for coordination among these areas of intervention, covering the economic, abiotic/biotic and social systems.[129]
Bathing waters are to be classified as 'poor' if in the set of bathing water quality data for the last assessment period (1), the percentile values (2) for microbiological enumerations are worse (3) than the 'sufficient' values set out in Technical Annex VIII, Table 2, column D.
Bathing waters are to be classified as 'sufficient' if, in the set of bathing water quality data for the last assessment period, the percentile values for microbiological enumerations are equal to or better (4) than the 'sufficient' values set out in Technical Annex VIII, Table 2, column D; and if the bathing water is subject to short-term pollution.
Bathing waters are to be classified as 'good' if in the set of bathing water quality data for the last assessment period, the percentile values for microbiological enumerations are equal to or better (4) than the 'good quality' values set out in Technical Annex VIII, Table 2, column C; and if the bathing water is subject to short-term pollution.
Bathing waters are to be classified as 'excellent' if, in the set of bathing water quality data for the last assessment period, the percentile values for microbiological enumerations are equal to or better than the 'excellent quality' values set out in Technical Annex VII, Table 2 column B; and if the bathing water is subject to short-term pollution.

7.4.2 Recreational and Bathing Waters Protection Areas in Mati

There are many different types of recreational usage of water environments. These include, for example, sunbathing, wading, swimming, diving, boating, fishing and sail boarding. Within the socio-economic context of recreational water use, the importance of tourism is considerable — in terms of its size, impacts on socio-economic and environmental spheres and the responsibility and means to intervene that it has at its disposal.
The purpose of the objective is not to deter recreational water use but, instead, to ensure that recreational water areas are operated as safely as possible in order that the largest possible population gets the maximum possible benefit.
There are recreational and bathing water areas inside the Mati River Basin Protected Areas.

Protection status: MNR "Kune-Vain-Patok-Fushekuqe-Ishem"

- *Managed Natural Reserves, IUCN Category IV of protected areas, approved by DCM No. 60, dated 26.01.2022.*
- *Important Bird Area approved by order of the Minister of Environment no. 283, dated 10.04.2013.*

Important habitats

- *Mati and Drini river estuary*
- *Coastal lagoons (Merxhani, Vaini, Zajet, Ceka)*
- *Coastal dunes forests with mediterranean pine forests*
- *Riverine and aluvium*

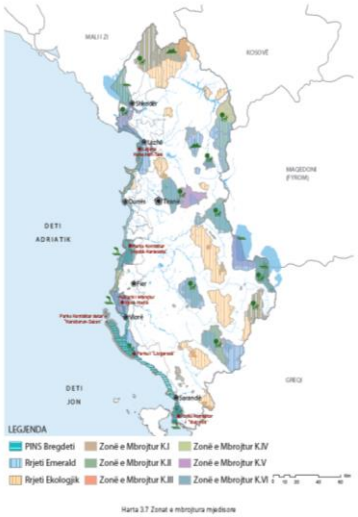
Important species

- *Populus alba*
- *Fraxinus excelsior*
- *Zostera noltii*
- *Lutra lutra*
- *Canis aureus*

[129]World Health Organization.Guidelines for safe recreational water environments.Volume 1, Coastal and fresh waters.

- *Larus ridibundus*
- *Solea vulgaris*

A Map overview of either legally identified or provisionally identified recreational protection areas (RBPA) is shown in Technical Annex VIII.



Managed nature reserves / nature park Kune-Vain-Patok-Fushe Kuqe-Ishem[130]

This system lagoon and at the same time protected area has an area of 8092.3 ha and it is located at the mouth of the Drin River and the Mat River. There are many waterflow in here, from which two are found lagoons, that of Ceka with an area of 235 ha and of Merxhani, with an area of 77 ha.

The sandy island of Kunes, which has an area of 125 ha and is placed in the right side of the Drini and Mat delta is pleasant for the tourist. Kune Island is covered with a lush hydrophilic vegetation. 227 plant species are known in this region. This zone still preserves special scientific values as an area with a variety of habitat types like the IBA, which has a lot of importance for migratory birds and in special way for the *capercaillie* colony (fam. *Ardeidae*). This area has one typical Mediterranean forest, while the lagoon of Marjan and the wetlands around it have numerous species of birds, for which it has gained and the status of an IBA. Has a management plan.

7.5 Areas Designated as Nutrient Sensitive Areas

7.5.1 Overview

EU legislation defines two forms of area that should be protected from surface pollution:

- Areas actually or potentially used for drinking water abstraction, where the concentration of nitrates as a result of surface practices could exceed 50 m/l, under the Nitrates Directive.[131] These should be declared as 'nitrate vulnerable zones' (NVZs) with appropriate land-management practices applied.
- Areas designated under the Urban Waste Water Directive (UWWD) [132] as 'nutrient sensitive areas'. These are areas where waterbodies are already eutrophic or which may become eutrophic if protective action is not taken, or where further treatment of wastewater is required to protect habitats or species (UWWD, Annex II).

Nitrate Vulnerable Zones (NVZs) are designated where nitrate concentrations in water bodies are high or increasing, or water bodies are, or may become, eutrophic due to agricultural nitrate pollution. Farmers within NVZs must comply with mandatory action programme measures to reduce agricultural nitrate losses. In addition, a code of good agricultural practice has been established for voluntary implementation by all farmers.

7.5.2 Nutrient Sensitive Areas in Mati

Identification of Nutrient Sensitive Areas in Mati Basin is not completed and there is no map to identify different areas.

NVZs are areas designated as being at risk from agricultural nitrate pollution. Waters will be defined within the Nitrates Directive and Nitrate Regulations as polluted if they:

[130] Integrated cross-cutting coastal plan (PINS)

[131] European Commission – Directive 91/676/EEC - concerning the protection of waters against pollution caused by nitrates from agricultural sources

[132] European Commission – Directive 91/271/EEC - concerning urban waste-water treatment

- contain or could contain, if preventative action is not taken, nitrate concentrations greater than 50mg/l ;
- are eutrophic, or become eutrophic, if preventative action is not taken.

To designate the NVZ it is necessary that farmers will need to keep records of the sources of nutrients in the farm and fertilisers applied to the` fields. The main focus will be on the follow up of volumes of slurry, dirty water, poultry layer manure, poultry litter and other solid manure generated on a farm. With these records, the tool will estimate the quantities of nutrients (Nitrogen and others) produced by the farm. Then, knowing where the farm and plots are located, it can calculate the amount of fertiliser to be applied on each parcel, to comply with the NZV regulations.

7.6 Areas Designated for the Protection of Habitats and Species

7.6.1 Overview

As applicable national legislative in non-EU countries is not fully harmonized with EU standards, a complete inventory of PA as required by the WFD cannot currently be drawn up for the basin as a whole. Therefore, a modified approach could be applied, which takes into consideration:

- National standards for the delineation of PA;
- A different status within Bern Convention implementation and NATURA 2000 network design within the country;
- The different level of adaptation of national legislation to EU legislation and standards in non-EU countries;
- The general lack of registers and/or effective databases of PA in country;
- Shared responsibility regarding maintenance and the protection of drinking water zones between national and sub-national level competent authorities;
- Shared responsibility for the monitoring of drinking water protection areas.

7.6.2 Habitat Protection Areas in Mati

The National Agency for Protected Areas (NAPA) is the competent authority for managing the national system of protected areas in Albania.

Three protected areas assigned in accordance with Albanian law are located along the borders of the Mati River Basin in Albanian territory. The approach for assigning and managing protected areas in Albania is described in Law for Protected Areas. The law regulates the protection of six (6) categories of protected areas. The categorization of areas, status and level of protection for each area is based on the criteria of World Centre of Nature Conservation.

Only recently the work has commenced on managing Natura 2000 sites.[133] In framework of the project NaturAL the potential distribution of the Natura 2000 Sites of Community Interest (SCIs) was identified, resulting in the preliminary list of 43 proposed sites. There are identified three Natura 2000 sites of community interest in Mati River Basin.

Based on the relevant legislation of protected areas, these categories of PAs should be managed according to their management plans. From the current management situation of these areas it results that not all PAs within the Mati River Basin have their own management plans. Within these plans, programs of measures are proposed, within which there are relevant measures for monitoring and evaluation of the situation of water resources and water biodiversity related to them.

A summary information on each protected area is included under the Technical Annex VIII.

[133] EU - Strengthening National Capacity in Nature Protection – Preparation for Natura 2000 Network, March 2019

Table 7-2 – Register of Protected Areas – Category DRINKING WATER PROTECTED AREAS

NAME OF PROTECTED AREA	SUB-BASINS	FUNCTION	DATE ESTABLISHED	NATIONAL LEGISLATION RELEVANT	EU LEGISLATION RELEVANT	RELEVANT WATERBODIES	CURRENT STATUS	BOUNDARIES PUBLISHED

Tabela 7-3 - Register of Protected Areas - Category AQUATIC SPECIES OF ECONOMIC IMPORTANCE

NAME OF PROTECTED AREA	SUB-BASINS	FUNCTION	DATE ESTABLISHED	NATIONAL LEGISLATION RELEVANT	EU LEGISLATION RELEVANT	RELEVANT WATERBODIES	CURRENT STATUS	BOUNDARIES PUBLISHED
	MAT0	DWPA			Directive2000/60/KE Directive 91/676/KEE			

Tabela 7-4 – Register of Protected Areas – Category RECREATIONAL AND BATHING WATER

NAME OF PROTECTED AREA	SUB-BASINS	FUNCTION	DATE ESTABLISHED	NATIONAL LEGISLATION RELEVANT	EU LEGISLATION RELEVANT	RELEVANT WATERBODIES	CURRENT STATUS	BOUNDARIES PUBLISHED
Kune-Vain- Patok-Fushë Kuqe-Ishëm	MAT0	PAMNR		DCM No. 60, datë 26.01.2022	Directive 2006/7/KE	TW351211	4	yes

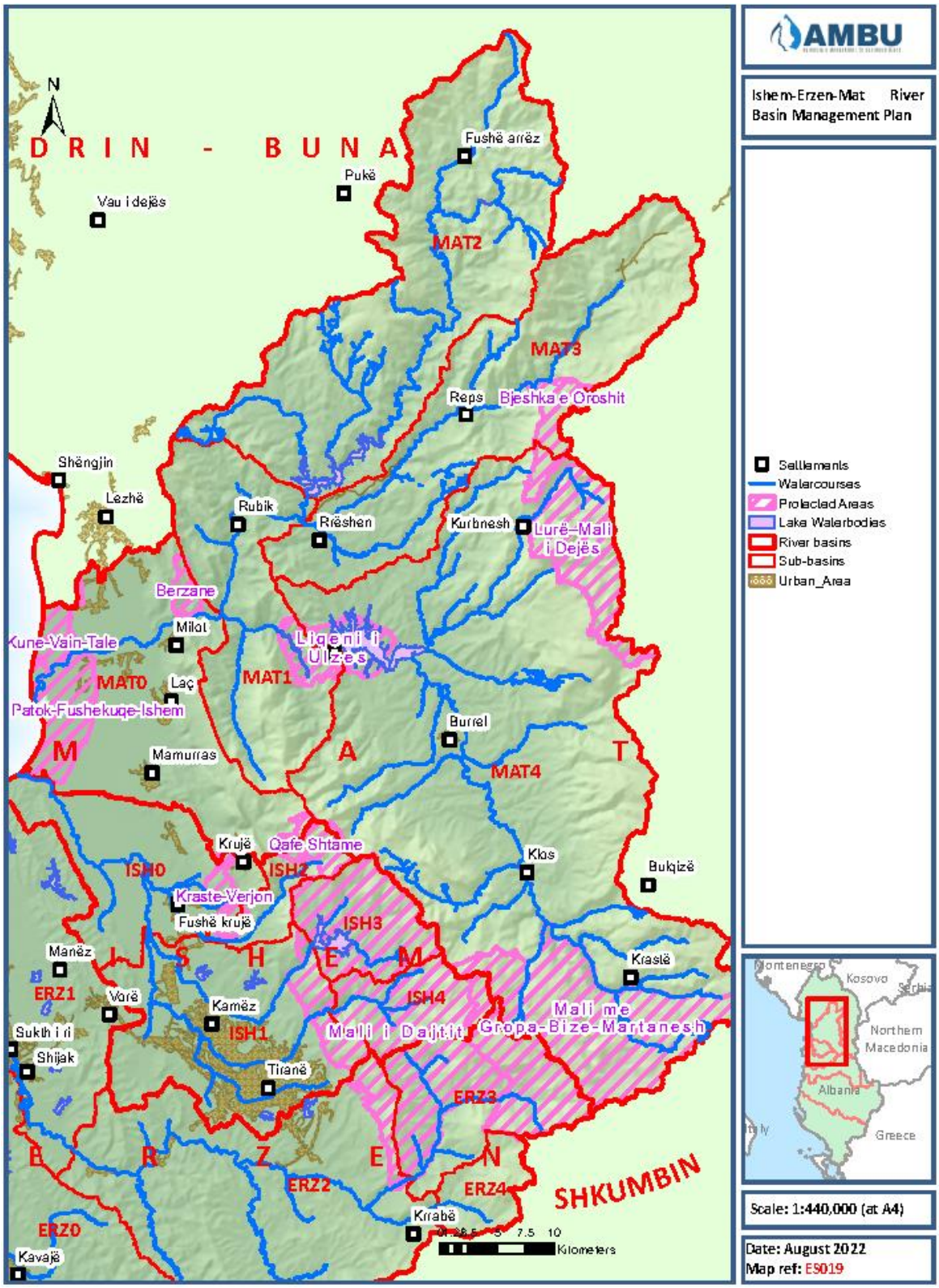
Tabela 7-5 - Register of Protected Areas – Category NUTRIENT SENSITIVE AREAS

NAME OF PROTECTED AREA	SUB-BASINS	FUNCTION	DATE ESTABLISHED	NATIONAL LEGISLATION RELEVANT	EU LEGISLATION RELEVANT	RELEVANT WATERBODIES	CURRENT STATUS	BOUNDARIES PUBLISHED
	MAT0	RBPA			Directive 91/676/KEE Directive 91/272/KEE			

Tabela 7-6 – Register of Protected Areas – Category HABITATS AND SPECIES PROTECTION

NAME OF PROTECTED AREA	SUB-BASINS	FUNCTION	DATE ESTABLISHED	NATIONAL LEGISLATION RELEVANT	EU LEGISLATION RELEVANT	RELEVANT WATERBODIES	CURRENT STATUS	BOUNDARIES PUBLISHED
Kune-Vain-Patok-Fushe Kuqe-Ishem	MAT0	PAMNR		DCM no. 60 datë 26.1.2022	Directive 91/676/KEE Directive 91/272/KEE	TW351211	4	Po
Ulza Lake	MAT 1&4	PANP		DCM no. 60 datë 26.1.2022	Directive 91/676/KEE Directive 91/272/KEE	LW351202	4	Po
Bjeshka e Oroshit	MAT 3&4	RBPA			Directive 91/676/KEE Directive 91/272/KEE	3512227	3	Po
Lure-Mali i Dejes	MAT 4	PANP		DCM no. 56 datë 26.1.2022	Directive 91/676/KEE Directive 91/272/KEE	3512345	3	Po
Mali me Gropa-Bize Martanesh	MAT4	PANP		DCM no. 60 datë 26.1.2022	Directive 91/676/KEE Directive 91/272/KEE	351291 351293 3512921	3	Po

Map 7-1 – Overview Map of All Protec ted Areas – Mati



8. Monitoring Networks and Surveillance Data

8.1 Legal Context

8.1.1 Albania

The EU Directive 2008/105/EC has been transposed in the DCM No. 246, date 30.4.2014"on setting environmental quality standards for surface water". [134] [135] The present water monitoring programmes are prepared based on the DCM No. 1189 dated 18.11.2009 on "rules and procedures for drafting and implementing the national environment monitoring programme".

WRMA is to use the information collected via water monitoring, and any other relevant information including existing environmental monitoring data, for an assessment of the probability that surface water bodies within the water basin will fail to meet the environmental quality objectives of the designated for the bodies. WRMA may use modelling techniques to assist in such a decision.

Based on the characterization and impact assessment carried out in accordance with Annex 1, of DCM no. 1015, date 16.12.2020, for each period in which the water basin management plan is implemented, a surveillance monitoring program and an operational monitoring program shall be established, and in some cases should also establish investigative monitoring programs.

State institutions responsible for monitoring should monitor the parameters which are indicative of the status of each relevant quality element. The National Water Cadastre serves as a database of acquired Geo-Reference sources on GIS system bases. The publication of data for the layers, contained on the National Water Cadastre, is done on ASIG website.

8.1.2 European Union

The WFD compliant monitoring program at national level aims at collecting data for baseline status assessments, identification of water quality trends, and reviewing the effectiveness of water protection measures applied. Annexes II and V of the WFD specify a comprehensive assessment and monitoring plan for waters. This applies to both surface water and groundwater bodies, and protected areas. [136]

Key aspects of monitoring programmes include:

- the monitoring types and objectives (reconnaissance, [137] surveillance, operational and investigative)
- the choice of monitoring sites (designed so as to provide a coherent and comprehensive overview of ecological and chemical status within each river basin)
- the quality elements (QEs) to be monitored, and the required monitoring frequencies

8.2 Surface Water Quantity Monitoring Programme

8.2.1 Competent Authority

The competent authority responsible for the quantity monitoring of surface waters is the Institute of Geosciences, Energy, Water and Environment (IGEWE). This is a national research unit that operates under the umbrella of the Polytechnic University of Tirana.

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

[135] The Directive 2008/105/EC has been amended by the Directive 2013/39/EU amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy

[136] Water Framework Directive, Annex V

[137] The term 'reconnaissance monitoring' is not used in the WFD, but is used in Albania to indicate a widespread and rapid assessment of biological and/or physico-chemical conditions where the national monitoring programme is insufficient, in order to derive a first approximation of likely waterbody status

This Agency has encountered significant management, funding and organisational difficulties in recent years with respect to the satisfactory delivery of basic, and reliable flow data, processed according to minimum acceptable international standards.[138] In spite of numerous repeated technical assistances from major international agencies since 2007, the majority of meteorological and hydrological monitoring stations are not functioning or have major calibration problems.

8.2.2 Relevance of the Surface Water Quantity Monitoring Network

A reliable and current hydrometric network is utterly essential for effective IWRM. Processed surface water flow data is essential on four counts:

- Determination of recent actual flow regimes and water resources availability, so that local, regional and national water resources can be accurately determined for water allocation purposes, through the mechanism of water balances
- Determination of trends in precipitation and resultant basin outflows to assess the impacts of climate change
- Determination of flow regimes generally and environmental flows specifically so that ecological aspects of waterbody status can be correctly established.
- Determination of correct flow volumes, so that pollutant loads in receiving waters (and the consequent necessary corrective measures) can be reliably calculated.

It is self-evident that without an efficient and functioning hydrometric network, the majority of objectives required under a comprehensive IWRM strategy for any river basin fail completely.

8.2.3 Status of the Surface Water Quantity Monitoring Network

Historically (1960-2008) an efficient and reliable national hydrometric network was maintained. However, this project could only be provided with historical flow data no later than 2008. The lack of recent reliable flow data raises many issues for the relevance and integrity of any IWRM strategy envisaged under this and other related reports and strategies. The use of old flow data, taking into account the many changes that have occurred in the river basin, not least probable climate change, is highly suspect.

8.3 Surface Water Quality Monitoring Programme

8.3.1 Competent Authority

The monitoring network of surface water quality (rivers, lakes, transitional and coastal waters) in the Mati River basins, and the associated sampling programmes, is under the competent authority of the National Environmental Agency (NEA) of the Ministry of Tourism and Environment. [139] The NEA publishes annually the National Environmental Monitoring Program, which sets out the intended monitoring sites and the target parameters. [140]

8.3.2 Relevance of the Surface Water Quality Surveillance Monitoring Network

The surface water quality monitoring network should ideally be established in accordance with the requirements of WFD Article 8 and Annex V, 1.3. The monitoring network should be designed so as to provide a coherent and comprehensive overview of ecological and chemical status within each river basin and should permit classification of water bodies into five classes consistent with the normative definitions of ecological status for surface water.

The current surface water quality monitoring network operated by the National Environment Agency is shown in Map 8-1.

[138] On the Establishment of Institutional and Regulatory Platform for Governance and Functioning of the National Water Resources Cadastre. World Bank/SIDA – May 2020

[139] Government of Albania - DCM No 1189 - "On the rules and procedures for implementation of the National Monitoring Program", 2009

[140] National Environmental Agency - http://www.akm.gov.al/cil%c3%absia-e-mjedisit.html#raporte_publikime

8.3.3 Status of the Surface Water Quality Surveillance Monitoring Network and Data

Currently, due to resource and capacity limitations, BQEs are not routinely sampled or analysed in Albania. The laboratory under NEA works in accordance with ISO 17025:2017 and is accredited for the main physic-chemical parameters: alkalinity, suspended solids, chemical oxygen demand, biochemical oxygen demand, nitrite, nitrate, and ammonium, orthophosphate and total phosphorous.

Priority substances (being those which present a significant risk to the aquatic environment) [141] are not routinely monitored at present. River basin specific pollutants (RBSP) (those pollutants deemed by the competent authority to be of particular importance in the river basin) are not yet defined.

The number of monitoring sites varies on an annual basis depending on budget limitations. Routinely monitored surface water quality data are available for four river sites inside the Mat River Basin.

The surface water quality monitoring network and selected results from the monitoring network are shown for the parameters of BOD_5, P and NH_4 in the Technical Annex IX. These three parameters are good general indicators of pollution arising from anthropogenic sources that are likely harmful to aquatic systems.

8.3.4 Monitoring campaign during 2019 and 2022

Map 8-2 and Table 8-1 in appendix IX clearly show that the number of stations in the current national monitoring program is not very large and does not represent the majority of water bodies delineated in water basins. Thus, the current KTA program does not meet the compliance requirements of Annex V 1.3 of the WFD. In order to make a better quantification of the possible status of the water body, in October 2019 and June 2022, two more comprehensive sampling campaigns were carried out in the Mat basin.

The October 2019 campaign included 15 points along the Mat basins, where 11 physico-chemical parameters were analyzed. The June 2022 campaign included 11 points along the Mati basin, where 7 physico-chemical parameters and the biological assessment of water quality were analyzed.

Detailed analyzes are presented in Technical Appendix IX. The comprehensive campaign enabled a better assessment of the possible quantitative status of all water bodies of the water basin. These locations are given in Table 8-1, where the values for the two most important physico-chemical indicators of anthropogenic pollution and possible impact on environmental quality elements (ECB), BOD5 and NH4 (mg/l) are presented.

Full physicochemical data from the 2019 and 2022 monitoring campaigns are presented in Technical Annex IX.

8.3.5 Hydro-morphological assessments

Under the WFD, the hydro-morphological quality elements are considered as supporting the biological quality elements. This acknowledges that the hydrobiological quality elements not only can be affected by water quality, but also by hydrological and/or morphological conditions. Currently, there are no provisions in Albania that stipulate the assessment of the hydro-morphological status. On top of the poor state of the hydrological monitoring and the lack of systematic monitoring of morphological quality elements. Nevertheless, a preliminary attempt has been made to assess the hydro-morphological status of the surface waterbodies delineated in the Mati River Basin. Details about the approach and methodology are included in Technical Annex VI.

[141] European Commission – Directive 2013/39/EU – The Environmental Priority Substances Directive

8.4 Groundwater Monitoring Programme

8.4.1 Competent Authority

The monitoring network of groundwater in the Mati river basins, and the associated sampling programmes, is under the competent authority of the National Environment Agency (NEA) of the Ministry of Tourism and Environment. The NEA publishes annually the National Environmental Monitoring Program, which sets out the intended monitoring sites and the target parameters.

The collection of groundwater quality samples and 'hydro-dynamic' monitoring (groundwater level) is sub-contracted to the Albanian Geological Service (AGS). The AGS operates a secondary monitoring programme under its own budget for other hydrogeological purposes, which is not part of the official NEA programme.

The groundwater monitoring network as fully deployed (varies annually) is shown in Map 8-2 and tabulated in Table 8-10. [142]

8.4.2 Relevance of the Groundwater Quantity Monitoring Network

A groundwater monitoring network should ideally be established in accordance with the requirements of WFD Article 8 and Annex V, 2.2 and 2.3. The monitoring network should be designed so as to provide a coherent and comprehensive overview of groundwater quantity and chemical status of all discrete waterbodies.

The primary measure of quantitative status is the depth to, or elevation of, groundwater level in purpose-built monitoring wells. This is fully applicable to the alluvial and sandstone-conglomerate aquifers (Types 1, 2 and 5). However, in the highly karstified limestone massifs (Type 4 aquifers) where there is little pumping from drilled wells, spring flows are probably a better indicator of quantitative (and qualitative) status.

8.4.3 Status of the Groundwater Quantity Monitoring Network and Data

Groundwater quantity monitoring is only concerned with measuring water depth and is spatially and temporally incomplete. The levels were measured in selected wells in the alluvial water body GW35120101 (Laç) and GW35120103 (Shënkoll) during the period 2004 - 2020:

- Ex. 197 Gurres
- Church of Shënkolli

Selected results from the groundwater monitoring network are presented in Table 8-8 in Technical Appendix IX. Available data show a slight but steady decline in water levels since 2004. However, this trend in levels cannot be confirmed with certainty due to large gaps between measurements compared to normal seasonal fluctuations.

No data are available for other water bodies in the Mat basin. There are specific measurements of source flows, also referring to seasonal fluctuations, but there are no systematic datasets on discharges separated by periods.

8.4.4 Status of the Groundwater Quality Monitoring Network and Data

The WFD and the Groundwater Directive require monitoring of a wide range of chemical parameters in order to determine the qualitative status if groundwater. Currently only a fraction of the requisite parameters, comprising major anions (Cl, SO4, NO3 and alkalinity) and cations (Na, K, Ca, Mg, Fe and NH4) and indicator parameters (pH, T, EC and TDS) are routinely measured. In addition, there is limited monitoring of heavy metals including Cu, Cr, Pb, Ni, Mn, Zn, Co and Cd.

Groundwater quality monitoring is conducted at abstraction wells in the alluvial groundwater bodies (GW35120101 to GW35140107). Abstraction wells mix water from different depths and from a large

[142] The precise location and status of many groundwater monitoring sites could not be verified despite extensive communication with the Albanian Geological Service.

area, and so are effective at identifying the presence of contaminants but poor locating their source or the concentrations in the source area. Large springs serve similar purposes in karst aquifers.
Regular, up to four times a year, measurements of major ions and heavy metals have been reported in the annual State of the Environment reports since 2012. The data are laboratory analyses of water samples collected by AGS from 16 abstraction wells including most of the same wells as used for water level monitoring. There is no routine monitoring of groundwater quality at wells or springs.

18, F. KUQE	509, LAÇ
19, F. KUQE	176, MILOT
23+26, F. KUQE	St. Pomp., MILOT
46, H. GJUETISË	St. Pomp., SHËNGJIN
87, SHËNKOLL	2S, RRILË
177, PATOK	62, RRILË
197, GURRËZ	6V, RRILË
502, PATOK	

Selected results from the monitoring network are shown for the parameter of nitrate (NO3 mg/l) (Table 8-8) and electrical conductivity (EC µS/cm), Table 8-9. NO3 monitoring detects adverse trends for one of the main pollutants due to nutrient sources, which may be hazardous to health (EQS < 50 mg/l), or the cause of eutrophic surface waters. EC is a useful broad measure of potential pollution as it is directly proportional to total dissolved solids (TDS) in water. Values significantly above the background level characteristic of the local hydrogeology (typically 300 µS/cm for carbonate rich waters) may indicate anthropogenic pollution of some kind.
In coastal areas, a highly elevated EC value (e.g. > 1500 µS/cm) in deep groundwater (> 30m) may be indicative of saline intrusion to the groundwater.
Figures 8.9 to 8.12 show the trends in nitrate, EC, chloride and sulphate in groundwater in the alluvial groundwater bodies (GW35120101 - GW35120107), combining quarterly monitoring data from 2015 to 2020 with the few available older measurements. Figure 8.9 shows an increase in nitrate concentrations from 2004 levels to the post-2014 monitoring period south of the Mati river but do not display any clear trend in the period 2015 to 2019, and all nitrate concentrations are below 10 mg/L NO3 (well below the 50 mg/L standard).
EC measurements (Figure 8.10) are only available for the post-2014 monitoring period and display no clear trend. Measurements of EC and chloride are well correlated, and indicate the presence of modern or ancient seawater. All measurements at Rrile-6V exceed the 2500 µS/cm standard. A comparison of chloride measurements (Figure 8.11) from 2000-04 levels with post-2014 monitoring suggests a slight drop in concentrations. However, post-2016 increasing chloride concentrations are observed at some wells. The two wells at Patok in the south and the well Rrile-6V in the north have unacceptably high (exceeding the 250 mg/L standard) chloride concentrations.
Sulphate measurements (Figure 8.12) show no clear trend over time. Most values are below 100 mg/l (… standard) except for the brackish well Rrile-6V, which is consistently around 300 mg/L, and two 2016 determinations at Shenkoll which suggest a sampling problem or well defect.
Full physico-chemical data from the groundwater monitoring programmes 2014 – 2019 is provided in Technical Annex 8.

8.4.5 Rapid Reconnaissance Monitoring During 2019

From Map 8 1 and Table 8-6 in Technical Appendix IX it is quite clear that the number of stations in the current national hydrogeological monitoring program is not very large and does not represent the majority of underground water bodies delineated in water basins. Thus, the current program of ShGjSh does not meet the compatibility requirements of Appendix V 2.2 and 2.4 of the WFD. In order to make

a better quantitative expression of the possible status of the water body, in November 2019 a more comprehensive sampling campaign was carried out in the Mat basin.
The November 2019 campaign included 9 points along the Mat basin, where 11 physico-chemical parameters were analyzed. Detailed analyzes are presented in Technical Annex 8. It was not possible to analyze the water levels at these points, which are water production points and not boreholes for monitoring purposes. These locations are given on Map 8 1, where the values for the two most important physico-chemical indicators of anthropogenic pollution and the possible impact on the chemical status of groundwater, electrical conductivity (µS/cm) and NH4 (mg/l) are presented.

8.5 Protected Areas Monitoring Programme

8.5.1 Competent Authorities

WFD Article 6 and Annex IV summarises several types of protected area to be addressed in the River Basin Management Plan. These are:

- Protected areas of drinking water for human consumption, also in accordance with the DUP abbreviation for the Designated Water for Human Consumption Directive.
- Areas designated for the protection of economically significant aquatic species
- Areas designated as recreational waters, including bathing waters under EU Directive 2006/7/EC
- Areas designated as 'nutrient sensitive' under EU Directives 91/676/EEC and 91/271/EEC
- Areas designated as important habitat areas, special areas of conservation (SAC) and Natura 2000 sites [143]

Therefore coordination is required across several competent authorities, specifically:

- Drinking water abstraction points for > 50 persons or > 10 m^3/day. Regulation of water abstraction falls under the Permit system of the AWRM. Major operators such as the municipal water utilities are legally obliged to comply with the Water Permit limitations, although as of 2020 numerous drinking water abstraction points do not possess such Permits, and many sites are not even measured in terms of quantity of abstraction.
- • Local Health Care Units (LHCU) carry out routine physico-chemical and pathogen sampling of all drinking water extraction points (post-treatment phase) in Albania for public health purposes. Since these sampling data are considered part of the drinking water supply network, this program has no direct relation to the watershed's environmental objectives.
- The water utilities do not report directly to the AWRM in terms of abstraction quantity; rather they report annually to the competent authority, the Water Regulatory Authority (WRA) as part of annual compliance with service levels.
- Municipal water utilities conduct their own routine physico-chemical monitoring programmes for their respective sources. Tirana Water (UKT), the largest water utility, conducts regular monthly sampling of all potable water sources under its control.
- The National Agency for Protected Areas (NAPA) aims to halt the loss of biodiversity in Albania through improved management of its protected areas and setting the basis for the future implementation of European Natura 2000 network.

8.5.2 National Monitoring and Reporting to the European Commission

Every four years Member States are required to report to the European Commission on:

- Nitrates concentrations in groundwater and surface waters
- Eutrophication levels of surface waters
- Assessment of the impact of action programme(s) on water quality and agricultural practices
- Revision of NVZs and action programme(s)
- Estimation of future trends in water quality.

Albania is – besides Switzerland – the only none-EU country reporting the annual bathing water quality to the European Environmental Agency. [144] NEA reports the results of its surface water quality monitoring programmes to European Environmental Agency via 'WISE EIONET' (Water Information System for Europe, European environment information and observation network). [145]

[143] European Commission – Natura 2000 - https://ec.europa.eu/environment/nature/natura2000/index_en.htm
[144] Compare, for example: Albanian bathing water quality in 2019 https://www.eea.europa.eu/themes/water/europes-seas-and-coasts/assessments/state-of-bathing-water/country-reports-2019-bathing-season/al-bw-country-reports-2020.pdf
[145] Visit for example: https://cdr.eionet.europa.eu/al/eea/wise_soe/wise6/envx_ilxq

8.5.3 Operational Status of the Protected Areas Monitoring Networks in Mati

Protected areas make up as we speak about 21.4% of Albania's territory.

The National Environmental Monitoring Program for each year, but in the specific case for 2021, defines the following environmental indicators of the situation in the "Biodiversity" chapter:

- diversity of ecosystems and habitats in protected areas - statistical processing, list of species and habitats in a graphic table;
- the proximity of the transport infrastructure to the protected areas - Presentation in the table.

The current monitoring situation of protected areas

Although the number of protected areas at the country level has increased, management issues still lag far behind. Management of Protected Areas in accordance with the national legal framework is based on the management plan. To date, the progress noted regarding the preparation of the Management Plan is as follows:

- Development and rehabilitation of the infrastructure of Dajti National Park, Lura-Mali i Deja National Park, Kune-Vain-Patok-Fushëkuqe-Ishëm Managed Nature Reserves. During 2014 and 2015, projects were implemented with investments from the state budget.
- Management Plans for 6 protected areas were drawn up with the assistance provided by the SELEA project, IPA 2010. Management Plans for Protected Areas: Protected Landscape of Lake Pogradec, Bredhi i Hotova-Dangelli National Park, National Park "Mali i Tomorri", Nature Park "Korab-Koritnik", Nature Park "Mali me Gropa - Bize - Martanesh" and the proposed National Park of the Alps (which will include the existing National Park of Theth and Valbona, and Strict Nature Reserves of the Gashi River). The five management plans, except for the Alps, were approved in December 2014.

Bërzane Natural Park

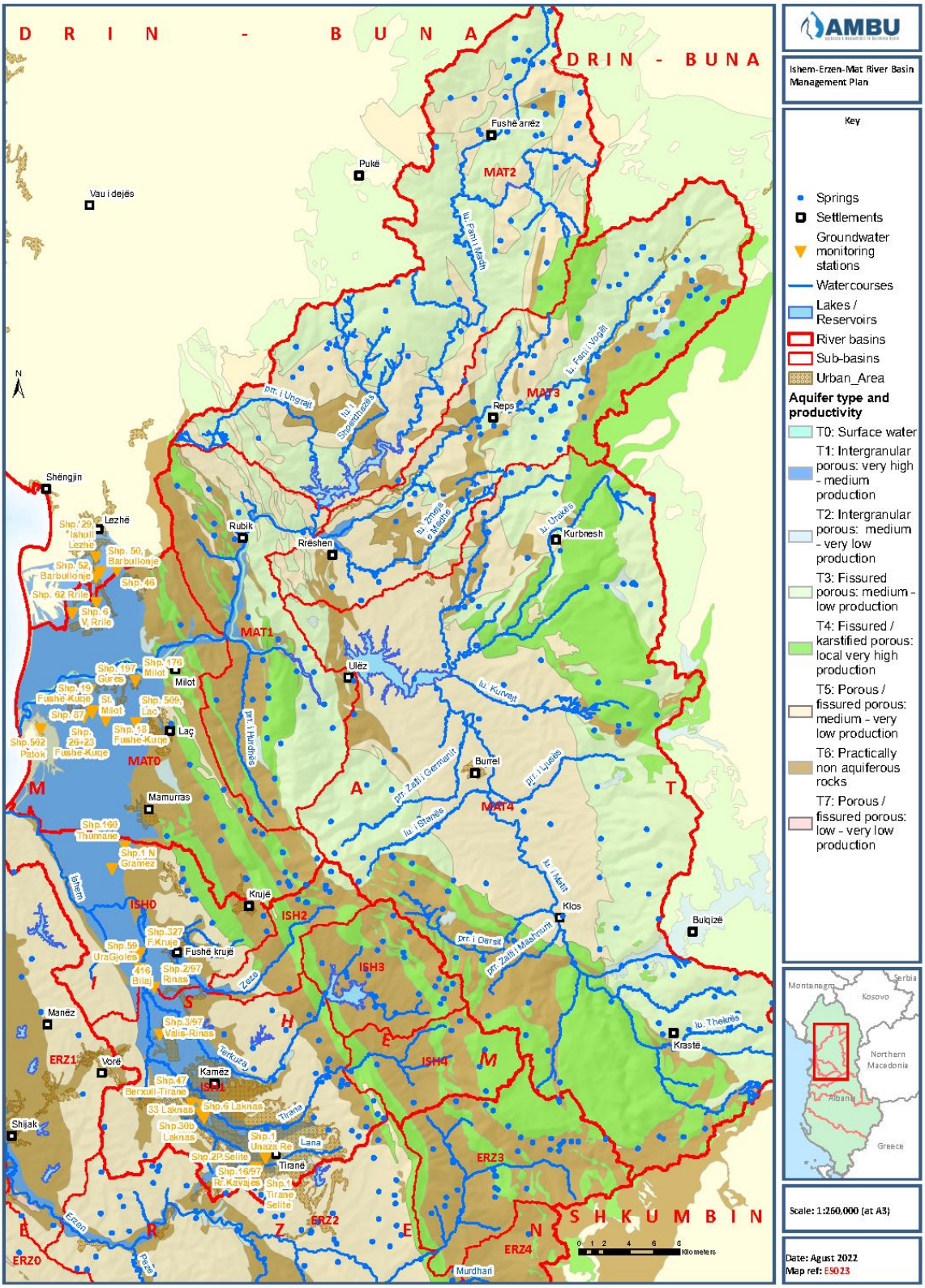
In 2008, a monitoring was carried out. Also, for this protected area there is no complete information and the progress made during these 14 years is not known, therefore it is proposed to carry out a complete study and obtain the status of a municipal natural park.

According to the assessment carried out by the National Agency of Protected Areas (November 2019), in the Bërzana region grows a typical Mediterranean vegetation that includes oak and heather forests, ash (Forsythia europaea), white heather, juniper, etc.; 3 types of natural habitats, according to the NATURA 2000 Habitat List, of which 1 type of habitat is listed as a priority; 3 species, important for the flora, rare/endemic (Forsythia europaea and Festucopsis serpentini), and from the fauna species have been found: 7 almost endangered species, 5 vulnerable species, 40 non-endangered species, for 2 species there is no data and 9 species are not included in the IUCN list. For this protected area, the digitalization of plant cover, habitat types, land use, surface zoning, and there is no Protected Area Management Plan.

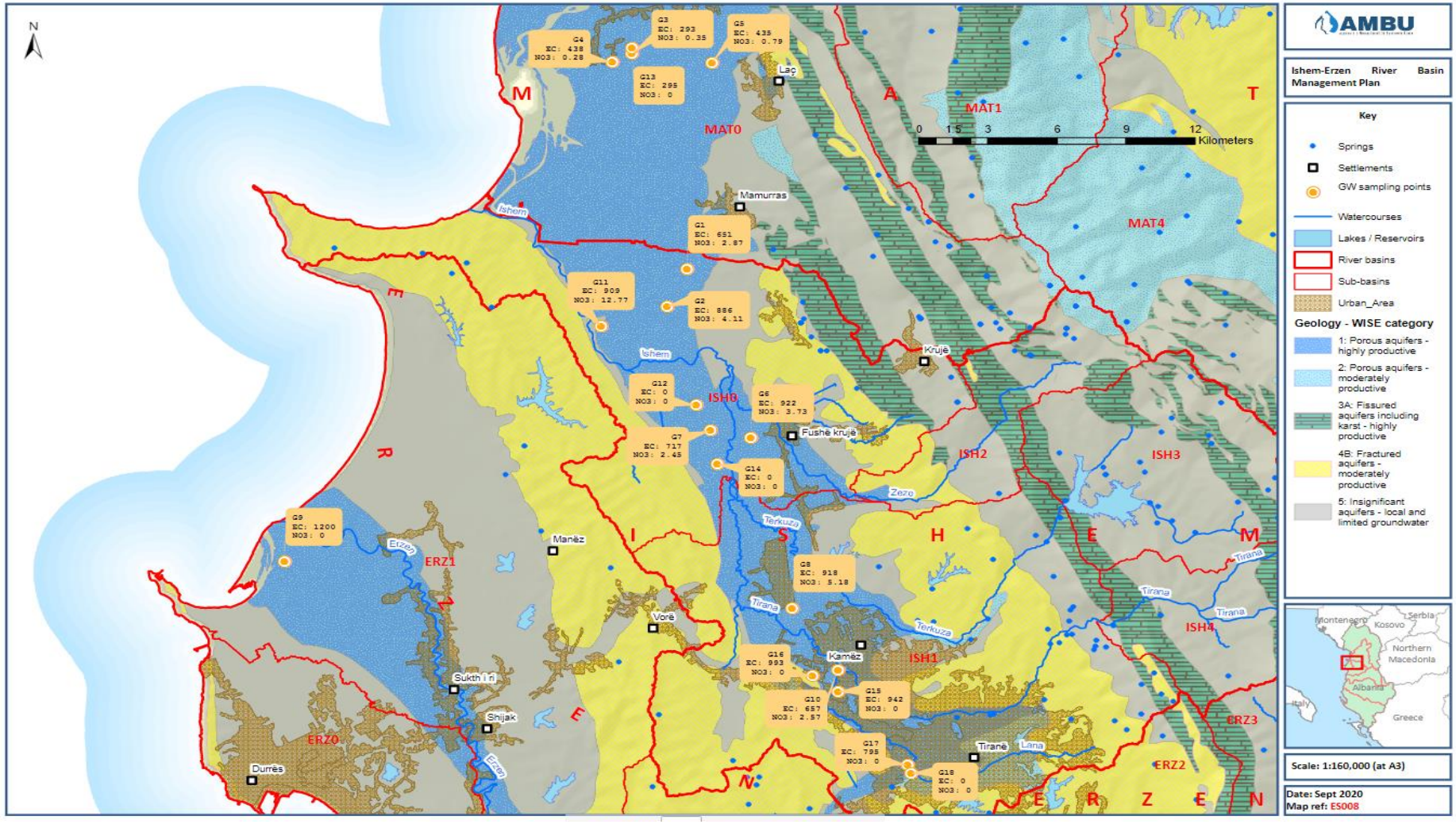
Kune – Vain – Patok-Fushekukuqe-Ishem

For the protected area, the Managed Nature Reserve "Kune-Vain-Patok-Fushëkuqe-Ishëm" was drawn up and approved in 2011, the Management Plan, which expired in 2020, but with VKM no. 60, dated 26.01. 2022, this protected area was merged into a single RNM "Patok-Fushë Kuqe-Ishëm" with a total area of 8092.3 ha. With the approved changes, a new management plan will be prepared for this protected area. It is worth noting that the "Kune-Vain-Tale-Patok-Fushë Kuqe-Ishëm" Nature Park contains the most complex wetland system, located in the delta of the lower flow of the Drin, on the coast of the Adriatic Sea. Includes terrestrial habitats, lagoons, marshes and swamps. Here we mention Merxhan Lagoon (2.5 km2); Ceka Lagoon (Drin Delta) (2.2 km2); Kunes Lagoon (10 km2); Vain Lagoon (14.5 km2). Despite the great damage, scientific and ecological values are still preserved, as an area with a variety of habitat types and as an IBA very important for migratory birds and especially for the heron colony (Ardeidae family), while for the Merxhan lagoon and the wetlands around it many species of birds are found, for which it has the status of "IBA".

Map 8-1 – Location of Groundwater Quality and Quantity Monitoring Points - Mati



Map 8-2 – Location of the Rapid Reconnaissance Surface Water Survey Sites 2019



9. Summary of Subsidiary Strategies and Plans

9.1 Overview

9.1.1 Albania

The aim of Strategies, Policy Documents and Plans is to meet the challenges in the water sector, guarantee efficient management and governance of water resources, and governance of water resources.

The main Strategies, Policy Documents and Plans in the water sector, are:

- The **2030 Agenda for Sustainable Development**, specifies 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries, with the aim of achieving them by 2030. 2030 SDG Agenda is adopted by Albania in 2015.
- **National Strategy for Development and Integration (NSDI), 2015-2020,** represents the core strategic document that combes the EU integration agenda with the country's sustainable economic and social development. Pillar 4 of this strategy states ensuring growth through interconnection, sustainable use of resources and territorial development through:
  - a healthy and sustainable environment,
  - improving water supply, sewerage and waste management systems,
  - increase the coverage of the country with wastewater treatment plants for the population,
  - sustainable management of water resources.
- **National Strategy for Integrated Water Resources Management (2018-2029)**, is the main strategy, and serves as a base for water sector reforms. It enables institutions responsible for water resources management, to reach European standards by setting the main strategic objectives for this sector:

To enable the achievement of the fourth objective of NSWRIM (2018-2029), "*Securing trustworthy water and climate data and models, recognized by all stakeholders, and government advice adequate policy based on these data and models is provided by relevant institutional data owners*", WRMA has established a National Water Cadaster which serves as a database of acquired geo-reference sources on GIS system bases. The publication of data for the layers, contained on the NWC, is done on website (http://kadastraujore.gov.al/).

- (Draft) **National Sector Program for Water 2018-2030**, for integrated water management aims to provide vital needs, competitiveness of use and reduction of the risk of water by paying special attention to the sustainability of aquatic ecosystems. The vision of this program is the water sector governance in accordance with the best European standards and practices, with the main purpose of promoting the sustainable use of water resources, their protection and protection from water.
- **National Strategy for Irrigation and Drainage 2019–2031**, has defined four strategic components:
  - Strategic component 1 "Irrigation",
  - Strategic component 2 "Drainage",
  - Strategic component 3"Safety of dams and their use",
  - Strategic component 4 "Flood protection".
- Document of **Strategic Policies for the Protection of Biodiversity.**

The overall objective is to contribute at the national level on the prevention of biodiversity losses and the degradation of ecosystem services, through the full implementation of the Albanian and EU legislative framework, the reduction of pressures on biodiversity, the restoration in a biologically fair and equal way of ecosystems, the transfer of relevant technologies, the channeling of biodiversity issues and values and the effective implementation of appropriate policies.

- (Draft) **National Strategy of Water Supply and Sewerage**

The purpose shall be to improve the quality provision of water supply and sewerage services to the citizens of Albania and to support the economic development of the country, based on the performance of a key infrastructure service.

- **National Civil Emergency Plan (2004),** aims to:
    - Prevent, alleviate and rehabilitate from any damage affecting the population, animals, property, cultural heritage and environment from civil emergencies;
    - Provide conditions for the state, public and private institutions, economic activities and population, for the transition to an emergency situation, with the smallest possible losses.
    - Guarantee the use of all possible state resources for the purpose of public safety, continuous preservation of the national economy, localization of the emergency zone and the mitigation of the consequences.
- **Integrated Cross-sectoral Plan for the Coast**

The Integrated Cross-sectoral Plan for the coast (PINS) serves as a regulatory system to ensure standards in planning and guaranteeing instruments that enable quality tourism services. The objectives and principles are to ensure the sustainable use and management of coastal areas, in order to preserve natural coastal habitats, landscapes, natural resources and ecosystems, in accordance with international standards and norms legal in force.

- **General Local Plan**.

From 2017 to date the process of preparing general local plans for all municipalities of the country is ongoing, from the municipalities that are part of Mati river basin. Municipalities of Lezha, Kurbin, Mat, Mirdita, Klos have GLP.

9.1.2 European Union

River basin management plans may be supplemented by the production of more detailed programmes and management plans for sub-basin, sector, issue, or water type, to deal with particular aspects of water management. Implementation of these measures does not exempt Member States from any of their obligations under the rest of the WFD.

In accordance with best international practice, the RBMP framework for Albania envisages additional subsidiary strategies and/or Plans coordinated with but distinct from the core RBMP document (the measures of 1.5.1.). In some cases these secondary Plans are recognised explicitly within the Water Framework Directive e.g. Directive 2007/60/EC (the Floods Directive) or implicitly by way of European Commission policy such as that for water scarcity and droughts.[146]

These strategies or plans (substantial analyses in themselves) are cross-referenced to the WFD 'core Plan' (this document) only with reference to how the respective strategy or its proposed activities or schemes will impact on the environmental objectives of the river basin. Schemes that adversely impact on environmental objectives i.e. the status of waterbodies - will have to either i) implement adequate mitigation measures to maintain ecological status ii) demonstrate that the beneficial objectives served by those modifications or alterations of the waterbody cannot for reasons of technical feasibility or disproportionate cost be achieved by other means that are a significantly better environmental option.[147]

In its full extent, a comprehensive RBMP may also require the following:

[146] European Commission, Water Framework Directive – Article 13(5)

[147] European Commission, Water Framework Directive – Article 4(7).

9.1.3 A Water Resources Management Plan

The Water Resources Management Plan primarily ensures that river basin water balances (both surface water and groundwater) are properly identified and how so managed for long-term sustainability. This should include sub-basin level abstraction registers and management controls, and identification of environmental flow requirements and protection measures. The EU WFD Common Implementation Strategy (CIS) has only more recently recognised these elements as important ancillary activities. [148] [149]

It is now recognised that the flow regime in all rivers plays the primary role in the structure and functioning of aquatic ecosystems [9] and is somewhat more significant than the 'ancillary element' referred to in the WFD. Since abstractions for economic uses of water generally have a significant impact on flow regime and environmental flows, it may be the case that water resources management is considered inextricably linked to the measures of section 1.5.1, and therefore 'water resources management' should be considered as an essential part of the core RBMP. Achievement of 'Good Status' of any waterbody is unlikely unless the flow regime is managed so as to be reasonably close to the original natural flow regime.

However, sustainable water resources is a major policy area for the European Commission, and a major management topic within most river basins.[150] Sustainable water resources management requires more than a narrow focus on ecosystem water needs. It also demands resource-efficiency policies and tools and an assessment and planning of interactions with other resources, especially food and energy security. Measures to enhance water resource efficiency invariably have impacts — positive and negative — on other sectors, especially agriculture and hydropower for example.[151]

9.1.4 A Flood Risk Management Plan

Catastrophic floods endanger lives and result in heavy economic losses. Flood alleviation and protection measures are costly, and cannot be implemented across an entire basin. Other than ecosystem based adaptation measures (the preferred norm), identification of priority areas for flood-protection and cost-benefit appraisal is required to ensure that flood protection measures are directed on a risk-based approach.

These concepts have been addressed at EU level in the Directive 2007/60/EC [152] and the EU Flood Risk Management Programme generally [153], identifying flood risk areas and developing, at the scale of the RBD or river basin as appropriate, Flood Risk Management Plans (FRMPs) enshrining the concepts of prevention, protection and preparedness. Several FRMPs may be required within the RBD depending on local flood risks.

It is an explicit requirement of the Floods Directive (FD) that the measures and impacts of any proposed protection works take full account of the environmental objectives of the WFD as set out in the RBMP (FD, Article 7, Article 9). Where environmental objectives are not met, then the over-arching requirement of 'Good Status' of impacted waterbodies may not be achieved. If the environmental impacts of proposed flood works have not been properly addressed and mitigated, then the impacted waterbodies (quite often 'heavily modified') will further fail the test of WFD Article 4(7).

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[148] European Commission - Guidance document 31 - Ecological flows in the implementation of the Water Framework Directive, Technical Report 2015-086, 2015

[149] European Commission - Guidance document 34 - On the application of water balances for supporting the implementation of the WFD, Technical Report 2015-090, 2015

[150] European Environment Agency, Climate change and water adaptation issues, EEA Technical Report No 2/2007, 2007

[151] European Environment Agency, Towards efficient use of water resources in Europe, EEA Report No 1/2012, 2012

[152] European Commission - Directive 2007/60/EC - on the assessment and management of flood risks – "the Floods Directive"

[153] https://ec.europa.eu/environment/water/flood_risk/flood_risk.htm

9.1.5 A Drought Risk Management Plan

In the face of ever-increasing demands for water and declining resources due to climate change, water scarcity and drought is an increasingly frequent and widespread phenomenon in the European Union. The long term imbalance resulting from water demand exceeding available water resources has potentially catastrophic consequences.

EU water policy with respect to water scarcity is designed to prevent and to mitigate water scarcity and drought situations, with the priority to move towards water-efficient and water-saving economies. [154] [155] It is particularly emphasised that a stronger focus on quantity issues is required in national policies of WFD implementation.[156]

In the absence of a specific Directive or framework for water scarcity management, best international practice [157] strongly suggests that formal Drought Risk Management Plans should be prepared at many levels, possibly at river basin level, but especially at sub-basin or municipal level where drought impacts may be severe for either aquatic ecosystems or municipal or agricultural water supplies.

9.1.6 A Coastal Zone Management Plan

According to the WFD, Water Basin Management Plans should specifically consider 'coastal' water bodies, assessing the pressures, condition, impact and environmental objectives shared with other categories of water bodies. However, coastal regions have significant management issues that go beyond the narrow focus of section 1.5.1. For example, coastal erosion, infrastructure development, tourism and coastal flooding due to climate change are significant technical issues that are unlikely to be covered by the main focus of WFD's PMBU.

The ICZM Protocol (signed in 2008 and entered into force in 2011) is an essential step in the field of coastal zone management. Albania has been a signatory of the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) since 1990 and accepted the amendments to the Convention in 2001.

Albania has acceded to the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean in 2000, through law no. 8690, dated 11/16/2000 "On the accession of the Republic of Albania to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its 6 accompanying protocols". In 2010, Albania accepted another Protocol of the Barcelona Convention, approved by law no. 10234, dated 18.2.2010 "On the accession of the Republic of Albania to the protocol "On the Integrated Management of the Mediterranean Coastal Zone" of the Barcelona Convention "On the Protection of the Marine Environment and the Coastal Region of the Mediterranean".

In this context, in 2014, the National Council of the Territory approved the initiative of drafting the Integrated Cross-Sectoral Plan for the Albanian coast, which aims to determine the most appropriate ways of developing the region through the rational use of the territory and its resources and assets, focusing on caring for ecosystems. The main objectives of this plan are:

- Sustainable development
- Protection of environmental capacities and landscape values, preserving the character of coastal localities;
- Adding protected natural areas;
- Transformation of the coast into a unique destination;

[154] European Commission - Addressing the challenge of water scarcity and droughts – COM(2007)414,

[155] European Commission – The Blueprint to Safeguard Europe's Water Resources – COM(2012)673

[156] European Commission - Report on the Review of the European Water Scarcity and Droughts Policy - COM(2012)672

[157] Global Water Partnership - Guidelines for preparation of the Drought Management Plans - Development and implementation in the context of the EU Water Framework Directive, 2015.

• Extending the duration of the tourist season for the development of tourism in the most diverse way throughout the year; Equitable distribution of investments and social equality throughout the territory.

9.2 Water Resources Management in the Mati Basin

9.2.1 Competent Authority and Coordination Measures

The competent authority to develop and implement the water resources strategy is the WRMA. The Register of Abstractions is held centrally by the WRMA in Tirana, and is publicly accessible via the National Water Resources Cadastre.

In exercising this function, it is necessary to carry out detailed consultation and coordination activities with other major users of water and their respective regulators, most notably the agriculture and hydropower sectors.

The River Basin Council (RBC) is the body responsible for decision-making, for water resources, at the respective basin level. Mat river basin forms part of the Mat RBCs, with 15 members. RBCs issues authorizations and permits when the activity befalls within the boundaries of a single basin.

WRMA, as the leading institution in water resources management at the national level coordinates and controls the work of local water resources management bodies, designs and implements water basin management plans. With the aim of ensuring rational conservation, development and distribution of water resources; protection of water resources from pollution; misuse and damage that affects their quality and quantity. WRMA accepts and reviews applications for issuing a permit/authorization for water resources use, process that is currently proceeding online in: https://e-albania.al/eAlbaniaServices/UseService.aspx?service_code=13279.

In regional level, Mat river basin is managed by Tirana WBAO. The main competences of WBAOs, are the compilation of the draft plan for water resources for the respective basin and submission for approval to the water basin council; monitoring the implementation of the decisions of the NWC and water basin council. WBAOs serve as the technical secretariat of each relevant water basin council.

9.2.2 The Water Resources Strategy

According to Albanian legislation and the WFD, for water resources management on the national level, is designed and implemented the National Strategy for Integrated Water Resources Management (NSIWRM) for the period 2018-2029. The national strategy defines five key objectives.

In the first chapter of the strategy, with the aim of achieving a rigorous water resources assessment with respect to WFD implementation, based on the document "Guidance document for the application of water balance to support the implementation of WFD", as the official guide on water balance defined by the European Commission, specifies the water balance (1.2.1) for water resources at the national level and also the water balance for the average annual inflows and only for the summer months, for the six water basins.

In order to carry out the appropriate strategic interventions, we must have well-defined specific pressures for each water basin. Once the pressures are determined, specific weights should be given to each pressure, that will enable us to judge correctly which of these pressures have the greatest impact and therefore intervention to minimize or keep them under control will be classified as a priority.

Strategic interventions related to the issues identified for Mat river basin are:

- *Monitoring water courses in the river basin from their source, over their entire length, and in respect of all their uses.*
- *Information on the water balance in river basin that must be reflected on NWRC.*
- *Declaration and determination of protected areas in order to maintain optimum conditions for the catchment of surface water and groundwater within the river basin.*
- *Zoning and specifying the limits on the use of watersheds/ water resources in certain river basin zones which have suffered degradation as a result of over-use by population.*
- *Increase regional self-sufficiency.*
- *recovery of groundwater levels and restoration of their quality after over-use.*

- *Determination of limits on the use of or access to potential water pollutants deriving from industry, urban areas, mining operations, agricultural farms and aquaculture.*
- *Construction and/or upgrade of urban waste water treatment.*
- *Water pollution control, stream corridor restoration and recovery of rural and urban drainage capacity.*
- *Hydro-morphological measures such as improvements to river continuity.*
- *Control and manage floods effectively and scientifically. Increase regional drought and flood preparedness.*
- *Strict controls and specifying spatial conditions on licensing of activities aimed at extracting materials from river beds and continuous monitoring on the existent subjects.*
- *stabilization of river beds which have been subject to extraction of aggregate, changes in sediment load, changes in their banks, use of the land for dumping refuse and other uses affecting the natural environmental conditions.*
- *Restriction on the recreational use waters, with the aim on avoiding potential damage to natural resources.*
- *Incorporate future variability, uncertainties and risk in the decision-making process.*
- *Promote regional coordination and collaboration among local governments and agencies, public and private organizations.*

9.2.3 Water Resource Operations or New Schemes Impacting on Waterbody Status

Table 9-2 summarises those waterbodies whose status may be potentially affected by water resource schemes, and which may therefore be at risk of failing the environmental objectives as set out in Chapter 3. Mitigation measures or justification of failure to maintain or achieve good status will have to be provided in the Programme of Measures (Chapter 13).

Table 9-1 – Waterbodies Potentially Impacted by Water Resources Operations

WATERBODY NAME	SUB-BASIN	WATERBODY EU CODE	CURRENT FORM	CURRENT STATUS	POTENTIAL IMPACT
Fani Madh	Mat1	3512231	HMWB	Bad	Flow regime impacted by Lezha Dam
Lezha Dam	Mat2	LW351204	HMWB	Low	
Ulza	Mat1	3512333	HMWB	Bad	The flow regime affected by the Ulza dam
Uraka	Mat4	3512343	Natural	Average	The flow regime affected by the HPP dam

9.3 Flood Risk Management in the Mati Basin

9.3.1 Competent Authority and Coordination Measures

The National Water Council (NWC) is the main inter-institutional body responsible for drafting policies and plans for integrated water resource management.

WRMA in cooperation with the Ministry responsible for Civil Emergencies, drafts bylaws for plans and rules for flood risk management, in accordance with the legislation in force on Civil Emergencies and the National Plan of Civil Emergencies. For each river basin, WRMA:

- prepares a preliminary flood risk assessment based on available information, such as data and studies on long-term developments, and in particular the impacts of climate change in the event of floods;
- prepares flood hazard maps and flood risk maps, at the most appropriate level, for the announced flood risk areas;

- Prepares Flood Risk Management Plans (FRMPs) coordinated at the water basin level based on flood hazard maps and flood risk maps.

These plans focus on prevention, protection, readiness, including flood forecasting and early warning systems, which presents for the coordination to the bodies responsible for civil emergencies. WRMA contributes, in collaboration with the Ministry of Interior, to prevent civil emergencies. This includes the coordinated implementation of policies for river basin management and flood risk management in compliance with the legislation in force for civil emergencies and the National Management Plan for Civil Emergency.

MARD prepares and implements the investments for the protection of agriculture land and drainage pumping stations based on the FRM-plans.

The municipalities are responsible to protect urban areas from flood risk, also based on the FRM-plan.

The Agency for civil emergencies prepares and implements the national plan for civil emergencies which shall be coordinated with the flood risk management plans.

9.3.2 Summary of Historic Floods

Flooding is a frequent problem in the Mat River Basin.

A review of records and observations shows that there have been seven major floods over the past 150 years, in 1854, 1860, 1905, 1937, 1962-63, 1970-71 and 1992. The 1962-63 flood ranks third on this list. , and they seem to come back about every 50 years. During the floods of 1962-1963, an area of 8,000 ha in the Mat River basin was flooded for 10 consecutive days. Major floods in the coastal lowlands as a result of a combination of heavy rainfall, storm surges and tidal surges have been more frequent especially over the past 15 years. The intensification of these events is considered as an indicator of climate change in Albania. They have caused damage to infrastructure, drainage pump systems (eg, in September 2002), agriculture, etc. Coastal erosion has been more aggressive.

Another major flood in the coastal lowlands and estuary of the Mat Basin occurred in January 2010. The event was the result of the river receding as a result of the coincidence of very large tides, strong westerly winds combined with large flows of Mat river, but which were not in values beyond those usual for the river in that period of time. The main causes of extreme floods are the morphological characteristics and climatic conditions (cyclonic rains, which are preceded by storms) in this area. It should be added that the effects of adverse climatic conditions are sometimes exacerbated by poorly maintained high-level water channels and/or malfunctioning pumping stations (as in the case of the September 2002 flood), which fail to drain properly. rainwater is needed.

9.3.3 The Flood Risk Management Strategy

The EU FD is transposed into Albanian policy as part of the policy “The Content, Development and Implementation of National Water Strategies, of River Basin District Management Plans and of Flood Risk Management Plans”.

Floods are natural phenomena that cannot be avoided. While there are some human activities and climate change that contribute to increasing the probability of their negative effects. Floods pose a constant threat to human life, population displacement, the environment and economic development. The modern approach of the directive is to cooperate with all relevant actors to “live with the floods”, to protect, if possible, to adapt uses and constructions to flood risks in respective areas, and especially to prepare for being flooded, in a holistic approach with all potentially affected people, organizations, administrations and businesses.

WRMA, with the support of the project "Program for Improvement of the National Early Warning System and Flood Prevention in Albania" - PRONEWS, supported by the European Union.

Currently, there is no flood management plan in the Mat River Basin and flood hazard maps have not been prepared for all areas where there is a potential risk or likelihood of flooding. The same applies to flood risk maps.

The EU-funded Environmental and Social Impact Assessment (ESIA) and Detailed Design of the WBIF Project "Mat River Flood Protection Infrastructure" were implemented by the COWI-IPF Consortium (Infrastructure Projects Facilitating Instrument 8) in collaboration closely with the Ministry of Agriculture and Rural Development and the Water Resources Management Agency. This project started in January 2020 and was successfully completed in April 2021. The Feasibility Study and Preliminary Design for the most urgent flood protection measures in the lower Mat River Basin, Lezha Region, were prepared by the Infrastructure Projects Facilitating Instrument 2 (TA3-ALB-ENV-03) in 2012. The interventions were identified as "no regret" measures within the regional study "Analysis of gaps and assessment of needs in the context of the implementation of the EU Floods Directive", which was implemented by Infrastructure Projects Facilitating Instrument 4 (WBEC-REG-ENV-02) in the period January – September 2015. WBIF renewed its support in June 2018 through a grant for detailed design, environmental impact assessment and tender documents to enable the implementation of the project.
The objective of the project is to improve the level of flood protection management for the Mat River to prevent damage to human health, flora and fauna, and the economy. The project is expected to improve safety and reduce flood risk for 210,000 people, reduce soil erosion and promote sustainable agriculture and sustainable and risk-free settlements, while providing a boost to the local economy by providing jobs and reduction of economic losses. This is a continuation of an earlier project funded by WBIF in 2012, in which a comprehensive Feasibility Study for the Improvement of Flood Protection Infrastructure in Albania was developed and recommended that, unless the necessary improvements are made, floods can seriously damage people's health and the economy.

9.3.4 Flood Management Operations or New Schemes Impacting on Waterbody Status

Table 9-2 summarises those waterbodies whose status may be potentially affected by flood risk management operations and which may therefore be at risk of failing the environmental objectives as set out in Section 3. Mitigation measures or justification of failure to maintain or achieve good status will have to be provided in the Programme of Measures (Chapter 12).
According to the National Water Cadastre, no flood risk areas have been identified for the Mat River Basin. [158] But according to the Integrated Sectoral Coastal Plan many of these areas are flooded by Floods due to rainfall massive, from Shengjin to Ishëm.

Table 9-2 – Waterbodies Potentially Impacted by Flood Management Operations

WATERBODY NAME	SUB-BASIN	WATERBODY EU CODE	CURRENT FORM	CURRENT STATUS	POTENTIAL IMPACT
Mat	MAT0	351213	River	Low	Very High
Shperdheza	MAT2	35122613	HMWB	Low	Very High

9.4 Drought Risk Management in the Mati Basin

9.4.1 Competent Authority and Coordination Measures

The risks posed by water scarcity (droughts) are met with an efficient management of water resources and investments that serve all interests by applying national acts and by-laws which transpose with EU directives. According to the European Commission, droughts should be treated in a manner similar to

[158] http://kadastraujore.gov.al/

flood risk management. Although there are no EU directives, there are clear guidelines based on the WFD for the preparation of Drought Management Plans (GWPCEE, 2015).
As we prepare for droughts and scarce amounts of water, it is important to understand that they are two different phenomena. Droughts have natural origin while water scarcity (or water depletion) is defined as a situation where water resources are insufficient to meet long-term water use requirements. Planning to cope with droughts and to manage small amounts of water is a complex combination of monitoring hydro-meteorological trends with technical management of water resources and mitigation of socio-economic impacts. Regarding Drought Risk Management, there is no DCM on the establishment and functioning of a competent body, responsible for dealing with drought risk management.
MARD performs certain responsibilities through the exchange of information between municipalities and drainage boards. In addition, the Strategy for Irrigation and Drainage in Albania covers partially the drought management at country level.

9.4.2 Summary of Historic Droughts

Precipitation regime in Albania is Mediterranean and the most important factors that influence atmospheric precipitation are geographic location and topography. The smaller amount of precipitation receives the Southeast part of the country, where the annual amounts reach up to 600 mm, following by the Myzeqeja field, which receives about 1000 mm per year. The amount of precipitation falling down in Albanian territory is on the average 1480 mm/year. The biggest amount of precipitation is recorded during the cold months (October-March) about 75 % of the amount. The richest month on precipitation over all the territory is November, while the driest are July-August. Albania is considered a water-abundant country. Its renewable water resources amount to 41.7 billion cubic meters in a year out of which about 65% are generated within Albania and the remaining from upstream neighboring countries. Most of the rivers have highly irregular seasonal flow patterns. Nearly all carry less than 10% (and sometime zero) of their winter averages during the summer season. Lakes cover about 4% of the country's territory. There are 3 large lakes and 247 smaller lakes. 630 reservoirs totalling 5.60 billion cubic meters in a year of storage capacity have been built, mostly along the rivers for flood protection, irrigation and production of hydropower.
3 types of droughts are considered in Albania:

- meteorological droughts – defined on the basis of rainfall deficiency:
- hydrological droughts – where accumulated shortfalls in river flows or groundwater replenishment are of primary importance;
- Agricultural droughts where the availability of soil water through the growing season is the critical factor.

The most important drought type in the economic sector is the hydrological drought. This because water resources play a key role in the economy of Albania. About 97% of the total electricity production is generated from hydropower plants mostly on the 3 rivers. Also agricultural sector is influenced because about 50% of the cropland (400 000 ha) is irrigated producing about 80% of agriculture output.

9.4.3 The Drought Risk Management Strategy

The development of Water Basin Management Plans provides a good opportunity to address issues related to drought and water scarcity. Specifically, the WFD's requirement to achieve the quantitative groundwater status involves balancing between groundwater depletion and replenishment. Regarding the requirement for achieving good ecological status for surface waters, it is necessary to determine the minimum water (ecological) flow for each river, which supports the achievement of area-specific objectives related to aquatic biodiversity. Measures to achieve these objectives should be included in the Water Basin Management Plans. Regarding to drought management, since among other things, it directly affects the water supply for irrigation, the drought should be treated as a clear climatic concept

which is characterized by temporary water shortages for an extended period of time related to the normal supply (one season, one year, or several years). Regarding to the typology's role (meteorological, agricultural or hydrological drought), it determines the beginning, severity and end of a drought. The Strategy for Irrigation, Drainage in Albania includes a description of the current situation and key challenges for irrigation, drainage, dams and reservoirs, and flood protection. Irrigation and drainage systems throughout the country are deteriorated after years as lack of maintenance and necessary repairs. Emerging changes needed in cropping patterns and water application methods, as well as climate change, require modernization of structures to permit better water use efficiency and more intensive and reliable management and financing procedures. Also, the Drought Management Plans should be designed and implemented in accordance with international standards, including the engagement mechanism through the communication between relevant institutions and stakeholders and their involvement into the plan.

9.4.4 Drought Management Operations or New Schemes Impacting on Waterbody Status

Table 9-3 summarizes those waterbodies whose status may be potentially affected by drought risk management operations, and which may therefore be at risk of failing the environmental objectives as set out in Chapter 3. Mitigation measures or justification of failure to maintain or achieve good status will have to be provided in the Program of Measures (Chapter 12).

Table 9-3 – Waterbodies Potentially Impacted by Drought Management Operations

WATERBODY NAME	SUB-BASIN	WATERBODY EU CODE	CURRENT FORM	CURRENT STATUS	POTENTIAL IMPACT
				Reference	

9.5 Coastal Zone Management Plan

9.5.1 Competent Authority and Coordination Measures

In Albania coastal zone management plans are not yet fully developed. The National Coast Agency extends its activity throughout the territory of the coastal area of the Republic of Albania and in areas, territories, facilities and activities that are located or developed, in whole or in part or have an impact on the coastal area. It is responsible for the protection and sustainable development of the coastal area by monitoring and controlling the existing potential of the entire coastal zone, ensuring performance in coastal areas, managing integrated coastline and for their implementation. Creating and updating the National Inventory of the Coastal Zone; contributes to informing, consulting and accessing the public during the design and implementation of policies and strategies related to integrated coastal zone management; participates in the drafting of national policies and strategies for integrated coastal management and coordination of work for their implementation; proposes changes and improves the legal and sub-legal framework for integrated coastal zone management; controls the implementation of criteria and conditions by entities that exercise tourism activities, following applicable legal provisions; exercises control and inspects in the premises and in the documentation of the subjects that exercise tourist activities.

9.5.2 The Coastal Management Strategy

In the field of coastal zone management there are two operational framework documents:

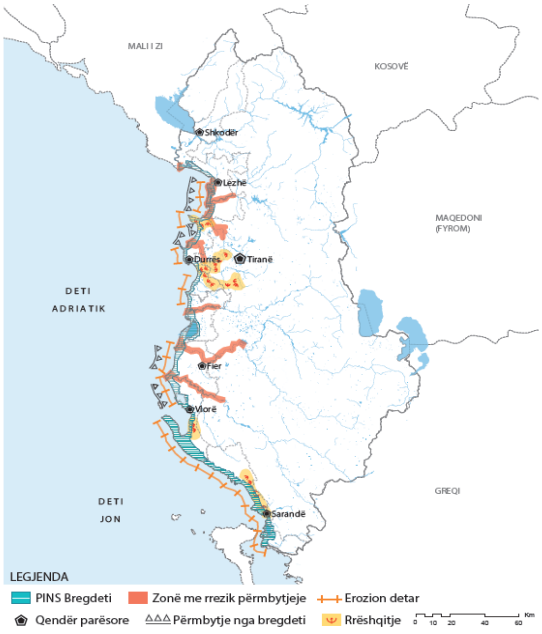
- National Strategy for the Development of Sustainable Tourism 2019-2033;
- Integrated Cross-Cutting Plan for the Coastal Belt 2030 (PINS).

The National Strategy for the Development of Sustainable Tourism aims at developing destinations, areas, products and diversifying the tourist offer, as well as increasing the added value of tourism potentials for the economic and social development of the country, through action plans for each region.

The integrated cross-sectoral plan will be the creation of the development of the coastal region, which will promote sustainable economic development, social integrity and protection of natural resources for the next 15 years.

In Albania, the lack of spatial plans and non-implementation of the legal basis is considered to be the biggest obstacle to sustainable development on the coast. The lack of an Integrated Cross-Cutting Plan for the coast has also caused fragmentation of planning, where territorial competencies and jurisdictions are separated. This has hampered the drafting of regional plans, which would potentially intersect if an Integrated Cross-cutting Coastal Plan would precede them. Moreover, all local and regional plans (few), as well as the developments so far, have been implemented without agreeing with a clear regional vision, much less national.

9.5.3 Coastal Management Operations or New Schemes Impacting on Waterbody Status



Harta 3.8 Zonat e rrezikuara

Table 9-4 summarises those waterbodies whose status may be potentially affected by coastal management operations, and which may therefore be at risk of failing the environmental objectives as set out in Chapter 3. Mitigation measures or justification of failure to maintain or achieve good status will have to be provided in the Programme of Measures (Chapter 13).

Albania's coastal ecosystems are under a considerable pressure. Risks are related with the loss of biodiversity and habitats natural, which play an important role in human health, food chain and in the availability of natural resources for economic development. According to a study of made by UNDP and INCA for the strategic plan regarding coastal protected areas, this situation comes as a result of the combination of several factor.

Lezha Municipality, where as a threatened area seen that of the Drin river estuary from New Balldren to the area of Tales, from marine erosion and coastal flooding (from Shengjini island) to the estuary of the river Mat. Also, the introduction of salt water in the Shengjin island area and erosion from the mouth of the Drin River to at the mouth of the Mat River endanger its flooding.

Kurbin Municipality is endangered by floods of the Mat River from Shkopet to estuaries, as well as marine erosion and floods from the coast are present from the mouth of the Mat River to estuary of the Ishëm River, from Fushë-Kuqja to the mouth of the Ishëm River. Areas of endangered by landslides are Gallata and Vinjolli.[159]

Table 9-4 – Waterbodies Potentially Impacted by Coastal Management Operations

WATERBODY NAME	SUB-BASIN	WATERBODY EU CODE	CURRENT FORM	CURRENT STATUS	POTENTIAL IMPACT
Tale	MAT0	CW351202	Coast	Moderate	Salinity level and Flood from the coast
Patok	MAT0	CW351205	Coast	Moderate	
Patoku Lagoon	MAT0	CW351206	Coast	Moderate	
Mati	MAT0	351213	River	Bad	

[159] Integrated cross-cutting coastal plan (PINS)

9.6 Strategic Environmental Assessment

9.6.1 Competent Authority and Coordination Measures

Strategic Environmental Assessment (SEA) is one of the key instruments for integrating environmental issues and principles of sustainable development in strategic planning and decision making. Since the PoMs is a key output of RBMPs, and these measures may themselves have major regional or cross-sectoral environmental implications, it is likely that in most cases the RBMP need be subjected to a SEA review. In Albania, Law 91/2013 on SEA and all related by-laws constitute the minimum requirement for the SEA assignment. The law is broadly aligned with Directive 2001/42/EC.[160] In Albania, Law 91/2013 serves to provide environmental protection and sustainable development through the incorporation of environmental issues in the drafting or reviewing plans or programs with potential negative consequences to the environment, which may include the River Basin Management Plan for example. The decision whether or not an SEA should proceed is under the competence of the Ministry of Tourism and Environment.

SEA procedure for both national and local-level plans and programmes is conducted at the national level, and includes the following stages:

- Notification of the Ministry of Environment by the proposing authority;
- Consultation with stakeholders on the issues that shall be addressed in the SEA report (scoping);
- Drafting of and public consultations on the preliminary SEA report;
- Drafting of the final SEA report;
- Review of the final SEA report and issuance of the Minister's declaration (i.e. official position of the
- Ministry);
- Decision of the proposing authority for adoption of the plan or programme;
- Monitoring of effects of the plan or programme on the environment, and reporting.

In case the ministry finds that the proposing authority has not implemented the requirements of the SEA law, then it communicates to the proposing authority the non-consideration for the approval of the declaration, giving the relevant reasons. The ministry also sends a copy of the response to the approval authority. If the plan or program is not approved within 2 years from the date of approval of the declaration, then the SEA Minister's Declaration becomes invalid and the SEA procedure starts from the beginning. The competent authority for the final approval of the RBMP ensures that before making a decision on their approval or not, the requirements of the SEA law have been implemented and the proposer has received the Declaration of the Minister for SEA.

9.6.2 Main Elements of the Strategic Environmental Assessment

The SEA can be understood as "a systematic and anticipatory process, undertaken to analyse the environmental effects of proposed plans, programmes and other strategic actions and to integrate the findings into decision-making".

The Albanian law on SEA defines four main elements (Table 9-5):

- Preparation of reports on strategic assessment.
- Ensuring public participation and public debate.
- Taking into account the results of the strategic assessment and public participation in the decision-making stage.
- Providing information on made decisions.

[160] European Commission - Directive 2001/42/EC - On the assessment of the effects of certain plans and programmes on the environment, 'the strategic environmental assessment Directive'

Table 9-5 – Main Elements of the SEA Process

STAGE	OBJECTIVES	COMPLETION STATUS
Screening stage by Competent Authority	Decision on whether an SEA of the RBMP is required and under what criteria.	*Law no.91/2013*
Scoping and statutory consultation	Scope and level of detail to be considered in the environmental assessment, and list of key stakeholders and coordination measures	*Completed by 15.06.2023*
Environmental assessment report and consultation	Assessment of significant impacts on the environment arising from the implementation of the RBMP Programme of Measures and consideration of reasonable alternatives. The draft SEA report must accompany the draft RBMP.	*Completed by 30.06.2023*
SEA Declaration by the competent authority	Statement of how environmental considerations and consultations have been integrated into the final RBMP, with issue of a final SEA Declaration.	*Issued on 04.09.2023*

The SEA process assists authority responsible for the RBMPs, as well as decision-makers, to take into account:

- Key environmental trends, potentials and constraints that may affect or may be affected by the RBMP
- Environmental objectives and indicators that are relevant to the RBMP
- Likely significant environmental effects of proposed options and the implementation of the RBMP
- Measures to avoid, reduce or mitigate adverse effects and to enhance positive effects
- Views and information from relevant authorities, the public and – as and when relevant – potentially affected neighbor countries.

A strategic environmental assessment to be carried out for RBMPs comprising:

a) preparation of an environmental report
b) carrying out of consultations
c) taking into account of (i) and (ii) in decision making
d) information on the decision.

9.6.3 Main Conclusions of the Strategic Environmental Assessment

The SEA Report has to summarize all findings and conclusions achieved during the entire SEA process and serve as a basis for consultations with relevant authorities and other stakeholders.
The Strategic Environmental Assessment is not a decision-making tool. It provides information about the likely impacts on the environment and human health caused by the decision.
Nevertheless, the conclusions of the SEA process must be taken into account in the decision (and later during the implementation of the RBMP).

10. Waterbody Pressures, Status and Impacts Assessment

10.1 Overview

Central to the objectives of the River Basin Management Plan is a structured assessment of all pressures likely to be operating on waterbodies in the river basin(s), the resultant change in status and consequent impacts on aquatic ecosystems. Pressures (predominantly anthropogenic or 'artificial influences', but also climate change) may create a change in status (the central indicator of the 'health' of the waterbody), which may then result in negative impacts. These may be adverse changes in water quality, quantity, ecosystem morphology or all combined.

The deficient status (risk of failure) for each waterbody creates a gap relative to the environmental objectives (EOs) set out in Chapter 3. Where 'good status' is achieved, environmental policies and the regulatory system should maintain that status (Chapter 12). Where 'good status' is not achieved a remedial action plan should either maintain or improve each waterbody where it is at risk of failing the specified EOs, set out under the PoMs (Chapter 13).

The WFD requires the systematic identification of significant pressures from anthropogenic influences such as point sources of pollution, diffuse sources of pollution, modifications of flow regimes through abstractions or regulation and morphological alterations, as well as any other pressures[161], WFD Article (5). 'Significant' means that the pressure contributes to an impact that may result in failing to meet the WFD environmental objective of not having at least 'good status', WFD Article 4(1). In some cases, moderate pressures from several marginal drivers may in combination become significant.

The key stages of the general approach as laid down in the WFD are:

- Identify driving forces (influences)
- Identify the significant pressures
- Determine the consequent status
- Assess the impacts
- Evaluate the risk of failing to meet the objectives.
- Propose mitigation and/or protection measures.

10.2 Examples of Pressures and Impacts

Conventionally, pressures and impacts occur either at point scale or diffuse scale. [162] Diffuse pressures e.g. nitrate pollution from agriculture e.g. over-abstraction of groundwater - may require general environmental policies or management strategies that apply over a wide area (e.g. a sub-basin, group of waterbodies or an aquifer). Conversely, point pressures such as wastewater discharges or hydropower outflows may require specific actions for individual waterbodies, although the correctly determined and enforced higher level policies should in theory prevent the need for later remedial specific measures in many cases. To varying degrees all of above the pressures and impacts are present in the Mati basins.

10.3 Standardized Pressures Assessment Using WISE Reporting Procedures

10.3.1 Standard Enumeration Lists of Pressures and Indicators from WISE

In order that pressures reporting in the RBMP is correctly aligned with WISE reporting obligations, Tables 10-1 and 10-2 set out the principal key types of pressures, together with two variants of

[161] European Commission – CIS Guidance Document 3 - Analysis of Pressures and Impacts, EC 2003

[162] European Commission – CIS Guidance 2 – Analysis of Pressures and Impacts

'pressure indicator', derived from WISE 2016 guidance and reproduced in full in Technical Annex 10.[163] [164]

Pressure 'types' are the principal forms of anthropogenic influence that may impact on waterbody status: e.g. untreated urban wastewater e.g. hydrological alteration due to hydropower. Pressure 'indicators' give the quantitative strength of the pressure that has to be reduced in order to meet environmental objectives, e.g. BOD_5 load in the receiving watercourse e.g. flow or time reduction required of HPP running time. The pressure enumeration list codes are shown as part of the Pressures – Status summary (Tables 10-6, 10-7) and should also form part of the attribute list of the Waterbody feature class of the NWRC.

10.3.2 Identification and Quantification of Pressures and Indicators

The pressures assessment and resultant status are central to understanding and quantifying the gaps between environmental objectives and the current state of waterbodies in the river basin. The assessment is necessarily a mixture of analytical and descriptive criteria depending on the level of data available.

Assessment of waterbody status can be a reasonably simple exercise by comparison against standards on the basis of a single analytical sample, but assessment of pressures is more complex, because *a)* pressures are typically more abstract and harder to quantify *b)* different pressures combine in complex ways to influence a waterbody's status. Quantification of pressures, though feasible, requires significant amounts of good quality data, much of which is not collected in Albania at this time. Significant improvements in data collection and coordination between competent authorities will be required in future.

It is noted that many of the 'pressure indicators' require a volume quantity to be reported, either as part of a pollutant load calculation, or as part of an environmental flow impact. Due to the complete collapse of the national hydrometric network and absence of recent useable hydrological data, and a substantial lack of monitored effluent volume data generally by municipalities and industries, it is not often possible to set meaningful pressure indicators at this time. Further, in numerous cases in the river basins of Albania, there are an insufficient number of monitoring points to cover all delineated waterbodies. Consequently, the pressures and status of the non-monitored waterbodies has to be assumed using expert judgement. (This is a specific reason to sub-divide the river basin to sub-basins, so that local pressures can be more precisely quantified and managed).

In order to improve environmental policy making within the AWRM and other competent authorities, and to identify 'environmental hotspots' that may require stricter regulation (through Permit conditions and enforcement) some degree of quantitative indexing of pressure is essential. Table 10-1 and Table 10-2 therefore provide two sets of indicators for pressure, both of which are broadly compliant with the WISE 2016 reporting schema.

'General indicators' are high level quantities of pressure related objects, such as numbers of outfalls, number of hydropower or agricultural abstraction points, lengths of waterbodies affected, number of installations without Permits etc. These should be easily definable even in the currently reduced functional state of the National Water Resources Cadastre (NWRC), based on desk studies or rapid field inspections.

'Precise indicators' in compliance with WISE 2016 will require greatly improved sectoral measurement and reporting than is currently available through the NWRC, especially regarding effluent parameter measurement and river flow volumes.

[163] The approach adopted in the new template for RBMPs in Albania is to closely align with WISE reporting requirements in terms of feature classes and attributes. This focuses data collection only on what is needed for WISE and EIONET reporting, and orientates the NWRC data structures to be broadly aligned with WFD outputs.

[164] Water Information System for Europe – WISE GIS Guidance – on the reporting of spatial data to WISE, v 6.0.6, 2016.

Table 10-1 – Standard Pressure Types and Indicators, Types 1 to 3

SECTORAL PRESSURE	CODE [165]	TYPE A GENERAL INDICATOR [166]	TYPE B PRECISE INDICATOR [167]
	1	**POINT POLLUTION PRESSURES**	
URBAN WASTEWATER	1.1	NO. OF OUTFALLS FAILING OBJECTIVES	BOD/N/P LOAD REDUCTION (t/year)
URBAN STORM OVERFLOWS	1.2	NO. OF OVERFLOWS FAILING OBJECTIVES	STORM WATER VOLUME REDUCTION
INDUSTRY - IED PLANTS	1.3	NO. OF SITES FAILING OBJECTIVES	BOD/NH_4/PS LOAD REDUCTION (t/year)
INDUSTRY – NON IED	1.4	NO. OF SITES FAILING OBJECTIVES	BOD/NH_4/PS LOAD REDUCTION (t/year)
CONTAMINATED SITES	1.5	NO. OF SITES FAILING OBJECTIVES	PS/RBSP LOAD REDUCTION (t/year)
LANDFILL WASTE DISPOSAL	1.6	NO. OF SITES FAILING OBJECTIVES	PS/RBSP LOAD REDUCTION (t/year)
MINE DEWATERING	1.7	NO. OF SITES FAILING OBJECTIVES	PS/RBSP LOAD REDUCTION (t/year)
AQUACULTURE FISH FARMS	1.8	NO. OF SITES FAILING OBJECTIVES	BOD/NH4/PO_4 LOAD REDUCTION (t/year)
OTHER NOT SPECIFIED	1.9		
	2	**DIFFUSE POLLUTION PRESSURES**	
URBAN RUNOFF	2.1	KM OF WATERBODY FAILING OBJECTIVES	PS/RBSP LOAD REDUCTION (t/year)
AGRICULTURE RUNOFF	2.2	KM OF WATERBODY FAILING OBJECTIVES	N/P LOAD REDUCTION (t/year)
FORESTRY RUNOFF	2.3	KM OF WATERBODY FAILING OBJECTIVES	N/P LOAD REDUCTION (t/year)
HIGHWAY/TRANSPORT	2.4	KM OF WATERBODY FAILING OBJECTIVES	PM/NO_2/RBSP LOAD REDUCTION (t/year)
ABANDONED SITES	2.5	NO. OF SITES FAILING OBJECTIVES	PS/RBSP LOAD REDUCTION (t/year)
URBAN DIFFUSE WASTE	2.6	NO. OF SITES FAILING OBJECTIVES	PS/RBSP LOAD REDUCTION (t/year)
ATMOSPHERIC DEPOSITS	2.7	CATCHMENT AREA FAILING OBJECTIVES	PM/NO_2 LOAD REDUCTION (t/year)
MINING CONTAMINATION	2.8	NO. OF SITES FAILING OBJECTIVES	PS/RBSP LOAD REDUCTION (t/year)
AQUACULTURE	2.9	NO. OF SITES FAILING OBJECTIVES	BOD/NH4/PO_4 LOAD REDUCTION (t/year)
OTHER NOT SPECIFIED	2.10		
	3	**FLOW ABSTRACTION/DIVERSION PRESSURES**	
AGRICULTURE	3.1	NO. OF ABSTRACTION POINTS	VOLUME TO BE REDUCED (Mm^3/year)
PUBLIC WATER SUPPLY	3.2	NO. OF ABSTRACTION POINTS	VOLUME TO BE REDUCED (Mm^3/year)
INDUSTRY + HYDROPOWER	3.3	NO. OF ABSTRACTION POINTS	VOLUME TO BE REDUCED (Mm^3/year)
ENERGY COOLING WATER	3.4	NO. OF ABSTRACTION POINTS	VOLUME TO BE REDUCED (Mm^3/year)
AQUACULTURE FISH FARMS	3.5	NO. OF ABSTRACTION POINTS	VOLUME TO BE REDUCED (Mm^3/year)
RECREATION / OTHER	3.6	NO. OF ABSTRACTION POINTS	VOLUME TO BE REDUCED (Mm^3/year)

[165] Classification based on WISE 2016 GIS Reporting Schema element – *SWSignficantPressureTypes; GWSignficantPressureTypes*

[166] General Indicators should be interpreted as number/length of installations/sites/objects assumed to be creating detrimental impact. Either a) Permits do not exist or are not complied with b) Permits are insufficient in terms of ELVs and/or EQSs.

[167] Precise Indicators should be interpreted as the quantity reduction required to achieve the environmental objective(s), usually tonnes/year, Mm^3/year, hours/year.

Table 10-2 – Standard Pressure Types and Indicators, Types 4 to 8

SECTORAL PRESSURE	CODE [168]	TYPE A GENERAL INDICATOR	TYPE B PRECISE INDICATOR
	4	**MORPHOLOGICAL PRESSURES**	
FLOOD DEFENCES	4.1.1	KM OF WATERBODY FAILING OBJECTIVES	KM OF STRUCTURES FAILING OBJECTIVES
AGRICULTURE	4.1.2	KM OF WATERBODY FAILING OBJECTIVES	KM OF STRUCTURES FAILING OBJECTIVES
NAVIGATION	4.1.3	KM OF WATERBODY FAILING OBJECTIVES	KM OF STRUCTURES FAILING OBJECTIVES
OTHER MODIFICATIONS	4.1.4	KM OF WATERBODY FAILING OBJECTIVES	KM OF STRUCTURES FAILING OBJECTIVES
HYDROPOWER STRUCTURES	4.2.1	KM OF WATERBODY FAILING OBJECTIVES	STRUCTURES FAILING OBJECTIVES
FLOOD STRUCTURES	4.2.2	KM OF WATERBODY FAILING OBJECTIVES	STRUCTURES FAILING OBJECTIVES
MUNICIPAL STRUCTURES	4.2.3	KM OF WATERBODY FAILING OBJECTIVES	STRUCTURES FAILING OBJECTIVES
IRRIGATION STRUCTURES	4.2.4	KM OF WATERBODY FAILING OBJECTIVES	STRUCTURES FAILING OBJECTIVES
RECREATION STRUCTURES	4.2.5	KM OF WATERBODY FAILING OBJECTIVES	STRUCTURES FAILING OBJECTIVES
INDUSTRY STRUCTURES	4.2.6	KM OF WATERBODY FAILING OBJECTIVES	STRUCTURES FAILING OBJECTIVES
NAVIGATION STRUCTURES	4.2.7	KM OF WATERBODY FAILING OBJECTIVES	STRUCTURES FAILING OBJECTIVES
OTHER STRUCTURES	4.2.8	KM OF WATERBODY FAILING OBJECTIVES	STRUCTURES FAILING OBJECTIVES
	4	**HYDROMORPHOLOGICAL PRESSURES**	
AGRICULTURE	4.3.1	KM OF WATERBODY FAILING OBJECTIVES	EN15843 FLOW MODIFICATION INDEX
TRANSPORT	4.3.2	KM OF WATERBODY FAILING OBJECTIVES	EN15843 FLOW MODIFICATION INDEX
HYDROPOWER	4.3.3	KM OF WATERBODY FAILING OBJECTIVES	EN15843 FLOW MODIFICATION INDEX
MUNICIPAL WATER	4.3.4	KM OF WATERBODY FAILING OBJECTIVES	EN15843 FLOW MODIFICATION INDEX
AQUACULTURE	4.3.5	KM OF WATERBODY FAILING OBJECTIVES	EN15843 FLOW MODIFICATION INDEX
OTHER ACTIVITIES	4.3.6	KM OF WATERBODY FAILING OBJECTIVES	EN15843 FLOW MODIFICATION INDEX
HABITAT LOSS	4.4	KM OF WATERBODY FAILING OBJECTIVES	KM^2 OF HABITAT LOSS
OTHER MODIFICATIONS	4.5		
	5	**AQUACULTURE & INTRODUCED PRESSURES**	
INTRODUCED SPECIES	5.1	KM OF WATERBODY FAILING OBJECTIVES	NO. OF INTRODUCED SPECIES
EXPLOITATION OF SPECIES	5.2	KM OF WATERBODY FAILING OBJECTIVES	NO. OF LOGGED SITES
SOLID WASTE TIPPING	5.3	KM OF WATERBODY FAILING OBJECTIVES	NO. OF LOGGED SITES
	6	**GROUNDWATER PRESSURES**	
GROUNDWATER RECHARGE	6.1	NO. OF GWBs IMPACTED BY RECHARGE	VOLUME OF RECHARGE TO RECOVER
GROUNDWATER VOLUME	6.2	NO. OF ABSTRACTION POINTS	VOLUME OF ABSTRACTION TO RECOVER
	7-8	**MISCELLANEOUS & CHEMICAL PRESSURES**	
OTHER PRESSURE	7	KM OF WATERBODY FAILING OBJECTIVES	AS REQUIRED
UNKNOWN PS	8	KM OF WATERBODY FAILING OBJECTIVES	PS LOAD REDUCTION (t/year)
UNKNOWN RBSP	8	KM OF WATERBODY FAILING OBJECTIVES	RBSP LOAD REDUCTION (t/year)

[168] Classification based on WISE 2016 GIS Reporting Schema element – *SWSignficantPressureTypes; GWSignficantPressureTypes*

10.3.3 Standard Enumeration List of Impact Types

Table 10-3 reproduces Annex 1b of the WISE 2016 reporting requirements, with the relevance to surface water and groundwater. [169] Identifying the pressure(s) applying to waterbody *nnnnn*, it should generally be possible to infer the most relevant type of impact. Several impacts may arise from a single pressure.

For example, a hydropower installation may disrupt downstream flow quantity, water temperatures, habitat morphology and flow regime.

For example, excessive groundwater abstraction may reduce the water table static level, impacting on groundwater dependent terrestrial ecosystems and/or induced saltwater intrusion in coastal areas.

Table 10-3 – Standard Impact Types

Impact Type	Relevant SW	Relevant GW
Nutrient pollution	Y	Y
Organic pollution	Y	Y
Chemical pollution	Y	Y
Saline pollution/intrusion	Y	Y
Acidification	Y	N
Elevated temperatures	Y	N
Altered habitats due to hydrological changes	Y	N
Altered habitats due to morphological changes (includes connectivity)	Y	N
Litter (an impact under the MSFD)	Y	N
Microbiological pollution	Y	Y
Diminution of quality of associated surface waters for chemical / quantitative reasons	N	Y
Damage to groundwater dependent terrestrial ecosystems for chemical / quantitative reasons	N	Y
Alterations in flow directions resulting in saltwater intrusion	N	Y
Abstraction exceeds available GW resource (lowering water table)	N	Y
Other Significant Impacts	Y	Y

10.4 Surface Waterbody Pressures and Status Assessment Overview

10.4.1 Pressures Assessment at Sub-basin Level

For general policy purposes and regulatory focus (i.e. Permits) a useful summary of pressures following the list of Tables 10-1 and Table 10-2 is presented in Table 10-4 (general indicators) and Table 10-5 (precise indicators). Where data are not available within the NWRC, indicators are not reported. Improvements of data collection relevant to environmental objectives are a key measure in most RBMP Programmes of Measures (PoMs).

The matrix approach of Tables 10-4 to 10-6, (where the reported values are a direct reflection of the degree of potential pressure(s)) helps the Competent Authority to take the risk-based approach i.e. to identify the priority areas for investigation or tighter regulation.

Interpretation of the Pressures-Status Tables 10-4 to 10-6 in their various forms should be done in conjunction with the overview Map 10-1 (Abstraction, Hydropower and Morphological Pressures) and Map 10-2 (Wastewater Discharges, Diffuse Pollution and Other Pressures).

Abstraction and hydropower pressures are derived from the AWRM "Register of Abstractions" presented in Technical Annex 10. The Register is not fully up to date or accurately coordinated in many cases. Where known, abstractions include for major irrigation offtakes, although the operational status of many irrigation abstractions is not currently recorded by AWRM.

Wastewater discharges are also incomplete; industrial effluent points largely derive from the Permit register maintained by the competent authority, the National Environmental Agency (NEA). However,

[169] WISE 2016 GIS Reporting Schema element: *<SWSignficantImpactTypes>, <GWSignficantImpactTypes>*

the predominant impact on river water quality is likely to be from urban municipal wastewater, and currently no register exists of specific municipal outfalls with precise coordinates. The general level of urban wastewater pollution therefore has to be inferred simply from the number of recorded wastewater outfalls (Indicators 1.1, 1.2, 1.3 of Table 10-1).
Physical pressures are taken to include significant changes to river morphology due to river gravel extraction points or channel modifications for agriculture, flood protection or realignment purposes.
Chemical pressures are taken to include pollution hotspots (solid waste dumps and chemical residues) and mining activities.
All Heavily Modified Waterbodies (HMWBs) infer some degree of physical pressure on the riverine ecosystems, and therefore the HMWBs are also shown in Map 10-2.

10.4.2 Status Determination Methodology at Waterbody Level

Tables 10-4 to 10-6 summarise the status determination for all surface waterbodies in the Mati basin. The general procedure has been set out under section 3.3. Currently in Albania, with very limited resources directed at the monitoring programmes, there is a significant deficit of data to support ecological assessments. In particular, biological quality elements are not routinely sampled in most river basins, and reference conditions for BQEs are not yet established. There is also limited laboratory capability to test for many priority substances.
Consequently, in the first issue of the updated RBMPs for Albania (2024-2029) the majority of waterbody status allocations have been made on the basis primarily of physico-chemical standards and expert judgement regarding biological quality. WFD CIS guidance states that the determination of the ecological status necessary for the 'risk assessment' should be based directly only on biology, (the highest ranked quality element). Alternatively indicative data (hydromorphological and physico-chemical elements) can be used in situations where only these data are available.
Since data quality is central to the status methodology, it is also necessary to report on the 'confidence level' (CL) of the status assessment. [170] A low confidence and precision in the data potentially leads to a risk of misclassification, hence the CL gives an indication of the reliability of the status value. WISE 2016 guidance advises on the following classification to indicate the confidence on the ecological status or potential assigned:
'0' = no information; '1' = low confidence; '2' = medium confidence; '3' = high confidence.
The criteria are as follows:
Low = no monitoring data, expert judgement only; Medium = some supporting quality element (QE) data and limited data on one BQE; High = good data on 1+ BQE and most relevant supportive QEs.

10.4.3 Exemption Types for Heavily Modified Waterbodies

The overall WFD objective for HMWBs/AWBs is good ecological potential, rather than ecological status. Additional information is required on the designation and reporting of AWB and HMWBs in order to justify certain derogations of environmental objectives as set out under WFD Article 4(2) to 4(7) so as to permit the continuation of these specified uses (which provide valuable social and economic benefits) but at the same time encourage mitigation measures to improve water quality.[171]

[170] WISE GIS Guidance 2016 – Schema: SWB; schema element *<SWEcologicalConfidence>*

[171] European Commission – CIS Guidance Document 20 – Exemptions to the Environmental Objectives

10.5 Special Consideration of Hydropower Impacts

A significant legacy issue is the lack of a consistent and objective methodology to assess the potential hydro morphological impacts of proposed hydropower operations, as described under Chapter 3, Environmental Objectives. The new RBMP framework for Albania addresses this issue through the use of the European Standard EN15843, as described as part of the overall environmental objectives, section 3.3.5.

A standard template is used to objectively identify the degree of flow disruption for all HPPs operating in the river basin, in terms of flow disruption and time disruption (Table 10-11). If it is assumed that Moderate Status (Class 3) (in terms of flow regime) is the best that can be achieved for a Heavily Modified Waterbody (HMWB) impacted by hydropower i.e. equating to Maximum Ecological Potential, then Table 3-2 illustrates for example that in order to achieve GEP, the HPP flow diversion % must be < 50%, and the duration of operation must < 60%. This is a mean annual value. Seasonal values for critical ecosystems may be significantly more onerous.

HPPs that are not able to deliver this level of GEP will therefore place the impacted waterbodies in a permanent state of deficient status for the duration of the HPP concession and will therefore fail WFD environmental objectives. The competent authority (AWRM) is obliged to provide justifications under WFD Article 4(3)(a) & (b) for existing installations or WFD Article 4(7) for new installations or modifications to the waterbody as to why GEP cannot be achieved.

The impact score of Table 10-11 is a simple relative score to facilitate comparison of different HPPs across waterbodies, sub-basins and basins. The expected hydro morphological status of the waterbody (as determined by EN 15843) is factored by the length of the depleted reach, measured in 500m 'continuity units'. It is nominally assumed that a depleted reach of ≤ 500m will not significantly impact on the longitudinal continuity of the river, but this would require confirmation from ecological surveys.

The objective methodology of Table 10-11 and Table 10-15 promotes a risk based approach to the efforts required to achieve Good Ecological Potential for HMWBs affected by hydropower operations i.e. those HPPs with high impact scores should obviously receive priority attention in the Programme of Measures.

10.6 Surface Water Pressures and Status Main Summary – Mati Basin

10.6.1 Overview

Table 10-4 presents one of the main outputs of the Mat River Basin PMBU, namely the final inventory of delineated water bodies, potential pressures, rough calculation of water body status and assessment of water bodies at risk of failure meet environmental objectives.

Multiple activities apply to status determination. General drivers described in Chapter 4, characterization and delineation (Chapters 5, 6, 7), monitoring results and data (Chapter 8), and potential impacts from related strategies (Chapter 9).

Tables 10-5 and 10-6 also include artificial (AWB) and highly modified (HMWB) water bodies, as the target setting process for HMWBs and AWBs should be in line with the general principles that apply to natural water bodies (delineation, pressures, status elements). The main difference is that the AWBs/ HMWBs are assessed as being linked to the “maximum ecological potential” (PEM) reference conditions (see sections 3.3.6 & 10.5).

Often, the way reservoirs should be classified is not very clear. DKU's GIS guidance suggests that reservoirs created by the construction of dams in rivers should be classified as highly modified river water bodies (but at the same time typology differentiation and applicable environmental quality elements (ECM) should be taken into account, in accordance with the descriptors of any category of natural surface water to which the AWB or HMWB is more similar, eg LAKES). This is not a logical approach and in the WISE reporting scheme it is accepted that reservoirs are classified in the lake category, provided that the <Reserved> reporting scheme element is met. This is the approach used in the Albanian classification.

Water body status by length should be the preferred unit of measure, as this measure more accurately reflects the overall ecological impact of pressures.

For the "Lakes" category, there is no data available in terms of activities/possible pressures on water bodies and water quality monitoring. KTA does not monitor the lakes. Future lake and coastal water monitoring requirements are set out in Section 10.7.2.

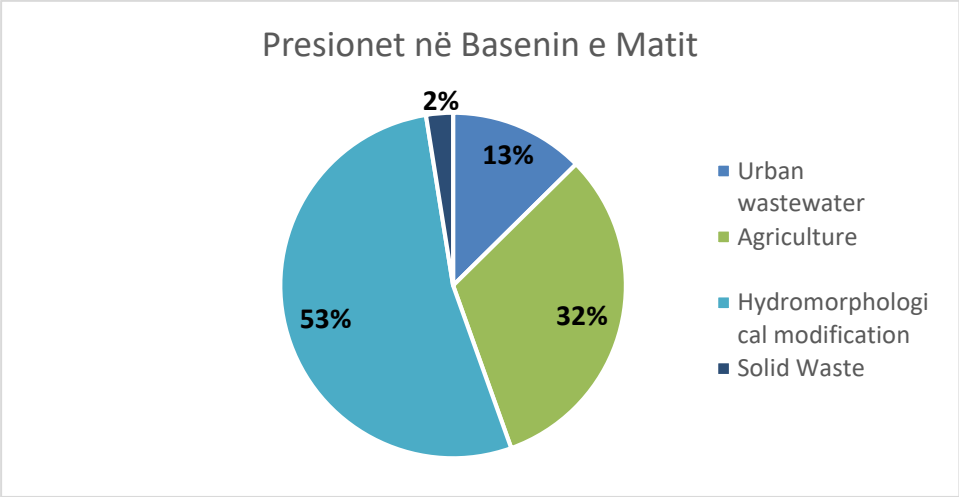
One of the main tasks of the environmental policies (Chapter 12) and the Program of Measures outlined in Chapter 13 is to specifically identify the objectives for improving the status based on the current determinations (2021). The Program of Measures must identify indicators and targets in a clear, objective and verifiable manner. For example, the goal of reducing Poor Status from 45% to 30% and improving the status of water bodies to Good Status from 5% to 20% is a goal that can be quantified to see the implementation result. of the Water Basin Management Plan until 2029.

The main significant pressures on surface water bodies are hydro-morphological pressures, distributed sources, especially from agriculture, discharges, wastes, water extractions, etc. The main impacts on the Mat River are nutrient enrichment, chemical pollution and altered habitats due to morphological changes. A variety of pollutants in the Mati River threaten aquatic ecosystems and may cause public health concerns. Reducing pollution to meet the objectives of the WFD requires the implementation of several other objectives and regulations. Agricultural production is a major source of diffuse pollution, mainly as a result of excess emissions of nutrients and chemicals, such as Pesticids. Other contributing factors include rural housing, flooding from urban areas and forests. There are several mitigation measures that can be implemented in the current situation, including farm-level nutrient planning, fertilizer standards, proper tillage, nitrogen fixation, and intercropping, crop rotation, and crop rotation. of agricultural crops. Over the past decades, there has been a steady increase in the use of mineral fertilizers and in nutrient surpluses of agricultural origin.

The view of the bed of the river Mat in the Municipality of Klos is really alarming, as on both sides of it there are plastic waste stuck in the vegetation. A large part of this waste remains in the vegetation along the bed of the Mat River. Since 2016, when heavy rains significantly increased the flows at the river entrance, which then directly affected the speed of waste transport. Despite the fact that almost

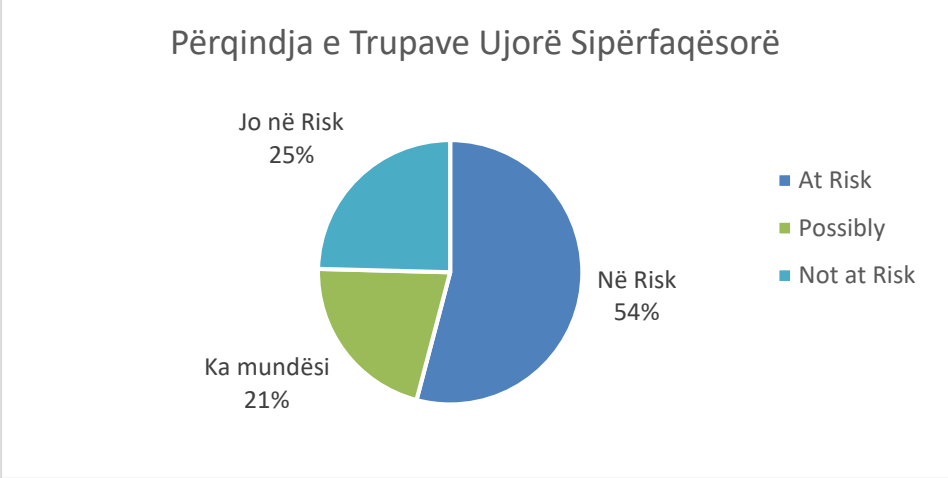
4 years have passed, no initiative has been taken to clean the river bed of these wastes that have stuck in the vegetation.
The consequences of this assessment are numerous, both in the aquatic world that lives in the Mati River and in the Ulza Lake, as well as in the ecosystem. The presence of numerous wastes, ranging from plastics to rags, has a negative impact on the parts of nature they pass through. According to national legislation or international standards for sustainable waste management and integrated management systems, waste management systems are not very effective in these areas.
The Lezhë-Shëngjin coastline, located in the center of the Adriatic Sea, is characterized by a variety of water bodies that have a direct impact on sea quality. The presence of the Kune-Vain lagoon complex, the Drin and Mat rivers, urban pollution of the cities of Lezha and Shengjin, agricultural and industrial activities, and the influence of the port of Shengjin are also important indicators.

Figure 10-1 – Pressure percentages in the Mat Basin



In the Mat Basin, the percentages of water bodies distributed according to variable status levels are presented in Figure 10 -2. 54% of 61 river water bodies have been identified as being at risk of not meeting the environmental objectives (status lower than "I good") in the category of "Rivers, TUTMs and Temporary Waters".

Figure 10-2 - Proportions of delineated water bodies according to status levels - Mat River Basin



Water body status by length should be the preferred unit of measure, as this measure more accurately reflects the overall ecological impact of pressures. Most of the water body status classification is dominated by water bodies with "Medium" status. This is due to a significant lack of data for many water bodies, where there is insufficient evidence to determine bad or poor status, but the analysis of the Assessment of Pressures and Status table for RIVERS, TUAs, TUTM- of TRANSIENT WATERS indicates that the status is likely to be “less than good”. Therefore, for the period 2024-2029, the addition of monitoring and assessment of water bodies with average status is needed, to be as accurate as possible in determining these statuses.

10.6.2 Surface waterbodies most likely ‘at risk’

This section further elaborates on the assumptions behind determining the potential pressures and status of individual water bodies that are considered "at risk of not meeting environmental objectives", requiring additional monitoring, implementation of general policies (Chapter 12), or more specified measures (Chapter 13) in order for these water bodies to achieve "good status". It is more than clear that the overall status of most water bodies derives from very limited data on individual "quality elements" (EC), which are mainly physico-chemical. Consequently, the confidence level (NB) has a high degree of uncertainty.

The methodological assumption is that the water body should be classified with "good status" (class 2) or "very good status" (class 1) only if a) there is no evidence of significant pressures in the water body or upstream and b) the measured status of the water body is confirmed by the data on the quality elements. Consequently, 61 river water bodies in the basin have been assigned a "moderate" status (class 3), as there is insufficient data to support the assessment and it appears that there may be significant pressures that could affect their status. unknown

Other water bodies, where the observed conditions and/or the measured status are more certain, are assumed to be classified either with "bad status" (class 5), or with "poor status" (class 4).

River water body 3512231 – the lower course of the Lezha Dam. This river is fully dammed to ensure reservoir capacity. Apparently there was no provision for environmental flows, and virtually all the collected water was diverted through the HPP's dysfunctional canal and pipeline, leaving the stream completely devoid of most of its flow to the confluence. The dam has also formed a major barrier for migratory species; therefore, the water body has been assessed with the status 'bad' (class 5) (considerable pressure 3.3, 4.2.1, 4.3.3). It is possible that the flow above the dam of the water body (LW351204) was significantly affected by this physical barrier, in terms of hydrobiological elements, but there are no data to support this.

River water body **3512333** – the downstream of the Ulza Dam. This river is fully dammed to ensure reservoir capacity. Apparently there was no provision for environmental flows, and virtually all the collected water was diverted through the HPP's dysfunctional canal and pipeline, leaving the stream completely devoid of most of its flow to the confluence. The dam has also formed a major barrier for migratory species; therefore, the water body has been assessed with the status 'bad' (class 5) (considerable pressure 3.3, 4.2.1, 4.3.3). It is possible that the flow above the dam of the water body (LW351202) was significantly affected by this physical barrier, in terms of hydrobiological elements, but there are no data to support this.

River water body **3512773** – clearly has several pressures, including untreated urban sewage and gravel extraction. This stream passes through agricultural lands, where there may be some groundwater withdrawals, which most likely affect stream flows. However, the primary pressure is assumed to come from water intakes that are mainly for irrigation and the canal system located on the north bank of the river and extending westward. The physical change in the water body related to the construction of dams in the river, so the water body has been assessed with a "bad" status (class 5).

River water body **3512771** - Pressures in the upstream basin, mainly in small HPPs and gravel extraction. Minimum pressure on dirty water.
River water body **351275** – this water body joins the rivers in the center of the city, near the municipality of Klos. Although in its natural form, untreated urban waters introduce extremely high levels of BOD5 into receiving waters. Also, the situation in the Municipality of Klos is really alarming, since on both sides of it there are plastic wastes stuck in the vegetation. A large part of this waste remains in the vegetation along the bed of the Mat River.
River water body **3512343** – this water body is representative of 90% of limestone in the upper reaches of the river basin with low pressures, mainly from agricultural activity.
River water body **3512225** - this river water body is affected by several pressures, including the hydric peak from the effects of the HPP upstream and the presence of urban wastewater. However, the most significant pressure seems to come from the hydromorphological influences distributed along the river. The current status is assumed to be "Weak" status.
River water body **3512226** - Copper mine 6.0 km upstream of the Balkan Basalt mine, current status assumed to be 'poor'.
River water body **35122221** - Discharge point of polluted waters from Rresheni. A score if in its natural form, untreated urban waters bring extremely high levels of BOD5 to the receiving waters.
River water body **351231** - Pressures in the upstream basin, mainly in small HPPs and gravel extraction. Minimum pressure on dirty water.
River water body **351213 and 3512211** – the last course of the Mat River basin. It is assumed that the most important local pressures are those of diffuse pollution from agricultural practices and likely from irrigation ditch water intake and gravel mining. Physical change of the water body due to the construction of the river dam. It is assumed that the changes have caused this body of water to have a "weak status".

10.6.3 Implications and Requirements for the Surface Water Monitoring Program

Tables 10-4 identify the assumed key reasons for failure to achieve environmental objectives (quality pressures, (including priority substances and river basin specific pollutants), quantity pressures (including abstraction and flow regime), and morphology pressures (including canalization, gravel mining and physical obstructions). In many cases, due to the lack of widespread environmental monitoring, the reasons for failure may be based initially on expert judgement or desktop investigations. This lack of certainty in the status assessment will be reflected in the confidence level (CL) reported under Table 10-4. Confidence levels of 0 or 1 indicate no data available for the waterbody assessed.
In this case, under the requirements of WFD Annex V, 1.3.2 or 1.3.3, it may be necessary during the RBMP implementation period (2024-2029) to conduct additional short-term monitoring (operational monitoring or investigative monitoring) in order to more correctly determine the precise values of various quality elements to confirm the pressure and status evaluation.
In order to assess the magnitude of the pressure Member States should monitor for those quality elements which are indicative of the pressures to which the body or bodies are subject. In order to assess the impact of these pressures, Member States should monitor as relevant:

- Parameters indicative of the biological quality element, or elements, most sensitive to the pressures to which the water bodies are subject
- All priority substances discharged, and other pollutants discharged in significant quantities
- Parameters indicative of the hydro morphological quality element most sensitive to the pressure identified.

It is not necessary to individually monitor each and every waterbody potentially failing objectives, and this would be prohibitively expensive. The enhanced monitoring can be strategically planned such that it is likely to be sufficiently indicative of groups of waterbodies, assuming that these grouped waterbodies are subjected to the same broadly similar pressure(s) in the contributing areas.

Strictly speaking, provision of increased monitoring is not regarded as a Key Type of Measure (see 12.1). Increased monitoring is intended to further inform the establishment of a program of measures for the achievement of the environmental objectives and specific measures necessary to remedy the effects of accidental pollution, rather than a measure in itself.

In this first initialization of the new RBMP framework however, due to the weaknesses of the monitoring program and widespread lack of environmental data generally, it is considered relevant to record specific and targeted monitoring enhancements as part of the PoM. In this context the relevant Key Type of Measure covering enhanced monitoring falls under KTM 14 – "Enhancements to Knowledge Base Reducing Uncertainty".

Table 10-4 – Pressures and Status Assessment – Category RIVERS, AWBs, HMWBs, TRANSITIONAL

IDENTIFICATION			PRESSURE ANALISYS[172]								STATUS AND GENERAL OR POTENTIAL STATUS						RISK ASSESSMENT	
EMRI I TRUPIT UJOR	EU CODE	FORM	POINT PRESSURE1	POINT PRESSURE2	DISTRIBUTION PRESSURE1	DISTRIBUTION PRESSURE1	PRESSURE FROM WATER USE1	PRESSURE FROM WATER USE1	MORPHOLOGICAL PRESSURE	HYDROMORPHOLOGY PRESSURE	BQES EQR[173]	P-CHEM [174]	H-MORPH [175]	ANNEX X PSs [176]	ANNEX VIII RBSP	GENERAL STATUS	RISK LEVEL [177]	NS [178]
Mati	351211	Tranzitor		5.2												4	At Risk	0
Mati	351213	River	1.1		2.2		3.2		4.1.1; 4.1.4; 4.1.5	4.5		2	3			4	At Risk	0
Fani i Madh	3512211	River							4.1.4	4.3.3		2	3			4	At Risk	0
Fani i Madh	3512213	River	1.1	1.5	2.2	2.10	3.1	3.5	4.1.5; 4.2.8; 4.2.9	4.3.3; 4.5			4			4	At Risk	0
Fani i Vogel	3512221	River	1.1	1.4						5.3		3	3			4	At Risk	1
Rrëshen	35122221	River	1.1	1.3; 1.5	2.2	2.8	3.2	3.5				4	3			4	At Risk	1
	35122223	River										2	2			2	Not At Risk	0
Fani i Vogel	3512223	River	1.1		2.2		3.3						2			2	Not At Risk	0
Fani i Vogel	3512224	River					3.3		4.2.1	4.3.3			3			4	At Risk	0
Fani i Vogel	3512225	TUTM	1.1	1.3	2.2; 2.4	2.8	3.3	3.5	4.1.5; 4.2.1; 4.2.8	4.3.3; 4.5; 5.3		2	4			3	Maybe	1
	3512226	River				2.8			4.1.4			2	3			4	At Risk	0
Fani i Vogel	3512227	River	1.1	1.3; 1.5	2.2; 2.4				4.1.4; 4.2.1; 4.1.5	4.3.3		2	4			3	Maybe	0
Fani i Madh	3512231	TUTM					3.3		4.2.1	4.3.3			4			5	At Risk	0
Diga HEC Lezha	LW351204	TUTM					3.3		4.2.1	4.3.3						4	At Risk	0
Ungrajt	35122413	River			2.2				4.1.5				3			3	At Risk	0
Shperdhazë	35122613	TUTM			2.2								2			4	At Risk	0
Fani i Madh	35122713	River			2.2		3.5		4.1.5; 4.2.1	4.3.3			2			3	At Risk	0
Fani i Madh	35122715	River			2.2				4.1.5				3			3	At Risk	0
Fani i Madh	35122717	River			2.2				4.1.5				2			3	At Risk	0
Gjegjan	3512272	River											3			3	At Risk	0
Fani i Madh	3512273	River					3.3			4.3.3			2			4	At Risk	0
	3512281	River					3.3			4.3.3			3			4	At Risk	0
Lumzi Pukë	LW351206	TUTM							4.2.1							4	At Risk	0
	3512285	River		1.4	2.2			3.5		4.5; 5.3			2			3	At Risk	0
	3512283	TUTM														3	At Risk	0

[172] Llojet e presionit përputhen me Udhëzuesin e Raportimit të WISE GIS 2016 – Shtojca 1a
[173] Koment mbi metodën BQE
[174] Koment mbi të dhënat P-CHEM – Vlerësimi i statusit P-CHEM bazuar kryesisht në kampionimin në vend të korrikut 2019, duke përdorur vlerat BOD5 dhe/ose NH4 si vlera treguese.
[175] Komenti mbi metodologjinë H-MORPH – MORFOLOGJIA tregon pengim të konsiderueshëm të rrjedhave ujore ose ndryshime në morfologjinë e lumenjve për shkak të ndryshimeve fizike ose minerare; HYDROMORPH tregon ndryshim të rëndësishëm në regjimin e rrjedhës për shkak të abstraksioneve komunale, ujitëse ose hidrocentrale;
[176] Substancat prioritare nëse monitorohen
[177] Lista e numërimit për rrezik = Jo në rrezik; Ne rrezik; Mundësisht në rrezik; E panjohur;
[178] Lista e numërimit për nivelin e besimit = '0' = nuk ka informacion; '1' = besim i ulët; '2' = besim mesatar; '3' = besim i lartë. E ulët = nuk ka të dhëna monitorimi, vetëm gjykimi i ekspertëve; Medium = disa të dhëna të elementit të cilësisë mbështetëse (QE) dhe të dhëna të kufizuara për një BQE; E lartë = të dhëna të mira për 1+ BQE dhe mbështetja e QE-ve më të rëndësishme.

Fani iMadh	3512291	River	1.1	1.4; 1.5	2.2				4.1.5				4			3	Maybe	0
Fani i Madh	3512293	River	1.1	1.4	2.2	2.8			4.1.5				3			3	Maybe	0
Fani i Madh	3512295	River	1.1		2.2					4.3.3			3			3	Maybe	0
Mati	351231	TUTM								4.3.3		2	2			4	Maybe	1
	351232	River			2.2								3			2	At Risk	0
Mati	3512331	River			2.2		3.5		4.2.1; 4.1.5	4.3.3			2			4	At Risk	0
Diga HEC Shkopeti	LW351208	TUTM			2.2				4.2.1	4.3.3						4	At Risk	0
Diga HEC Ulza	LW351202	TUTM							4.2.1	4.3.3						4	At Risk	0
	3512333	TUTM			1.8				4.1.5; 4.2.1							5	At Risk	0
Urakes	3512344	River	1.4	1.8	2.2								3			3	Maybe	0
Kurvajt	3512342	River	1.3; 1.4	1.8	2.2				4.1.5				3			3	At Risk	0
Urakes	3512343	River	1.4		2.2							2	3			3	At Risk	0
Urakës	3512345	River	1.5		2.2								3			3	At Risk	0
Mati	351235	River			2.2								2			2	Not At Risk	0
Zalli i Germanit	3512411	River			2.2								1			2	Not At Risk	0
Zalli	3512413	River	1.1; 1.3	1.4; 1.5	2.2								3			3	Maybe	0
Mati	351251	River	1.1	1.4	2.2							2	2			3	Maybe	1
Ljuses	351261	River			2.2								3			2	Not At Risk	0
Mati	351271	River	1.1;1.3; 1.4		2.2								2			2	Not At Risk	0
Stanes	351272	River			2.2		3.3			4.3.3		2	3			2	Not At Risk	1
Mati	351273	River	1.1	1.3; 1.4	2.2		3.3					2	2			3	Maybe	1
Darsit	3512741	River										2	3			2	Not At Risk	0
Darsit	3512743	River	1.4		2.2		3.3	3.5	4.1.3	4.3.3			3			4	At Risk	0
Mati	351275	River	1.1							5.3			3			3	Maybe	0
Zalli i Mashnurit	351276	River			2.2				4.1.4			2	3			2	Not At Risk	1
Mati	3512771	River	1.4		2.2				4.1.4			2	2			2	Not At Risk	1
	3512772	River			2.2								1			1	Not At Risk	0
Mati	3512773	River							4.1.4				2			5	At Risk	0
	351278	River	1.3		2.2											4	At Risk	0
Mati	351279	River														4	At Risk	0
	351281	River	1.3						4.1.4				2			5	At Risk	0
Mati	351291	River							4.1.4	4.2.8			3			2	Not At Risk	0
	3512921	River			2.2		3.3		4.2.8	4.3.3			4			3	Maybe	0
Thekres	3512922	River	1.3		2.2	2.8			4.1.4				3			2	Not At Risk	0
	3512923	River	1.3		2.2		3.3						3			3	Maybe	0
Mati	351293	River					3.1						1			2	Not At Risk	0

Table 10-5 – Pressures and Status Assessment – Category LAKES

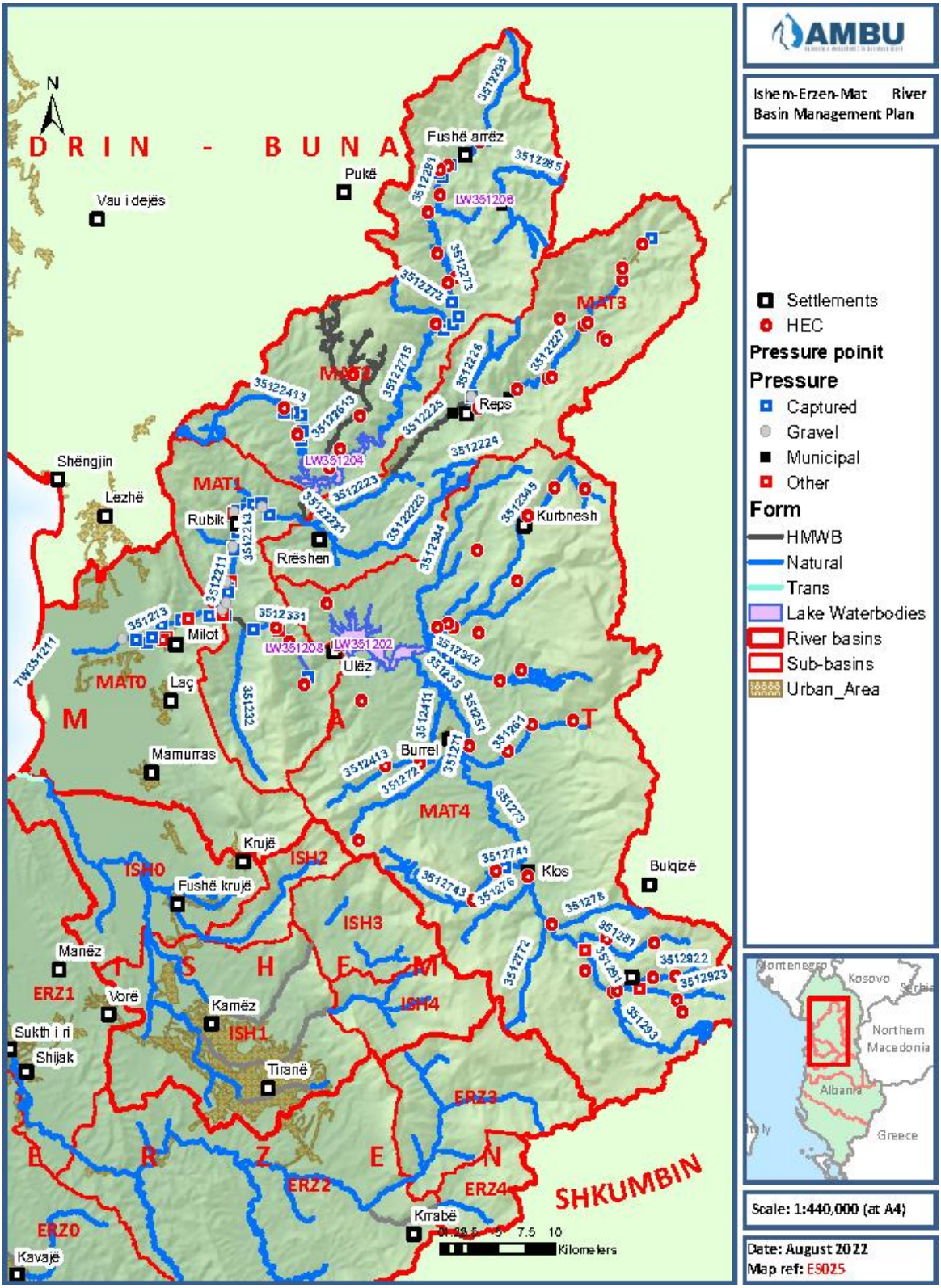
IDENTIFICATION			PRESSURE ANALISYS[179]								STATUS AND GENERAL OR POTENTIAL STATUS						RISK ASSESSMENT	
WATER BODY NAME	EU CODE	FORM	POINT PRESSURE1	POINT PRESSURE2	DISTRIBUTION PRESSURE1	DISTRIBUTION PRESSURE1	PRESSURE FROM WATER USE1	PRESSURE FROM WATER USE1	PHYSICAL PRESSURE 1	PHYSICAL PRESSURE 2	BQES EQR[180]	P-CHEM [181]	H-MORPH [182]	ANNEX X PSs [183]	ANNEX VIII RBSP	GENERAL STATUS	RISK LEVEL [184]	NS [185]
Ulza	LW351202	TUTM							4.2.1	4.3.3			4			4	At Risk	0
Lezhe	LW351204	TUTM					3.3		4.2.1	4.3.3						4	At Risk	0
Lumzi Puke	LW351206	TUTM							4.2.1				4			4	At Risk	0
Shkopetit	LW351208	TUTM			2.2				4.2.1	4.3.3			4			4	At Risk	0

Table 10-6 – Pressures and Status Assessment – Category COASTAL

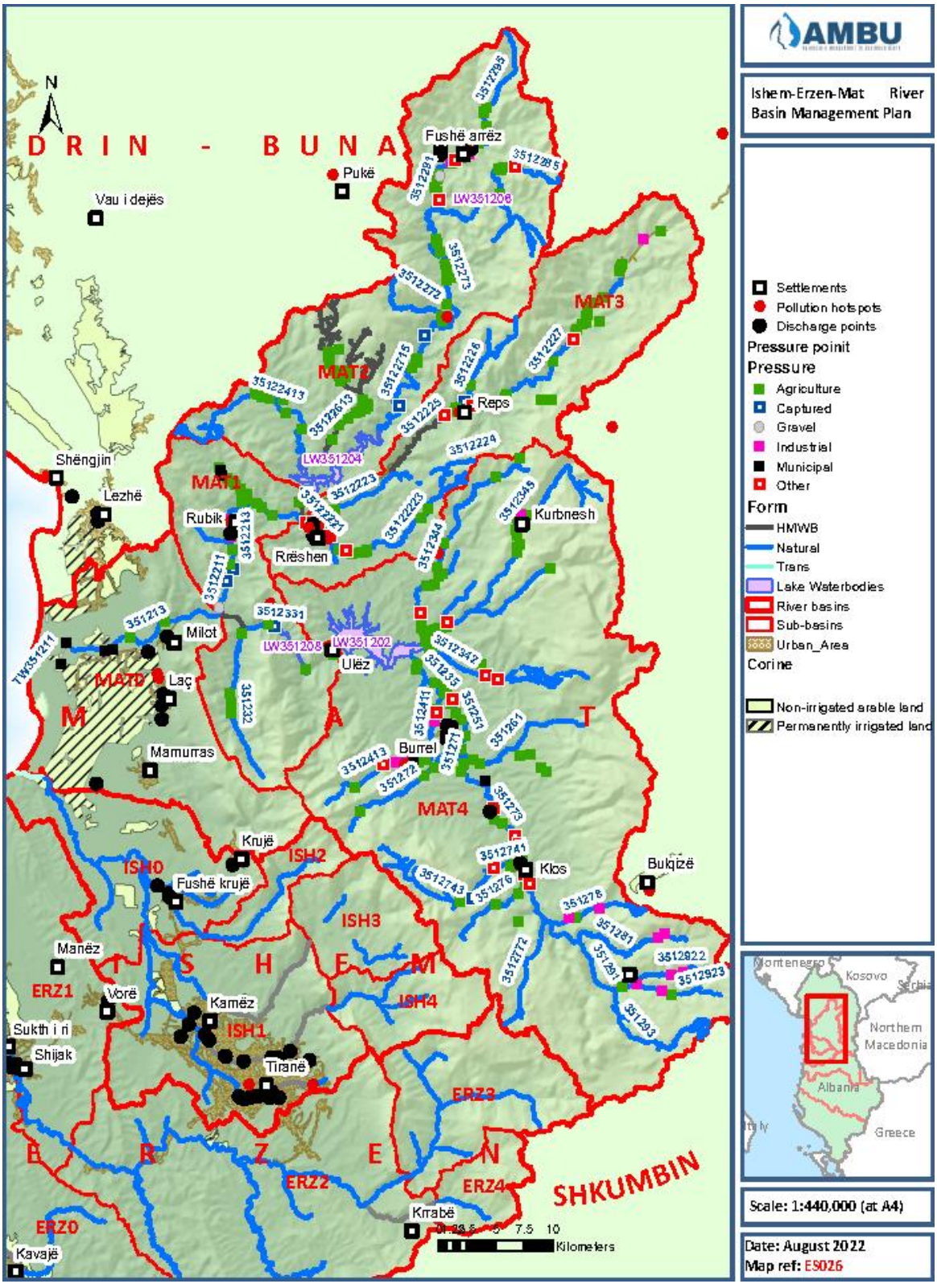
IDENTIFICATION			PRESSURE ANALISYS[186]								STATUS AND GENERAL OR POTENTIAL STATUS						RISK ASSESSMENT	
WATER BODY NAME	EU CODE	FORM	POINT PRESSURE1	POINT PRESSURE2	DISTRIBUTION PRESSURE1	DISTRIBUTION PRESSURE1	PRESSURE FROM WATER USE1	PRESSURE FROM WATER USE1	PHYSICAL PRESSURE 1	PHYSICAL PRESSURE 2	BQES EQR[187]	P-CHEM [188]	H-MORPH [189]	ANNEX X PSs [190]	ANNEX VIII RBSP	GENERAL STATUS	RISK LEVEL [191]	NS [192]
Tale	CW351202															3	Maybe	0
Patok	CW351205															3	Maybe	0
Laguna e Patokut	CW351206																Maybe	0

[179] Llojet e presionit përputhen me Udhëzuesin e Raportimit të WISE GIS 2016 – Shtojca 1a
[180] Koment mbi metodën BQE
[181] Koment mbi të dhënat P-CHEM – Vlerësimi i statusit P-CHEM bazuar kryesisht në kampionimin në vend të korrikut 2019, duke përdorur vlerat BOD5 dhe/ose NH4 si vlera treguese.
[182] Komenti mbi metodologjinë H-MORPH – MORFOLOGJIA tregon pengim të konsiderueshëm të rrjedhave ujore ose ndryshime në morfologjinë e lumenjve për shkak të ndryshimeve fizike ose minerare; HYDROMORPH tregon ndryshim të rëndësishëm në regjimin e rrjedhës për shkak të abstraksioneve komunale, ujitëse ose hidrocentrale;
[183] Substancat prioritare nëse monitorohen
[184] Lista e numërimit për rrezik = Jo në rrezik; Ne rrezik; Mundësisht në rrezik; E panjohur;
[185] Lista e numërimit për nivelin e besimit = '0' = nuk ka informacion; '1' = besim i ulët; '2' = besim mesatar; '3' = besim i lartë. E ulët = nuk ka të dhëna monitorimi, vetëm gjykimi i ekspertëve; Medium = disa të dhëna të elementit të cilësisë mbështetëse (QE) dhe të dhëna të kufizuara për një BQE; E lartë = të dhëna të mira për 1+ BQE dhe mbështetja e QE-ve më të rëndësishme.
[186] Llojet e presionit përputhen me Udhëzuesin e Raportimit të WISE GIS 2016 – Shtojca 1a
[187] Koment mbi metodën BQE
[188] Koment mbi të dhënat P-CHEM – Vlerësimi i statusit P-CHEM bazuar kryesisht në kampionimin në vend të korrikut 2019, duke përdorur vlerat BOD5 dhe/ose NH4 si vlera treguese.
[189] Komenti mbi metodologjinë H-MORPH – MORFOLOGJIA tregon pengim të konsiderueshëm të rrjedhave ujore ose ndryshime në morfologjinë e lumenjve për shkak të ndryshimeve fizike ose minerare; HYDROMORPH tregon ndryshim të rëndësishëm në regjimin e rrjedhës për shkak të abstraksioneve komunale, ujitëse ose hidrocentrale;
[190] Substancat prioritare nëse monitorohen
[191] Lista e numërimit për rrezik = Jo në rrezik; Ne rrezik; Mundësisht në rrezik; E panjohur;
[192] Lista e numërimit për nivelin e besimit = '0' = nuk ka informacion; '1' = besim i ulët; '2' = besim mesatar; '3' = besim i lartë. E ulët = nuk ka të dhëna monitorimi, vetëm gjykimi i ekspertëve; Medium = disa të dhëna të elementit të cilësisë mbështetëse (QE) dhe të dhëna të kufizuara për një BQE; E lartë = të dhëna të mira për 1+ BQE dhe mbështetja e QE-ve më të rëndësishme.

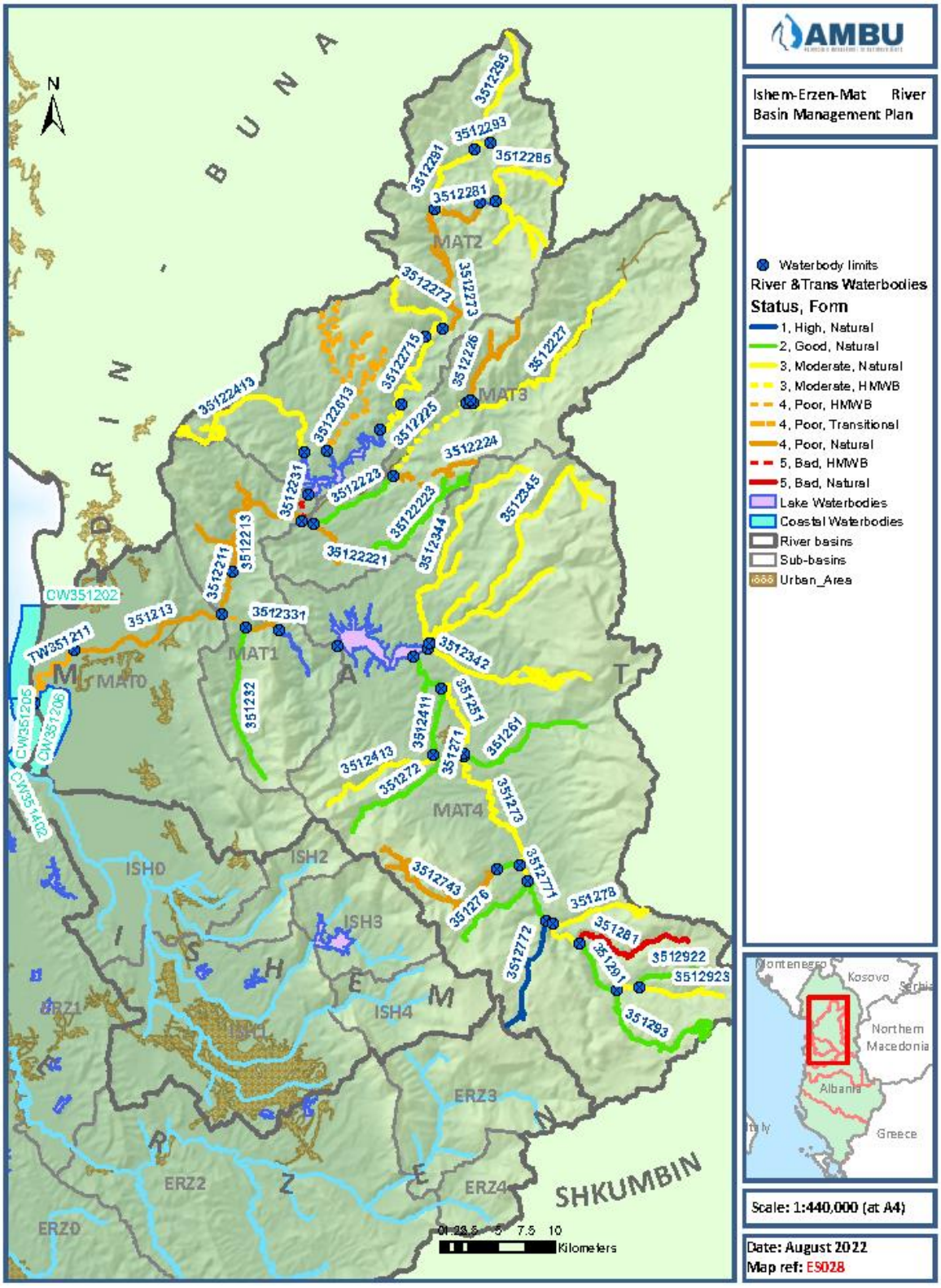
Map 10-1 – Overview of Surface Abstraction, Hydropower and Morphological Pressures - Mati



Map 10-2 – Overview of Surface Wastewater Discharge and Diffuse Pollution Pressures – Mati



Map 10-3 – Final Status Determination for all Surface Waterbodies – Mati Basin



10.7 Groundwater Body Pressures and Status Assessment Overview

10.7.1 Pressures Assessment at Sub-basin Level

The objectives of the DKU for groundwater are: (i) preventing or limiting the penetration of pollutants and preventing the deterioration of the status; (ii) protection, enhancement and restoration of underground water bodies; and (iii) reversal of any significant trend toward increasing pollutant concentrations. The DKU/DUN procedures differ in terms of status assessment, which takes into account the current state according to the assessment of the risk that may appear during the future duration of the plan, that is, that a water body is at risk of not reaching environmental objectives at the end of the plan's duration.

In the analysis of pressures related to underground water bodies, GIS project data (sources, wells, pollution hotspots, discharge points, population and settlements) and the Corine spatial land use database were used, which are presented in Technical Appendix VII for Groundwater.

Quantification of pressures from wastewater extraction and discharge is limited due to lack of data and the nature of source discharges, which can be greater than 1 m3/s. Natural sources and discharges, exploited for human purposes, differ from pumping withdrawals, which are man-made and reduce natural discharges. GIS analysis of source discharges may incorrectly assign some sources to groundwater bodies because the point of discharge may be located quite a bit beyond the geological unit boundary. Many sources, if not the vast majority, are inventoried in GIS. Groundwater withdrawals occur from five sources: (i) wells with GIS locations, although most have low discharges; (ii) public extraction wells with high capacity that are mostly documented; (iii) private wells that are mostly undocumented, but that are expected in those areas where there are no wells or springs, or public pipes for water supply; (iv) private industrial wells that are largely undocumented and may be of great importance; and (v) irrigation wells that are largely undocumented and likely significant.

The DKU defines the status of groundwater using only two criteria, namely the chemical and quantitative criteria, where each of them is either "good" or "poor" and the overall status is the lower of these two. definitions (so if one is weak, the overall status is "weak"). The overall status is determined after four quantitative tests and five chemical tests have been performed (see Chapter 3). The DUN requires, among other things, that there are no significant upward trends, which could lead to a change of status in the foreseeable future.

Large differences can be observed between the pressures acting on different types of aquifers in the Mat River basin. Alluvial groundwater bodies (Type 1) are densely populated, are the focus of industrial and commercial development, are subject to multiple extractions, and are threatened by several potential sources of pollution. During the last years there have been radical changes of land use due to agricultural activity, housing and industrial development. This has replaced the risk of pollution from fertilizers, nitrates and Pesticides with the risk of pollution from human waste and industrial chemicals, and at the same time, water withdrawals for irrigation purposes have been replaced by municipal and industrial withdrawals. Thus, the general increase in quantitative and chemical pressures has been promoted.

The hydrogeology of basic and ultrabasic magmatic masses (Type 3) in the middle and upper catchment is barely understood due to their limited development, which is mainly based on the collection of natural resource discharges, and therefore does not endanger the resource itself, but reduces base flow of streams and wetlands.

Carboniferous massifs (Type 4) in the middle and upper catchment are usually subject to little human intervention, except for agricultural and mining activities and the capture of large springs for municipal water supply. The latter relies on the capture of natural discharges, so it does not endanger the source itself, but reduces the base flow of streams and wetlands.

10.7.2 Status Determination Methodology at Waterbody Level

In accordance with the EU Groundwater Directive (GWD), status assessment only needs to be carried out for groundwater bodies identified as being at risk and in relation to the receptor and each of the pollutants which contribute to the GWB being so characterised (GWD, Annex III). Groundwater bodies not at risk are automatically classified as being of good status. The standard procedure outlined in section 3.4.3 has been used.

However, due to the substantial deficiency of both quantity and quality monitoring points in the surveillance monitoring network at this time, and the overly-simplified delineation of the waterbodies as of 2020, interim analysis is presented for all groundwater bodies in the RBMP 2024-2029 in order to establish a broad overview. With increased sophistication of data and surveillance monitoring in future, more distinction can be drawn between waterbodies 'at risk' and 'not at risk'. Increased and improved surveillance monitoring is a matter for the Program of Measures.

As for surface waterbodies, since data quality is central to the status methodology, it is also necessary to report on the 'confidence level' (CL) of the status assessment. [193] A low confidence and precision in the data potentially leads to a risk of misclassification, hence the CL gives an indication of the reliability of the status value.

WISE 2016 guidance advises on the following classification to indicate the confidence on the ecological status or potential assigned:

'0' = no information; '1' = low confidence; '2' = medium confidence; '3' = high confidence.

The criteria are as follows:

Low = no monitoring data, expert judgement only; Medium = some supporting quality element (QE) data and limited data on one BQE; High = good data on 1+ BQE and supporting most relevant QEs

Table 10-7 – Proposed Threshold Values

PARAMETER	UNITS	QUALITY STANDARD OF PWT	Threshold values (TV)	NOTES
Nitrate	mg/L	50	37.5	
Pesticid	µg/L	0.1 0.5 (total)	0.075 0.375	
Arsenic	µg/L	10	7.5	
Cadmium	µg/L	5	3.75	
Pb	µg/L	5	3.75	
Mercury	µg/L	1	0.75	
Ammon	mg/L	0.50	0.375	
Chlorine	mg/L	250	188	
Sulphate	mg/L	250	188	
Nitrites	mg/L	0.50	0.375	
Phosphate	mg/L	?	?	
Trichloroethene	µg/L	10	7.5	
Tetrachloroethene	µg/L	10	7.5	
Salinity as CM	µS/cm	2500	1875	

[193] WISE GIS Guidance 2016 – Schema: SWB; schema element *<SWEcologicalConfidence>*

10.7.3 Methodology for Determining the Status at the Water Body Level

According to the EU Groundwater Directive (GWD), an assessment is required of the status of all groundwater bodies identified as at risk and connected to receiving waters and of any pollutant that contributes to that characterization of the GWT (DUN, Appendix III). Groundwater bodies not at risk are automatically classified as TUN with good status. The standard procedure defined in section 3.4.3 was used.

However, due to the essential insufficiency of the quantity and quality monitoring points in the supervisory monitoring network at this time, as well as the extremely simplified delineation of water bodies since 2020, the PMBU 2024-2029 has also provided for the interim analysis for all underground water bodies to determine the overall picture. With the sophistication of surveillance monitoring and data in the future, the distinction between "water bodies at risk" and "water bodies not at risk" may be refined. Increasing and improving the level of supervisory monitoring is an issue addressed in the Program of Measures.

Regarding surface water bodies, since data quality is essential to the status methodology, it is necessary to report on the "confidence level" (LB) of the status assessment. The low level of reliability and accuracy of the data can be indicative of the risk of misclassification, so the NB indicates the reliability of the status value.

The WISE 2016 guidance suggests the following classification to indicate the reliability of the ecological status or potential determined:

'0' = no information; '1' = low reliability; '2' = medium reliability; '3' = high reliability.

The criteria are as follows:

Low= no monitoring data, only expert judgement; Medium= some data supporting the quality element (EC) and limited data for an ECB; High= good data for 1+ ECB and support of more suitable ECs.

10.8 Groundwater Pressures and Status Main Summary – Mati Basin

10.8.1 Overview

The underground water body **35120101 (Lac)** is the underground water body from which the most water has been extracted in the basin. It splits into two horizons toward the coast with uncertainty about the percentages of extraction from each. Extraction is dominated by the Fushe Kuqe well field, which is a vital and vulnerable resource. There is no suitable monitoring (in a well) of the groundwater level in the TUN, so it is impossible to determine the status with certainty. There is some evidence of salt intrusion from the Patok region in which there is also an unconfirmed suggestion of land subsidence under the lagoon. There are increasing threats of pollution from human activities, such as household waste, fertilizers and Pesticides, and oil deposits, plus two identified hotspots: the copper smelter in Lac and the superphosphate plant in Lac. Considering the balance of the available evidence, it is judged that TUN Lac has a good quantitative and chemical status, but with low reliability and a risk of not fulfilling its objectives in the next plan period.

Type 1 underground water body **35120103 (Shenkoll**). This TUN is hydrogeological similar to the Laçi TUN, but with less extraction. It is divided into two horizons towards the coast with uncertainty about the percentages of extraction from each, as well as from the cross-boundary flows from the south and north. There is evidence of some presence of salt water in the north, but its extent is unknown. Despite the considerable uncertainty, it is judged that TUN has a good quantitative and chemical status, but low reliability and possibly a risk of non-fulfillment of its objectives.

Type 1 underground water body **35120105 (Mat Canal**). There is almost no status information, but there are pollution pressures. It is judged that TUN has good quantitative and chemical status, but very low reliability and risk of not fulfilling its objectives.

Reporting on Type **3 Group A Groundwater Bodies: Western Ultrabasic Rocks (35120301/05)**. There is almost no status information, but there are local pollution pressures. It is judged that the Group has good quantitative and chemical status, but low reliability and probably no risk of not fulfilling its objectives.

Type 3 underground water body **35120303 (Kraste)**. There is almost no status information, but there are local pollution pressures. It is judged that TUN has a good quantitative and chemical status, but low reliability and probably no risk of not fulfilling its objectives.

Reporting on Type 3 **Group B Groundwater Bodies: Eastern Basic and Ultrabasic Rocks (35120307/09)**. There is almost no status information, but there are local pollution pressures. It is judged that the Group has good quantitative and chemical status, but low reliability and probably no risk of not fulfilling its objectives.

Type 4 underground water body **35120401 (Makaresh)**. There are many illegal and unregistered wells that are used for drinking water, agriculture, livestock and small industrial activities. The polluted waters of these activities are a factor for the pollution of underground water bodies. Some hydrothermal waters discharge directly into the main irrigation/drainage system polluting the ground water body and the air.

Reporting on underground water bodies of Type 4 **Group C: Northern massif of Dajti (35120403/15)**. Over-extraction from countless illegal wells used for irrigation and agriculture.

Pollution pressures. Mainly from the nitrite content of human activity and agriculture. In case of heavy rains during a short time, the turbidity increases.

Reporting on underground water bodies of Type 4 **Group G: Name the massifs (35120405/19)**

Reporting for Type 4 **Groundwater Bodies Group D: Northeast Karst Massifs (35120407/11/13)**

This group consists of semi-similar karstified limestone blocks belonging to the Cretaceous period (Cr) with high productivity. The aquifer is 700-800 m thick and quite rich in underground water. The limestones are quite karstified both on the surface and in depth with many funnels 40-80 m deep. All the funnels together have created a plateau with a height of about 1900 m. The springs have discharges

varying from 1l/s to 250l/s, such as the Shutri and Vinjolli springs (which originate from conglomerates, but are fed by limestones).
Pressure is created primarily by over-extraction of resources and lack of rainfall due to climate change. The use of water by HPPs is another reason for reducing the amount of spring water.
The TUN is affected by surface water which can be polluted by cattle stables and turbidity caused by washing waters of surface formations.
Type 4 underground water body **35120409 (Selit i Mali)**
Groundwater is used for drinking water, irrigation and small industrial activities, such as quarries for limestone without control of the amount used and technological discharges. surface. Septic tanks, agricultural activity, as well as industrial activities for the extraction of limestone are another factor that puts pressure on the TUN.
Type 4 underground water body **35120417 (to be named)** ...
Reporting on groundwater bodies of Type **5 Group E: Sandstones and conglomerates (35120501/03)**
35120501- One of the pressures in this TUN is over-extraction caused by illegal unregistered wells for agricultural and industrial activities.
There are many dug wells that are out of sanitary standards. Industrial activity of quarries and mines, as well as agricultural and livestock activities.
35120503- In this TUN there is a mining industry and over-extraction from many illegal wells that are not registered, agricultural and farm activities, which cause the pressure of today. In this TUN there is also waste from mines and waste dumps as well as over-extraction.
Reporting on Type 5 **Groundwater Bodies Group F: Northern Volcanics (35120505/07)**
Groundwater is widely used for drinking, agriculture and farm operations.
35120505-Pollution pressures. Mainly from agriculture and the bottled water industry, but also from farm activity. On the other hand, there are also abandoned mines and several HPPs, some of which are existing and some under construction.
35120507- Groundwater is mainly used for drinking, farm activities and agriculture.
Pollution pressures. Mainly from farm and mining activities. Igneous formations with high mineral content are washed by surface waters.
Map 10 4 and Map 10 5 present the main identified pressures and status assessment for Mati's underground water bodies.

10.8.2 Implications and Requirements for the Groundwater Monitoring Network

Monitoring of underground water bodies in the Mat basin requires significant improvement. As noted above, groundwater levels are monitored in only one well in each of the two groundwater bodies (GW35120101/03) in the basin, meaning that the quantitative status is virtually unknown. This deficiency must be addressed immediately through investment in operational and supervisory monitoring. Note that supervisory monitoring is the responsibility of AMBU or AGS acting on behalf of AMBU, so responsibility for operational monitoring rests primarily with the relevant entity, even if the activity is performed by another agency.
Supervisory monitoring should expand the range of parameters and include those required by the DKU/DUN, especially the identified pollution pressures.
The field of Fushe Kuqe wells, with a capacity of approximately 750 l/s, besides being an underground water body that meets the great demand for irrigation and water needs for family consumption in the Mat basin, is a critical source for supplying the municipality with water and the tourism industry in the city of Durres (Erzen river basin). Extractions in Fushe-Kuqe likely also affect the intrusion of saline waters, surface waters and ETVUNs, as well as the general water picture of the TUN. Thus, these withdrawals are indeed very important in their own right as sources of supply and affect the water resources of the basin.

The well field must be part of a Drinking Water Protected Area (DWA) and requires intensive operational monitoring and water resource protection measures (Chapter 13), in addition to the surveillance monitoring required to assess the overall status of the water body.
The recommended object of monitoring in the field of Fushe-Kuqe wells includes: (i) construction of special wells for monitoring; (ii) data logging and telemetry; and (iii) improved water quality monitoring. For operational purposes, six nests of piezometers have been suggested. Designing should be done to confirm the details, but one nest should be located near the center of the well field and one nest should be located between the well field, the Mat river and the municipality of Laci. Three hatches should be installed to provide early warning and protection against the risk of saltwater intrusion or previous saltwater migration: two between the well field and the Patok lagoon and one towards the poor quality waters to the southwest . All piezometers should be equipped with pressure transducers, data loggers and telemeters, and those protecting against saltwater intrusion should be equipped with an EC probe, trapped inside the well filter, to track salinity changes.

Table 10-8 – Pressures and Status Assessment – Category GROUNDWATER

IDENTIFICATION		PRESSURE ANALYSIS [194]					
The name of the underground water body	Code	Point pressure1	Point pressures2	Distributed pressures1	Distributed pressures1	Exploitation pressures	Groundwater pressures
Laç	GW35120101	1.1/1.2	1.3/1.4/1.5	2.2/2.6		3.1/3.2/3/3	6.2
Shenkoll	GW35120103						
Kanali i Matit	GW35120105		1.9			3.2	
Komsi	GW35120301	1.5	1.3/1.4				
Shkopet	GW35120305		1.9			3.2	
Kraste	GW35120303	1.5			2.8		
Thirre	GW35120307	1.5		2.2	2.8		
Gjegjan	GW35120309	1.5		2.2	2.8		
Kruje	GW35120401			2.1/2.2		3.1/3.2/3.3	
Kruje-Dajt	GW35120403			2.2			
Spiten	GW35120415			2.2			
Ndershene	GW35120407			2.2			
Gojan-Munelle	GW35120411			2.2			
Arren	GW35120413			2.2			
Selit I Malit	GW35120409						
Madhesh Mëllezë	GW35120405			2.2			
To be named	GW35120417						

[194] Pressure Types align with WISE GIS Reporting Guidance 2016 – Annex 1a.

Burrel	GW35120501	1.1		2.2			
Rreshen	GW35120503	1.1	1.3/1.4	2.2		3.2/3.3	
Kryezin	GW35120505		1.5	2.2	2.9	3.2	
Kacinar	GW35120507			2.2	2.8		

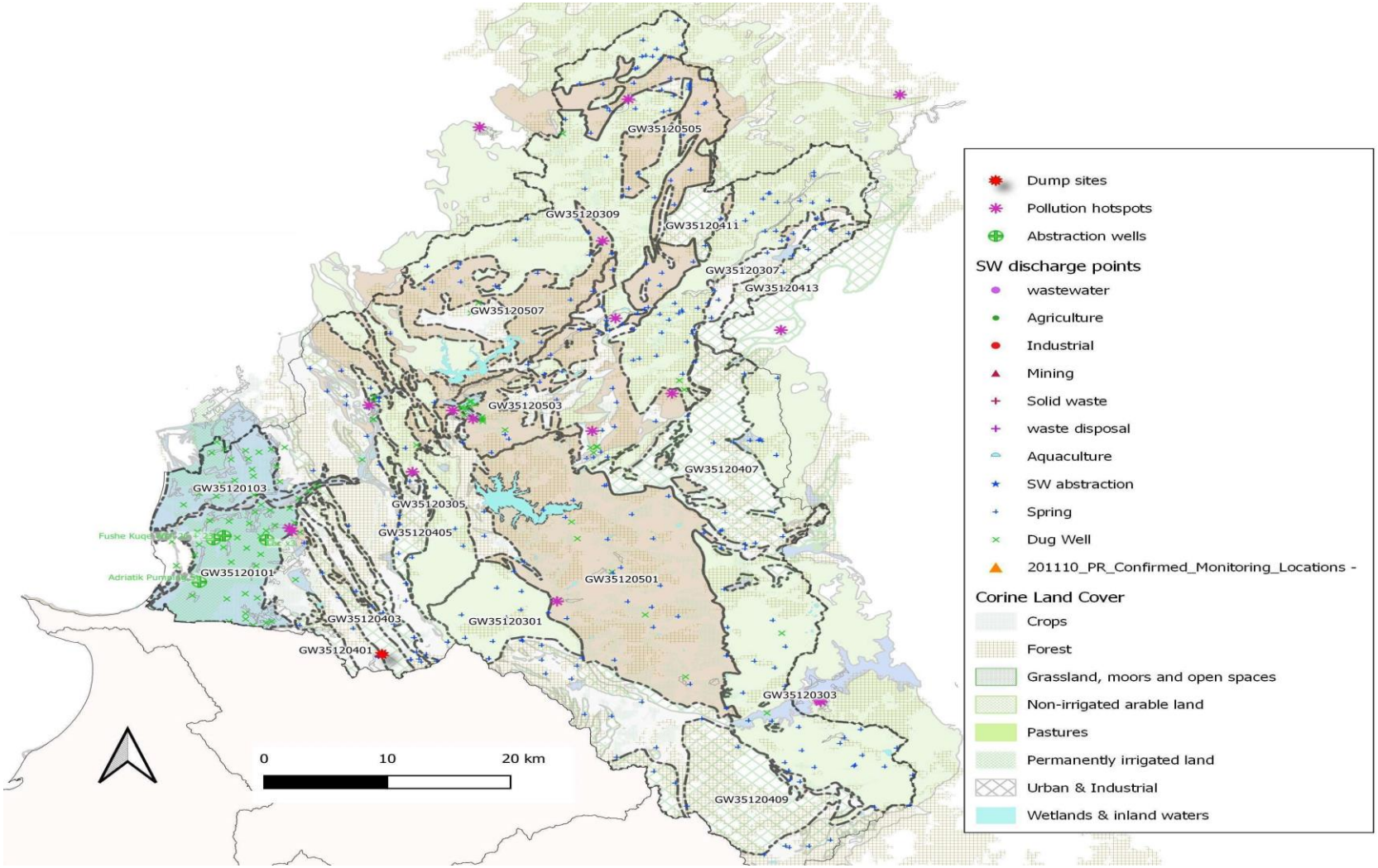
Table 10-9 -Status Assessment – GROUNDWATER Category – Mati

IDENTIFICATION			Chemical status test (and confidence level)					Quantity status test (and confidence level)				GENERAL STATUS		
GW Group	CODE of GW	GW Name	Salinity / Other interferences	US	GWDTE	DWPA	Overall Quality	Salinity / Other interferences	US	GWDTE	Water balance	Status	Confidence level	Risk Status
-	GW35120101	Lac	G (1)	G (0)	G (0)	G (1)	G ()	G (0)	G (0)	G (0)	G (1)	Good	0	At risk
-	GW35120103	Shenkoll	G (1)	G (0)	G (0)	G (0)	G (0)	G (0)	G (0)	G (0)	G (0)	Good	0	At risk
-	GW35120105	Kanali i Matit	G (2)	G (0)	G (0)	G (0)	G (0)	G (2)	G (0)	G (0)	G (0)	Good	0	At risk
A	GW35120301 GW35120305	Komsi Shkopet	G (3)	G (1)	G (1)	G (1)	G (1)	G (3)	G (1)	G (1)	G (1)	Good	1	Not At Risk
-	GW35120303	Kraste	G (3)	G (1)	G (1)	G (1)	G (1)	G (3)	G (1)	G (1)	G (1)	Good	1	Not At Risk
B	GW35120307 GW35120309	Thirre Gjegjani	G (3)	G (1)	G (1)	G (1)	G (1)	G (3)	G (1)	G (1)	G (1)	Good	1	Not At Risk
-	GW35120401	Krujë	G (3)	G (1)	G (1)	G (1)	G (1)	G (3)	G (0)	G (0)	G (1)	Good	1	Not At Risk
C	GW35120403 GW35120415	Kruje-Dajt *Spiten*	G (3)	G (1)	G (1)	G (1)	G (1)	G (3)	G (0)	G (0)	G (1)	Good	1	Not At Risk
D	GW35120407 GW35120411 GW35120413	Ndershene Gojan Arren	G (3)	G (1)	G (1)	G (1)	G (1)	G (3)	G (0)	G (0)	G (1)	Good	1	Not At Risk
-	GW35120409	Selit I Malit	G (3)	G (2)	G (2)	G (2)	G (2)	G (3)	G (0)	G (0)	G (1)	Good	2	Not At Risk
G	GW35120405	Madhesh	G (3)	G (1)	G (1)	G (1)	G (1)	G (3)	G (0)	G (0)	G (1)	Good	1	Not At Risk
-	GW35120417	*To be named*	G (3)	G (1)	G (1)	G (1)	G (1)	G (3)	G (0)	G (0)	G (1)	Good	1	Not At Risk
E	GW35120501 GW35120503	Burrel Rreshen	G (3)	G (0)	G (0)	G (0)	G (1)	G (3)	G (0)	G (0)	G (0)	Good	0	At risk
F	GW35120505 GW35120507	Kryezin Kacinar	G (3)	G (1)	G (1)	G (1)	G (1)	G (3)	G (1)	G (1)	G (1)	Good	1	Not At Risk

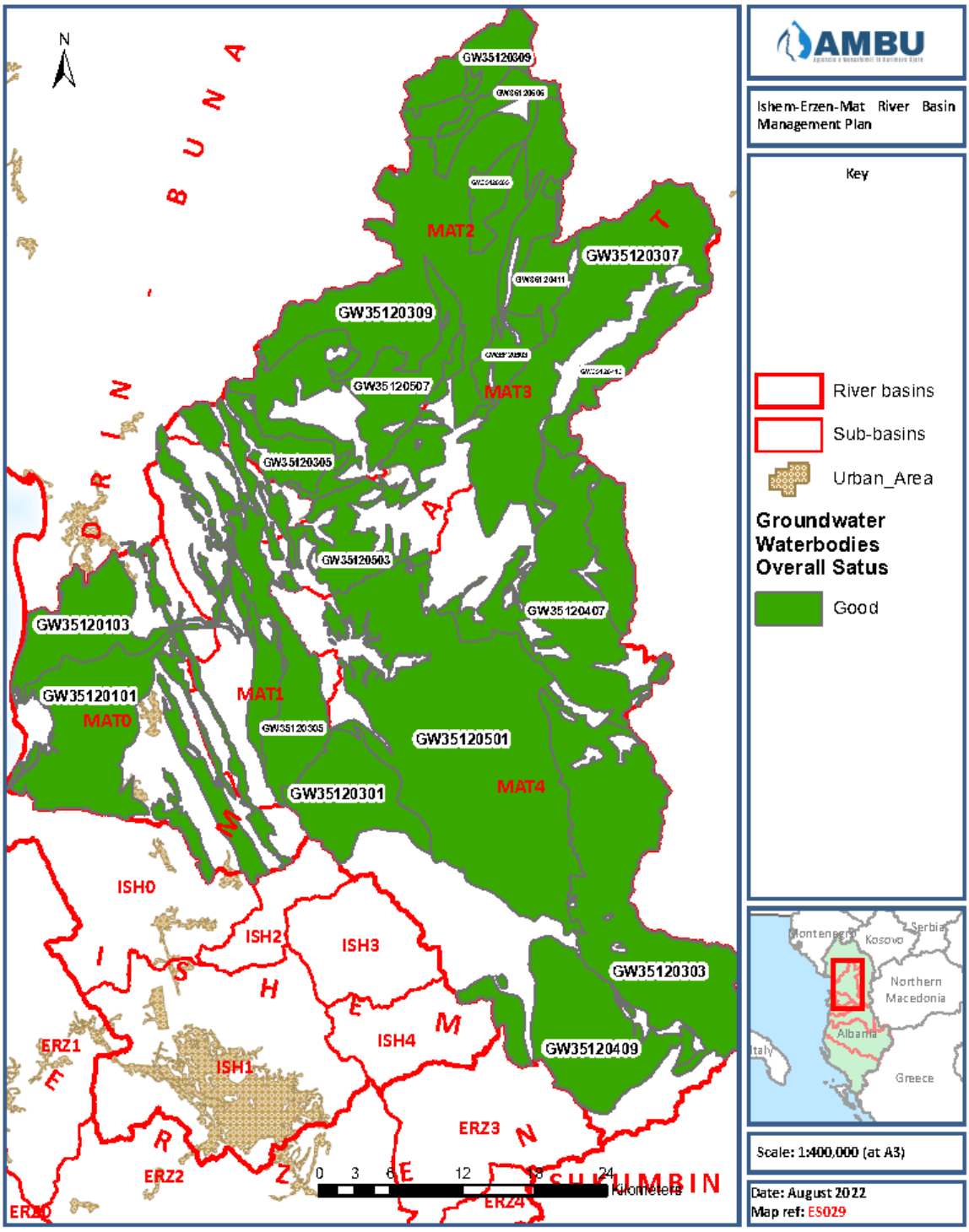
Shenime:

1. G- status i mirë, P – status i dobët
2. Niveli i besueshmerise: 0 – no information; 1 –i dobet; 2 – mesatar; 3 – i mire

Map 10-4 – Overview of Groundwater Abstraction and Pollution Pressures – Mati Basin



Map 10-5 - Final Status Determination for all Groundwater Bodies – Mati Basin



11. Summary of the Economic Analysis

11.1 The economic analysis according to WFD-Article 5, Annex III

The economic analysis, based on requirements of Article 5 of the WFD shall contain enough information in sufficient detail (taking account of the costs associated with collection of the relevant data) in order to:

(a) make the relevant calculations necessary for taking into account under Article 9 the principle of recovery of the costs of water services, taking account of long-term forecasts of supply and demand for water in the river basin district and, where necessary:

- Estimates of the volume, prices and costs associated with water services, and
- Estimates of relevant investment including forecasts of such investments;

(b) Make judgements about the most cost-effective combinations of measures in respect of water uses to be included in the PoMs under Article 11 based on estimates of the potential costs of such measures.

Regarding Albania and as part of the overall requirements to prepare RBMPs, AMBU must prepare an economic analysis of water use and productivity in the basin, in particular to establish whether water is being used efficiently and its true environmental cost fully recovered from the users.

This chapter presents a summary of the economic analysis of the Mari RB. While not all required information is available at this stage in Albania (and was not available during the first implementation cycles also for many Member States), an economic analysis report has been prepared for the Mati RB and can be found in the Annex X.

11.2 The Mati basin: a short overview

The Mati river basin is mostly part of the central mountainous region of Albania (average altitude of 746 m), covering its northern parts and has a catchment area of 2,814 km2. The Mati River (overall length of 144 km) reaches the Adriatic coast through coastal plains at Fushe Kuqe. The hydrological borders of the basin that separates it from the other basins mostly lie in mountainous areas with very limited human activities.

An allocation of municipalities and provinces to the river basin was performed in order to enable a river basin-specific economic analysis. As a result, 4 municipalities were allocated to the Mati basin with 100% that is Klos, Mat, Kurbin and Mirdite, while Lezhe was partly allocated to Mati (20%). Regarding the prefecture level, Diber was allocated to the Mati RB with 35%, while for Lezhe prefecture the Mati percentage is 50%.

The allocation of municipalities to the combined Mati RBs shows a relatively good congruence between the RB-area (2.814 km2) and the area of the 5 municipalities falling within the boundaries of this RBs as described above (2.157 km2). So, the analysis at this level of disaggregation can be considered sufficiently reliable.

11.3 Characteristics and the economic importance of water uses

The main objective of this section is to assess how important water is for the economy and the socio-economic development of a specific river basin district. It provides the river basin's economic profile in terms of general indicators, e.g. economic turnover, gross income, employment or number of beneficiaries for significant water uses, as far as this kind of information is available. The analysis needs to pave the way for the assessment of significant water management issues and the ensuing cost-effectiveness analysis, by initiating investigations of likely trade-offs between socio-economic

development and water protection within the river basin, as well as issues of allocation of costs and benefits of water management measures to different water uses.

11.3.1 General socio-economic indicators

11.3.1.1. Population and urban/rural and household structure

It needs to be noted that the current population data are available at municipal level, and the historical ones at prefecture level. In addition, the rural-urban structure of the basins is presented, as well as the household structure.

For the Mati RB (Table 11-1), it is clear that this basin has low population density, so being mostly rural; the urban areas of the municipalities of the basin are just between 0 and 6%. This is confirmed by the fact that while the area of the Mati RB is approx. 9,8% of Albania, only approx. 3,6% of the inhabitants of the country live in this RB. In the recent years (since 2017), the decline in population in the Mati RB is significantly stronger (6%) than the slight decline of population for the whole of Albania (1%).

Regarding water management, this situation implies that the main issues related to rural settings (costs of increasing the rural water service provision, decentralized solutions; diffuse pollution due to untreated sewage runoff and agriculture; linking environmental issues/water body status to economic development in rural areas, pressures due to hydropower etc.) are of special importance here. For some of those, the issues will become more significant at a higher pace than for the average of Albania due to the stronger decline of population.

Table 11-1 – Historical Population Mati RB (2017-2020)

Population 2020	Inhabitant number	% of prefecture	% of municipality	Urban area of prefecture	Urban area of municipality
Albania	2.845.955				
Mati RB	101.900				
Prefecture Diber	**115.857**	35%		1%	
Municipality of Klos			100%		0%
Municipality of Mat			100%		1%
Prefecture Lezhe	**122.700**	50%		3%	
Municipality of Kurbin			100%		6%
Municipality of Mirdite			100%		1%
Municipality of Lezhe			20%		6%

Instat data Year 2020 (Prefecture Level)

11.3.1.2 Work force and employment

In order to better understand the socio-economic situation of the population in a basin, it is important to see issues linked to the working situation, both from the perspective working and employment population/unemployment changes, but also what the importance of the different sectors is for employment.

For the Mati RB it can be seen that the working age and employment population is strongly decreasing in the last years (by 11 and 22% respectively), while the working age population remains almost constant and the employment population increases (by 6%) for the whole of Albania.

Unemployment in the Mati RB is higher than for the whole country and is increasing, while for the whole of Albania it is decreasing. This shows significant structural difficulties regarding the working situation of the inhabitants, being a key factor for them leaving the RB.

While the tendencies of change at the sector level are not significant in the last years (2017-2019) for the whole of Albania, in the Mati RB the situation is different: the very high importance of the agricultural sector is decreasing (41,1% working here in 2019, as compared to 49,3% in 2017). this shows a fast structural change away from agriculture. Correspondingly, the importance of the industry sector (from 16,2% to 18,6%) is increasing; even more this is the case for the service sector (from 34,4% to 40,3%).

Thus; agriculture as an important sector for employment seems to be facing serious difficulties, which – depending on the overall strategy for long-term sustainability of the employment in the RB – might strongly impact the water management situation (both regarding lower water needs due to the decline of agriculture, but on the other hand increased investment (and water) needs in order to re-strengthen the sector and make it more productive, e.g. through irrigation).

11.3.2 Characteristics and economic importance of specific water uses[195]

Regarding the GDP, the Mati RB contributes slightly less than 3% to the national GDP, which is significantly lower than it´s size share (of 9,8%), showing the lower economic activity in the RB. In addition, the growth rate 2015-2019, even if at 10,4%, is also lower than for the whole of Albania (of 18%), which shows that the "gap" of the Mati RB contribution to the national GDP is steadily further increasing. The per capita GDP is correspondingly significantly lower than for the whole of Albania, and growing at slightly lower rates.

In the Mati RB, and regarding the structure of the sectors and their contribution to GVA, the corresponding tables of the full economic analysis (Annex X) confirm the rather low economic importance of the basin; in addition, the growth rate 2014-2019 is lower than for Albania (115% as compared to 120% for Albania). Beyond that, it can be seen that agriculture, forestry and fishing have a significantly higher GVA share in Mati as compared to the whole of Albania, while other sectors are "below average" (e.g. Wholesale/retail trade/transportation, Information/ communication, and Arts/entertainment/recreation).

11.3.2.1. Agriculture (including livestock) and irrigated agriculture

Agriculture is important from a water management point of view both regarding pollution aspects (diffuse pollution of fertilizers/nutrients, but also Pesticides) but also regarding water quantity. Therefore, this chapter presents the overall information regarding the structure of agriculture, but also separately the information available regarding irrigation.

For the Mati RB in 2019-2020 regarding hectares planted (arable land with field crops), the area shows a minor decrease, while for the whole of Albania a minor increase can be noted.

Overall, the arable land with field crops in the Mati RB as compared to the whole of Albania (6%) is lower than its size share of Albania (9,8%).

- Data regarding the average income produced though farming is not available, as well as added value per ton of crop/livestock, which would enable a shift to more "value added per qm" in the mid and long-term perspective.
- Regarding the use of key inputs (nitrates, phosphates, Pesticids) as well as for farming type systems (e.g. on farm size, intensive-traditional/sustainable, organic) and cropping patterns that could give an indication of the scale of pressures regarding pollution/leakage, information is currently not available.

[195] Limited information regarding the quantification of water use in Albania, the main source for estimating the water-related importance of the different water uses is the permit database of AMBU.

- Yet and in order to establish generally the importance of agriculture, the types of crops are important (since different crops have different needs regarding water and chemicals); this information is available both at country and municipal level, both as per area planted as well as per tons produced.

In more detail and for 2020, it can be seen that this basin is of lower importance for many crops types, yet is of special significance for soya (47% of national production).

Regarding livestock, the data show that overall the Mati RB is of mixed importance, both regarding number of heads but also tonnes/pieces produced. While the area of the basin is 9,8% of Albania, the number of heads is significantly higher for pigs (17%), approx. average for cattle (8%) and lower than average for the remaining livestock categories; these differences are reflected by the tons produced.

Regarding the crucial issue of irrigated agriculture (having significant water management implications), for the whole of Albania, the available information shows that 55% of the agricultural area could theoretically be irrigated, 37% has irrigation infrastructure in place, but the actually irrigated area is only 28% (due mostly to a lack of investments/maintenance of the irrigation infrastructure). The overall water consumption for irrigation is 473,5 Mio m3/year, while information regarding losses from the irrigation infrastructure is not available.

The available information for the Mati RB shows that approx. 5-6% of the agricultural areas could and actually are irrigated, a smaller percentage than the relative size of the basin (but similar to the percentage of agriculture in general as compared to the whole of the country). So, irrigation is less prominent in Mati as compared to the whole of Albania based on the basin size, but has the same importance for the agriculture in the basin as for the whole of Albania. The water volume used for irrigation amounts to 27,1 Mio m3/year.

Yet, the numbers from the official AMBU database show that out of the 8 permits of the whole of the country for “irrigation water use”, only one of them is in the Mati RB; the quantity unit is “hectares irrigated” (so, no metering etc. required), yet this one permit does not even indicate the irrigated area. Obviously, almost all irrigation water use the Mati does not have the required water use permit (which holds also for the whole of Albania).

Table 11-2 – Irrigation: potential and actual irrigated areas, Mati RB, 2020

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Agriculture	% in RB	Total land area for agriculture	Potential - area that could be irrigated	Actual - area with irrigation infrastructure	Irrigated area
Albania		657.481	357.245	244.950	181.704
Mati RB		33.856	19.515	14.316	10.860
Prefecture Diber					
Municipality of Klos	100%	5.295	3.200	2.500	1.500
Municipality of Mat	100%	8.239	4.200	2.800	2.500
Prefecture Lezhe					
Municipality of Kurbin	100%	10.393	7.015	6.156	4.380
Municipality of Mirdite	100%	6.230	3.400	1.900	1.780
Municipality of Lezhe	20%	3.699	1.700	960	700
Share of Mati RB		5%	5%	6%	6%

Source of information: Ministry of Agriculture and Rural Development

11.3.2.2. Industry

For the Mati RB and based on the water use permit database196 (see table below), 25% of such permits for the whole of Albania have been issued for this basin (57 out of 231), with a forecasted quantity of 224.000 m3/year (which represents only 5% of the permitted industrial volumes for the whole of Albania). Considering overall the high number of industrial enterprises in Albania and even if the Mati RB has lower than average industrial activity, this number seems low; yet there is no other source in order to cross-check this information.

Regarding discharge, the AMBU database shows 44 permits for "industrial discharge" – but none of them in the Mati RB. Here, there is a significant lack of reliable information.

Regarding information on the public water supply for industry/enterprises as well as discharge into the public sewer systems, this information is included below in the chapter regarding water services (and their cost recovery).

11.3.2.3. Services

Regarding services it is difficult to get a better indication regarding the water-related importance of the sector, since:

- Regarding self-supply/direct discharge, the AMBU permitting system does not have separate water permits especially linked to/regarding services. Therefore, the relevant information is included in various water use "types" that can be found in the chapter above on "industry"; at the same time, it can be expected that self-supply is rather not so significant for this water use;
- Regarding supply from the water/sewage utilities, this information is part of the overall supply to "enterprises" and will be dealt with in the chapter regarding water services (and their cost recovery).

11.3.2.4 Hydropower

Regarding the Mati RB, significant hydropower production exists in the Mati RB: 9-12% of the electricity produced through hydropower in 2018-2020 in Albania are produced in this basin by 38 hydropower plants. This is approx. the same as the share of the RB to the overall size of Albania (which is 9,8%). Therefore, hydropower in the Mati RB can be regarded as an important pressure (and with related impacts leading to potential risks for the achievement of good ecological status of water bodies), with the same importance as for the average of Albania.

11.3.2.5 Gravel extraction (from rivers and/or other water bodies)

In general, gravel extraction is prohibited and has been allowed only for specific river segments (of which none are within the Mati RB), as defined in 2006 in the respective decision No. 1 (dated 21.6.2006) of the National Water Council. This has been based on the findings of the study on "Assessing the effects, environmental impact and hydro-dynamic issues" conducted in that given period. Due to environmental concerns, a full prohibition of gravel extraction entered into force, again through a National Water Council decision in 2010. Based on the need for construction materials to support the rapid infrastructure development in the country, a year later (2011) the National Water Council decided that gravel extraction can be permitted, however only for national road construction and only in specific river segments (of which none are in the Mati RB).

For the Mati RB, there are concerns of frequent illegal gravel mining although the prohibition of gravel extraction is in force since many years. 13 permits exist for the use of "inert materials extracted from

[196] AMBU register of water users

river basin, streams, and lakes, with or without water" for the whole of Albania, of which 4 are situated in the Mati RB. There is no indication of the tons of gravel extracted, since the use unit (as basis for the water use fees) is "2% of the value of gravel sold". It can be noted that these 4 permits are large, covering more than 95% of the forecasted and actual quantities/ 2% value of gravel sold for the whole of Albania.

So, many illegal gravel extraction sites exist; as confirmed by an AMBU field report from July 2021 which identified 14 gravel extraction sites/companies in the Mati RB that were not licensed.

11.3.2.6 Tourism

Unfortunately, no disaggregated data are available for tourism, so no RB-specific considerations can be made at the Mati level. At the national level the arrivals of foreign citizens increased from 2014 to 2019 by almost 75%, showing the high dynamics of the sector. Also, the nights spent in accommodation structures from 2018 to 2019 (2020 has been a "special" year due to COVID-19 so cannot be considered) shows a significant increase of 5,5% in just one year. This underlines the high growth rates of the sector, and the importance it needs to have also for water management in the future.

Regarding self-supply by tourism, no permit is issued for such activities in the Mati RB. Regarding water use/discharge and for the services provided by the water/sewage utilities, the tourism sectors is included as part of "enterprises"; therefore, relevant information is to be found in the chapter regards water services (even if due to the lack of disaggregation in billing etc., no specific information regarding the tourism sector can be found there).

11.3.2.7 Flood control and drainage

Flood control and drainage is a significant water use, both due to its impacts on environmental aspects of water bodies (river straightening/deepening, bank reinforcements, dikes etc.), but also due to the economic damages it can prevent (and of course save human lives.

Systematically, only limited economic information is available in Albania regarding the socio-economic information regarding flood protection, including historic investments for flood protection etc.). At the same time, through a specific project, information on historical data has been collected for Mati RB, as well as the possible risks of flooding assessed (regarding occurrence, specific areas, people affected etc.) based on the requirements of the FD (see chapter 9.3).

11.3.2.8 Fish farming and leisure fishing

Only very limited data is available in Albania regarding the actual number and size of (inland) fish farming activities.

No permits were issued by AMBU regarding this type of water use activity for the Mati RB. The unit here is "kilogram of fish sold", with an overall permitted/forecasted volume of 55.500 kilograms (55,5 tons).

There are data available at country level regarding fish caught in tonnes from different parts of the water environment. Two of them are of specific interest:

- regarding inland water fishing and for 2020, 2.844 tonnes of fish have been caught in 2020, an increase of 168% as compared to 2016.
- Regarding aquaculture, 8.799 tonnes of produced fish are recorded (of course for both marine and inland waters) in 2020, an increase of 275% as compared to 2016.

So, even in the specific numbers/importance of inland aquaculture remains unclear, it can be assumed that it is much higher than the permitted 55 tonnes per year. Regarding leisure fishing, no specific

information is available in order to be able to assess the importance of the water use activity (no. of persons fishing or fishing per day, amount of fish caught etc.)

11.3.3 Main gaps regarding the characteristics and economic importance of water uses

The main gaps are:

- For various indicators, a difficulty in disaggregation of the available data based on river basins (e.g. due to the information being available only at national level;
- A limited information base to assess the economic importance of water-related activities (e.g. in sub-industries with highest water footprints, tourism) by having information on turnover as well as the "added value" created per qm of water;
- Only fragmentary information on the actual water abstracted/consumed and sewage discharge for various water uses, with very important issues here being touristic water uses, water abstractions by (irrigated) agriculture as well as in general self-supply water uses (e.g. water abstractions and sewage discharge in/from industry);
- For non-consumptive water uses (e.g. gravel extraction, fish farming) the information base is limited (e.g. no information on volumes of gravel - illegally – extracted, numbers of fish farms and their fish volumes and overall the economic importance of such activities).
- For flood protection, the economic information available needs be improved (by better information of current costs of the flood protection strategy per RB, but also information on population and economic activities/turnover protected (or planned to be protected), potential losses of properties/economic activities due to sub-optimal flood protection etc.).

11.4 Water Services and cost recovery[197]

The key elements investigated under this chapter are the status of water services, a summary of the tariffs applied and the extent of the recovery of the costs (financial, environmental and resource costs) of the water services. These issues are again structured according to hydrological boundaries/the River Basin approach.

This analysis is based on the allocation of 5 municipalities and corresponding water service utilities to the Mati RB. Of these, 4 are fully allocated to the Mati RB (Klos, Burrel, Kurbin, Mirdite), while it is estimated/assumed that the Lezhe Municipality/water service company lies 20% within the Mati RB.

There is a large gap of information regarding water abstraction through self-supply:

- While it is known that a number of households use well/springs for their drinking water supply, no estimation on relevant numbers (volumes of water, population with self-supply) can be found;
- Regarding self-supply for industry, there is some information available, nevertheless is fragmented;
- Regarding self-supply for agriculture and while there are noticeable areas irrigated (and while the public water supply is not used for irrigation), basically none of these water abstractions are registered in the AMBU-permit database;
- A significant number of households are not connected to the public sewage system, but there are no estimations regarding sewage disposal volumes;
- Regarding industry, only fragmentary information regarding direct discharges; no permit issued by AMBU in the Mati RB.

11.4.1 Drinking water production and supply service

The drinking water supply in Albania is performed by 57 public utilities/water service companies at municipal level, which mostly correspond to the borders of the municipalities. These utilities are

[197] Data available through ERRU Reports.

subject to monitoring by Agency for AKUM through performance assessment, while their tariffs are evaluated and need to be approved by the ERRU.

11.4.1.1. Population and Public Water Supply coverage

The size of the water service companies in the Mati RB is smaller than the average of Albania (9% of number of utilities in Albania covering 3% of the serviced population[198]).

Regarding the changes of connection rates in the recent 3 years, there are rather small changes/decreases to be observed, both for the Mati RB but also for the whole of Albania. This indicates that the focus of currently implemented investments is rather on improving the quality of other service components (e.g. continuity of service) than on expanding coverage.

11.4.1.2 Water volumes and losses regarding Public Water Supply

Out of the water produced (60% by pumping and 40% by gravity at the level of Albania) for water supply, only 35% (at the level of Albania) is actually billed; this number being higher for the Mati RB (52%). In addition, a significant amount of water is billed without metering. These numbers show the high percentage of water extracted from the environment which actually does not reach the consumer/is not creating income for the water supply companies. Again, the issue of lack of metering remains an important one (even if activities/investments are underway in that regard).
Regarding the development of overall water losses in the recent years (see economic analysis, Annex X) and even with investments/efforts for efficiency improvements underway, the situation is getting slightly worse at the level of Albania, hinting at the deterioration of infrastructure being faster than the speed of implemented necessary investments (investment gap). In the contrary, the water losses overall have been decreasing in the Mati RB in the recent years.

Table 11-3 – Water Volumes: produced, billed, lost in the Mati RB, 2020

Water Service Companies	Volume of water produced	*Out of which Metered*	Volume of water billed	*Out of which Metered*	Water Losses in %
Albania	**309.887.138**	*177.452.816*	107.097.811	*80.799.421*	65%
Mati RB	5.730.263	*484.502*	2.983.582	*1.367.428*	48%
Prefecture Diber					
Klos UK (100%)	210.720	*42.270*	162.070	*42.270*	23%
Burrel UK (100%)	1.785.000	-	965.300	*627.385*	46%
Prefecture Lezhe					
Kurbin UK (100%)	2.394.143	*24.752*	1.096.730	*163.728*	54%
Mirdite UK (100%)	744.000	-	388.000	*255.000*	48%
Lezhe UK (of which 20%)	2.982.000	*2.087.400*	1.857.411	*1.395.227*	38%
% as compared to Albania	2%	0%	3%	2%	

ERRU 2020 Data, Water Balance Report (Water Service Companies level)

53 permits were issued by AMBU regarding groundwater and 5 regarding surface drinking water use/abstractions.

A “permit gap” can be seen when comparing the forecasted water quantities based on the permits to the “Water volumes produced” based on ERRU-information (as collected by the water utilities). The comparison shows that only 74% of the water volume produced is forecasted in the permits/is actually permitted at country level.

[198] Note: the overall population within the jurisdictional area used by the municipalities (and also ERRU as the regulator) is based on different information bases and assumptions, thus not using the INSTAT-population numbers (as are being used in the economic analysis report (Annex X.) and chapter 11.4.1.1. above), leading to a larger population to be served of 35% for Albania and 44% for the Mati RB.

In the Mati RB, this ratio is 91% when comparing volume of water produced to the forecasted quantities in the permits and 79% when compared to the actually billed quantities. Approx. 14% less than the permitted water quantity is actually billed. So, less water is billed than actually permitted, while the water produced is more than the quantity in the permits. These numbers show that the permitting system only covers part of the actual water use, something that needs to be urgently improved.

In addition, and for the Mati RB water utilities, one has no drinking water abstraction permit (Klos), while the other four have permits for part of their abstraction points; no water utility has all its abstraction points included in permits.

11.4.2 Wastewater collection and treatment service

In Albanian urban areas, wastewater is mostly collected through public sewers. Sewer systems are combined ones, hence collecting together wastewater and storm water. Due to poor maintenance of sewage canals and small dimensions of the pipes, leakage from these channels often creates risks of contamination of drinking water.

In many suburban areas and rural areas of cities there is a lack of sewerage systems and wastewater is collected in septic tanks. Every house uses its own means of wastewater discharge, usually collecting them to septic tanks, and using private trucks for removing them away from the settlements.

Most of the wastewater in Albania is currently not treated, only a limited number of WWTP are currently in use. In the entire Mati RB there is no operational wastewater treatment plant - all sewer pipes discharge directly into the closest water body without treatment. There is one WWTP in Lezhe, yet it currently serves only the city of Lezha and the Shengjini area, being part of Drini River Basin Area.

Regarding wastewater volumes discharged into the environment through the public utilities, only very limited information can be found in the AMBU-permit database.

The sewerage coverage rates are significantly lower than the water supply coverage for Albania (51% compared to 76%). For the Mati RB, the sewage connection rates vary greatly: from 0% for the Klos utility to 60% for the Lezhe utility.

11.4.3 Assessing the current levels of the recovery of costs of water services

ERRU defines the methodology for calculating the retail and wholesale tariffs of water for public consumption, wastewater disposal and treatment in accordance with government policy for the sector development and the EU WFD, the main purpose for the sector is to achieve full cost recovery. They need to ensure customers that they pay tariffs based on the necessary and reasonable costs for the services provided. The tariff policy followed includes a gradual increase of tariffs in the coming years, conditionally that the service providers achieve an improved level of service performance.

There are three distinct user groups that is state households, institutions and enterprises (including industry). A fixed tariff is applied per connection, while in the Mati RB, for 3 out of the 5 utilities such a fixed tariff is not available; regarding drinking water supply/consumption (metered or estimated), a fixed tariff is applied per qm, which is lower for state institutions/connections. Tariffs for enterprises are lower than for households.

Regarding wastewater disposal, the same qms are estimated/billed as the water used. Here again in the Mati RB, lower tariffs are observed for state institutions, while the wastewater tariffs for enterprises are lower or the same as for households. There is no differentiation regarding the composition of wastewater disposed/pollution loads, something esp. of relevance for enterprises/industry. This means that state institutions contribute to a lesser extent to the costs of water supply and sewage than the other two user groups.

An important issue regarding the tariff setting (and potential increases needed in the future in order to increase cost recovery rates), is the one of collection rates (what % of bills issued are actually paid by the consumers).

The general collection rate is at 90% for the whole of Albania, while for the utilities in the Mati RB this rate ranges between 53% (for Mirdite) and 93% (for Lezhe).

There is a decline to be noted for the General Collection Rate (from 96% to 90%) when compared to the data of 2020. This is despite the utilities trying to improve it with agreements between the utilities and the debt customers, according to which old debits are collected in addition to current bills. While utilities have collected in 2020 about 1.3 Mio ALL from arrears, this is approx. 300 Mio ALL less than in 2019.

11.4.3.1 Water Service Financial Performance/current overall financial Cost Recovery

The revenues of the utilities are contrasted to two summary cost categories (which largely correspond to the WFD-related definitions), that is:

- Total direct operational and maintenance (O&M) costs (including labour, energy and repair costs, services from Subcontractors, costs of material and chemicals and other costs such as costs for regulatory fees for ERRU SHUKALB, Board of Directors, the Ministry of Environment for the quantity of the water extracted from the basins, accounting experts, costs for decommissioning, court decisions, etc.);
- Total costs; here, what is additionally included are capital costs (depreciation and other taxes/loans/credit interest costs).

What has to be noted here is that the cost recovery rates do not include subsidies provided by the state (in order to cover the financing gap for O&M expenses), which is correct since the analysis intends to show the financial viability of the services based on their own revenues. In addition, and regarding the large issue of future investments (excluding the issue of cost recovery of historical investments), these are not separately accounted for in the water utilities information.

Here, due to the complex nature of funding, it's fast pace of changing, the difficulty to distinguish between investments for maintenance of the existing system vs. for improving/expanding the services and allocating investments to various financial years, having a complete overview is challenging.

The main categories of investments are state/government investments (through the central state budget/the AKUM) amounting to 4,8 Billion ALL in 2020 and investments by foreign sources (bilateral/international) amounting to 1,7 Billion ALL for the year. This is part of the financial investment planning for 2020-2023 of 24,3 Billion ALL (22,6 Billion ALL from the state budget and 1,7 Billion ALL from foreign sources). All of them need be seen as subsidies since (so far) not covered by the revenues of the water utilities.

The financial sector performance for the whole of Albania shows a negative result (of 3,3 Billon ALL), indicating the problematic overall financial situation of the sector (and the need for subsidies, which cover part of the financial O+M losses through 720 Million ALL in 2020). Regarding the cost recovery rate of total costs, this is correspondingly at a low 75% (with only 2 utilities covering their total costs (none of them in the Mati RB).

At the level of the Mati RB (Table 11-4), the total cost recovery rate of 48% is considerably lower than for the whole of Albania (75%), ranging from 42% (Klos) to 62% (Burrel) – all Mati RB water utilities show a financial loss.

Also regarding coverage of O+M costs, the Mati RB shows a below-average recovery rate of 67% (ranging from 40% for Kurbin to 132% for Lezhe), while the national average is 103%. Only Lezhe covers

its O+M costs, with all other water utilities in the Mati RB staying below the national O+M cost recovery average.

Considering the evolution of the financial performance of the water utilities in the last 3 years there is a negative trend, both regarding the whole of Albania as well as for the Mati RB. This is due to the increase in both O+M and total costs observed for 2020, while the revenues remained basically the same (increase of less than 1 % as compared to 2019).

Table 11-4 – Water Service Financial Performance/Cost recovery, Mati RB, 2020

					in '000 ALL		in %
Water Supply Companies	***Revenues from the Activity***	***Total Costs***	***Total Direct Operational & Maintenance***	***Subsidies***	***Financial Result 2020***	***Cost Recovery of Total Costs***	***Cost Recovery of Direct Operational & Maintenance Costs***
Albania	**9.850.414**	**13.149.117**	**9.542.489**	**720.000**	**-3.298.699**	**75%**	**103%**
Mati RB	172.213	359.214	257.674	36.996	-187.001	**48%**	**67%**
Prefecture Diber							
Klos UK (100%)	12.084	28.531	*18.341*	*0*	*-16.447*	*42%*	*66%*
Burrel UK (100%)	42.047	68.355	*59.690*	*3.198*	*-26.308*	*62%*	*70%*
Prefecture Lezhe							
Kurbin UK (100%)	44.199	120.825	*111.183*	*19.700*	*-76.626*	*37%*	*40%*
Mirdite UK (100%)	35.202	65.870	*39.086*	*14.098*	*-30.668*	*53%*	*90%*
Lezhe UK (of which 20%)	193.405	378.166	*146.871*	*0*	*-184.761*	*51%*	*132%*
% as compared to Albania	2%	3%	3%	5%	6%		

ERRU 2020 Data, Performance Report (Water Service Companies level) - July 2021

11.4.3.2 Current financial cost recovery levels of public water supply and sewage collection/treatment

A key observation is that for the whole of Albania, the total cost recovery rate for sewage disposal is higher (96%) than for drinking water supply (73%) and wastewater treatment (75%), hinting to a cross-subsidy within the water utilities.

For the Mati RB, the situation is different (Table 11-5): the cost recovery rate of sewage disposal (49%) is approx. the same as for drinking water supply (51%) – yet with significant differences among the utilities.

Looking at the utility level at the Mati RB, the cost recovery rates for drinking water supply range from 37% in Kurbin to 61% in Burrel. For sewage disposal, the range is from 23% in Kurbin to 75% in Lezhe (while Klos does not indicate costs/revenues for sewage disposal).

Regarding wastewater treatment, no treatment takes place in the Mati RB. Yet, there is one WWTP in the Lezhe municipality/utility which currently serves only the city of Lezha and the Shengjini area (being part of Drini River Basin Area). For Lezhe, no revenues are reported regarding WWT but various costs, and thus a recovery rate of 0%. It is interesting here to also look at the WWT cost recovery for the Erzeni RB, where two utilities with WWTP (Kavaje and Durres) show extremely different recovery rates, that is 1% in Kavaje (due to very low revenue linked to this) and 281% for Durres.

So overall, these are hints either to different ways of billing this service or to uncertainties in reporting. Further work is needed here, esp. since the increase of WWT to be expected in the future and the need for a uniform and rational way of charging and reporting this service, leading to an affordable yet financially sustainable cost recovery rate.

Finally, an estimation of the contribution of the different water uses (for Albanian utilities that is state institutions, enterprises and households) to the cost recovery of the water services would be advisable in order to establish their contribution to the established cost recovery. This has not been done yet,

but based on the higher tariffs paid by households, it can be assumed that these customers cross-subsidize the water service use by state institutions (and depending on the specific tariffs of a utility, also of enterprises).

Table 11-5 – Total Cost Recovery Rates for water supply-sewerage-wastewater treatment plants, Mati RB, 2020

									in '000 ALL	in %	in %	in %
Water Service Companies	REVENUES Water	REVENUES Sewerage	REVENUES Wastewater TP	Direct COSTS Water	Direct COSTS Sewerage	Direct COSTS Wastewater TP	Other COSTS Water	Other COSTS Sewerage	Other COSTS Wastewater TP	Total Cost Recovery Rate Water	Total Cost Recovery Rate Sewerage	Total Cost Recovery Rate Wastewater TP
Albania	**8.390.079**	**1.233.044**	**227.290**	**8.729.978**	**682.456**	**130.056**	**2.832.484**	**601.403**	**172.741**	**73%**	**96%**	**75%**
Mati RB	159.665	12.548	-	241.730	13.963	1.982	75.390	11.854	6.996	50%	49%	0%
Prefecture Diber												
Klos UK (100%)	12.084	0	0	18.341	0	0	2.890	0	0	57%	n/a	n/a
Burrel UK (100%)	40.115	1.932	0	57.145	2.545	0	8.270	395	0	61%	66%	n/a
Prefecture Lezhe												
Kurbin UK (100%)	42.483	1.717	0	107.490	3.693	0	5.850	3.792	0	37%	23%	n/a
Mirdite UK (100%)	32.320	2.882	0	34.003	5.083	0	24.540	2.244	0	55%	39%	n/a
Lezhe UK (of which 20%)	163.319	30.086	0	123.755	13.208	9.908	169.202	27.113	34.980	56%	75%	0%
% as compared to Albania	2%	1%	0%	3%	2%	2%	3%	2%	4%			

ERRU 2020 Data, Performance Report (Water Service Companies level); own calculations

11.4.3.3. Environmental and resource costs of public water supply and sewage collection/treatment

With regards to the issue of environmental and resource costs (E&R costs), specific calculations are currently not available. This is valid for these costs categories regarding the impacts of the drinking water supply and sewage collection (and treatment) services (where some, even if limited, information is available on water volumes and - fragmentary – for wastewater disposed), but even more so for self-supply, where at an initial stage the volumes used/disposed and their location will have to be investigated, in order to establish their impact on the WFD-environmental status.

Additionally, the costs of the POM in a specific RB could be taken as a proxy (if the measures would reach WFD-good environmental status, then the POM costs can be seen as the "lower end"-estimation of E&R costs). Yet, at this stage, the POM focusses at "low hanging fruits" and cannot be assumed to reaching good status for all water bodies even if fully implemented. In addition, the costing of measures needs to be specified further.

An optional way for having at least a first estimation of E&R costs is that of instruments internalizing these costs, meaning mainly water abstraction and wastewater disposal charges/fees collected. The new charges and fees setting for water use is a great step ahead, the level of charges/fees is not connected to the environmental impact of the specific water use (to the specific location and impact to the good status of a specific use, e.g. the specific pollution load of a wastewater discharge into the environment.

These cost categories will be an important element of work for the future for a better understanding of the impacts of water use, leading to a better information base for sustainable water management.

11.4.4 Main gaps regarding water services and cost recovery

The main gaps are:

- Information regarding self-provision of services (e.g. irrigated agriculture, water abstractions and discharges by industry and households);
- Even if many efforts underway to improve the situation, more reliable information regarding both (metered) volumes/population served/losses etc. but also financial information of water utility companies and it´s disaggregation;

- Information on planned investments as well as plans on how to cover the additional costs (e.g. of new WWTP) in a way that ensures some “acceptable” and socially viable cost recovery, as well as a plan on how to ensure the financial viability of the water utilities in the long-run as linked to such investments increasing service quality;
- Assessments of the environmental and resource costs related to the provision of water services.

11.5 Baseline scenario: looking at the future

The specific role of the economic analysis in the development of a baseline scenario (BLS) is the assessment of forecasts in key economic drivers likely to influence pressures and thus water status. The focus should be on changes in general socio-economic variables (e.g. population growth), in economic growth of main sectors as well as changes in the implementation of planned investments linked to existing regulation.

It is important to note that on the supply side, projections need to also take place from a hydrological point of view. A key element here are the projected impacts of climate change on the water availability. Unfortunately, for many crucial elements regarding the water demand side, systematic information on the relevant socio-economic drivers and their effects on water management are not available in Albania (as well as in many other countries).

For the Mati RB, the population projections (of the medium-average scenario) show an expected very significant decrease from 2021 to 2031 of 13%, which is significantly higher than the expected decrease of population in this time frame for the whole of Albania of 4 %.

This will clearly impact the water management requirements in many ways, especially regarding water supply and sanitation. In order to better estimate these changes, a more detailed analysis of the regional changes with the basin(s), also linked to changes of per capita consumption (while the uncertainties regarding the population served and volumes actually produced need to be considered/reduced in order to do so).

The Ministry of Finance in is medium term budget program 2021-2023, indicates that after the strong recession in 2020 at the level of -4.0 percent, according to the latest estimate of INSTAT, the economy was expected to recover in 2021 and continue the positive trend in the medium term. Economic growth is projected (5.5 % 2021) to remain above 4 percent over the medium term. More specifically, economic growth is projected at 4.8, 4.5 and 3.9 percent, respectively for the years 2022, 2023 and 2024.

Beyond the information provided on investments in the cost recovery section regarding drinking water supply and sanitation (chapter 5.4.3 above), the National water sector programme 2018-2030[199] presents projections regarding the objectives for the water sector. The financial projections are calculated taking into consideration the specific budget items listed in the PBA Programme, per each responsible institution, for e.g. MTI Budget line for WSS, Ministry of Environment Budget line for Monitoring, etc. As a result, the total financing needs for achieving these objectives is estimated at 388,4 Billion ALL by 2030, while the actual budget foreseen in this time period is at 237,4 Billion ALL. Thus, a financial gap of 151 Billion ALL is established.

11.5.1 Main gaps regarding the baseline scenario

The In terms of gross domestic product (GDP), the Ishem-Erzen basins are very important for Albania. Although they represent only 7.3% of Albania's surface, these basins contribute almost half of the

[199] Draft National Sector Programme, prepared by AMBU in cooperation with relevant stakeholders. It follows the logic of the SDGs UN Agenda 2030 for water. Not yet adopted, yet was widely consulted with all relevant stakeholders, at national and local level, including mutual dedicated meeting with line ministries

national GDP. The importance has been increasing during the last years (2015-2019), since the GDP growth in the Ishem-Erzen basins has been the highest for the whole of Albania (25% against 18%). GDP per capita is higher than that of Albania and appears to grow at a similar rate (although somewhat slower).

Besides specific projections needing to be established/developed in more detail/supported by particular studies, the most urgent gap is process-oriented. Here, a systematic scenario building approach is required since the information/expert knowledge is located in a number of relevant ministries (agriculture, rural development, economics, etc.) as well from other institutes and stakeholders (water suppliers, agricultural associations, research institutes and organisations, etc.). Structural and regional plans as well as local authority plans will constitute important sources of information.

While it will be difficult to obtain information on certain parameters stated in the list above, approximations/estimations would have to be developed for each parameter/ policy projection in cooperation with the ministry/ administrative body that is responsible for/ capable of providing the required information/ projections/expert judgements.

The aim should be that overall, regionalized estimations on future water demand and expected pressures on water resources (quantity/quality) in the RBs will be developed in the future.

12. Environmental Policies at River Basin Level

12.1 Environmental Policies for Waterbodies

This Chapter summarises the broad policy and strategic approach within the 2024-2029 RBMP envisaged by the AWRM (the competent authority) to meet the environmental objectives defined in Chapter 3. These policy or strategic broad measures will apply to both surface water and groundwater as appropriate.

A distinction is to be drawn between general environmental policy objectives and the more targeted Programme of Measures (PoM, Chapter 13). For waterbodies known to be failing environmental objectives, targeted measures are required for those waterbodies, requiring quantification of the relevant pressures and measures. However, it is a fundamental requirement of the Water Framework Directive (WFD Preamble (26) that where good water status exists it should be maintained, and consequently this broad objective logically falls outside the Programme of Measures.

The purpose of this Chapter therefore is to set out in broad terms the policy and/or strategic approach that will be implemented by the competent authority (AWRM) across the river basin. The broad intention of these policies is to ensure that generally all waterbodies that are in good status remain at that status (i.e. no deterioration). Consequently, these strategic objectives apply potentially to all waterbodies within the river basin, and may include a wide range of technical guidance and/or legal or fiscal instruments to achieve in particular:

- Maintaining and improving the quality of the aquatic environment (WFD 19)
- The phasing out of priority hazardous substances (WFD 27)
- Coordination of long-term sustainability measures within the same ecological, hydrological and hydrogeological systems (WFD 33)
- Greater integration of qualitative and quantitative aspects of both surface water and groundwater systems (WFD 34)
- The implementation of a combined approach to pollution prevention and control incorporating both emission limit values (ELVs) and environmental quality standards (EQSs) (WFD 40)

It may be the case that some of these policy instruments are directly relevant to individual waterbodies or groups of waterbodies as part of the more targeted Programme of Measures, but in these cases the measure(s) to be applied should be quantifiable both in terms of the type of measure and the measure indicator (see Chapter 13).

12.1.1Summary of Initiatives to Support Environmental Objectives

An overview of proposed policy, general strategy, and increased regulation or enforcement practices is summarised in Table 12-1. The implementation of these policies, strategies and possible subsequent measures is likely to require the coordination and budgets of multiple competent authorities under the leadership of WRMA and in some cases may also require secondary legislation.

Table 12-1 is not intended as a matrix of 'possible options'. The purpose is to summarize for the benefit of stakeholders where WRMA intends to actively implement changes in policy and/or strategic interventions to ensure long-term sustainability of water resources and water services.

The methodologies and sectoral implications for each policy or enforcement intervention are outlined in more detail in sections 12.1.2 to 12.1.11, as are the likely coordination requirements between competent authorities.

12.1.2 Policy or Strategic Interventions for Adequate Surface Water Quantity Monitoring

A reliable and continuous river flow hydrometric network has not existed in the Mati river basin for at least two decades. The last reliable published information on surface water quantities dates from the 1984 publication 'Hydrology of Albania'. The national hydrometric network (meteorological and

hydrological) is under the competent authority of IGEWE (Institute of GeoSciences, Energy, Water and Environment - Department of Water Economy and Renewable Energy), but by common consent this authority is insufficiently managed or resourced in order to deliver a reliable national network. [200] The majority of international standard flow measuring stations for routine surveillance of river flows has collapsed in the Ishem, Erzen and Mati basins.
The condition of the River Mati flow gauging station at Shoshaj is typical, where a staff gauge still exists but there is no automation of continuous data collection, and clearly, no validation of essential head-discharge rating curves for many years.

Photograph 12-1 – Defunct Gauging Station at Shoshaj, River Mati

Without a reliable source of recent actual flows at strategic locations within the river basin, many critical aspects of a meaningful IWRM based RBMP cannot be achieved, most particularly:

- No information on water resources in the river basin, no possibility to establish even a basic water balance, and therefore no facility to determine appropriate water allocations between sectors.
- Environmental flows, essential to the preservation of aquatic ecosystems, cannot be reliably calculated
- Pollutant loads, (an essential factor in quantifying the physico-chemical status of waterbodies and/or target values for restoration measures) cannot be calculated
- The long-term probable decrease in river basin water resources, or at least major seasonal shifts, due to climate change, cannot be assessed with consequent critical implications for future river basin water resource management

The latest EC report 2021 highlighted that "*align further with key water directives by adopting the newly prepared legal package; adopt the new strategy for water supply and sewerage 2021-2030; substantially increase the budgetary resources and implementation capacity of its key national agencies for Water Resource Management and for Water Supply, Sewerage and Waste Infrastructure, and of the national agencies for implementing a national water monitoring programme financed through a statutory*".

[200] ON THE ESTABLISHMENT OF INSTITUTIONAL AND REGULATORY PLATFORM FOR GOVERNANCE AND FUNCTIONING (IRP) OF THE NATIONAL WATER RESOURCES CADASTRE IN ALBANIA, World Bank, October 2019.

Furthermore, there are different monitoring activities in the action plan of the NSIWRM that are not fully implemented, due to the financial gap that is needed in order for these activities to be fully complete.

Considering all the above and also the requirements for the implementation of the NSIWRM, WRMA *is requesting financial help for improving the monitoring network (as well as equipment and technical assistance) through the Action Document on water, in the IPA III assistance.*

Besides WRMA*, this assistance will benefit other institutions such as NEA, IGEWE, AGS, IPH, etc.*

The overall objective (impact) of the action is "*to maintain or improve the water bodies` quality status in Albania".*

The specific objectives (outcomes) of the action, corresponding to the two areas of support identified in the rationale (IWM and WWT) are to:

- Outcome 1: *Increase Albania approximation with the EU water acquis.*
- Outcome 2: *Reduce the discharge of wastewater pollution in water bodies, advancing the alignment with the requirements of the UWWTD.*

*Within outcome 1, is expected output 1.3 "*Water monitoring, reporting and enforcement are sustainably enhanced in line with the requirements of water related EU Directives", and more specifically:

1.3a: **Laboratory capacity development**-Increased monitoring capacity in terms of number of water monitoring parameters from EU water directives which the reference laboratories are accredited for (NEA, AGS, IPH, LHCUs)

1.3b: **Operational monitoring in RBs**-Increased monitoring capacity in terms of number of monitoring stations (fixed, boat-based or vehicle-based) equipped, installed and routinely operated (for surface water, groundwater, coastal water, meteo, hydrometric).

1.3c: Number of notifications and enforcement actions reported, on a yearly basis (NEA, AGS, and IPH).

12.1.3 Policy or Strategic Interventions for Adequate Groundwater Monitoring

Within outcome 1 "Increase Albania approximation with the EU water acquis" of the action document on water, is expected output 1.3 "Water monitoring, reporting and enforcement are sustainably enhanced in line with the requirements of water related EU Directives", where specifically for the groundwater monitoring is requested:

- Chemical analyses, morphology, quantities, groundwater assessment in 7 RBs
- Increased monitoring capacity in terms of number of water monitoring parameters from EU water directives which the reference laboratories are accredited for (NEA, AGS, IPH, LHCUs)
- Increased monitoring capacity in terms of number of monitoring stations - 40 new groundwater monitoring stations.

12.1.4 Policy or Strategic Interventions for Adequate Water Quality Monitoring

Within outcome 1" Increase Albania approximation with the EU water acquis" of the action document on water, is expected output 1.3 "Water monitoring, reporting and enforcement are sustainably enhanced in line with the requirements of water related EU Directives", where specifically for adequate water quality monitoring is requested:

- Increased monitoring capacity in terms of number of water monitoring parameters from EU water directives which the reference laboratories are accredited for (NEA, AGS, IPH, LHCUs)

- Increased monitoring capacity in terms of number of monitoring stations (fixed, boat-based or vehicle-based) equipped, installed and routinely operated (for surface water, groundwater, coastal water, meteo, hydrometric-New Hydro-met monitoring stations (15 hydro + 15 meteo)
- Drafting of National monitoring programme.

12.1.5 Policy or Strategic Interventions for Adequate Hydro biological Monitoring

Within outcome 1" Increase Albania approximation with the EU water acquis" of the action document on water, is expected output 1.3 "Water monitoring, reporting and enforcement are sustainably enhanced in line with the requirements of water related EU Directives", where specifically for the hydro biological monitoring is requested:

Increased monitoring capacity in terms of number of water monitoring parameters from EU water directives which the reference laboratories are accredited for NEA.

Sampling and analyses, assess biological status in 7 RBs.

Increased monitoring capacity in terms of number of monitoring stations (fixed, boat-based or vehicle-based) equipped, installed and routinely operated (for adequate Hydro biological Monitoring).

12.1.6 Policy or Strategic Interventions for Water Abstraction Controls

Uncontrolled use or overexploitation of water resources are currently detrimental impacts on our water resources. This applies to surface and groundwater which are critical sources and currently supply large quantities of drinking water and for irrigation of agricultural lands, especially in the coastal areas in Mat RB. WRMA is the responsible authority that must ensure on an annual basis, environmental needs and total water consumption from water sources, which should not be exceeded at the levels of annual renewable sources.

The problem related to water extraction control consists mainly of the operation of countless users for drinking water supply and irrigation in agriculture or industrial uses. As a result of the problem, there is an annual water balance at the water basin level which is not recognized as data are either unavailable or missing, users do not report regularly, the user registration is incomplete and there are several illegal users.

To provide a solution to the identified problems for the control of water extraction, the National Strategy for Water Resources Management, represents the main policy and strategic tool for intervention. Its main objective is to protect the water quantity and, consequently, in the most efficient distribution among users, is required the design and implementation of RBMPs, aiming to improve water distribution infrastructure, taking protection measures and having regards to the impacts of climate change.

The routine control over the water users, at country and river basin level in terms of application procedures and issuing the permits or authorizations, are specifically provided under the DCM No.550 dated 15.07.2020.

Based on legal provisions, WRMA is responsible for the technical assessment of applications and issuing the permits for use of water resources. Current conditions need to be improved to achieve a sustainable balance between economic and environmental needs in the future.

12.1.7 Policy or Strategic Interventions for Water Use Efficiency

Based on the WFD:

- Point (19) states that: The Directive seeks to preserve and improve the aquatic environment in the community. This purpose is primarily concerned with the quality of the water in question. Quantity control is an auxiliary element to ensure good water quality and therefore the necessary quantity measures must be taken to serve the objectives of ensuring the best possible quality.
- Item No. (41) States that: Concerning the amount of water, general control principles for intake and collection should be established to ensure the environmental sustainability of the affected water systems.

Having as a reference the Directive, the main problems related to the efficient use of water resources have been identified:

1. Control and recording the issuance of permits for the use of water resources

2. Global climate change (affected by floods and droughts)
3. Monitoring the quantity and quality of the water source.

As surface water inflows decrease and evaporation increases, water accumulated each year in reservoirs will also decrease, meaning less water for humans, for HPPs and agriculture, especially during the critical (dry) summer months. Groundwater will be affected by the decrease in surface water due to the decrease of precipitation, surface streams and soil moisture losses from increased evapotranspiration.

The authorities responsible for monitoring hydrometeorology must urgently improve the availability and range of data related to the efficient use of water. Preparation of an updated and valid balance of water resources at the basin level, reopening of monitoring stations (measurement of inflows and operation by national agencies), preliminary risk assessments from floods or droughts by preparing relevant management plans, which are regulated and sanctioned based on the legislation in force.

Strategy for Water Resources Management, represents the main policy and strategic tool for intervention. Its main objective is to protect the water quantity and, consequently, in the most efficient distribution among users, is required the design and implementation of RBMPs, aiming to improve water distribution infrastructure, taking protection measures and having regards to the impacts of climate change.

The routine control over the water users, at country and river basin level in terms of application procedures and issuing the permits or authorizations, are specifically provided under the DCM No.550 dated 15.07.2020.

Based on legal provisions, WRMA is responsible for the technical assessment of applications and issuing the permits for use of water resources. Current conditions need to be improved to achieve a sustainable balance between economic and environmental needs in the future.

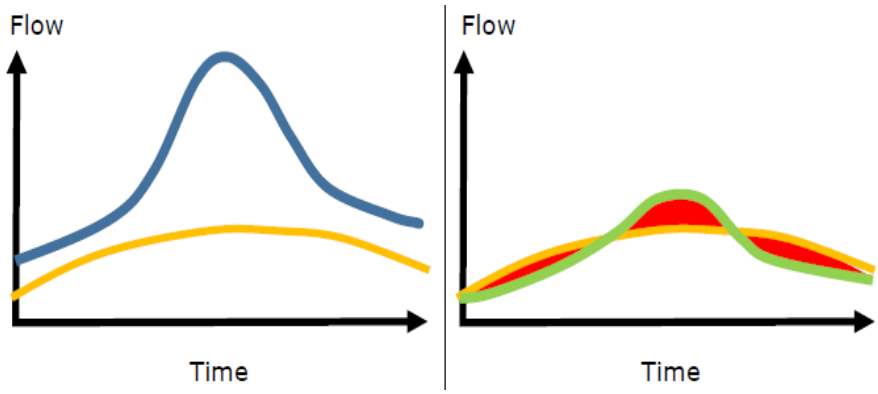
12.1.8 Policy or Strategic Interventions for Environmental Flow Compliance

The correct determination and maintenance of environmental flow is utterly critical to achieving good ecological status for most river systems (see section 3.3.5). Under best practice, environmental flow is not considered to be a single minimum or time-invariant flow (Figure 12-1 *left*), above which all abstraction or diversion may be permitted without damage to the aquatic ecosystems (as is implied by the current Water Law definitions under Article 4 – 'sustainable flow = flow exceeded 355 days per year (Q97)). Rather, environmental flow should mirror the entire natural flow regime of the river, varying across the seasons (Figure 12-1 *right*), and hence environmental flow can be both above or below current actual flows created by artificial influences.

The current legal definition of 'sustainable flow' in Albania does not equate to best practice, and in the period 2024-2029, policy work will be undertaken to review the national methodology for environmental flow. In due course Operators will have to comply with a more seasonally based and ecologically appropriate flow regime than at present, determined for individual rivers.

It will become mandatory for Operators planning to abstract, store or divert water for any purpose to plan their operations such that the downstream environmental flow regime is not excessively impacted.

Figure 12-1 – Concept of Environmental Flow Restoration



Source: EU CIS – Guidance 31 [201]

The hydrological regime of inflow into many rivers plays a role in the structure and functioning of aquatic ecosystems. When the natural regime changes, for example through the diversion of inflows for the construction of HPPs, or exceeded levels of water extraction for irrigation or drinking water, the changed regime is expected to have a detrimental impact, noticeable on aquatic ecosystems, reduce the ecological status of water bodies to less than "good". This concept is the main environmental objective of the WFD.

It is almost certain that the "minimum ecological contribution", described in the law no. 111/2012 amended and updated by law no. No. 6/2018, based on the inflow equivalent to 355 days of the year is insufficient for the protection of aquatic ecosystems. Many HPPs across the country continue to be approved based on these criteria, potentially allowing all inflows above this minimum limit for exploitation and diversion.

Figure 12-1 shows one of the best ecological flow management practices, where the minimum ecological flow is identified for each month of the year. To maintain the good ecological status of a water body, it must be used during the wet period of the year (in March, April) and this can reduce to less use during the dry summer months (for example August, September). Overuse of water simply destroys the ecological status of a water body.

For every intervention foreseen or planned by operators, an environmental assessment of impacts shall take place (law no. 10440, dated 7.7.2011,"on Environmental Impact Assessment"), which aims to ensure a high level of environmental protection, through the prevention, minimization and compensation of environmental damage, from projects proposed before their development approval; and ensuring an open decision-making process, in identifying, describing and assessing adverse environmental impacts, in a timely and appropriate manner; as well as the involvement of all stakeholders in it. The conditions to be met by operators (for use of surface water, for drinking water, for irrigation, for aquaculture, for purposes industrial etc.), are defined under the DCM no.550 dated 15.07.2020.

The concept of ecological input and its application in water resources use permits in Albania should be reviewed and re-evaluated, based on the opinion of experts and international best practices. Where these standard technical procedures should be applied to accurately determine the level of impact on ecological input activities related to different uses of water resources and discharges created in aquatic ecosystems after water use. These destructions will directly contradict the EOs of the WFD and therefore measures must be taken following the fulfilment of criteria of the Directive for good ecological status.

[201] Ecological flows in the implementation of the Water Framework Directive – Technical Report 2015-086

12.1.9 Policy or Strategic Interventions for Increased Reporting by Operators

The increasing demand for the use of water resources also leads to an increase in the reporting of the situation and the monitoring of water bodies by the operators themselves. Each operator planning to use water shall be awarded a respective permit or authorization, based on the provisions of the Law no. 111/2012 as amended by law no.6/2018.

Respective conditions are listed as mandatory to be met by Operators once the permit is issued by WRMA (DCM no. 550 dated 15.07.2020) including the obligations to report on the water quantity used, discharge points and quantities.

In addition, Operators are also issued an environmental permit or undergo the environmental impact assessment procedures prior to establishing a certain industrial activity, based on the provisions of the law no. 10448, dated 14.7.2011, "on Environmental Protection" law no. 10440, dated 7.7.2011, "on Environmental Impact Assessment". Operators perform self-monitoring periodically and report to NEA accordingly.

Fulfilment of obligations and periodic reporting would bring improvements and more efficient control of the water source.

12.1.10 Policy or Strategic Interventions for On-site Pollution Control

Wastewater discharges are inflows that are discharged mainly into rivers or coastal waters after their extraction and use (for drinking water, industrial, agricultural or hydropower production). In the case of drinking water and urban wastewater, without having a proper level of treatment, amounts of pollutants can be discharged into surface water bodies, creating a very large environmental impact for aquatic species and reducing the ecological status of water bodies.

Pollution from urban wastewater, industry and the agricultural sector are the biggest problems in Albania because wastewater contains high concentrations of pathogens, nitrate, phosphate, ammonium, heavy metals and hydrocarbons. The direct dumping of urban or industrial solid waste into rivers or areas near the coast is also a major problem and creates pollution.

Pollution control at the point of treatment or after use is regulated by based on the provisions of law no. 10448, dated 14.7.2011 "on Environmental Protection" which aims to protect the environment at a high level, preserve and improve it, prevent and reduce risks to life and human health, ensure and improve the quality of life, for the benefit of present and future generations, and providing conditions for the sustainable development of the country.

Apart from the above “umbrella” law, specific legal requirements are foreseen in related legislation which respond to the different aspects of water sector. For controlling the quality of bathing waters, certain standards and rules are defined, EU compliant by the regulation "Quality of drinking water" (DCM no. 379, dated 25.5.2016). In addition, in order to prevent, reduce and avoid the pollution of receiving water environments by hazardous substances, which are discharged into them through wastewater, and defining the limit values for permitted components, specific standards and rules are foreseen through the DCM no. 177, dated 31.3.2005 on the Allowed Norms of Liquid Discharges and the criteria for zoning of receiving water environments”.

Furthermore, aiming to control the quality of wastewater discharges into the environment, specific rules of their environmental treatment, as well as the obligations of wastewater dischargers are foreseen by law no. 9115, dated 24.7.2003 "on the Environmental Treatment of Wastewater”.

To have a pollution control at the source or at the place where the water is used it must be a functional register and the strengthening of all industrial discharges to provide a better indicator of the pressure of the pollutants is urgently needed where to assess individually the environmental conditions and objectives for the receiving aquatic environments and the discharges carried out in the same water body.

12.1.11 Policy or Strategic Interventions for Operational Self-monitoring

Measuring and managing the amount of water is very important for the long-term use of water. Accurate rainfall measurement and discharge of water into the water basin are essential elements in managing surface and groundwater inflows, as well as assessing the impact of climate change.

The problem related to hydro morphological monitoring is that WRMA faces a lack of quantitative assessment of the water source in water basins. This lack of knowledge requires immediate intervention as it is closely related to the global climate change emergency.

Regarding the problem of monitoring the quantities of resources, it is also encountered in the users of HPPs, who do not regularly report the quantities they use, to WRMA. This means that the annual review or control of the water balance in the Water Cadastre cannot be performed.

The legislation that is currently in force is closely related to monitoring and defines exactly the appropriate ways of acting as users of the water resource but also the agencies that manage and control these water resources.

One of the institutions which in their jurisdiction deal with extensive use of water resources for reasons of drinking water supply and sewerage in the consumer sector, is the ERRU/WRA monitors the performance of water and sewerage operators to ensure that their responsibilities are met and to see the progress they make to improve services. Monitoring provides the opportunity to make an accurate assessment of the performance of each operator and set challenging objectives, taking into account current capacity. Achievements are measured by Key Performance Indicators. Each year, the operator's operational, financial and customer service performance is subject to public scrutiny when the Performance Report is published.

Operators are also issued an environmental permit or undergo the environmental impact assessment procedures prior to establishing a certain industrial activity, based on the provisions of the law no. 10448, dated 14.7.2011, "on Environmental Protection" and law no. 10440, dated 7.7.2011, "on Environmental Impact Assessment". Operators perform self-monitoring periodically and report to NEA accordingly.

Taking concrete measures in updating the status of water balance, in a standard and legally binding reporting system for the Water Cadastre, in cooperation and coordination with the institutions involved in the issue, to achieve a better status of the water body overtime of the implementation of this management plan.

12.1.12 Policy or Strategic Interventions for Nutrient Discharge and Diffuse Pollution Controls

Nutrient pollution is considered a wicked problem because of its many significant economic, social, and environmental impacts that are caused by multiple pollutants originating from a variety of sources and pathways that exist across different temporal and spatial scales. Further adding to the difficulty in managing nutrient pollution is that it is a global, rural, and urban problem.

Pollution control at the point of treatment or after use is regulated by based on the provisions of law no. 10448, dated 14.7.2011 "on Environmental Protection" which aims to protect the environment at a high level, preserve and improve it, prevent and reduce risks to life and human health, ensure and improve the quality of life, for the benefit of present and future generations, and providing conditions for the sustainable development of the country.

Apart from the above “umbrella” law, specific legal requirements are foreseen in related legislation which respond to the different aspects of water sector. For controlling the quality of bathing waters, certain standards and rules are defined, EU compliant by the regulation "Quality of drinking water" (DCM no. 379, dated 25.5.2016). In addition, in order to prevent, reduce and avoid the pollution of receiving water environments by hazardous substances, which are discharged into them through wastewater, and defining the limit values for permitted components, specific standards and rules are

foreseen through the DCM no. 177, dated 31.3.2005 on the Allowed Norms of Liquid Discharges and the criteria for zoning of receiving water environments".
Furthermore, aiming to control the quality of wastewater discharges into the environment, specific rules of their environmental treatment, as well as the obligations of wastewater dischargers are foreseen by law no. 9115, dated 24.7.2003 "on the Environmental Treatment of Wastewater".
Based on the legislation and best practices of control of food dischargers, appropriate measures will be drafted to prevent and minimize pollution.

12.1.13 Policy or Strategic Interventions for River Structures and Continuity Restoration

Interference and destruction of aquatic habitats through sewers and changes in flooded areas have a very large impact on aquatic species. These include direct damage to aquatic ecosystems through uncontrolled mining activity, fish barriers and the laying of fish and migration eggs, followed by the construction of barriers, dams, embankments, river sewers as a result of urbanization and zoning of natural floods from the river corridor as a result of flood protection schemes. All these activities affect the quality of aquatic ecosystems and their sustainability.
There is a neglect of the harmful effects of interventions on the morphology and continuity of rivers. Many schemes have been allowed to be constructed without conducting a thorough environmental impact assessment. Dams and barriers are built without considering fish passageways or habitat continuity. Gravel extraction is an illegal activity, as enforcement of legislation does not occur. Flood protection embankments and other activities on the shores separate the canal from the natural bed of the flooded area. The widespread distribution of small HPPs in Albania without sufficient control of impacts and inflows is damaging aquatic ecosystems.
Environmental protection and restoration of ecosystems is regulated by based on the provisions of law no. 10448, dated 14.7.2011 "on Environmental Protection" which aims to protect the environment at a high level, preserve and improve it, prevent and reduce risks to life and human health, ensure and improve the quality of life, for the benefit of present and future generations, and providing conditions for the sustainable development of the country.
Apart from the above "umbrella" law, specific legal requirements are foreseen in related legislation which respond to the different aspects of water sector. In addition, in order to prevent, reduce and avoid the pollution of receiving water environments by hazardous substances, which are discharged into them through wastewater, and defining the limit values for permitted components, specific standards and rules are foreseen through the DCM no. 177, dated 31.3.2005 on the Allowed Norms of Liquid Discharges and the criteria for zoning of receiving water environments".
Furthermore, aiming to control the quality of wastewater discharges into the environment, specific rules of their environmental treatment, as well as the obligations of wastewater dischargers are foreseen by law no. 9115, dated 24.7.2003 "on the Environmental Treatment of Wastewater".
The preparation of RBMPs puts key standards, at river basin level, as to how to "save" the status of water bodies if proven to be good or high and improve in case it is reported to be moderate or lower. Immediate intervention in the fragments of water bodies that have undergone a physical modification with high environmental impact should be in the focus of taking immediate measures.

Table 12-1 – Summary of General Policy or Strategic Measures to Support Environmental Objectives 2024-2029

PRESSURES BY SECTOR AND SOURCE	ABSTRACTION CONTROLS	WATER USE EFFICIENCY	PRICING POLICIES	ON-SITE TREATMENT	OPERATOR MONITORING & REPORTIN	NUTRIENT CONTROLS	EFLOW COMPLIANCE	HABITAT RESTORATION	STRUCTURES + CONTINUITY
MUNICIPAL WATER SUPPLY SURFACE WATER	Yes (26) DCM on Strategy NSIWRM DCM no.550, dt.15.07.2020)	Yes (8) DCM on Strategy NSIWRM	Yes (9) ERRU - Tariffs DCM no.993/2020	Yes (13) DCM no.379/2016	Yes (14) DCM no 1122/2020 NWRC DCM no 1189/2009 NMP ERRU Benchmark / Performance Reporting	Yes (2)(3)(13) Law no.111/2012 DCM no.379/2016	Yes (7) Law no.111/2012 DCM no.550, dt 15.07.2020	Yes (6) DCM no.550, dt 15.07.2020 Law on EIA 128/2020 Law on 81/2017 on NAPA	Yes (5)(6) DCM no.550, dt 15.07.2020 Law on EIA 128/2020
MUNICIPAL WATER SUPPLY GROUNDWATER	Yes (26) DCM on Strategy NSIWRM DCM no.550, dt.15.07.2020)	Yes (8) DCM on Strategy NSIWRM	Yes (9) ERRU - Tariffs DCM no.993/2020	Yes (13) DCM no.379/2016	Yes (14) DCM no 1122/2020 NWRC DCM no 1189/2009 NMP ERRU Benchmark / Performance Reporting	Yes (2)(3)(13) Law no.111/2012 DCM no.379/2016	Yes (7) Law no.111/2012 DCM no.550, dt 15.07.2020	Yes (21) DCM no.550, dt 15.07.2020 Law on EIA 128/2020 Law on 81/2017 on NAPA	Yes (21) DCM no.550, dt 15.07.2020 Law on EIA 128/2020

MUNICIPAL WASTEWATER	n/a DCM no.550,dt 15.07.2020	Yes (8) DCM no.550, dt.15.07.2020)	Yes (9) ERRU - Tariffs DCM no.993/2020	Yes (1) DCM no.177/2005 DNWC no.2/2015 Law on URWWT no 9115/2003	Yes (14) DCM no 1122/2020 NWRC DCM no 1189/2009 NMP	Yes (1) DCM no.177/2005 DNWC no.2/2015 Law on URWWT no 9115/2003	Yes (18) DCM no.550, dt.15.07.2020) Law on EIA 128/2020	Yes (19) DCM no.550, dt.15.07.2020) Law on EIA 128/2020	n/a DCM no.550, dt 15.07.2020
INDUSTRIAL WATER SUPPLY SURFACE WATER	Yes (26) DCM on Strategy NSIWRM DCM no.550, dt.15.07.2020)	Yes (8) DCM on Strategy NSIWRM	Yes (10) ERRU - Tariffs DCM no.993/2020	Yes (13) DCM no.379/2016	Yes (14) DCM no 1122/2020 NWRC DCM no 1189/2009 NMP	Yes (2)(3) (13) Law no.111/2012 DCM 379/2016	Yes (7) Law no.111/2012 DCM no.550, dt 15.07.2020	Yes (21) DCM no.550, dt 15.07.2020Law on EIA 128/2020 Law on 81/2017 on NAPA	Yes (21) DCM no.550, dt 15.07.2020 Law on EIA 128/2020
INDUSTRIAL WATER SUPPLY GROUNDWATER	Yes (26) DCM on Strategy NSIWRM DCM no.550, dt.15.07.2020)	Yes (8) DCM on Strategy NSIWRM	Yes (10) ERRU - Tariffs DCM no.993/2020	Yes (13) DCM 379/2016	Yes (14) DCM no 1122/2020 NWRC DCM no 1189/2009 NMP	Yes (2)(3) (13) Law no.111/2012 DCM no.379/2016	Yes (7) Law no.111/2012 DCM no.550, dt 15.07.2020	Yes (6) DCM no.550, dt 15.07.2020 Law on EIA 128/2020 Law on 81/2017 on NAPA	Yes (5)(6) DCM no.550, dt 15.07.2020 Law on EIA 128/2020
INDUSTRIAL WASTEWATER	n/a DCM no.550,dt 15.07.2020	Yes (8) DCM no.550, dt.15.07.2020)	Yes (10) ERRU - Tariffs DCM no.993/2020	Yes (1) DCM no.177/2005 DNWC no.2/2015 Law on URWWT no 9115/2003	Yes (14) Law on EIA 128/2020 Law on Env. Permits 52/2020 Emissions Register (Air/ Oils)	Yes (1) DCM 177/2005 DNWC no.2/2015 Law on URWWT no 9115/2003	Yes (18) DCM no.550, dt.15.07.2020) Law on EIA 128/2020	Yes (19) DCM no.550, dt.15.07.2020) Law on EIA 128/2020	n/a DCM no.550, dt 15.07.2020

AGRICULTURE SURFACE WATER	Yes (26) DCM on Strategy NSIWRM DCM no.550, dt.15.07.2020	Yes (8)(12) DCM on Strategy NSIWRM	Yes (11) Law no. 24/2017, on irrigation and drainage administration	Yes (16) DCM no.177/2005	Yes (14) DCM no 1122/2020 NWRC DCM no 1189/2009 NMP Law on Env. Permits 52/2020	Yes (2)(3)(18) Law on EIA no.128/2020 Law on Env. Permits 52/2020	Yes (7) Law no.111/2012 DCM no.550, dt 15.07.2020	Yes (17) (22) DCM no.550, dt.15.07.2020) Law on EIA no.128/2020	Yes (5)(6) Law no.111/2012 DCM no.550, dt.15.07.2020)
AGRICULTURE GROUNDWATER	Yes (26) DCM on Strategy NSIWRM DCM no.550, dt.15.07.2020)	Yes (8) (12) DCM on Strategy NSIWRM	Yes (11) Law no. 24/2017, on irrigation and drainage administration	Yes (16) DCM no.177/2005	Yes (14) DCM no 1122/2020 NWRC DCM no 1189/2009 NMP Law on Env. Permits 52/2020	Yes (2)(3)(18) Law on EIA 128/2020 Law on Env. Permits 52/2020	Yes (7) Law no.111/2012 DCM no.550, dt 15.07.2020	Yes (17) (22) DCM no.550, dt.15.07.2020) Law on EIA 128/2020	Yes (5)(6) Law no.111/2012 DCM no.550, dt.15.07.2020)
HYDROPOWER SURFACE WATER	Yes (26) DCM on Strategy NSIWRM DCM no.550, dt.15.07.2020)	Yes (8) DCM on Strategy NSIWRM	Yes (10) ERRU - Tariffs DCM no.993/2020	Yes (16) DCM no.177/2005	Yes (14) DCM no 1122/2020 NWRC Law on EIA 128/2020	n/a	Yes (7) Law no.111/2012 DCM no.550, dt 15.07.2020 Law on EIA 128/2020	Yes (23) (24)(6) (17) (18) (19) DCM no.550, dt 15.07.2020 Law on EIA 128/2020 Law on 81/2017 on NAPA	Yes (6) DCM no.550, dt 15.07.2020 Law on EIA 128/2020 Law on 81/2017 on NAPA

MINING OPERATIONS SURFACE WATER	Yes (26) DCM on Strategy NSIWRM DCM no.550, dt.15.07.2020	Yes (8) DCM on Strategy NSIWRM	Yes (10) ERRU - Tariffs DCM no.993/2020	Yes (13) DCM no.379/2016	Yes (14) DCM no 1122/2020 NWRC DCM no 1189/2009 NMP	Yes (2)(3) (13) Law no.111/2012 DCM no. 379/2016	Yes (7) Law no.111/2012 DCM no.550, dt 15.07.2020	Yes (21) DCM no.550, dt 15.07.2020 Law on EIA 128/2020 Law on 81/2017 on NAPA	Yes (21) DCM no.550, dt 15.07.2020 Law on EIA 128/2020
FLOOD RISK MANAGEMENT	n/a	n/a	n/a	Yes (13) DCM no.379/2016	Yes (14) DCM no. 1122/2020 NWRC	Yes (1) Law no.111/2012	n/a	Yes (4) (17) (21) (22) (24) (25) Law on Env. protection Permits 53/2020	Yes (6) DCM on Strategy NSIWRM DCM no 1015/2020
DROUGHT RISK MANAGEMENT	Yes (26)(24)(13) DCM on Strategy NSIWRM DCM no.550, dt.15.07.2020)	Yes (8) DCM on Strategy NSIWRM	Yes (10) Law no. 24/2017, on irrigation and drainage administration	Yes (1) (16) DCM no 177/2005	Yes (14) DCM no 1122/2020 NWRC	Yes (2)(3) Law no.111/2012 DCM 379/2016	Yes (7) Law no.111/2012 DCM no.550, dt 15.07.2020	Yes (24) (23) (25) Law on Env. protection Permits 53/2020	Yes (6) DCM on Strategy NSIWRM DCM no 1015/2020
TRANSBOUNDARY AGREEMENTS	n/a	n/a	n/a DCM Tariffs	n/a	n/a	n/a	n/a	n/a	n/a

13. The Programme of Measures for the Mati Basin

13.1 Overview

The RBMP is the main tool for the water management of all surface and groundwater bodies within a specified RBD, and the Programme of Measures for the Mati river basin is the principal output of the RBMP Report. The programmes, regulatory improvements or enforcements, and remedial or protective actions identified for specific waterbodies, areas or economic sectors are expected to be legally binding on the appropriate competent authorities once the RBMP is formerly adopted by the GoA Council of Ministers.[202]

In this report, the extent to which waterbodies do not meet these objectives is summarised principally in Chapter 10, based on the supportive evidence of Chapters 4 to 9. To restate, the environmental objectives for the Mati river basin broadly are:

- To prevent the further deterioration of the status all waterbodies from their current status or potential
- Where waterbodies currently fail the test of 'good status' or are at risk of failure, remedial measures will be required so as to enhance and ultimately restore all waterbodies to 'good status' or 'good potential'
- Artificial and heavily modified waterbodies may be subject less stringent environmental objectives from 'good ecological status' to 'good ecological potential', providing the reasons and technical and/or economic justifications are specifically mentioned in the river basin management plan
- Priority substances and priority hazardous substances discharged to the environment should be progressively phased out

The Programme of Measures for the Mati basins comprises both 'Basic measures' and 'Supplementary measures', see section 13.2 and 13.3.

13.1.1 The Concept of 'Measures' and Key Types of Measures (KTMs)

The content and purpose of the Programme of Measures (PoM) is frequently misapplied or misunderstood by regulatory agencies.

This RBMP sets out the Programme of Measures that will be required in the period 2024-2029 to achieve the 'environmental objectives' described fully under Chapter 3, in compliance with the Water Framework Directive Article 4. The PoM is not intended to address all issues relating generally to water management and use within the river basin, including for example national deficiencies in water resource monitoring capability, structural deficiencies in national inter-Agency competencies or coordination, provision of rural water supply, the need for flood protection schemes, drought risk management plans etc., although these are often incorrectly incorporated into PoMs.

These non-structural and/or structural issues are relevant only in so far as they impact on the core objective of achieving river basin environmental objectives. 'Measures' are intended solely to ensure the protection and sustainable use of water at river basin level. The WFD intention is to maintain or improve the aquatic environment, and therefore 'measures' primarily address management of quality of waterbodies, and quantity where it serves the objective of good quality.

Precisely because of this widely varying interpretation among MS, and inappropriate inclusion of 'non-environmental' objectives in many RBMPs, the WISE WFD Reporting Guidance 2016 identified a core list of Key Types of Measures (KTMs) to be followed in the development of PoMs. KTMs are groups of measures identified by Member States in the PoMs which target the same pressure or purpose. It is expected that most Member States will be able to report their measures in terms of predefined KTMs.

[202] GoA legal confirmation needed

The use of additional "new" KTMs should be very limited to facilitate comparability and the consolidation of information at EU level.[203] Member States are expected to "bundle" their particular 'national measures' (usually more detailed than the KTMs) to report them in an aggregated way as KTMs. [204]

As for other chapters in this RBMP Report, the intention is to develop standard reporting templates that closely align with the EU WISE reporting requirements. As and when the National Water Resources Cadastre becomes fully functional, it will be evident that this structured and compliant approach to data collection and reporting is essential.

Measures should be strictly definable and targeted in terms of their type and extent to ensure that the identified pressures at basin, sub-basin or waterbody level are correctly managed, and that these measures will deliver measurable improvements towards achieving good status or potential in individual or groups of waterbodies.

Table 13-1 summarises the EU WISE compliant Key Types of Measures (KTMs) that have been broadly adopted in this RBMP Report. It should be noted that Albania introduces at this time one additional nationally specific KTM, namely "26 - Control of excessive abstraction quantities through Water Permit conditions and enforcement".

This reflects the current situation in Albania that many Operators are operating abstractions without any form of Permit, and abstractions are frequently unregulated and excessive in quantity. A first step for measures will be to identify all such abstractions, quantify appropriate abstraction levels, and enforce these through an improved Permit and inspection regime.

Control of excessive abstraction quantity by the municipal, agriculture and industrial sectors (through Permit restrictions and/or pricing policies) is likely to achieve several multiplier benefits in terms of increased water resource availability to other sectors, climate change resilience, improved environmental flow compliance, and improved dilution potential for pollutant loads.

It is further important to note that many of the KTMs mentioned in Table 13-1 can be implemented as Nature-Based Solutions (NBS). Beyond KTM 24 "Adaptation to climate change," the following measures can be implemented in particular as NBS:

• KTM 6 "Improving the hydromorphological conditions of water bodies in addition to longitudinal continuity (e.g. restoration of rivers, improvement of coastal areas, removal of strong embankments, reconnection of rivers with floodplains, improvement of the hydromorphological condition of transitional waters, etc.)";

• KTM 7 "Improvement in the flow regime and/or establishment of ecological flows." Investments for the restoration of ecosystems damaged by human intervention in river environments (diversions of natural flows from HPPs or other purposes, ecosystem degradation)."

• KTM 12 "Advisory services for agriculture"–through adaptive ecosystem-based approaches that increase the resilience of the agricultural sector while simultaneously producing benefits from biodiversity;

• KTM 13 "Protection of drinking water. 1. Designation of Protected Areas and involvement in planning control

• KTM 17 "Measures for reducing sediments from soil erosion and surface runoff.

1. Conservation and reduction of erosion rates to protect high-risk soils.
2. Rehabilitation of existing infrastructure for erosion protection (embankments and riverbanks).
3. New afforestation and increase of vegetation."

While some of the KTMs mentioned in Table 13.1 may qualify as NBS, it is not necessarily the case that they will, as this depends on the specifics of the design and context of the measure. The IUCN global standard for nature-based solutions should be applied to the design of KTMs that satisfy the required

[203] In exceptional circumstances, a new Key Type Measure may be introduced and reported by the MS if the list is insufficient, under WISE schema element "*NewKeyTypeMeasure"*

[204] European Commission, WISE Reporting Guidance 2016, Chapter 10. Schema "RBMPPOM"

NBS criteria. Indeed, the Global Standard supports funders, investors, and decision makers in designing NbS initiatives that are effective and scalable, prevent misuse, and consider potential externalities. Adherence to criteria and indicators ensures the design, implementation, monitoring, and evaluation of NbS, which provides cost-effective solutions for achieving environmental objectives in water management, as well as ensuring access to increased funding for these measures.

In relation to climate change adaptation in Watershed Management, there are several types of WFD measures to address climate change adaptation. In addition to traditional measures, different types of NAPs that can be applied to address climate change impacts on river basin management are listed in Table 13.1 based on the IPCC Working Group II AR6 Report (Pörtner et al., 2024). The IPCC WGII (2024) notes that NBS approaches rivers and wetlands to reduce flood risk, and has seen significant investment in recent years. Such approaches include natural flood management (NFM), which involves various techniques in river and coastal systems.

In the Mat River Basin, NBS measures can be applied to both catchment and channel management (IPCC, 2024). For example, restoring natural meanders in channelized watercourses and allowing woody debris to accumulate is effective in slowing flow rates, whereas restoring or creating upstream wetlands in urban and peri-urban situations can enable water conservation during flood events (Acreman and Holden, 2013; Ameli and Creed, 2019; Wu et al., 2020).

Another type of NBS involves the protection and restoration of natural river systems and vegetation cover within watersheds. Additionally, NBS can include agro-ecological integration techniques in agricultural systems. These measures can help manage the risk of drought and increase the security of the water supply, especially under climate change conditions, as they increase water storage in catchments and improve water quality (Taffarello et al., 2018 ; Agol et al., 2021; Khaniya et al., 2021).

Table 13-1 – EU WISE Key Types of Measures Mapped to Albania National Sectoral Water Program

KTM	KTM DESCRIPTION	PROGRAM OF PROPOSED MEASURES BASED ON NSWP[205]	SOFT/HARD MEASURE
1	Construction or upgrades of wastewater treatment plants.	1. Operation of existing urban wastewater treatment plants, and compliance with WFD 2000/60 / EC standards.	Hard
		2. Construction of urban wastewater treatment plants.	Hard
		3. Construction of sewerage system with septic tanks.	Hard
		4. Implementation of projects for the closure of non-sanitary landfills for urban waste, as well as for the opening of landfills / urban waste treatment plants, or transfer stations.	Hard
2	Reduce nutrient pollution from agriculture.	1. Investments for protection from pollutants coming from agriculture, concentrated (drip) and non-concentrated (non-drip).	Hard
		2. Rehabilitation and cleaning of drainage canals and construction of new irrigation schemes.	Hard
3	Reduce Pesticides pollution from agriculture.	1. Investments for protection from pollutants coming from agriculture, concentrated (drip) and non-concentrated (non-drip).	Hard
		2. Rehabilitation and cleaning of drainage canals and construction of new irrigation schemes.	Hard
4	Remediation of contaminated sites (historical pollution including sediments, groundwater, soil).	1. Rehabilitation of contaminated "hotspots".	Hard
		2. Rehabilitation of mining dams and surfaces contaminated by industrial discharges.	Hard
		3. Construction of collection points and treatment of waste and oils from vessels in all ports and necessary points by making investments to reduce the risk of natural disasters.	Hard
5	Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams).	*Improvement of irrigation systems for irrigated agricultural lands and rehabilitation and maintenance of dams following the technical conditions, according to the recommendations of ICOLD, to increase safety and reduce the potential effects caused by their damage.*	
		1. Rehabilitation and cleaning of drainage canals and construction of new irrigation schemes.	Hard
		2. Rehabilitation of other dams to guarantee the water source for irrigation and increase their safety (previously assessed by the subordinate structures of MARDWA).	Hard

[205] These are the measures proposed by Albanian National Sectoral Water Program. http://WRMA.gov.al/public/PROGRAMI%20KOMB%C3%8BTAR%20SEKTORIAL%20I%20UJIT%202018-2030.pdf

KTM	KTM DESCRIPTION	PROGRAM OF PROPOSED MEASURES BASED ON NSWP[205]	SOFT/HARD MEASURE
6	Improving hydro morphological conditions of water bodies other than longitudinal continuity (e.g. river restoration, improvement of riparian areas, removal of hard embankments, reconnecting rivers to floodplains, improvement of the hydro morphological condition of transitional waters, etc.).	1. Construction/reconstruction of flood protection infrastructure in the Mat river.	Hard
		2. Preservation and reduction of erosion rate to protect high-risk soils. Rehabilitation of existing infrastructure for erosion protection (embankments, river protection spurs).	Hard
7	Improvements in flow regime and/or establishment of ecological flows.	Investments for the restoration of ecosystems damaged by human intervention in river environments (natural flow diversions from HPPs or other purposes, ecosystem degradation).	Hard
8	Water efficiency, technical measures for irrigation, industry, energy and households.	1. Rehabilitation/expansion projects / new water supply systems in urban and rural areas.	Hard
		2. Construction of new water intake and irrigation schemes.	Hard
		3. Investments for industrial water treatment by the private sector.	Hard
9	Water pricing policy measures for the implementation of the recovery of the cost of water services from households.	Purchase and installation of meters for measuring the amount of water produced.	Hard
10	Water pricing policy measures for the implementation of the recovery of the cost of water services from the industry.	Installation of water meters	Hard
11	Water pricing policy measures for the implementation of the recovery of the cost of water services from agriculture.	Installation of water meters in irrigation works.	Hard
12	Advisory services for agriculture.	Reduce pollution from agrochemicals	Soft
13	Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc.).	1. Strengthening laboratory capacities for groundwater monitoring.	Hard
		2.Definition of Protection Zones and incorporation into planning control	Soft
14	Research, improvement of knowledge base reducing uncertainty.	Water resource assessments and investigations	Soft
15	Measures for the phasing-out of emissions, discharges and losses of Priority Hazardous Substances or the reduction of emissions, discharges and losses of Priority Substances.	1. Industry regulations	Soft
		2. Zonal planning control for new facilities	Soft
16	Upgrades or improvements of industrial wastewater treatment plants (including farms).	1. Construction of wastewater treatment plants.	Hard
		2. Construction of sewerage system with septic tanks.	Hard
17	Measures to reduce sediment from soil erosion and surface run-off.	1. Preservation and reduction of erosion rate to protect high-risk soils. Rehabilitation of existing infrastructure for erosion protection (embankments, river brushes).	Hard
		2. Construction of mountain dams.	Hard
		3. New afforestation and increase of vegetation.	Hard
18	Measures to prevent or control the adverse impacts of invasive alien species and introduced diseases.	Strengthening laboratory capacities for surface, ground and coastal water monitoring.	Hard

KTM	KTM DESCRIPTION	PROGRAM OF PROPOSED MEASURES BASED ON NSWP[205]	SOFT/HARD MEASURE
19	Measures to prevent or control the adverse impacts of recreation including angling.	Support on the application of aquaculture techniques that reduce the negative impact on the environment significantly, compared to traditional techniques.	Hard
20	Measures to prevent or control the adverse impacts of fishing and other exploitation/removal of animal and plants.		
21	Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure.	1. Operation of existing urban wastewater treatment plants, and compliance with WFD 2000/60 / EC standards.	Hard
		2. Construction of urban wastewater treatment plants.	Hard
		3. Waste collection plant at the estuary of the Erzen river.	Hard
		4. Installation of physical barriers to curb urban waste in the direction of surface water (lakes).	Hard
		5. Implementation of projects for the closure of non-sanitary landfills for urban waste, as well as for the opening of landfills / urban waste treatment plants, or transfer stations.	Hard
22	Measures to prevent or control the input of pollution from forestry.	Investments for protection from pollutants coming from agriculture, concentrated (droplet) and non-concentrated (non-droplet).	Hard
23	Natural water retention measures.	Sustainable urban drainage systems	Hard
24	Adaptation to climate change.	1. Apply nature base solutions for climate change resiliance	Hard
25	Measures to counteract acidification.	1. Increase efficiency in the use of chemicals and other materials for drinking water treatment.	Hard
		2. Strengthening laboratory capacities for surface water monitoring.	Hard
		3. Strengthening laboratory capacities for groundwater monitoring.	Hard
26	Control of excessive abstraction quantities through Water Permit conditions and enforcement	1. Registration and permitting of all abstractions	Soft
		2. Time-limited permits to include efficiency and resource available criteria	Soft
27	Controlling the Environmental impact of activities allowed nearby the river flow (raw intake, oil deposits controlling)	Reducing the environmental impacts of each activity	Soft
28	Create riparian buffers on urban areas or nearby the city	These fringes of grass, shrubs, and trees planted along stream banks are one of the best ways to protect a water source. Buffers improve water quality by filtering sediment and pollutants from soil runoff and providing shade to keep water cool. They combat erosion by stabilizing banks and regulating stream flow, and they offer habitats to many plant and wildlife species	Hard

13.2 Basic Measures

13.2.1 Overview

'Basic measures' should be interpreted as the legal minimum compliance requirements for all waterbodies in order to meet the emission limit values (ELVs), environmental quality standards (EQS), or other objectives set out under the principal Directives of the EU. [206]

This may include legislative and compliance measures to promote efficient and sustainable water use, point source and diffuse source pollution controls, controls on abstraction, and hydro morphological controls for habitat protection and enhancement, all of which are subject to various EU Directives in some form.

13.2.2 Legislative Compliance

It is expected that Basic measures will implement the requirements of various EU Directives set out under WFD Article 10, as follows:

- Bathing Water Directive (2006/7/EC)
- Birds Directive (79/409/EEC)
- Drinking Water Directive (80/778/EEC) as amended by Directive (98/83/EC)
- Major Accidents (Seveso) Directive (96/82/EC)
- Environmental Impact Assessment Directive (85/337/EEC)
- Sewage Sludge Directive (86/278/EEC)
- Urban Waste Water Treatment Directive (91/271/EEC)
- Plant Protection Products Directive (91/414/EEC)
- Nitrates Directive (91/676/EEC)
- Habitats Directive (92/43/EEC)
- Integrated Pollution Prevention Control Directive (96/61/EC)
- Environmental Liability, Prevention and Remedy Directive (2004/35/EC)
- Groundwater Directive (2006/118/EC)

It is a reporting requirement under WISE 2016 that the relevant Directives implemented as part of the Basic measure(s) are listed. Several national measures may contribute to a single Key Type of Measure, and conversely, a single measure may be part of several KTMs.

13.2.3 Operational Relevance of Basic Measures

In operational terms, basic measures will typically address the following issues:

- Measures to implement existing Community water legislation and other environmental legislation (set out in WFD Article 10 and in Part A of Annex VI – detailed above).
- Measures to implement WFD Article 9 (cost recovery), including environmental and resource costs
- Measures to promote efficient and sustainable water use
- Measures to protect drinking water quality and reduce level of treatment required
- Measures to control abstraction from surface and groundwater
- Measures to control recharging of groundwater
- Measures to control point source discharges
- Measures to prevent or control inputs of diffuse pollutants
- Measures to address any other significant impacts on status, in particular the hydro morphological condition
- Measures to prohibit direct discharges to groundwater
- Measures to eliminate or reduce pollution by Priority Substances
- Measures to prevent accidental pollution.

[206] European Commission – Directive 2000/60/EC – Annex VI

13.3 Supplementary Measures

Supplementary measures are defined under WFD Article 11(4) and Annex VI Part B. In addition to the Basic measures of section 13.2, other more general measures may also appropriate, such as:

- legislative instruments
- administrative instruments (including licence trading)
- economic or fiscal instruments
- negotiated environmental agreements
- emission controls
- codes of good practice
- restoration of wetland areas
- abstraction controls
- demand management measures, inter alia, promotion of adapted agricultural production such as low water requiring crops in areas affected by drought
- efficiency and reuse measures, inter alia, promotion of water-efficient technologies in industry and water-saving irrigation techniques
- construction projects
- desalination plants
- rehabilitation projects
- artificial recharge of aquifers
- educational campaigns
- research, development and demonstration projects
- other relevant measures

The Basic and Supplementary measures may frequently overlap. The principal distinction is that Basic measures must ensure compliance with various EU Directives as transposed to national legislation whereas Supplementary measures might not necessarily require transposed EU or national legislation.

13.4 Additional Measures

The concept of 'additional measures' as identified under WFD Article 11(5) is often misunderstood. If the environmental objectives identified under WFD Article 4 (Chapter 3 of this report) cannot be achieved for a specific waterbody within the first phase RBMP, then this is the result of failure of all Basic and/or Supplementary measures.

With proper understanding of the pressures and committed implementation of measures, such a situation is unlikely. However, there may be specific reasons that have to be investigated further, and 'additional measures' formulated i.e. measures not yet applied under WFD basic and/or supplementary approaches.

Under WISE 2016 reporting convention, if the implementation of an additional measure lasts longer than one river basin management planning cycle, this measure becomes in any case either a basic or supplementary measure. Therefore the introduction of 'additional measures' is usually superfluous and should be considered as a last resort.

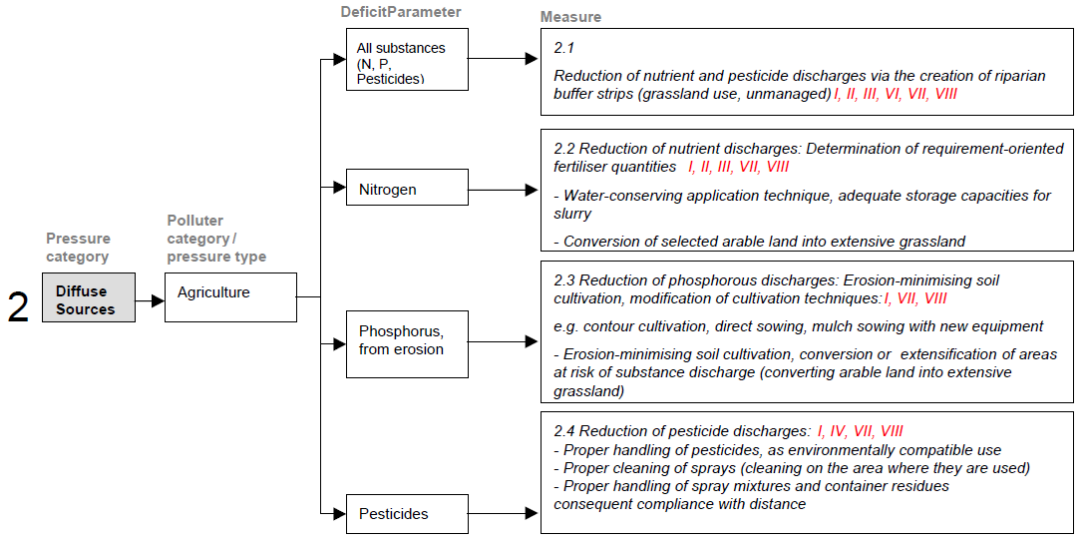
13.5 Systematic Approach to the Identification of Measures

The new RBMP framework approach in Albania adopts good practice in terms of following a well-defined 'pathway process' in reaching appropriate measures for given pressures. [207] Evidently, all waterbodies are to some extent unique, with specific and complex combinations of characteristics, location and pressures and therefore appropriate measures. However, as a starting point, a systematic approach to identifying suitable possible measures according to a set of basic options is recommended.

[207] Basic principles for selecting the most cost-effective combinations of measures for inclusion in the programme of measures as described in Article 11 of the Water Framework Directive – HANDBOOK. Report UBA-FB 000563, Ecologic 2004.

A set of pressure-measure pathways for each of the five main pressure types is given in Technical Annex 13.
An example pathway for diffuse sources of pollution is given in Figure 13.1.
The example illustrates that diffuse pollution falls within the WISE reporting category Type 2 (see Table 10-1). Typically, but not exclusively, diffuse pressures originate from agriculture. Diffuse pollution may originate also from urban areas, highways and forestry.
Depending on the exact pressure indicator e.g. Pesticide concentrations, annual nitrate loading etc., various measure options become available. To implement the measure, either Basic measures will be required in order to comply with the relevant EU Directive(s), and/or Supplementary measures may be required.

Figure 13-1 – Example Measures Pathway for Pressure Category "Diffuse Sources"



Source: Ecologic, 2004

13.6 Operational Implications for Waterbodies Failing Environmental Objectives

13.6.1 Active Management of the River Basin

Where monitoring data or other evaluations indicate that the objectives set under WFD Article 4 for the body of water are unlikely to be achieved within the RBMP period, it is a requirement that [208]:

- the causes of the possible failure are investigated with specific studies
- relevant Permits and authorisations are examined and reviewed as appropriate
- the monitoring programmes are reviewed and adjusted as appropriate
- Additional measures as may be necessary in order to achieve those objectives, including, as appropriate, the establishment of stricter emission limit values (ELVs) or environmental quality standards (EQSs).

This process clearly requires 'active management' by the relevant competent authorities (CAs). The CAs responsible for monitoring need to report at least annually as to whether or not the targeted change in status are being achieved. The overseeing Agency (AWRM), in coordination with others, must then take corrective action within the period of the Plan period.

[208] European Commission Water Framework Directive 2000/60/EC – Article 11(5)

13.7 Numeric Identification and Reporting of Measures

Reporting guidance for the Programme of Measures is set out under WISE 2016, section 10.1.19. A critical mandatory attribute is the 'measure code' or the numeric identification of the individual measure. [209] Providing each and every river basin measure with a unique code establishes some important disciplines with respect to the PoM:

- The code-identified measure and its primary attributes can be stored and accessed from a relational database such as the National Water Resources Cadastre (NWRC).
- The measure code can be cross-referenced to all waterbodies within the river basin where that measure is to be applied, and therefore visually mapped via any Geographic Information System.
- Identification of specific unique measure codes with associated attributes (relevant pressure, implementing Agency, budget, indicators, target date etc.) encourages focus and accountability of implementing the measure.

The coding of measures in the Albania RBMPs now adopts the same overall approach to the numeric identification of all water management related objects in the river basin, as described in Technical Annex 4 and Section 4.7.

13.7.1 The Use of Indicators to Ensure Achievement of Measures

Environmental indicators play a crucial role for effective and coherent policy making by highlighting key factors in the drivers-pressures-state-impact-response (DPSIR) model that cause environmental pressures and that policy can target. Indicators support technical assessments by providing information on states and trends of priority issues and progress towards targets or reference values. Quantitative indicators are therefore a key management tool and represent the best estimate of the gap to achieving good status or potential and the intended progress by a certain deadline.

The WISE 2016 reporting schema have mapped the expected association between pressures, pressure indicators, measures and measure indicators, and this reporting model is followed in the Albania RBMP reporting procedures. A definitive list of Key Types of Measures and Measure Indicators is provided in Table 13-2.

13.7.2 Reported Information on General and Specific Measures

The identification and traceability of any measure is essential, but the reporting system must work both numerically (i.e. can be entered into the NWRC with numeric attributes) and as a series of practical Tables and/or Maps within RBMP reports such that the proposed measure(s) can be easily identified and understood. Both methods of 'reporting' must ensure that whether general or specific in nature, the pressures are clearly identified, and that the measures proposed will directly influence the pressures. Further, the achievement level of the measure(s) must be monitored by the use of indicators (see 13.6.4).

However, the implementation of measures and the interrelations between types of measure and the target group (Basic or Supplementary, general or specific) makes for a potentially very complex reporting system, see Table 13-3.

The reporting Tables designed for Albania (the precise design of which is at MS discretion, subject to the EU WISE minimum requirements[210]) take account of important subtleties and complexities in the application of measures in a new and innovative way.

Table 13-3 summarises a generally complex set of permutations with these key points:

- Basic and Supplementary measures may apply both at general and specific scale
- Basic and Supplementary measures at general scale will typically be applied through basin-wide policies, strategies, fiscal or other instruments
- Basic and Supplementary measures at specific scale will typically be applied through determination of specific Permit conditions

[209] European Commission, WISE Reporting Guidance 2016, Chapter 10. Schema "RBMPPoM", Schema element: *MeasureCode*

[210] EU WFD Common Implementation Strategy – WISE 2016 Reporting Guidance – sections 10.1.9 and 10.2.3

- Pressure and Measure indicators are an essential element in achieving environmental objectives. However, these indicators are necessarily different, depending on whether the measure is to be applied at general or specific scale

Guidance on general pressure and measure indicators is provided under WISE 2016 Annex 3, with examples given in Table 10-1, Table 10-2 and Table 13-3. Typically, these require basin-wide statistics such as annual load of BOD_5, annual volume of water taken by sector X as % of renewable resource etc. Measure indicators are similarly basin-wide, such as population equivalent (p.e.) to be served by WWTPs etc. The definitive list of measure indicators at general level is provided by WISE 2016 Annex 8t, some 80+ individual indicators.

Specific measures (whilst falling within the framework of Key Types of Measures, KTMs), should address the specific pressures encountered at the waterbody level. The most effective way to reflect the relevant pressure(s) and consequent measure(s) is to summarise the individual elements that contribute to the waterbody overall status or potential. Where an exemption is applicable under WFD Article 4(5) or 4(7), this should be reported.

Table 13-2 – Standard Enumeration List for Key Measures and Indicators

KEY TYPE OF MEASURE	CODE [211]	GENERAL INDICATOR SPECIFIC INDICATOR
CONSTRUCTION/UPGRADE OF MUNICIPAL WWTPs	1	NUMBER OF WWTPs REQUIRED TO ACHIEVE EO POPULATION EQUIVALENT REQUIRING TREATMENT
REDUCE NUTRIENT POLLUTION FROM AGRICULTURE	2	AREA OF LAND COVERED BY CONTROL STRATEGY
REDUCE PESTICID POLLUTION FROM AGRICULTURE	3	AREA OF LAND COVERED BY CONTROL STRATEGY
REMEDIATION OF CONTAMINATED SITES	4	NUMBER OF SITES REQUIRING REMEDIATION
LONGITUDINAL CONNECTIVITY OF RIVERS	5	LENGTH OF WATERBODIES REQUIRING REMEDIATION NUMBER OF BARRIERS REQUIRING REMEDIATION
HYDROMORPHOLOGICAL CONDITIONS OF RIVERS	6	LENGTH OF WATERBODIES REQUIRING REMEDIATION
FLOW REGIME AND ENVIRONMENTAL FLOW	7	LENGTH OF WATERBODIES REQUIRING REMEDIATION NUMBER OF SITES REQUIRING REVISED PERMITS ENVIRONMENTAL FLOW INDEX FOR WATERBODY
SECTORAL WATER EFFICIENCY MEASURES	8	NUMBER OF HOUSEHOLDS/OPERATORS TARGETED VOLUME OF REAL + APPARENT LOSSES
WATER PRICING MEASURES FOR HOUSEHOLDS	9	NUMBER OF HOUSEHOLDS TARGETED
WATER PRICING MEASURES FOR INDUSTRY	10	NUMBER OF INSTALLATIONS TARGETED
WATER PRICING MEASURES FOR AGRICULTURE	11	AREA OF AGRICULTURAL LAND TARGETED
ADVISORY SERVICES FOR AGRICULTURE	12	NUMBER OF FARMS TARGETED
DRINKING WATER PROTECTION MEASURES	13	NUMBER OF PROTECTION ZONES REQUIRED
KNOWLEDGE BASE DEVELOPMENTS (CADASTRE)	14	NUMBER OF SITES REQUIRING IMPROVED DATA
MEASURES FOR PHASING OUT OF PHS & PS	15	NUMBER OF SITES REQUIRING REVISED PERMITS
CONSTRUCTION OR UPGRADE OF INDUSTRIAL WWTPs	16	NUMBER OF WWTPs REQUIRED TO ACHIEVE EO
SEDIMENT CONTROL STRATEGIES	17	AREA OF LAND COVERED BY CONTROL STRATEGY
INTRODUCED SPECIES/DISEASES CONTROL STRATEGY	18	LENGTH OF WATERBODIES REQUIRING REMEDIATION NUMBER OF SPECIES ACTION PLANS REQUIRED
MEASURES TO CONTROL RECREATIONAL IMPACTS	19	LENGTH OF WATERBODIES REQUIRING REMEDIATION
MEASURES TO CONTROL AQUACULTURE IMPACTS	20	LENGTH OF WATERBODIES REQUIRING REMEDIATION
MEASURES TO CONTROL URBAN DIFFUSE POLLUTION	21	LENGTH OF WATERBODIES REQUIRING REMEDIATION NUMBER OF INTERCEPTORS/BUFFERS/SUDS
MEASURES TO CONTROL FORESTRY POLLUTION	22	AREA OF LAND COVERED BY CONTROL STRATEGY
NATURAL WATER RETENTION/BUFFER MEASURES	23	NUMBER OF SITES REQUIRING IMPLEMENTATION
CLIMATE CHANGE ADAPTATION MEASURES	24	NUMBER OF INSTALLATIONS NEEDING ADAPTATION
MEASURES TO CONTROL ACIDIFICATION	25	LENGTH OF WATERBODIES REQUIRING REMEDIATION
MEASURES TO CONTROL EXCESSIVE ABSTRACTION	26	NUMBER OF PERMITS ISSUED WITH ABSTRACTION LIMITS

[211] Classification based on WISE 2016 GIS Reporting Schema element – *KeyTypeMeasure*

13.8 Finalised Templates for Measures Reporting

As summarised under Tables 13-4 and 13-5, reporting of measures in the Mati RBMP follows a structured approach complying with the minimum requirements as suggested under WISE 2016. These Tables can be applied identically to all categories of waterbody. The attributes of the measure(s) will include as a minimum:

Measure code - measure name - type of measure under Article 11 - water category (river, lake, groundwater etc.) - recipient unit (basin, sub-basin, waterbody) - relevant pressure(s) - contribution that the measure is expected to make towards achievement of the environmental objective – the lead Competent Authority – Operators or sectors affected by the measure – summary total cost

Further details regarding funding and implementation, especially regarding sources of funds and the costs of measures should be reported mainly in the Economic Analysis main Report.

13.8.1 Summary Reporting of the PoM at River Basin Level

In addition to the detailed level of 'national reporting' as set out under Table 13-4 and Table 13-5, it is a WISE reporting requirement to provide a high level summary of pressures and measures at the scale of the river basin. Member States should report one high level standard (MS) indicator for each of the eight main Key Pressure Types and at least one other predefined (national) indicator specifically relevant for the individual pressure or chemical substance.

The MS pressure indicator facilitates comparison between different river basins, and the recommended indicator is simply to indicate the total length (or area) of waterbodies subjected to the identified significant pressure as a % of the total length/area of waterbodies in the basin.

For example, as set out in Table 13-6, for the point pressure type of untreated urban wastewater (KTP 1), it is assessed that 45% of the combined length of all (river) waterbodies are subjected to untreated urban wastewater. This MS indicator identifies the relative scale of the pressure. The national pressure indicator gives the absolute scale, in this case either:

i) the total actual length of waterbodies affected (general indicator), 67 km in the example.
ii) or more usefully, the BOD load (specific indicator, tonnes/year) that needs to be reduced in order to achieve the environmental objective (e.g. a BOD_5 level compatible with 'Good Status', typically < 4 mg/l).

The national pressure indicator is a matter of choice for the MS BUT should generally comply with the standard set of indicators as set out under Table 10-1 & 10-2. The degree of flow quantity measurement in Albania (both effluents and receiving waters) is so deficient at this time that generally, volumetric based indicators (i.e. loads) cannot be reliably calculated. Consequently, in the first Plan period 2024-2029 indicators will have to rely on simplistic measures of waterbody length or number of sites.

With regard to the implementation of measures, the most generally applicable Key Type of Measure (KTM) for the Key Pressure Type should be identified, and the indicator that will be used to quantify progress of the measure. The most common indicator for each KTM should be identified AND its 'baseline' value in 2021.

For example, as set out in Table 12-6, the point pressure of urban wastewater has to be most usually addressed through the construction of wastewater treatment plants (WWTPs) (a Basic Measure under EU Urban Waste Water Treatment Directive (91/271/EEC), Key Type Measure 1).

It is of fundamental importance that the measure indicator is identified and quantified. In the case of urban wastewater, the most generally applicable measure indicator is the level of population equivalent (p.e.) requiring wastewater treatment in order to achieve the environmental quality standard of e.g. BOD_5 < 4 mg/l in the receiving waterbody.

The measure indicator should be a clear statement of the expected/actual level of progress towards the environmental objective (EO), and should therefore always be presented in a 'reducing balance'

format (i.e. the pressure remaining), and for at least the baseline + two forward RBMP Plan periods (since many measures may take 6, 12+ years to achieve objectives).
In the example of Table 12-6, it is estimated that 750,000 p.e. are currently without wastewater treatment to the required standard. Following implementation of various WWTPs, the progress of the measure is targeted at 500,000 and 250,000 by 2027 and 2033 respectively. Consequently, a pressure equivalent to 250,000 p.e. still remains by 2033, requiring further measures post-2033, but this is entirely clear from the reporting template.
A review of progress of measures implementation (by achievement of the indicators) is a fundamental component of the RBMP Plan review at the end of the six year period.

13.8.2 Summary of the National PoM Reporting Templates

The key attributes of the measure reporting templates exhibit 'best practice' with respect to the determination of measures generally:

- Measures should be targeted at the pressure(s) identified. Unless the measure demonstrably contributes to the reduction in pressure (and by inference an improvement in waterbody status) at either river basin or waterbody scale, it does not constitute a measure in the accepted sense of WFD Article 11.
- Measures should be realistic and achievable. Many early RBMPs, especially in pre-accession countries, set totally unrealistic and unachievable targets, ignoring limited central budgets, deficient technical competencies of staff, lack of monitoring data, or the degree of coordination needed between Competent Authorities.
- Measures must be quantifiable in terms of the progress towards the objective. Unless quantifiable targets are set, and progressively monitored, there is no way to ensure that the objectives will be achieved by the end of the RBMP period. This is achieved by the setting of standard 'indicators'.
- Basic and Supplementary measures may apply equally at general scale (river basin) or specific scale (waterbody). The essential difference between general measures and specific measures will generally be the number of waterbodies affected by the measure, and their spatial separation (disaggregated or grouped respectively).
- Measures can/should be differentiated by *a)* different Competent Authorities *b)* different pressures. Although two Competent Authorities may be working in parallel to address the same pressure, each CA will be using specific instruments, Permits, legal powers pertinent to that CA, and therefore the individual measures should be separated.
- The 'best practice' Tables of 12-4, 12-5 and 13-6 align with WISE 2016 reporting requirements that:

  "Measures should be targeted in terms of their type and extent to ensure that pressures are addressed and that this will deliver improvements towards achieving good status or potential in individual water bodies.
  The measures should be designed based on the assessment of the actual status of the water body, supplemented with the information from the analysis of pressures and impacts affecting the water body".

Annex 13 gives worked examples of how the Tables can be completed for the two principal alternative sets of measures:

- Single general measure applied to multiple waterbodies
- Multiple specific measures applied to single waterbody

Table 13-3 – Inter-relationship of Types and Targets of Measures and Coding System

	BASIC MEASURES	SUPPLEMENTARY MEASURES	EXAMPLE INDICATORS FOR PRESSURE(S)	EXAMPLE INDICATORS FOR MEASURE(S)
GENERAL MEASURES **Applies at basin or sub-basin level or multiple waterbodies** **CODE SYSTEM** BM or SM + Basin ID + Sequence e.g. BM-3514-01	EU Directives as relevant, especially: • Bathing Water Directive (76/160/EEC) • Drinking Water Directive (98/83/EC) • Urban Waste Water Treatment Directive (91/271/EEC) • Nitrates Directive (91/676/EEC) • Habitats Directive (92/43/EEC) • Integrated Pollution Prevention Control Directive (96/61/EC) • Plant Protection Products Directive (91/414/EEC)	• Charges/financial incentives • Cooperation arrangements • Advisory approaches • Statutory instruments • Measures do not take account of time-pressure or seasonality	• Number of wastewater outfalls without treatment • Annual tonnage of NPK applied • Number of waterbodies with morphological discontinuity • Annual Pesticides load above EQS • Number of hydropower plants • Groundwater abstraction volume	• Population equivalent to be treated by WWTPs • Total number of new/retrospective Permits • Agricultural area subject to NPK restrictions • Reduction % in sectoral water abstraction or consumption • Basin Water Exploitation Index • Basin Environmental Flow Index
SPECIFIC MEASURES **Applies at single waterbody level OR contiguous waterbodies** **CODE SYSTEM** BM or SM + Waterbody ID + Sequence e.g. SM-GW35140409-01	EU Directives as relevant, especially: • Bathing Water Directive (76/160/EEC) • Drinking Water Directive (98/83/EC) • Urban Waste Water Treatment Directive (91/271/EEC) • Nitrates Directive (91/676/EEC) • Habitats Directive (92/43/EEC) • Integrated Pollution Prevention Control Directive (96/61/EC) • Plant Protection Products Directive (91/414/EEC)	• Permit conditions take account of waterbody specific requirements e.g. emission limit values (ELVs), environmental flow, protected areas, groundwater dependent ecosystems, abstraction points etc. • Measures will take account of time-pressure or seasonality	• Status of individual elements for waterbody status -Biological quality elements -Physico-chemical elements -Hydromorphological elements -Annex X Priority substances - Annex VIII RBSPs • Length of depleted reach • % time disruption to waterbody • % flow disruption to waterbody • Groundwater observed level	• Waterbody Ecological Quality ratio • Waterbody Environmental Flow Index • Seasonal BOD load g/m^3 • Seasonal RBSP load g/m^3 • Operator Permit issued with seasonal constraints (time/flow) • Industrial installations with on-site treatment

13.9 Summary of surface waterbodies at risk of failing to meet environmental objectives

Based on the characterization and assessment of the water bodies analysed in Chapter 10, a summary of all surface water bodies that are at risk of not reaching the defined environmental objectives is presented in Table 13-4.
Where there is an expectation that the measures will apply to a specific water body or a similar group of water bodies, the relevant directive is mentioned for the basic measures, or the other instruments are mentioned for the supplementary measures, as appropriate. Safe measures are reviewed together with appropriate stakeholders during the RBMP consultation phase (January-June 2021).
Due to technical complexity, funding, or other constraints, it can be judged that despite the deficient status, there is no realistic prospect of implementing sufficient measures within the RBMP period for specific water bodies. The reasons for the inability to achieve compatibility are mentioned in the descriptive section.

13.10 Summary of groundwater waterbodies at risk of failing to meet environmental objectives

Based on the characterization and assessment of the water bodies analysed in Chapter 10, a summary of all underground water bodies that are at risk of not reaching the defined environmental objectives is presented in Table 13-5.
Where there is an expectation that the measures will apply to a specific water body or a similar group of water bodies, the relevant directive is mentioned for the basic measures or the other instruments are mentioned for the supplementary measures, as appropriate. Safe measures were reviewed together with appropriate stakeholders during the RBMP consultation phase (January-June 2021).
Due to technical complexity, funding or other constraints, it can be judged that, despite the deficient status, there is no realistic prospect of implementing sufficient measures within the RBMP period for specific water bodies. The reasons for the impossibility to achieve compatibility should be mentioned in the descriptive part.

Table 13-4 - Standard Template for Summary Pressures & Measures Reporting – River Basin Level

WATER BODY OR GROUP OF WATER BODIES	NAME	FORM	GENERAL STATUS	QUALITY FAILURE?	QUANTITY FAILURE?	MORPHOLOGY FAILURE?	PROPOSED MEASURE ?	BASIC INSTRUMENTS	ADDITIONAL INSTRUMENTS
351211	Mati	TEMPORARY WATER	2	Yes	No	No	Yes	EU 2000/60/EC Directive on Environmental Impact Assessment (85/337/ECC) Habitats Directive(92/43/ECC)	Law 111/2012 Law No. 10431/2011
351213	Mati	River	4	No	Yes	Yes	Yes	EU 2000/60/EC Directive on Environmental Impact Assessment (85/337/ECC) Habitats Directive(92/43/ECC)	Law 111/2012 Law No. 10431/2011
3512211	Lumi Fani Madh	River	4	Yes	Yes	Yes	Yes	EU 2000/60/EC Directive on Environmental Impact Assessment (85/337/ECC) Habitats Directive(92/43/ECC)	Law 111/2012 Law No. 10431/2011
3512213	Lumi Fani Madh	River	4	Yes	Yes	Yes	Yes	EU 2000/60/KE Directive on Environmental Impact Assessment (85/337/ECC) Habitats Directive(92/43/ECC)	Law 111/2012 Law No. 10431/2011
3512231	Lumi Fani Madh	HMWB	5	Yes	Yes	Yes	Yes	EU 2000/60/KE Directive on Environmental Impact Assessment (85/337/ECC) Habitats Directive(92/43/ECC) 91/271/ECC (Directives for the Treatment of Urban Wastewater)	Law 111/2012 Law No. 10431/2011
351231	Mati	HMWB	4	Yes	Yes	Yes	Yes	EU 2000/60/EC Directive on Environmental Impact Assessment (85/337/ECC) Habitats Directive (92/43/ ECC)	Law 111/2012 Law No. 10431/2011
3512331	Mati	River	4	Yes	Yes	Yes	Yes	EU 2000/60/EC	Law 111/2012

								Directive on Environmental Impact Assessment (85/337/ ECC) Habitats Directive (92/43/ ECC)	Law No. 10431/2011
3512333	Mati	HMWB	5	Yes	Yes	Yes	Yes	EU 2000/60/EC Directive on Environmental Impact Assessment (85/337/ ECC) Habitats Directive (92/43/ ECC)	Law 111/2012 Law No. 10431/2011
3512773	Mati	River	5	Yes	Yes	Yes	Yes	EU 2000/60/KE Directive on Environmental Impact Assessment (85/337/ ECC) Habitats Directive (92/43/ ECC)	Law 111/2012 Law No. 10431/2011
351281	Mati	River	5	Yes	Yes	Yes	Yes	EU 2000/60/EC Directive on Environmental Impact Assessment (85/337/ ECC) Habitats Directive (92/43/ ECC) 91/271/ ECC (Directives for the Treatment of Urban Wastewater)	Law 111/2012 Law No. 10431/2011
3512343	Uraka	River	3	Yes	Yes	No	Yes	EU 2000/60/EC Directive on Environmental Impact Assessment (85/337/ ECC)	Law 111/2012 Law No. 10431/2011

Table 13 5 – Summary of Groundwater Bodies at Risk of Not Meeting Environmental Objectives

WATER BODY OR GROUP OF WATER BODIES	GROUP	NAME	GENERAL STATUS	QUALITY FAILURE?	RECHARGE FAILURE?	EXTRACTION FAILURE?	PROPOSED MEASURE?	BASIC INSTRUMENTS	ADDITIONAL INSTRUMENTS
GW35120101	-	Laç	Good	Yes salinity	No	Yes	Yes	EU 2000/60/ EC EU 2006/118/ EC	Law 111/2012
GW35120103	-	Shenkoll	Good	Yes salinity	No	Yes	Yes	EU 2000/60/ EC EU 2006/118/ EC	Law 111/2012

GW35120105	-	Kanali i Matit	Good	Yes Industry	No	No	Po	EU 2000/60/ EC EU 2006/118/ EC	Law 111/2012
GW35120501 GW35120503	E	Burrel Rreshen	Good	Yes Industry	No	No	Po	EU 2000/60/ EC EU 2006/118/ EC	Law 111/2012

13.11 Summary of Surface Waterbodies at Risk of Environmental Failure

The program of basic and/or complementary measures targets surface water bodies that are at risk of not achieving environmental objectives. These water bodies require detailed assessment of how the current status and subsequent impacts will be addressed during the duration of the plan (2024-2029). Basic and supplementary measures, general and specific, should be identified together with the expected change in status, the responsible competent authority, target dates and costs of the measures.

As they should target individual water bodies or groups of water bodies, the measures are listed in order of water bodies, starting with the upstream water bodies.

General measures for groups of water bodies or special measures for individual water bodies are presented in Technical Appendix XI.

The MPs are based on the results of the pressure analysis and water status assessment (Chapter 10) and therefore include measures of basin-wide relevance, oriented towards the agreed visions and management objectives for 2029.

The PMs are structured taking into account the most significant pressures (organic, chemical, hydromorphological and nutrient changes) and water bodies found throughout the basin. The aim is to achieve management objectives for the entire basin, for each surface and underground water body, so that the environmental objectives set out in the DKU are achieved by 2029. The main findings and conclusions about the identified measures and their importance for the basin, as well as the priorities regarding their large-scale implementation are presented in the PM in a summarized form. The implementation of these important measures throughout the basin is ensured by coordinating with institutions whose objective is the implementation of these measures.

From the analysis of the pressures and the determination of the status, all those water bodies that have not reached the OMs are identified. According to Article 4 of the DKU, appropriate measures must be taken to prevent the deterioration of the status of surface waters and to achieve good ecological status or potential. Chapter 10 explains the source of these pollutants and their impact on water bodies. Below you will find the list of measures proposed to improve the status of these water bodies.

Measures should be targeted in terms of type and scale to ensure that pressures are being addressed and that this will lead to improvements towards achieving good water body status or potential. The measures should be designed based on the assessment of the current status of the water body, supplemented with information from the analysis of the pressures and impacts affecting the water body.

Quantitative indicators of the degree and progress of the implementation of the measures are proposed for each Key Type of Measure. Member States can also report on their own indicators if the proposed indicators are not considered appropriate for the national situation.

The grouping of water bodies was based on some very important factors such as proximity to each other (water bodies belonging to a river) and the same pressures acting on them. There are some water bodies that are unlikely to meet environmental targets.

Regarding the implementation of the measures, the most implemented Key Measure (LIMK) for Key Type Pressure should be identified, as well as the indicator that will be used to quantitatively evaluate the progress of the measure.

Tables of Measures for Water Bodies (see Technical Annex XI) present concrete examples of how measures are selected for cases of grouping of water bodies. The explanation of the methodology and the path followed can be found in Technical Appendix XI.

13.11.1 Group of Water Bodies 3512231, 3512333, 3512771, 3512343, 3512225, 351231

River water body **3512231** – the lower course of the Lezha Dam. This water body is fully dammed to ensure reservoir capacity. Apparently there was no provision for environmental flows, and virtually all the collected water was diverted through the HPP's dysfunctional canal and pipeline, leaving the stream completely devoid of most of its flow to the confluence.

River water body **3512333** – the downstream of the Ulza Dam. This river is fully dammed to ensure reservoir capacity. Apparently there was no provision for environmental flows, and virtually all the collected water was diverted through the HPP's dysfunctional canal and pipeline, leaving the stream completely devoid of most of its flow to the confluence.

River water body **3512771** - Pressures in the upstream basin, mainly in small HPPs and gravel extraction. Minimum pressure on dirty water.

River water body **3512343** – this water body is representative of 90% of limestone in the upper reaches of the river basin with low pressures, mainly from agricultural activity.

River water body **3512225** - this river water body is affected by several pressures, including the hydric peak from the effects of the HPP upstream and the presence of urban wastewater. However, the most significant pressure seems to come from the hydromorphological influences distributed along the river. The current status is assumed to be "Weak" status.

River water body **351231** - Pressures in the upstream basin, mainly in small HPPs and gravel extraction. Minimum pressure on dirty water.

Key Type Measures (KTM) most suitable for reducing pressures and impacts from hydromorphological change of water bodies is the improvement of hydromorphological conditions of water bodies in addition to longitudinal continuity (KTM 6). The HPP scheme with derivation must fulfill the obligations set forth in the permit for the use of the water source. They must be designed in such a way as to allow the passage of aquatic fauna and ecological flow even in the lowest course of the river.

Even the point pressure of urban wastewater (PPUW 1.1) should usually be treated through the construction of wastewater treatment plants (WWTP - KTM 1), but when the construction of ITUN is impossible, there are other KTM that can undertaken to reduce the load from urban wastewater as measures to prevent and control pollution from urban areas, transport and built infrastructure. (KTM 21). For these bodies of water, other measures have been proposed in addition to the urban wastewater treatment plant, which will improve their status. One of the measures is to reduce the points of discharge of dirty water, collect it in a small number of collectors and separate the combined systems from rainwater, which is channeled into the water supply system and is not allowed to flow with the bodies aquatic.

These measures will help to improve the current status of these water bodies and with their implementation it is expected that, in the plans of the second management cycle (from 2029), the very bad status will be improved to an average status.

The Single Measure in Water Body Group Table (see Technical Annex XI) summarizes all measures for these water bodies.

13.11.2 Group of Water Bodies 3512226, 35122221, 351213, 3512211

River water body **3512226** - Copper mine 6.0 km upstream of the Balkan Basalt mine, current status assumed to be 'poor'.

River water body **35122221** - Discharge point of polluted waters from Rresheni. Although in its natural form, untreated urban waters introduce extremely high levels of BOD5 into receiving waters.

River water body **351213 and 3512211** – the last course of the Mat River basin. It is assumed that the most important local pressures are those of diffuse pollution from agricultural practices and likely from irrigation ditch water intake and gravel mining. Physical change of the water body due to the construction of the river dam. It is assumed that the changes have caused this body of water to have a "weak status".

It has been established that, in these water bodies, the inlet pressure is mainly influenced by the points where there are industrial waste disposal sites. It is proposed to undertake the rehabilitation of the area by choosing appropriate technology as appropriate. It is also proposed to reduce the discharge points of dirty water, collect them in a small number of collectors and separate the combined systems from rainwater, which is channeled into the water supply system and is not allowed to flow with water bodies.

These measures will help to improve the current status of these water bodies and with their implementation it is expected that, in the plans of the second management cycle (from 2029), the very bad status will be improved to an average status. The Single Measure in Water Body Group Table (see Technical Annex XI) summarizes all measures for these water bodies.

13.11.3 Group of Water Bodies 3512773, 351275

River water body **3512773** – clearly has several pressures, including untreated urban sewage and gravel extraction. This stream passes through agricultural lands, where there may be some groundwater withdrawals, which most likely affect stream flows. However, the primary pressure is assumed to come from water intakes that are mainly for irrigation and the canal system located on the north bank of the river and extending westward. The physical change in the water body related to the construction of dams in the river, so the water body has been assessed with a "bad" status (class 5).

River water body **351275** – this water body joins the rivers in the center of the city, near the municipality of Klos. Although in its natural form, untreated urban waters introduce extremely high levels of BOD5 into receiving waters. Also, the situation in the Municipality of Klos is really alarming, since on both sides of it there are plastic wastes stuck in the vegetation. A large part of this waste remains in the vegetation along the bed of the Mat River.

Usually, the point pressure of urban wastewater (Key Type Pressure number 101) must be treated through the construction of a wastewater treatment plant (ITUN) (basic measure within

For these bodies of water, other measures have been proposed in addition to the urban wastewater treatment plant, which will improve their status. One of the measures is to reduce the points of discharge of dirty water, collect it in a small number of collectors and separate the combined systems from rainwater, which is channeled into the water supply system and is not allowed to flow with the bodies aquatic. Cleaning of all points where there are landfills of solid waste/urban waste near or on the river bed.

So, some of the measures promote the rehabilitation of the area of inert extractions. Subjects are required to fulfill the conditions of the permit for the rehabilitation of the area and the closure of the connecting roads after the completion of the permit. Providing protection against erosion of agricultural lands by the river. Removal of dams in the river. Monitoring the fulfillment of the conditions of the permits granted to entities that extract gravel from the bed of the water body.

These measures will help to improve the current status of these water bodies and with their implementation it is expected that, in the plans of the second management cycle (from 2029), the very bad status will be improved to an average status. The Single Measure in Water Body Group Table (see Technical Annex XI) summarizes all measures for these water bodies.

13.12 Definitions and Reporting of Costs and Sources of Funding

13.12.1 Overview of Costs

Table 13-11 summarises anticipated costs for all measures directed at surface waterbodies at risk, disaggregated as follows:

- Capital or Installation Costs – generally related to the implementation of specific measures, sometimes also referred to as 'installation costs' e.g. construction of wastewater treatment facilities
- Operation and Maintenance Costs – generally associated with the ongoing costs related to the installation costs above e.g.
- Administration Costs – generally defined as costs borne by competent authorities, Ministries or other governance agencies responsible for administering particular measures e.g. in the form of inspection and enforcement, collection of levies or taxes etc.
- Resource costs – a form of indirect cost, also referred to as 'opportunity costs' which are associated with using water (assumed a finite and scarce resource) in a specific way. Resource costs arise only if an alternative use of the water would generate a higher economic value than the current use i.e. the difference between net benefits (present v alternative use) is negative e.g. water quota historically reserved for irrigation could generate higher economic value if it was redirected to hydropower use.

13.12.2 Overview of Funds

For the PoM to have validity, sources of funding must be confirmed. If there is no designated budget line or funding stream to support the measure(s), the measure has little prospect of being implemented and should therefore be deferred until such time that funding is confirmed.

Since final confirmation of funds may take years to finalise, whether through international financing, the national fiscal budget or municipal funds, inevitably some of the funding sources may be anticipatory i.e. during the draft RBMP review period January 2021 – December 2021, final confirmation of funds may have to be assumed, if not actually approved.

Potential sources of funds are disaggregated as follows:

- External Grants or Loans – assumed to be sourced from non-governmental sources e.g. international funding agency, technical assistance programme
- Central or Agency budget – assumed to be financed through Government central budget or devolved funding mechanism to Ministry or regulatory agency
- Municipal budget – assumed to be financed through devolved funding mechanism to regional administrative authority or municipality
- State Water Charges or Levies – assumed to be financed through the administration of various fiscal instruments for environmental cost recovery at state or municipal level e.g. water abstraction charges, wastewater pollution taxes
- Operator financed – assumed to be financed directly from operator revenues where the operator has to finance measures according to the "polluter pays" principle (WFD Article 9).

13.12.3 Reporting of Costs and Funds

The flexible reporting structure Table 13 6 recognizes that multiple types of costs and/or financing mechanisms may arise during the implementation of a single measure. For example, the establishment of reduced water quotas by the regulatory authority for the maintenance of groundwater status may require expenditure on the part of irrigators to install more efficient technologies, with costs attributed to the advisory service to farmers, where the costs of the source arise due to the reduced yield as a result of the limitation of water use and administrative costs for the implementation of efficiency

measures. In Table 13-6, the different possible costs attributed to different agencies or operators should be detailed in different rows.
In accordance with recommended good practice, the instruments (legal or fiscal) supporting the measure should be identified; in the case of the basic type measure, the most appropriate EU directive should be cited. In the case of supplementary measures, the applicable national legislation on national taxes and duties must be cited. The relationship between specific measures and targeted water bodies is more easily identified if we refer to Table 13 6 for surface waters.

13.13 Summary Costings for Surface Water Measures

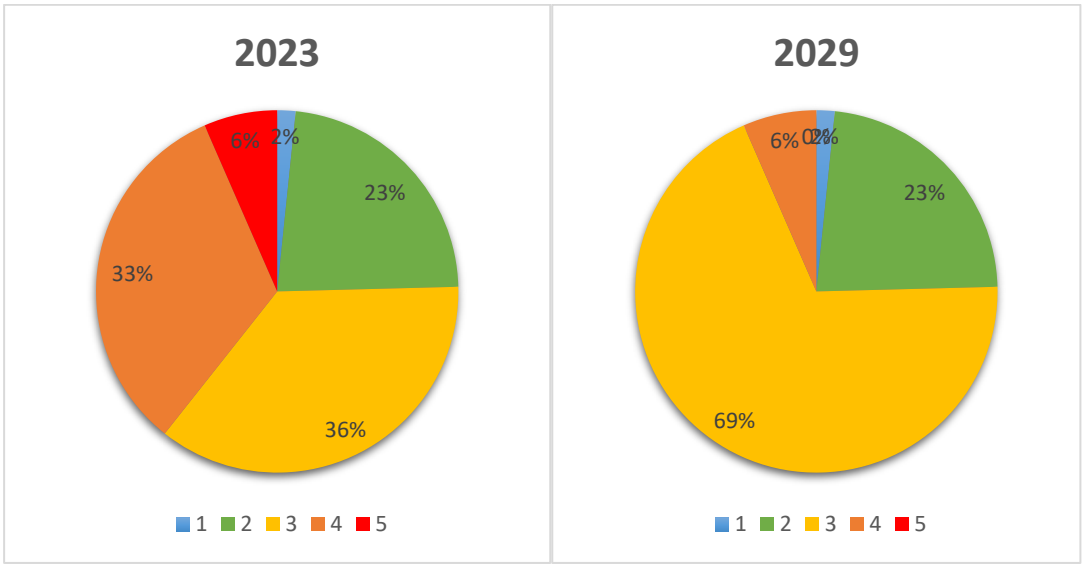
The table summarizing the estimated costs for all measures targeting surface water bodies at risk can be found in Technical Appendix XI. The order of the costume follows the order of repeated measures in the respective tables.

13.14 Final Summary of Current and Projected Surface Waterbody Status

Figure 13-1 summarises the expected outcomes of the 2024-2029 RBMP for the status of surface waterbodies in the Mati basins.

- It is expected that 1 water body with "good status" will maintain the good status
- It is expected that 4 water bodies with "bad status" will improve their status to poor status
- It is expected that 22 water bodies with "poor status" will improve from 36% to 69%.

Figure 13-2 – Current and Projected Proportions of Surface Waterbody Status



13.15 Monitoring and Evaluation Procedures

13.15.1 Details of the proposed 2024-2029 surface water monitoring programme

The proposed monitoring programme extends on existing capacities, but will require more resources than having been allocated so far.

Proposed water categories

The WFD distinguishes four main categories:

Proposed monitoring parameters

The acronyms P-CHEM, BQES ER, ANNEX VIII RBMP, and H-MORPH correspond to the ones used in Pressures and Status Assessment (as presented under Annex XIII to this RBMP).

General physical-chemical quality elements (P-CHEM)

The parameters routinely monitored by NEA cover the full range of the WFD general physical-chemical quality elements. They are to be monitored in both rivers and lakes (reservoirs).

Hydro biological quality elements (BQES ER)

The in-house capacity of NEA is limited to benthic invertebrate fauna. This parameter is indicative for the state of river waterbodies, but not that suitable for lakes/reservoirs. On the other hand, inter alia phytoplankton is a suitable parameter for lakes/reservoirs. Unfortunately, NEA does not employ corresponding experts. Currently they only perform monitoring for benthic invertebrate fauna in rivers and chlorophyll-an in lakes/reservoirs.

Other specific pollutants (ANNEX VIII RBSP)

BOD_5 and COD_{Cr} can be considered as part of the 'Other specific pollutants'. They are routinely analysed by NEA and applicable to both rivers and lakes/reservoirs.

Hydro-morphological quality elements

RIVERS: FLOW

IGEO[212] monitors river water levels at five stations (subsection 0); an extension of the number of hydrological posts is not expected during the period 2024-2029. However, flows of waterbodies can be approximated via modelling, that has actually been used by major RBMPs.

RIVERS: MORPHOLOGY

The Department of Hydrogeology of AGS is capable of monitoring river depth and width variation, and the structure and substrate of the river bed.

LAKES

Monitoring locations

RIVERS: P-CHEM and BQES ER

In principle, these quality elements are to be monitored in all delineated surface waterbodies. However, some could be excluded, for example because their status might be inferred from adjacent waterbodies (refer to the footnotes of Table 3-1 in Technical Appendix IX).

Several waterbodies are already covered by the currently monitored NEA sites. Most delineated waterbodies were visited during the EUSIWM "Sampling Campaign Rivers, April 2021", thus providing already an orientation for the remaining sites. However, determining the appropriate sites for sampling the benthic invertebrate fauna will take further preparatory work.

RIVERS: FLOWS

The present Hydrological monitoring stations are listed in Table 3- 3, Technical Appendix IX).

RIVERS: MORPHOLOGICAL QUALITY ELEMENTS

The profiles are primarily situated in areas with (intensive) gravel/sand abstractions.

LAKES: P-CHEM, chlorophyll-a

These lake/reservoirs are not routinely monitored by NEA, but were sampled during the EUSIWM "Sampling Campaign Lakes, June and July 2021".

[212] *The Q_h rating curves (required for calculating the flow from the water level) have not been updated since 15 or more years.*

Boat-based sampling is a prerequisite (samples taken from the shoreline are not representative for the lake/reservoirs). Further investigations are needed to determine whether one (vertical) site will suffice, either more sites are needed for representative monitoring & assessment of the status.
Furthermore, taking (sub) samples at different depths may be required (e.g. with a Ruttner sampler).
LAKES: HYDROMORPHOLOGY
It is suggested for the time being to use, if available, data for water levels, volumes, etc., that are collected by inter alia UKT, MARD, and others.

Monitoring frequencies

The proposed monitoring frequencies are shown in Table below (see also Annex IX).

Table 13-5 – Summary of Programme of Measures by Surface Waterbody

No.	Measures Code	WB Code or RB code	Significant pressure	KTM	Type of Measure	Measure Name	Responsible Authority	KTM indicator	Indicator Value 2024	Indicator Value 2029
1	BMRW3512-01	RBSW3512	1.1 – Point pollution of urban wastewater	1	*Basic*	*Improvement of treatment in the urban wastewater treatment plant. WWTP of Lezha*	*AKUM/AMBU*	*Number of ITUNUs required to be built or upgraded*	1	*1*
2	SMSW3512-01	RBSW3512	1.1 – Point pollution of urban wastewater *1.2 – Rainwater points in the sewage system*	21	*Supplementary /Complementary*	*Reduction of untreated direct discharges from sewer spills by diversion to new collector systems.*	*AKUM/ AMBU*	*The number of drainage systems needed to achieve the objectives*		
3	SMSW3512-02	RBSW3512	1.3 – IED plants	16	*Supplementary /Complementary*	*Strengthening the implementation of legislation for the treatment of industrial wastewater, requiring that every industrial installation has treatment in place of the effluent.*	*AKUM/ AMBU*	*The number of revised permits needed to achieve the objectives*		
4	SMSW3512-03	RBSW3512	3-Extraction or diversion of flow	8	*Supplementary /Complementary*	*Strengthening the implementation of legislation by monitoring the implementation of permit conditions (both for environmental permits and for water resource permits).*	*MIE/ AMBU*	*The number of revised permits needed to achieve the objectives*		

No.	Measures Code	WB Code or RB code	Significant pressure	KTM	Type of Measure	Measure Name	Responsible Authority	KTM indicator	Indicator Value 2024	Indicator Value 2029
5	SMSW3512-04	RBSW3512	4.4–Hydromorphological change, physical loss of all or part of the water body	6	*Supplementary /Complementary*	*Determining the length of water bodies that should reduce sediment discharges to achieve environmental objectives. Control over the obligations arising from the implementation of the conditions of the permits to the subjects for the rehabilitation of the area, closing the access roads after the end of the permit, creating protection systems against river erosion in the agricultural lands.*	*AKUM/Municipalities*	*Length (km) or area (km2) of the river network that will be affected by the measures necessary to achieve the objectives*		
6	SMSW3512-05	RBSW3512	2.2–Agriculture, distributed pressure	12	*Supplementary /Complementary*	*Maintenance and cleaning of the agricultural drainage system.*	*MARD/ AMBU*	*Length of river requiring buffer zones to capture or reduce sediment loads in rivers to achieve targets*		
7	SMSW3512-06	RBSW3514	2.2-Agriculture, distributed pressure	12	*Supplementary /Complementary*	*Creating and updating the register of the total amount of nutrients and pesticides used in agricultural practices.*	*MARD/ Municipalities*	*Length of river requiring buffer zones to capture or reduce sediment loads in rivers to achieve targets*		
8	SMSW3512-07	RBSW3512	1.6–Dump/waste disposal	21	*Supplementary /Complementary*	*Removal/cleaning of illegal solid waste dumps*	*AKUM/ Municipalities*	*Number of illegal dump sites identified for removal*	14	70

No.	Measures Code	WB Code or RB code	Significant pressure	KTM	Type of Measure	Measure Name	Responsible Authority	KTM indicator	Indicator Value 2024	Indicator Value 2029
9	SMSW3512-08	RBSW3512	3-Flow Extraction/Diversion on Pressures	26	*Supplementary /Complementary*	*Improving policies for the formalization and promotion of current water users. Updating the record of unauthorized discharges from surface water.*	*AMBU*	*Number of extraction points*		
10	SMSW3512-09	RBSW3512	3-Flow Extraction/Diversion on Pressures	7	*Supplementary /Complementary*	*Study of water bodies threatened by changes in flows by drawing up an action plan for the development of rehabilitation areas and prohibiting the granting of other permits in this area.*	*AMBU /IGEO*	*Number of water bodies*		
11	SMRW3512231	RW3512231	4.3.4-Hydrological change	7	*Supplementary /Complementary*	*Improving the environmental flow in the river 3512231. The 'recovered' water from the Lezha dam will be used to provide environmental flow for stream 3512231.*	*MIE Subject AMBU*	*Total length of water bodies and actual flow rate. Environmental flow*		
12	SMSW3512-10	RBSW3512	4.1.4 - Physical change of channel/bed/coastal area/bank - Other	5	*Supplementary /Complementary*	*Allowing aquatic fauna to pass through the modified body with unnatural bed structure.*	*Municipalities*	*Remaining length of canalized river channels required to achieve targets.*		
13	SMSW3512-11	RBSW3512	4.1.4 - Physical change of channel/bed/coastal area/bank - Other	5	*Supplementary /Complementary*	*Replacement of the damaged protective embankment with a new embankment (where they may*	*Municipalities*	*Remaining length of channelized river channels required to achieve the objectives*		

No.	Measures Code	WB Code or RB code	Significant pressure	KTM	Type of Measure	Measure Name	Responsible Authority	KTM indicator	Indicator Value 2024	Indicator Value 2029
						comply with NBS nature based measures/measures).				
14	SMSW3512-12	RBSW3512	2.2 - Agriculture, distributed pressure	7 & 12	*Supplementary /Complementary*	*Implementation of best environmental practices in relation to (new) agricultural practices*	*MARD/Municipalities*	*The irrigated surface is required to be covered with measures to achieve the objectives*		
15	SMSW3512-13	RBSW3512			*Supplementary /Complementary*	*Rehabilitation of areas from industrial waste disposal sites.*	*Municipalities*			
16	SMSW3512-14	RW3512771RW351251RW351213		14	*Supplementary /Complementary*	*Rehabilitation and operation of three suspended surface flow monitoring areas.* *Ura e Zogut-Milot Station* *Burrel-Station Shoshaj* *Klos-Station Klos*	*NEA/IGEO/ AMBU*	*Countries requiring monitoring station*	0	3

Table 13-6 Summary tables for costs and funds of surface water measures

A - Masa BMRV3514-01 Relevant Ministry, Implementing Authority or Operator	Directive or relevant Instrument	Capital or installation costs	Operation and maintenance costs	Administration Expenses	Resource Costs	Other costs	Σ of Costs€ M	Sources of Funds	Sources of Funds	Central or agency budget	The budget of the Municipality	Funded by the Operator	State Water Fees or Taxes	Other funds	Σ of funds €M
Improvement of urban wastewater treatment plants. *ITUNU Lezha* **AKUM/MIE /Municipalities**	Directive e Urban Wastewater (EU 91/271/EEC) Water Framework Directive (2000/60/EC)	525,000,000 ALL													
Reduction of untreated direct discharges from sewer spills by diversion to new collector systems. **AKUM/MIE /Municipalities**	Directive e Urban Wastewater (EU 91/271/EEC) Water Framework Directive (2000/60/EC)	2,487,873,111 ALL													
Construction of plants for the treatment of industrial wastewater, requiring that every industrial installation has effluent treatment on site, in accordance with the legislation **AMBU/NEA/Private entity**	Directive e Urban Wastewater (EU 91/271/EEC) Water Framework Directive (2000/60/EC) Integrated Pollution Prevention Control Directive (96/61/EC)	24,200,000.00 ALL													

Removal/cleaning of illegal solid waste dumps **AKUM/MIE /Municipalities**		49,931,453 ALL[213]													
Allowing aquatic fauna to pass through the modified body with unnatural bed structure. **AKUM/MIE /Municipalities**	Habitats Directive (92/43/EEC) Directive on Environmental Impact Assessment (85/337/EEC) Water Framework Directive (2000/60/EC)	9,000,000.00 ALL													
Determining the length and water bodies that must reduce sediment discharges from rivers to achieve environmental objectives. Control over the obligations arising from the implementation of the conditions of the permits to the subjects for the rehabilitation of the area, by closing the access roads after the end of the permit, by creating protection systems against river erosion in agricultural lands. **AMBU /MIE**	Habitats Directive (92/43/EEC) Directive on Environmental Impact Assessment (85/337/EEC) Water Framework Directive (2000/60/EC)	1,936,000,000 ALL													

[213] Referred from FINAL REPORT - RISK MITIGATION IN DEPOSIT VENUES. June 2018- This document was prepared by the Ministry of Tourism and Environment, supported by the Program for Decentralization and Local Development, through the Swiss Development Agency, with the technical assistance of the consultant.

Replacement of the damaged protective embankment with a new embankment (where they may be in accordance with measures/measures based on the nature of the NBS). **AMBU/MIE Municipalities**	Habitats Directive (92/43/EEC) Directive on Environmental Impact Assessment (85/337/EEC) Water Framework Directive (2000/60/EC)	36,000,000 ALL													
Rehabilitation of areas from industrial waste disposal sites. **MIE/AMBU/ Municipalities**															

B - Measure BMRV3514-02 & SMRV3514-01 & SMRV3514-02 & SMRV3514-03 Relevant Ministry, Implementing Authority or Operator	**Directive or relevant Instrument**	**Capital or installation costs**	**Operation and maintenance costs**	**Administration Expenses**	**Resource Costs**	**Other costs**	**Σ of Costs €M**	Sources of Funds	**External grant or loan**	**Central or agency budget**	**The budget of the Municipality**	**Funded by the Operator**	**State Water Fees or Taxes**	**Other funds**	**Σ of funds €M**
Implementation of restrictions to reduce the pollution load from chemical fertilizers, Pesticides in agricultural lands. *Creating and updating the register of the total amount of nutrients and Pesticides used in agricultural practices.*	The EU's Common Agricultural Policy	121,000,000 ALL													

MARD/AMBU /Municipalities															
Maintenance and cleaning of the agricultural drainage system. **MARD/AMBU /Municipalities**	The EU's Common Agricultural Policy	1,210,000,000 ALL													

C - Measure SMRV3514-04 Relevant Ministry, Implementing Authority or Operator	**Directive or relevant Instrument**	**Capital or installation costs**	**Operation and maintenance costs**	**Administration Expenses**	**Resource Costs**	**Other costs**	**Σ of Costs€M**	Sources of Funds	**External grant or loan**	**Central or agency budget**	**The budget of the Municipality**	**Funded by the Operator**	**State Water Fees or Taxes**	**Other funds**	**Σ of funds €M**
Improving policies for the formalization and promotion of current water users. **AMBU /IKMT/NEA/AGS/Municipalities**	Habitats Directive (92/43/EEC) Directive on Environmental Impact Assessment (85/337/EEC) Water Framework Directive (2000/60/EC)	121,000,000 ALL													
Preparation of a study on water bodies threatened by flow changes by drawing up an action plan for the development of rehabilitation areas and prohibiting the granting of other permits in this area. **AMBU /IGEO**		60,500,000 ALL													

Rehabilitation and operation of three suspended surface flow monitoring areas. *Bird Bridge-Milot Station* *Burrel-Station Shoshaj* *Klos-Station Klos.* **NEA/IGEO/ AMBU**		6,534,000 ALL													
Improving the environmental flow in the river 3512231. *The 'recovered' water from the Lezha dam will be used to provide the environmental flow for the stream 3512231.* **AMBU /Subject/MIE**															
Strengthening the implementation of legislation by monitoring the implementation of permit conditions (both for environmental permits and for water resource permits). **AMBU /MIE/MTE**															
Total costs and funds															

13.16 Measures for Groundwater Bodies at Risk

The program of basic and/or complementary measures targets groundwater bodies that are at risk of not achieving environmental objectives. These water bodies require detailed assessment of how the current status and subsequent impacts will be addressed during the duration of the plan (2024-2029). The precise measures are identified together with the expected change in status, the responsible competent authority, the target dates and the costs of the measures. Specific measures are aimed at individual water bodies, or groups of water bodies, which are at risk.

The WFD/GWD include two separate but complementary measures, where the first are those aimed at rehabilitating groundwater bodies that currently do not meet the objectives, while the other measures are included under the name of 'prevention and limitation'. The latter are related to underground water bodies. The WFD strongly emphasizes the importance of preventing significant contamination of groundwater, because it is based on European and world experience that has shown that if contaminated, cleaning up groundwater is difficult, slow and costly, while that protective measures are relatively simple, quick and without much cost.

Article 11(3) of the WFD requires a 'combined approach' to the protection of groundwater, which combines the control of pollution at the source with the determination of environmental quality standards; and Article 7 requires the maintenance of water quality to reduce the level of drinking water treatment. Cases of localized contamination do not necessarily affect the status of the entire TUN, provided that they are investigated and if necessary remedied as preventive and containment measures.

Based on the analysis of pressures in Chapter 10, Table 13 8 provides a mapping of all measures for underground water bodies.

13.16.1 Prevention and Limitation Measures for the Underground Water Body

The WFD and the GWD emphasize in particular the prevention and limitation of direct and indirect introduction of pollutants into groundwater throughout the extent of underground water bodies. The difference between direct and indirect inputs is explained in the following diagram, which focuses on whether the source of pollution lies above or below the water table. A more detailed explanation of the "Prevention and Limitation" measures is presented in Technical Appendix VII.

Prevention and mitigation measures are the first line of defense for preventing groundwater pollution and include regulatory measures such as permits and codes of conduct. For the identified pollution risks, the DKU expresses these protective objectives by defining EQVs and Compliance Values (CPs), which are applied to Compliance Points (CPs) and that are stricter than Limit Values.

A Compliance Value is the concentration (and corresponding compliance regime) which, when not exceeded in the PP, prevents contamination. This differs from a Limit Value because the latter is applied at the source (ie at PP-0). Pollution prevention requires taking all measures that are 'necessary and reasonable', where 'reasonable' means technically feasible without involving disproportionate costs. The design of monitoring prevention and limitation is described in Document 17 of WFD CIS.

Measures to regulate point source inputs generally include prohibitions, authorizations and general enforcement rules, including reference to the UWWTD. Control of diffuse sources is similar and can be achieved through prior regulation, prior authorisation, general enforcement rules and statutory Codes of Practice, including reference to the Nitrates and Plant Protection Products Directives. The WFD supersedes all previous directives and prohibits all direct discharges to groundwater.

13.16.2 Prevention and Limitation Measures Applicable to All Groundwater Bodies

Improvement of the Groundwater Monitoring Network and Program.

Piezometer nests should be installed and monitored in all alluvial and sandstone-conglomerate TUNs, starting with the main municipal pumping points and continuing in areas with intensive industrial or irrigation pumping. In addition, analytical capabilities should be improved in order to monitor the

parameters necessary for the assessment of the DKU/DUN compliant status, as well as in accordance with known pressures from chemical use.
Sources with large discharges, especially those measured or estimated to discharge 100 L/s or more, should be equipped with a gauging facility (eg, spillway or artificial channel) and data logger that records water level and indicators of quality. Resource monitoring is the most practical way of monitoring aquifers composed of limestone and igneous rocks, and every TUN should have at least one monitoring point.
Please note that the confidence level for Group B and C estimates is set to zero.

Extraction of Groundwater.

Exploitation control may be required at some point for some TUNs, however, there is currently no prospect of their implementation until most private wells are registered. Registration is a prerequisite for monitoring and all forms of active management, such as various activities for issuing permits, as well as for protection. Registration can be encouraged through a combination of active information gathering, as well as enforcement and incentive-based measures, such as 'follow-up to previous provisions'. Registration activities should be prioritized in alluvial GWBs (GW35120101-05).
The current extraction licensing system should be reviewed, improved to include automatic periodic review of licensed quantities as well as the possibility to request best practice measures for water efficiency as well as the condition of renewal.

13.16.3 Underground water bodies GW35120101 (Lac) and GW35120103 (Shenkoll)

In the alluvial underground waters of Laci and Shenkolli, multiple parallel measures are necessary:

Improvement of the Groundwater Monitoring Network and Program

Nests of piezometers (pairs of shallow and deep wells with short filters) should be installed and monitored in all GWBs, especially around the field of wells in Fushe Kuqe and beyond in the two GWBs. Special monitoring of the two horizons is necessary. Monitoring design in Fushe Kuqe should be based on risk, taking into account human activities along the Mat channel and the salinity of the groundwater in Patok.
The results of the measurements from this operation are an accurate representation of the state and hydraulic and chemical trend in the aquifers which are not disturbed by the vertical change of the characteristics as a result of natural or pumping activities.

Cooperation with Water Utilities, Resource Agencies and Local Government

These agencies should cooperate for planning, monitoring and protection of groundwater, based on the sharing of information on public platforms. This will provide essential data and institutional linkages for improved basin assessment and planning. Enterprises and Resource Agencies should improve and coordinate monitoring activities in order to comply with environmental and statutory objectives, as well as combine their monitoring data in an online platform. Together with local government, information on the large but unspecified number of industrial, commercial and irrigation wells should be systematically collected.
As groundwater can enter and exit the Ishmi and Drin basins and is subject to the largest scale export in the Erzen basin, WU companies and agencies responsible for resources in all four basins should collaborate on a platform with many stakeholders.
The measurable results of this action will be reflected in the database containing information on withdrawals and water quality for all municipal wells, the defined percentage of large industrial wells and the defined percentage of irrigation wells.

Pollution Risk Mapping, Groundwater Resource Protection Zones and Land Use Zoning

The pressure analysis has identified the pollution risks associated with the chemicals identified in WFD and GWD. In this context, a number of activities related to each other are needed. The first action is to identify the type and location of hazardous chemicals used or deposited in the TUNs, summarized in a digital hazard map. Secondly, comes the determination of the external and general space (well-drilling) of the catchment protection zone (CPZ) in the municipal wells. The third action is to determine

land use restrictions and chemical use practices in indoor and outdoor SPAs. The greatest priority should be given to the field of wells in Fushe Kuqe. The measurable results of this action are the quantitative reduction of risk, expressed in displaced objects, implemented mitigation measures, and in the exclusion of new risks.

The Management Model of the Alluvial Aquifer Ishem - Mat - Drin

A potentially significant pressure from a quantitative point of view is related to natural flows and as a result of groundwater pumping between basins and between groundwater bodies in the Ishem, Mat and Drin basins and exports in the Erzen basin. As pointed out by CEMSA (2012), the alluvium in the lower parts of the Ishem, Mat and Drin basins for a single aquifer. By necessity, river basin plans match water bodies with surface catchments; however, pumping from points that are on the margins of one groundwater body will affect another nearby body. The footprints of these aquifers serve as a residence for a large part of Albania's population and for economic activity, and there is a possibility of increased demand for more use of groundwater. The risks associated with over-allocation and unintended mobilization of contaminated groundwater require aquifer-wide management tools to advise basin-based and other local agencies, as well as to guide sustainable groundwater management in general water bodies. For this purpose, a central agency should design or commission the design, as well as maintain, a numerical model of the alluvial aquifer of Ishem-Mat-Drin, for the purpose of planning, allocation and assessment of requirements in different basins. Taking into consideration the concerns previously expressed regarding monitoring data, this program should be integrated with training and capacity building, s and with the improvement of groundwater monitoring. Thus, the program should be implemented for a period of several years, in order to create a strong model and achieved capacities for groundwater management.

Assuming that the relevant actions are taken based on its recommendations, the measurable results of this action will be reflected in the coordinated allocation of use between the basins, and in the avoidance of severe degradation of the quantitative status.

Specific Research

Despite the overall good status obtained on the basis of monitoring, this status depends on the undertaking of investigations, and if necessary, the implementation of remediation of the local pollution hotspots identified in Chapter 10, Figure 10-4 in the Technical Annex VII listed below.

- PH_2 Plant for phosphate fertilization in Lac
- Superphosphate and copper smelting plant in Lac

13.16.4 Underground water body GW35120103 (Mat canal)

Specific Research

Despite the overall good status obtained on the basis of monitoring, this status depends on the undertaking of investigations, and if necessary, the implementation of remediation of the local pollution hotspots identified in Chapter 10, Figure 10-4 in the Technical Annex VII listed below.

- PH_33 Rubik copper mine and plant

13.16.5 Group of Water Bodies E: GW35120501 to GW35120503

Specific Research

Despite the overall good status obtained on the basis of monitoring, this status is dependent on the undertaking of investigations, and if necessary, the implementation of remediation of local pollution hotspots identified in Chapter 10, Figure 10-4, Technical Appendix VII listed below.

- PH_13 Burrel ferro-chrome plant
- PH_19 Pesticides warehouse in Rreshen
- PH_32 Waste disposal site in Rreshen
- PH_35 Copper beneficiation plant and waste disposal site in Kurbnesh
- PH_37 Elbasan ferro-chrome plant (disputable location - outside the Mati basin

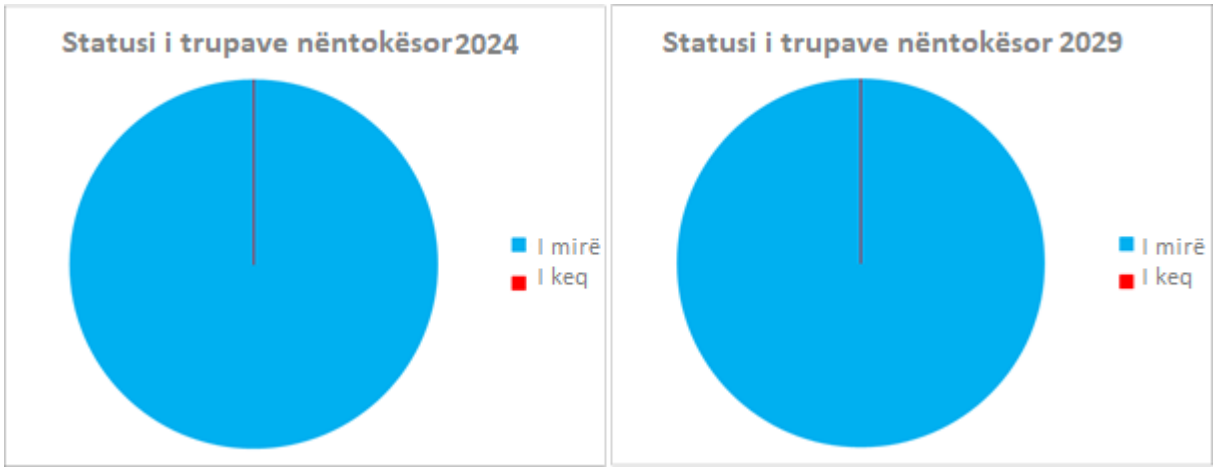
13.17 Summary Costings for Groundwater Measures

The preliminary costs summarized for all measures related to underground water bodies and the total value of all costs for all measures in the 2024-2029 Plan period are presented in Technical Appendix VII.

13.18 Final Summary of Current and Projected Groundwater Body Status

Figure 13-3 summarizes the expected results of the 2024-2029 PMBU for the status of groundwater bodies in the Mat basin.

Figure 13-3 – Current and Projected Proportions of Groundwater Body Status



13.19 Monitoring and Evaluation Procedures

Prevent and limit measures are the first line of defense in preventing pollution of groundwater and involve such regulatory measures as permitting and codes of conduct. For identified pollution risks, the WFD expresses these protective objectives by specifying Limit Values (LV's) and Compliance Values (CV) which apply at Points of Compliance (POC) and are more stringent than Threshold Values. Four points of compliance (POC-0 to POC-3) may be defined as indicated in Figure D-2. These points represent a progression along a pathway from the points where a contaminant (1) enters the subsurface, (2) reaches the water table, (3) an intermediate location within the aquifer and (4) the end of the flow system. Compliance points may be actual monitoring points or theoretical points used to calculate an acceptable input.

Table 13-7 – Summary of Program of Measures by Groundwater Body

No	Measures Code	WB Code or RB code	Significant pressure	KTM	Type of Measure	Measure Name	Responsible Authority	KTM indicator	Indicator Value 2024	Indicator Value 2029
1	SMGW3512-01	GW35120101 GW35120103	2.2-Agriculture, distributed pressure	12	*Basic*	Determining protective zones and sanitary hygiene in sources for the use of underground water.	*NEA AGS AMBU*	Length of river requiring buffer zones to capture or reduce sediment loads in rivers to achieve targets		
2	SMGW3512-01	GW35120105	2.8-Pressure distributed by mining contamination	21	*Supplementary/ Complementary*	Reduction of untreated direct discharges from sewage discharges and industrial activities	*AKUM Municipalities*	The number of drainage systems needed to achieve the objectives		
3	SMGW3512-03	GW35120501 GW35120503	1.1- Point pollution of urban wastewater	8	*Supplementary/ Complementary*	Strengthening the implementation of the legislation for the control over the permits granted for the uses of water resources, leading to a more sustainable management of the Ishem-Mat-Drin alluvial aquifer	*AMBU*	The number of revised permits needed to achieve the objectives		