Flood Risk Management Plan SHKODËR REGION

For some areas where there is a potential risk of flooding or floods are likely to occur, Drin-Bunë 4, 5 and 6 (territory of administrative units Shkodër, Ana e Malit, Bërdicë, Dajç, Guri i Zi, Rrethinat and Velipojë of Shkodër municipality and administrative unit Bushat of Vau i Dejës municipality)

2023 – 2028

Final Draft

June 2022

IMPRINT

The flood risk management plan for some areas where there is a potential risk of flooding or floods are likely to occur, Drin-Bunë 4, 5 and 6 (territory of administrative units Shkodër, Ana e Malit, Bërdica, Dajç, Guri i Zi, Rrethinat and Velipoja of Shkodër municipality and Bushat administrative unit of Vau i Dejës municipality), with implementation period 2023 - 2028

June 2022

Prepared in the frame of the project: Adaptation Climate Change through Transboundary Flood Risk Management in Western Balkans implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH,

On behalf of German Federal Ministry for Economic Cooperation and Development (BMZ)

Prepared by central, regional and local representatives

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A publication produced with the support of the German Federal Government through the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

FOREWORD

Dear colleagues, water and environmental experts and stakeholders,

Following the **process started** in June - September 2021, the Water Resources Management Agency (AMBU), together with the support of the German Government, through GIZ, has drafted the Flood Risk Management Plan (FRMP) for some areas where potential risk from floods it exists or floods are likely to occur, Drin-Bunë 4, 5 and 6 (territory of administrative units Shkodër, Ana e Malit, Bërdica, Dajç, Guri i Zi, Rrethinat and Velipoja of Shkodër municipality and Bushat administrative unit of municipality Vau i Dejës)"

The plan was drafted in accordance with the provisions of Decision no. 1015, dated 16.12.2020, of the Council of Ministers "On the content, development and implementation of the National Water Resources Management Strategy, water basin management plans and flood risk management plans " and the European Union Directive on Floods (Directive 2007/60/EC), and will cover the period 2023-2028, defining the objectives for the coverage region in accordance with the objectives of the Drin Water Basin Management Plan- Bunë (approved by Decision no. 849, dated 4.11.2020 of the Council of Ministers), considering the Preliminary Assessment documents, the Flood Hazard and Risk Maps, the hydrological characteristics, as well as the Strategic Environmental Assessment.

The main objectives of this document are the improvement of organizational and professional capacities for flood risk management, the prevention of new risks in flood-prone areas, the reduction of existing risks in flood-prone areas and the reduction of negative consequences after an event. flood, where the main goal is to prevent and reduce the possible negative consequences of floods for human health, the environment, cultural heritage and economic activity, in the respective areas.

Based on DCM No. 1015/2020, but also in the will to ensure the widest support for policies and to increase the efficiency of implementation efforts, any member of the public can comment on the draft flood risk management plan within a 6-month period from the date of its publication.

Comments can be in a written or electronic form and must be addressed to AMBU.

Considering the above, we would greatly appreciate your involvement, according to your area of expertise and knowledge, in identifying the issues you consider important and in proposing possible measures to solve them, as your thoughts and suggestions are considered quite valuable, and they express the commitment of each of us, believing that the Flood Risk Management Plan will be implemented during the period 2023-2028.

General Director, AMBU

Executive Summary

Floods are natural phenomena which cannot be prevented, which have the potential to cause disasters, displacement of people and damage to the environment, and which endanger and damage economic developments.

With the aim of avoiding and reducing the negative impacts of floods, it is necessary to develop management planning documents, at the level of the basin or territories of a water basin, documents that foresee the necessary measures within the surfaces affected by floods, to guarantee the safety of people, living thing and property addressing all phases of the management cycle, including prevention, protection and preparedness.

Directive 2007/60/EC of the European Parliament and of the Council, dated October 23, 2007, "On the assessment and management of flood risks" provides for the establishment of a framework for the assessment and management of flood risks, aiming to reduce the negative consequences for health human, environment, cultural heritage and flood-related economic activity in the community.

The directive is not binding for countries that are not members of the EU, but it is a widely accepted standard and contribution to the process of accession to the EU, therefore the Albanian Government has approximated the Directive 2007/60/EC through the adoption of VKM no. 1015, dated 16.12.2020, "On the Content, Development and Implementation of the National Water Resources Management Strategy, Water Basin Management Plans and Flood Risk Management Plans".

The traditional approach was to protect people, economic goods and agricultural land from flooding (which usually fails when extreme floods overwhelm defence works), while the modern approach of the Directive is to cooperate with all relevant actors to "live with floods" to protect by adapting uses and works against flood risk in the respective areas and especially to prepare for floods with a comprehensive approach with all affected people, organizations, administrations and businesses.

Referring to the legislation in force, the Water Resources Management Agency (AMBU) in collaboration with the water basin administration offices draws up the flood risk management plan(s), which focus on prevention, protection, preparedness, including flood forecasting and systems of early warning.

AMBU, with the support of the German Federal Ministry for Economic Cooperation and Development, through the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), in the framework of the project "Adapting to climate change through transboundary flood risk management in the Western Balkans", together with the inter-institutional working group, drafted the Flood Risk Management Project Plan for some areas where there is a potential risk of flooding or floods are likely to occur, Drin-Bunë 4, 5 and 6 (territory of

administrative units Shkodër, Ana e Malit, Bërdica, Dajç, Guri i Zi, Rrethinat and Velipoja of the municipality of Shkodër and the administrative unit Bushat of the municipality of Vau i Dejës (Draft-FRMP).

The project implemented by GIZ, with the objective of strengthening cross-border flood risk management in relation to climate change in the Western Balkans, aimed to implement the EU Floods Directive by strengthening local and national capacities to make meaningful risk assessments from floods, to prioritize technical, financial and political decisions in the field of flood risk management, civil protection and early warning, which also benefits other actors and populations in vulnerable areas and strengthens their adaptive capacities.

The project in question started its activity in November 2018 and ends in July 2022, with the finalization of the support for AMBU in submitting the Draft - FRMP for preliminary approval to the National Water Council.

Based on the applicable legislation, the drafted FRMP project had to be sent for coordination with the central institutions after it had been drafted, while AMBU estimated that the most effective approach was to draft the document itself in cooperation with these institutions as well as other public entities that are related with the field or possess the necessary knowledge and expertise to contribute. Therefore, the draft FRMP was drawn up in cooperation with the inter-institutional group created with the Prime Minister order no. 75 prot., dated 10.09.2021, which included 35 representative members of specified central and local institutions (ministry, central and local agencies) and 19 members invited by public entities that contributed and supported the process (municipality, faculties, institutes, etc.).

OBJECTIVE OF THE PLAN

The main objective of the FRMP is to raise the current level of flood risk management, focusing especially on non-structural measures, such as warning, information, preparedness and planning as well as structural measures, identified and foreseen for implementation in cooperation with all actors relevant including people, organizations, administrations and businesses.

The document serves to state institutions, public and private entities to manage in a harmonized way the risk from floods and take effective measures, with the aim of preventing and reducing the possible negative consequences of floods for human health, the environment, cultural heritage and economic activity, in the respective areas.

In addition to the objective of the FRMP document itself, in the processes that preceded its drafting (preliminary risk assessment, identification of areas where a potential flood risk exists or floods are likely to occur, creation of flood hazard and risk maps) other objectives

have been in focus and achieved such as the increase of local and national capacities to make flood risk assessments, the increase of the strategic capacity of central and local institutions to manage the risk of floods, the strengthening of cooperation and interaction mechanisms of institutions as well as strengthening cross-border flood risk management.

The processes followed and the documents are drawn up according to a well-defined methodology, in accordance with the definitions of the EU Directive, the Albanian legislation and the best practices referred by the experts involved in the process. This approach will serve as a guarantee that the FRMP, which covers the 6-year period (2023-2028), will be implemented and through its implementation will avoid or minimize the consequences that floods cause.

The plan, and more specifically the plan of measures provided for implementation, serves the achievement of the main objectives defined:

- Improvement of organizational and professional capacities for flood risk management;
- Prevention of new risks in flood-prone areas;
- Reduction of existing risks in flood-prone areas;
- Reduction of negative consequences during a flood event;
- Reduction of negative consequences after a flood event; as well as specific objectives in their function.

PROCESS OF DRAFTING FRMP, APPROVAL AND IMPLEMENTATION

The process of preparing the draft- FRMP was carried out guided by the obligations of the Flood Directive 2007/60/EC, as well as the provisions of DCM no. 1015/2020.

Drafting of the FRMP project was preceded by the processes and documents of:

- Preliminary flood risk assessment and identification of areas of potential significant flood risk approved by Decision no. 1, dated 15.6.2021 of KKU;

- With Decision no. 1, dated 15.06.2021 of the National Water Council (NWC), the Preliminary Flood Risk Assessment Report for the Drin-Bun Water Basin has been approved, and 8 areas where a potential flood risk exists, or floods are likely to occur in this basin;

- Flood hazard maps approved by Decision no. 3, dated 15.6.2021 of the NWC; among others, the flood risk maps for the area of Shkodra, which corresponds to some of the areas where there is a potential risk of flooding or floods are likely to occur in the Drin-Buna Water Basin.

- Flood risk maps which are approved by decision of the NWC;

- Creation of the inter-institutional group with the Prime Minister Order no. 75 prot., dated 10.09.2021.

The design was carried out taking into consideration the objectives of the Drin-Buna Water Basin Management Plan (approved by Decision no. 849, dated 4.11.2020 of the Council of Ministers).

At the same time, based on the provisions of Law no. 91, dated 28.02.2013 "On Strategic Environmental Assessment (SEA)" and Decision no. 219 dated 11.3.2015 of the Council of Ministers "On determining the rules and procedures for consultation with interest groups and the public, as well as the public hearing during strategic environmental assessment process", with the expertise provided by the project, through GIZ, the draft- FRMP has also completed with the Strategic Environmental Assessment.

The plan of measures envisaged in the Draft- FRMP, which in terms of the typology of measures has been referred to the catalogue of measures related to the "Types of measures" of the EU, has been completed and adapted by actors and interested parties with reference to regional characteristics .

These products, together with the document drawn up in 2015 regarding flood risk management for Shkodra region were the basis for the preparation of the Draft- PMRP.

The Draft- FRMP project was developed in a process with wide participation, with the involvement of the institutions defined in DCM no. 1015/2020, which contributed according to their areas of responsibility, the municipality of Shkodër, the municipality of Vau Dejës, universities, international experts, local experts, representatives of non-profit organizations and international organizations operating in the field of flood management.

The FRMP is the first plan, with all parameters according to the requirements of the Flood Framework Directive, that will be developed and approved in Albania and it will be able to serve as a model for drawing up plans for other basins. The document, after prior approval in the National Water Council, will be published for a period of 6 months associated with the measures defined in the document to be implemented. At the same time will be coordinated with the respective bodies of Montenegro to fulfil the obligation of the applicable legislation that if in a flood risk management plan are proposed to be included measures that in terms of their scale and impact, significantly increase the flood risks from upstream or downstream of other countries in the same river basin or sub-basin, the AMBU must not include these measures in the flood risk management plan until these measures are coordinated with and approved by the states involved.

Following the comments which will be treated and evaluated, the final flood risk management plan will be drawn up for the territory in question, which after preliminary approval in

the National Water Council will be approved in the Council of Ministers and will determine milestones on which flood risk management will be based for the period 2023-2028.

The implementation of the FRMP will be continuously monitored by the AMBU regarding the implementation of the measures and the level of achievement of the FRMP objectives, and will be periodically reported to the National Water Council on the progress of the implementation.

CHALLENGES ENCOUNTERED AND THOSE EXPECTED NEXT

During the last years, Albania has faced flood situations in several territories, but among those with a greater risk are the areas of sub-Shkodra, which have faced negative consequences for human health, the environment, cultural heritage and economic activity.

Floods cross institutional and administrative boundaries and therefore their risk management requires cooperation and coordinated and harmonized actions between all bodies responsible for flood risk management at the local and central level, but not only.

Although the preparation of the FRMP is the responsibility of the AMBU and the Drin-Bune Water Basin Administration Office, the processes followed and the drafting of the document required the involvement of all stakeholders as well as professional expertise in various fields.

Despite the fact that the creation and functioning of an inter-institutional group was formalized with a Prime Minister Order, finding functional mechanisms for cooperation and coordination was a challenge.

In order to achieve the defined objectives, with a focus on reducing the potential negative consequences of floods for human health, the environment, cultural heritage and economic activity, the FRMP contains the measures that have been estimated to affect the reduction of hazards and risks arising from floods in the territory of Shkodër, Ana e Mali, Bërdicë, Dajç, Guri i Zi, Rrethinat and Velipoja administrative units of the Shkodër municipality and the Bushat administrative unit of the Vau i Dejës municipality.

The main challenge for the implementation period 2023-2028 is the level of implementation of the measures provided in the FRMP, implementation which is the responsibility of the central and local institutions, respectively determined for each measure provided. The challenge itself contains all the elements of the difficulties expected to be encountered in forecasting, detailing and design, implementation and monitoring of implementation, and most importantly financing.

Monitoring the implementation of measures is a relatively simple process, but complex and difficult is the "translation" of the level of implementation of measures to the level of

fulfilment of the main and specific objectives, which are generally interdependent on the level of fulfilment of several measures simultaneously.

WHAT THE PLAN CONTAINS

As in all the processes implemented for flood risk management in areas where there is a potential risk of flooding or floods are likely to occur, Drin-Bune 4, 5 and 6, the content of the plan is also based on the provisions of Directive 2007/60 /EC and in the determinations of DCM no. 1015/2020. Draft- FRMP, in summary, contains:

- Background and objectives;
- Characteristics of the project area;
- Preliminary flood risk assessment as well as risk assessment for the project area;
- Appropriate objectives for flood risk management in the area;
- Measures for flood risk management;
- Strategic environmental assessment;
- Cross-border impact aspects of risk management;
- Coordination with the EU Directive;
- Public Information and publishing the measures;
- Annexes:
    - o Catalogue of type of EU measures;
    - o List of measures for implementation/Action plan;
    - o Monitoring system of important environmental impacts with reference to EIA;
    - o Recommendations and instructions for the implementation of FRMP measures with reference to the recommendations of the EIA;
    - o Hazard and risk maps.
- Tables and figures that argue and complement the chapters of the draft-FRMP.

PLAN OF MEASURES FOR THE IMPLEMENTATION PERIOD 2023-2028

The plan of measures of the draft-FRMP, which refers to the typology of measures defined in the catalogue of EU measures, has been drawn up in cooperation and coordination with central and local institutions that have their field of responsibility management components of floods and/or have the responsibility, according to the sectors they administer, for the implementation of these measures.

Referring to the typology, the measures are grouped into:

1. Aspect: Prevention of risks.
    - 1.1 Administrative instruments for risk avoidance;

1.2 Land use adaptation;

1.3 Risk prevention through flood-adapted construction;

2. Aspect: Natural Flood Protection

2.1 Management of natural floods, regulation of water flow;

3. Aspect: Technical flood protection.

3.1 Regulation of water flow / works in alluvial plains (holding measures);

3.2 Regulation of water flow / canals (dikes, dams, flood protection walls and movable flood protection);

3.3 Regulation of water flow / channels (masses in rivers / direction of the river);

3.4 Surface water management (Urban wastewater management measures);

3.5 Protection of objects / buildings;

3.6 Other protective measures;

4. Aspect: Preparedness and information.

4.1 Economic / financial readiness;

4.2 Information readiness;

4.3 Willingness in relation to conduct;

4.4 Preparation and post-processing of risk control.

In order to avoid or reduce the risk of floods, in the territory of the project, a total of 128 measures are foreseen, of which 41 are for the prevention of risks, 24 for natural protection from floods, 45 for technical protection from floods and 18 for preparedness and information.

Among the 128 measures foreseen, 64 are non-structural measures (the EU flood directive gives priority to non-structural measures as they are more cost-effective), 60 are structural measures (of which 19 are measures related to cleaning /systematization or periodic maintenance provided by the responsible sectors), as well as 4 measures have combined structural and non-structural components.

Regarding the cross-border impact aspect, 30 of the 128 measures are considered to have potential cross-border impact (2 with potential negative impact, 12 with potential positive impact and 16 with undefined or mixed impact).

LIST OF INSTITUTIONS INVOLVED

Organisation in charge for drafting the Flood Risk Management Plan:

- Water Resource management Agency (WRMA, http://www.ambu.gov.al/) **.

Stakeholders involved in the drafting process of the Flood Risk Management Plan in the inter-institutional working group and / or in field meetings in the Shkodra area:

- Ministry of Agriculture and Rural Development (https://bujqesia.gov.al/) **;
- Ministry of Tourism and Environment (http://turizmi.gov.al/) **;
- Ministry of Infrastructure and Energy (https://www.infrastruktura.gov.al/) **;
- Ministry of Health and Social Protection (http://shendetesia.gov.al/) **;
- Ministry of Education and Sports (http://arsimi.gov.al/) **;
- National Agency for Civil Protection (https://www.mod.gov.al/) **;
- National Territorial Planning Agency (https://www.planifikimi.gov.al/) **;
- Territorial Development Agency (http://azht.gov.al/) **;
- National Road Authority (https://www.arrsh.gov.al/) **;
- National Agency for Water Supply, Sewerage and Waste Infrastructure (http://www.akum.gov.al/) **;
- National Forests Agency (http://turizmi.gov.al/) **;
- National Environment Agency (http://www.akm.gov.al/) **;
- Albanian Geological Survey (https://www.gsa.gov.al/) **;
- Institute of Public Health (http://www.ishp.gov.al/) **;
- Institute of Statistics (http://www.instat.gov.al/) **;
- Water Basin Administration Office Drin -Bunë **;
- Prefect of Shkodër County (https://prefektishkoder.gov.al/) **;
- Regional Administration for Protected Areas Shkodër (https://akzm.gov.al/) **;
- Albanian Development Fund (https://www.albaniandf.org/) **;
- Municipality of Shkodër (http://www.bashkiaShkodër.gov.al/) *;
- Municipality of Vau Dejes (http://www.bashkiavaudejes.gov.al/) *;
- Faculty of Civil Engineering (https://fin.edu.al/) *;
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- Institute of Geosciences (https://www.geo.edu.al/) *;
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- University of Shkodra, Faculty of Natural Sciences (https://unishk.edu.al/universi-teti/fakultetet/fakulteti-i-shkencave-te-natyres/) *;

- Albanian Power Corporation (www.kesh.al/) *;
- National Committee of Large Dams (https://albcold.gov.al/) *;
- Shkodër County Council (https://qarkushkoder.gov.al/);
- Administrative Unit of Municipality of Shkodër (Ana e Malit; Berdicë; Dajç; Guri i Zi; Rrethinat; Shkodër; Velipojë);
- Administrative Unit Bushat, Municipality of Vau i Dejes.

NOTE:

** - *the institutions charged with the Order of the Prime Minister to draft the Plan.*

* - *supporting and consulting institutions in the drafting of the Plan.*

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LIST OF ABBREVIATIONS / ACRONYMS

ADZM	Regional Administration of Protected Areas Shkodër
AGS	Albanian Geological Survey
AKM	*see NEA*
AKMC	*see NACP*
AKPT	*see NTPA*
AMBU	*see WRMA*
APSFR	Areas of potential significant flood risk
ARA	Albanian Road Authority (*alb. ARRSH*)
AREB	*see RAEA*
ARRSH	*see ARA*
AU	Administrative Unit (*alb. NJA*)
BMZ	German Federal Ministry for Economic Cooperation & Development
BSH	*see MoSH*
BVD	*see MoVD*
CCAWB	Climate Change Adaptation in Western Balkans
CIS	Common Implementation Strategy
DCM	Decision of Council of Ministers
DEM	Digital Elevation Model
DID	Directorate of Irrigation and Drainage (*alb. DUK*)
DRM	*see RED*
DRR	Disaster Risk Reduction
DUK	*see DID*
EIA	Environmental Impact Assessment
EU	European Union
EU-WFD	European Water Framework Directive
FAO	Food and Agriculture Organisation of the United Nations
FHRM	Flood Hazard and Risk Maps
FRM	Flood Risk Management
GEF	Global Environment Facility
GIS	Geographical Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Development Cooperation)
GLP	General Local Plan
HPP Ashta	Hydro Power Plant Ashta
HPP Fierzë	Hydro Power Plant Fierzë
HPP Koman	Hydro Power Plant Koman

HPP Vau i Dejës	Hydro Power Plant Vau i Dejës
IGEO	Institute of Geosciences (*alb. IGJEUM*)
IGJEUM	*see IGEO*
INSTAT	Institute of Statistics
IPA CBC	Instrument for Pre-accession Assistance Cross-border Cooperation
KESH	Korporata Elektroenergjitike Shqiptare (*engl. Albanian Power Corporation*)
LGU	Local Government Unit
MARD	Ministry of Agriculture, Rural Development and Water Administration (*alb. MBZHR*)
MBZHR	*see MARD*
MIE	Ministry of Infrastructure and Energy
MIA	Ministry of Internal Affairs (*alb. MPB*)
MoHSPC	Ministry of Health and Social Protection *(alb. MSHMS)*
MoSH	Municipality of Shkodër (*alb. BSH*)
MoU	Memorandum of Understanding
MoVD	Municipality of Vau i Dejës (*alb. BVD*)
MPB	*see MIA*
MTE	Ministry of Tourism and Environment (*alb. MTM*)
MTM	*see MTE*
NACP	National Agency for Civil Protection (*alb. AKMC*)
NCEP	National Plan for Civil Emergency
NCLD	National Committee of Large Dams
NEA	National Environment Agency (*alb. AKM*)
NFA	National Forest Agency (*alb. Agjencia Kombëtare e Pyjeve*)
NGO	Non-Governmental Organization
NJA	*see AU*
NJAD	All administrative units of Municipality
NTPA	National Territorial Planning Agency (*alb. AKPT*)
NWC	National Water Council
OSM	Open Street Map
P	Prefecture (*alb. prefektura*)
PFRA	Preliminary Flood Risk Assessment
Q	Shkodër County Council (*alb. qarku*)
RAEA	Regional Agricultural Extension Agency Shkodër
RED	Regional Environment Directorate (Shkodër/Lezhë/Kukës (*alb. DRM*)
SEA	Strategic Environmental Assessment

SHPP	Small Hydropower Plant
SKMIBU	National Water Resources Management Strategy 2018-2027 *(alb. Strategjia Kombëtare e Menaxhimit të Burimeve Ujore)*
TNC	Third National Communication of Albania on Climate Change
UK Shkodër	*see WU Shkodër*
UK Vau i Dejës	*see WU Vau i Dejës*
UNDP	United Nations Development Programme
WBAO	Water Basin Administration Office Drin Buna (*alb. ZABU*)
WG	Working Group
WHO	World Health Organisation
WRMA	Water Resources Management Agency (*alb. AMBU*)
WU Shkodër	Water Utility of Shkodër (*alb. UK Shkodër*)
WU Vau i Dejës	Water Utility of Vau i Dejës (*alb. UK Vau i Dejës*)
ZABU	*see WBAO*

1 Background and objectives

1.1 Framework of the European Flood Directive

The “European Directive 2007/60/EC on the assessment and management of flood risks” (hereafter: EU Flood Directive) contributes to setting a legal framework for integrated water management including flood risk management for all European member states. It builds up on the change of strategy in fighting against flood risks: the traditional approach was to protect people, economic goods and agricultural land from floods (which regularly fails when extreme floods overtop the protection works). The modern approach of the EU Flood 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, organisations, administrations and businesses.

Thus, the purpose of the EU Flood Directive is to establish a framework for the assessment and management of flood risks, aiming at the reduction of the adverse consequences for human health, the environment, cultural heritage, and economic activity associated with floods in the community. According to the EU Flood Directive flood risk management shall address all aspects of floods, including prevention, protection, and preparedness. Actions and measures of the flood risk management plan shall tackle all the stages of the flood risk management cycle (see Figure 1).

Figure 1: The FRM cycle according to the EU Flood Directive
[graphic: INFRASTRUKTUR & UMWELT, EU-project STRIMA 2014, modified]

The Flood Risk Management Plans shall include measures for the prevention of flooding, for the preventive protection against flooding, and for preparedness. They also shall include measures for the periods before a flooding is coming, for the time when a flood event is happening and for the period of recovery after a flood has happened.

The EU Flood Directive has to be implemented in coordination with other legal acts, mainly the EU Directive 2000/60/EC (Water Framework Directive, EU-WFD) and requires cyclical implementation. The EU Flood Directive focusses on the integration of all relevant sectors, including land use management, civil protection, dam management, strategic and environmental impact assessments, nature legislation, public consultation etc. A major objective is the coordination across the river basin, including requirements for transboundary coordination.

In general, the EU Flood Directive foresees three steps (see Figure 2), which have to be implemented in all member states within the given deadlines for all river basins:

First Step: Preliminary flood risk assessment (PFRA) resulting in the identification of areas of potential significant flood risk (APSFR);

Second Step: Flood hazard and flood risk mapping (FHRM);

Third Step: Flood risk management planning.

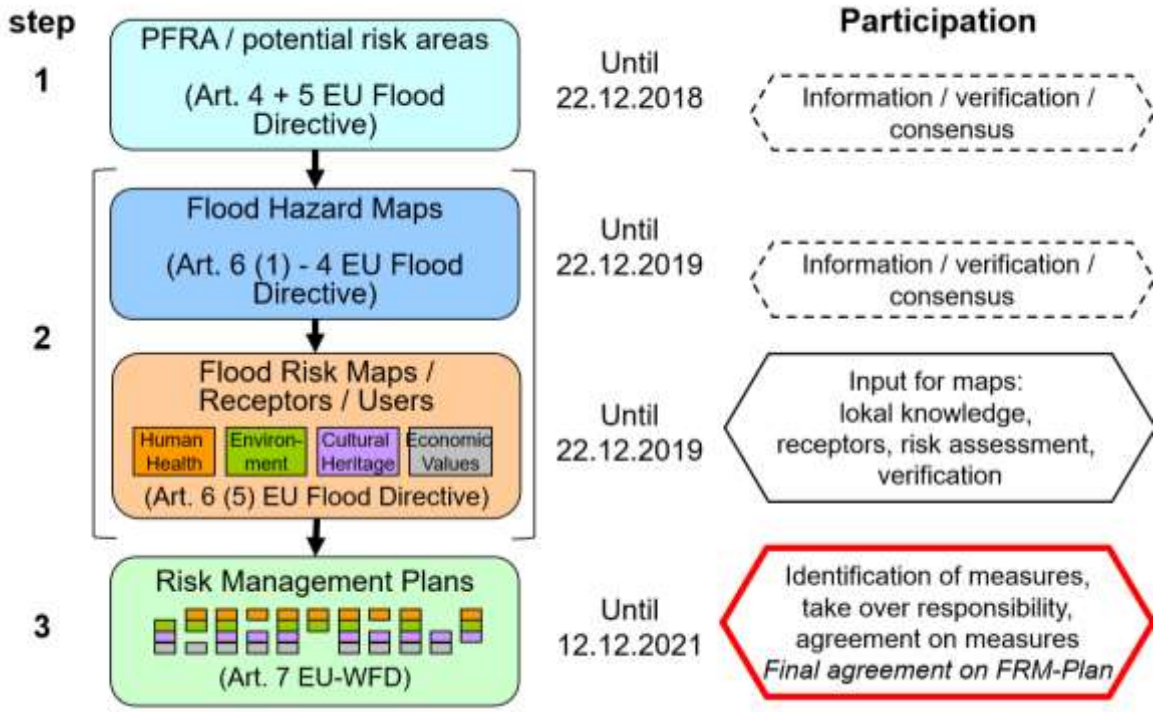


Figure 2: The steps and milestones of FRM according to the EU Flood Directive (reference to articles of the directive in brackets)

For the project region of Shkodër in Albania the EU Flood Directive is not binding since it is not within an EU member state yet. Nevertheless, it was agreed between the partners when specifying the project to follow the EU Flood Directive as close as possible to contribute to the approximation process for European integration.

For the project area the first step (preliminary flood risk assessment and identification of potential flood risk areas) has been finalised in April 2019 within an assessment for the transboundary region of the Drin-Buna River Basin resulting in four major APSFR for the project region of Shkodër. Details are given in chapter 3. The PFRA has been approved by the National Water Council Decision No. 1, date 15/06/2021, “On the Approval of the Preliminary Flood Risk Assessment Reports for the Water Basins Drin-Buna, Ishëm, Erzen, Shkumbin, Seman, Vjosa and on the Declaration of Areas where there is a Potential Risk of Floods or where Floods are likely to occur”.

The second step (development of flood hazard maps or flood extension maps) has been realised in the project “Flood Hazard and Risk Mapping in the Drin River Basin” where FHRM for Shkodër Region have been developed. The final versions are available from March 2022. FHRM has been approved by the National Water Council Decision No. 3, date 15/06/2021, “On the Approval of Flood Risk Maps for some areas of the Drin-Buna Water Basin”.

Based on these steps the third step (development of flood risk management plan) is the focus of the activities in this project, see chapter 1.4. The Decision of Council of Ministers DCM No. 1015, date 16/12/2020, defines “On the Content, Development and Implementation of the National Water Resources Management Strategy, Water Basin Management Plans and Flood Risk Management Plans”.

The main objective of this Flood Risk Management Plan is to improve Flood Risk Management (FRM) especially focussing on non-infrastructure measures, like warning, preparedness and spatial planning. This includes the consideration of all adequate types of measures for preparation, disaster management and recovery phases and the development of a regional flood risk management framework as well as local flood risk management plans for the Shkodër Region.

The following image shows the necessary steps within the FRM planning process, including risk description / assessment, appraisal of deficits / need for action, identification of potential measures, planning of measures and documentation.

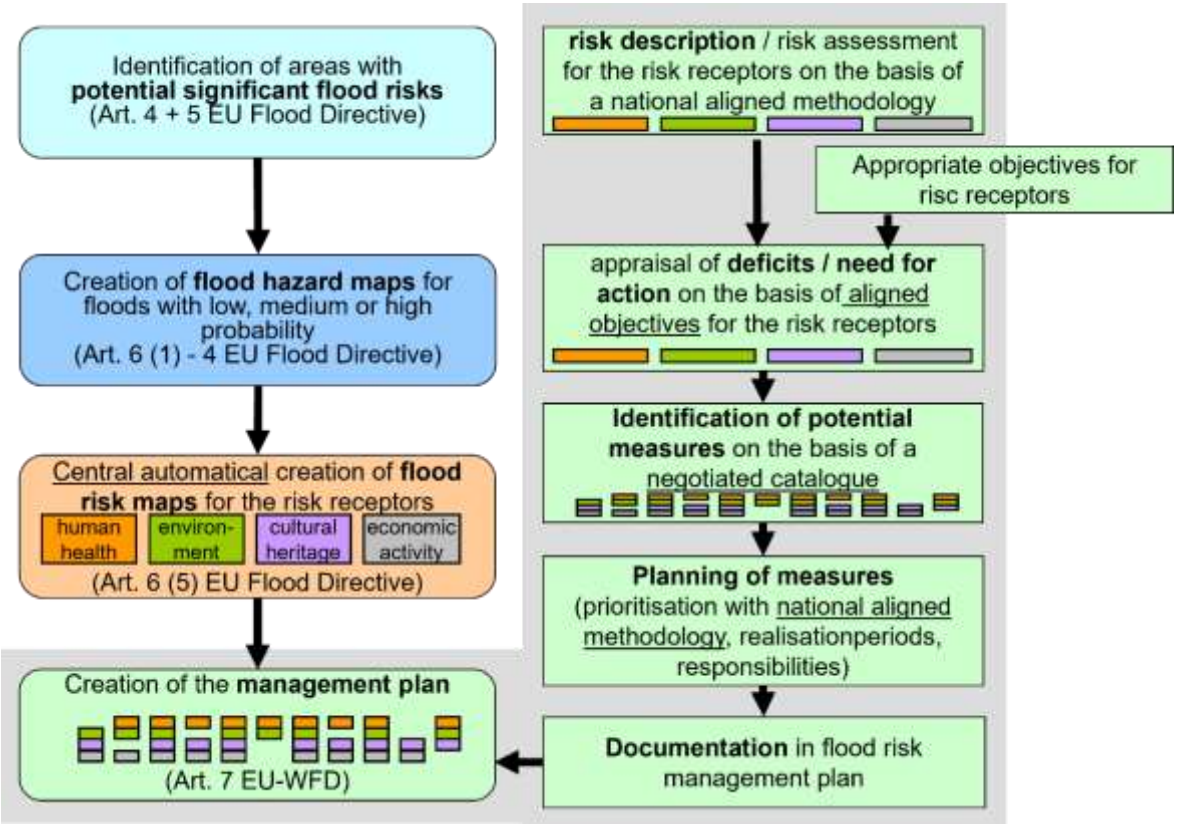


Figure 3: Development of the FRM-Plan according to the EU FRM Directive

The FRM project Shkodër follows in general the steps and the methodological approaches of the EU to implement the directive. Further details are documented in the working papers of the EU's working group on floods and in the working groups that coordinate the CIS process (Common Implementation Strategy)[1].

1.2 Albanian regulatory, legal and institutional framework

Within the EU approximation process, Albania is working to harmonize the legislation on fulfilling the requirements of the EU Flood Directive. The main responsible authority in Albania is the Water Resource Management Agency (WRMA).

In respect to flood risk management, there are four main areas of Albanian legislation and policy (Mott MacDonald, 2012a):

- Civil protection legislation that relates to planning for and responding to an emergency;
- Disaster Risk Reduction (DRR) regulations and policies;
- Flood protection and

[1] The CIS guidance documents are published under http://ec.europa.eu/environment/water/flood_risk/implem.htm

- Development planning that regulates and controls the development of infrastructure in areas at risk of flooding.

Hence, flood risk management is currently regulated by Law No. 45/2019 “On Civil Protection”, adopted in 18 July 2019, replacing Law 8756/2001 “On Civil Emergencies Services”. Law No. 45/2019 “On Civil Protection” constitutes the main legal framework, introduces the concept of disaster risk reduction (DRR) and promotes civil protection. It expects the development of

- national and local strategies for DRR[2],
- disaster risk assessment at national and local level and
- emergency plans at all levels in line with the National Plan for Civil Emergency (NCEP)[3].

Currently, the preparation of the following is in progress. Three inter-institutional working groups under the auspices of the Prime Minister have been established for the development of each of the document. Subsequently, the National Agency for Civil Protection (NACP) must verify the documents.

National Strategy for DRR: It is the basic strategic document of the Republic of Albania that defines the policies and activities of institutions, central and local structures, as well as of all other entities in disaster risk management

Disaster risk assessment : This document identifies the type, characteristic and origin of disaster risks, the level of exposure and vulnerability, the factors that cause or increase the level of risk, as well as the possible consequences for human life, living being, property, cultural heritage and the environment

Civil Emergency Plans: Civil Emergency Plans set out measures and activities for disaster prevention and response, such as capacities, engagement and organised action in emergencies to protect people’s lives, living being, property, cultural heritage and the environment. The county plans (Qark level) and the local plans for civil emergency shall be harmonised with the National Plan for Civil Emergencies (NCEP)

In terms of flood protection, the legal framework is also based on the national policy on irrigation, drainage and protection from flood and erosion under the auspices of the Ministry of Agriculture, Rural Development and Water Administration (MARD). In this respect, Law No. 24/2017, adopted in 09 Mar 2017 “On the Administration of Irrigation and Drainage”,

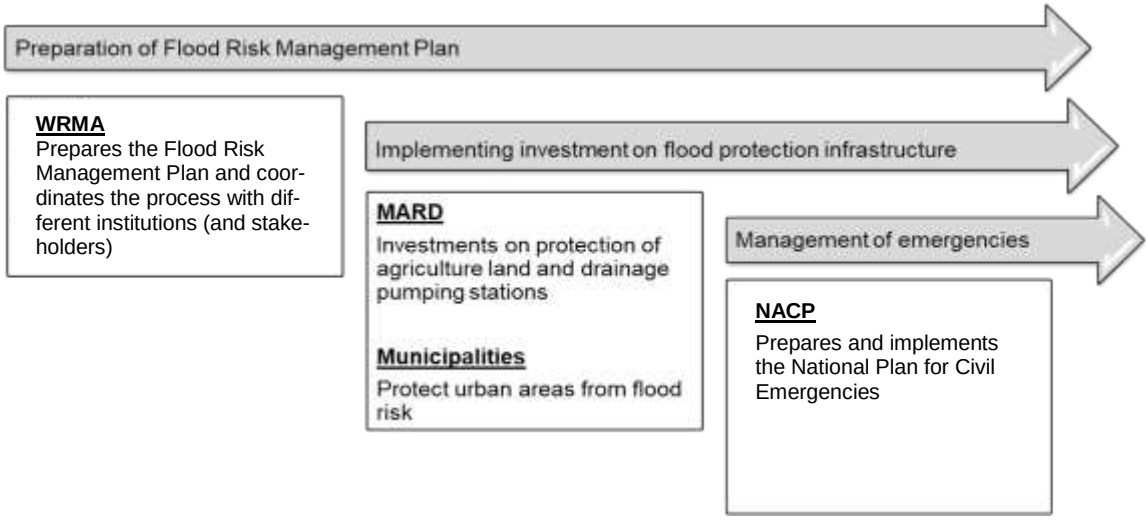
[2] In co-operation with the UNDP, Albania is preparing a National Strategy for Disaster Risk Reduction.

[3] NCEP has been adopted in 03 Dec 2004 by Council of Ministers Decision No. 835/2004

facilitates the establishment and operation of main duties and responsibilities of the Directorate of Irrigation and Drainage, municipalities and water user associations, thus, aiming to build the institutional and functional framework in line with the national policy for irrigation, drainage and flood protection. One of the three objectives of Law No. 24/2017 is the increase of agricultural productivity by meeting the water needs of farmers as well as by improving drainage and flood protection of all areas that can be drained.[4] Additionally, in the Irrigation and Drainage Strategy in Albania of 2017[5] policy goals and strategic objectives are set out. Out of four objectives, flood protection is one focal area of attention.

In terms of planning matters, Law No. 45/2019 "On Civil Protection" declares that urban development plans shall be drafted in accordance with disaster risk assessment documents and strategies (Law 45/2019, Art. 12). As such, amongst 43 municipalities, Shkodër Municipality has also drafted and approved its General Local Plan (GLP)[6]. The GLP does not only specify land use and territorial planning for the total administrative territory of the municipality such as agricultural land and water related areas but also comprises elements of DRR, the identification of areas at risk of natural hazards and their risk. (See chapter 2.9 for more information on spatial planning structures and its implication for flood risk management.)

Of course, there are links with other areas of legislation and policy such as financial and economic matters, environment, natural resources, agriculture, and tourism.



[4] There is an action plan for the drainage channel services in the Municipality of Shkoder of 2017 available: http://www.bashkiashkoder.gov.al/web/plan_veprimi_per_sherbimin_e_kullimit_1373.pdf

[5] For more information refer to https://bujqesia.gov.al/wp-content/uploads/2017/12/Strategjia_U_K_korrik__2017_konsultim-1.pdf

[6] The GLP for Shkodër Municipality is in force for the time period 2015-2030 with the Decision of National Territorial Council No. 5, date 16.10.2017. The Decision of the National Territorial Council No. 9, date 28/12/2020, approved a review of the GLP of Shkodër Municipality.

Figure 4: Structure of flood risk management processes in Albania [graphic: INFRASTRUKTUR & UMWELT, based on presentation of Mr. Arduen Karagjozi (WRMA), June 2018]

The National Water Council (NWC) is the main inter-institutional body responsible for approval of policies and plans for integrated water resource management, acting under Law No. 111/2012, date 08/02/2018, “On the integrated management of water resources”. It is chaired by the Prime Minister of Albania and composed of seven main stakeholder ministries. The Water Resources Management Agency (WRMA) is the responsible executive institution responsible for drafting and the implementation of policies and strategies related to water resources as approved by the National Water Council. WRMA, thus, is also responsible for drafting and implementing flood risk management policies according to Law No. 111/2012.

According to Article 70 of Law No. 111/2012 WRMA shall contribute in collaboration with the Ministry of Defence, to 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 NCEP. Apart from that, WRMA shall coordinate activities referring to the integration of FRM-Plans into the River Basin Management Plan (see chapter 0).

Practically, WRMA is in charge of FRM including FHRM and to coordinate the process with different institutions. MARD is responsible to prepare and implement 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 National Civil Protection Agency (NACP) coordinates the work for drafting the NCEP and implements policies of the Council of Ministers in the field of DRR and civil protection, such as the NCEP, which shall be coordinated with the flood risk management plans.

Responsible institutions for planning and policies:

- WRMA is responsible for policy and planning on central level;
- NWC and subsequently the Council of Ministers are responsible for the approval of Flood risk management plans;
- NACP is responsible for the coordination of preparation and implementation of NCEP (approval of NCEP is given by the Council of Ministers);
- Municipalities and ministries are the official territorial planning authorities in Albania;
- National Territorial Planning Agency is responsible for the coordination of GLPs to be in line with FRM-Plan.

Responsible institutions for flood protection investments and risk reduction measures:

- Ministry of Agriculture and Rural Development is responsible for flood protection infrastructure on Agriculture land;
- Municipalities are responsible for investments on flood protection of urban areas and risk reduction measures.

Responsible institutions for flood emergencies situations:

- Ministry of Defence and NACP is responsible for coordination of actions and intervention to protect human life and property;
- Prefecture is responsible to coordinate the local institutions during the emergency events on Qark level;
- Municipalities are responsible to coordinate their structures on protection of human life and property.

1.3 Involved institutions for the development of the FRM-Plan

The main cooperation partners of the project are the Regional and Local Government Units, their administrative units and other relevant stakeholder groups of the private sector and of civil society, e.g.

- Ministries, national institutes and agencies;
- Prefecture of Shkodër, Regional Council of Shkodër, regional administrations, municipalities and administrative units;
- Spatial planning departments, public security/ rescue services, emergency management;
- Academia (faculties of natural sciences, civil engineering, environmental engineering)
- Energy producers/ hydropower operators

Additionally, an inter-institutional working group has been established for the support of the development and approval of the Flood Risk Management Plan at national level. Its first meeting held was in 02 Nov 2021.

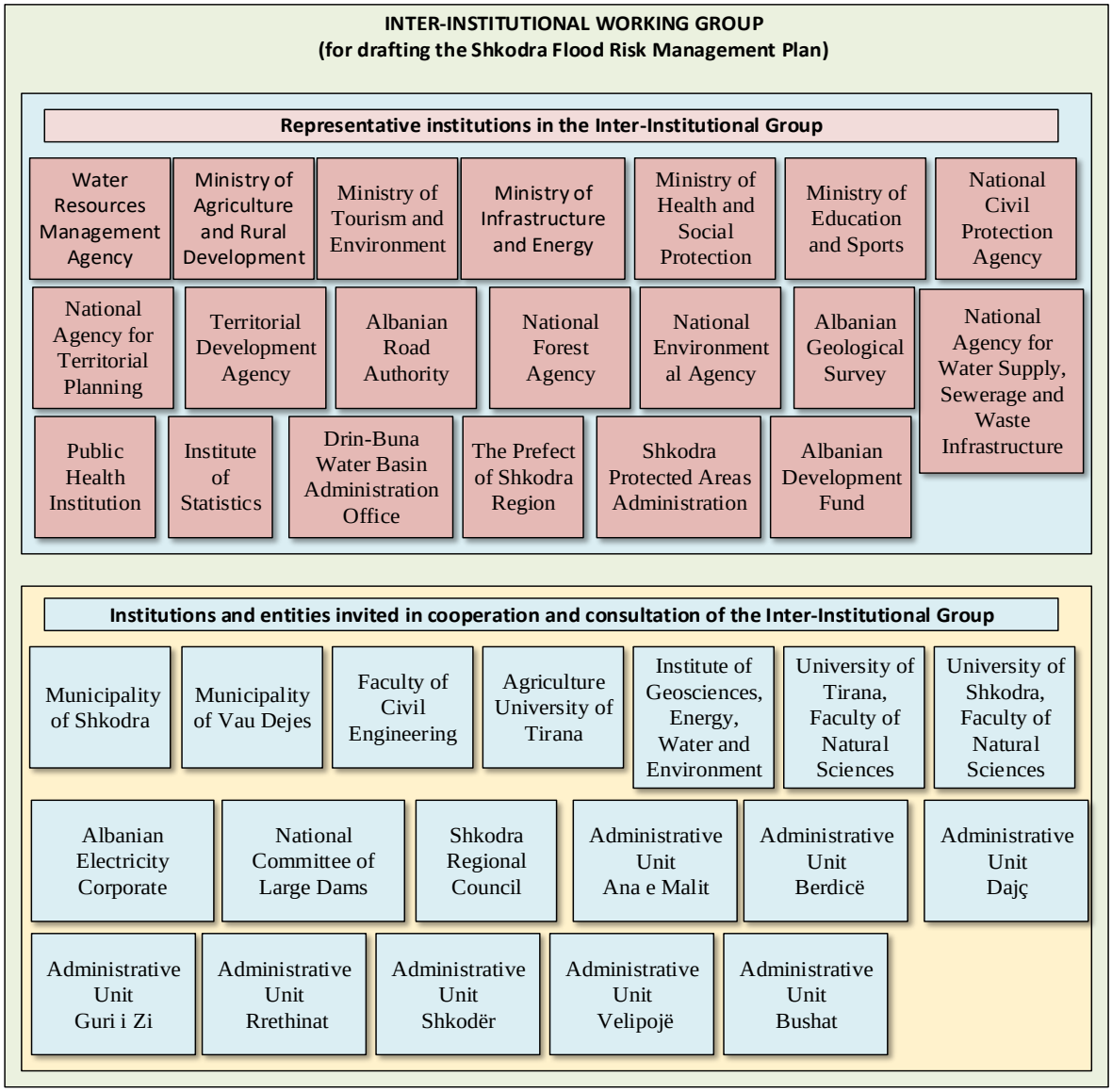


Figure 5: Involved national, regional and local actors of FRM-Plan (Shkodër Region)

The project focuses on the development of a Regional Flood Risk Management Plan for the affected administrative units in and around Shkodër. The plan includes the examination of the administrative units Ana e Malit, Bërdicë, Dajç, Guri i Zi, Rrethina, Shkodër and Velipojë in the Municipality of Shkodër and of Bushat in the Municipality of Vau i Dejës (see chapter 2) for a comprehensive description of the project area).

The process builds up on both the work that has already been done in the past and the contributions of the relevant regional and local administrations and other relevant stakeholders.

Key aspects of stakeholder involvement in the development of the FRM-Plan are:

- The FRM-Plan is guided by the principles of the EU Flood Directive and the DCM No. 1015, date 16/12/2020; both require strong stakeholder driven processes.

- The FRM-Plan includes a catalogue of measures related to the EU's "Types of measures", adjusted to the regional characteristics; the catalogue is a proposal, which has to be filled in and adjusted by local actors and stakeholders.
- The activities include training measures for local government units with focus on risk reduction, prevention of damage and awareness raising;
- The facts and figures used for planning the measures are based on the institutional and practical knowledge of the local and central specialists at each working group, guided and verified at maximum possible extend by the project experts.

1.4 Working steps and methods

Flood risk management plans focus on prevention, protection and preparedness. With a view to giving rivers more space, all relevant actors should consider where possible the maintenance and / or restoration of floodplains, as well as measures to prevent and reduce damage to human health, the environment, cultural heritage and economic activity. Important for a modern approach in FRM is to build on prevention and protection measures that cover the whole Flood Risk Management cycle, from preparation and disaster management to the recovery phase. All potential actors who could contribute to risk mitigation were involved in the FRM-Plan drafting process.

The process comprised:

- Identification of the affected LGUs based on the flood experience, flood hazard and risk maps, assessment and analysis of further planning documents and studies;
- Setting up an inter-institutional working group on FRM including all relevant local, regional and national actors;
- Assessment and discussion on the risk situation, main hot spots and general needs for action for the Shkodër Region together with the local and regional authorities and stakeholders;
- Development and agreement on the appropriate objectives for FRM, processes in the project and single steps including the responsibilities for the steps;
- Development and agreement on the measures to reduce risk, assessment of the implementation status of each measure and agreement on the list of measures in the FRM-Plan, including a common picture of the priorities of the flood risk management measures and further activities for the region and the local communities;
- Drafting the FRM-Plan report, publication of the draft and consultation of the inter-institutional working group (1st draft) and the public (2nd draft);
- Completion of the FRM-Plan 2023 - 2028.

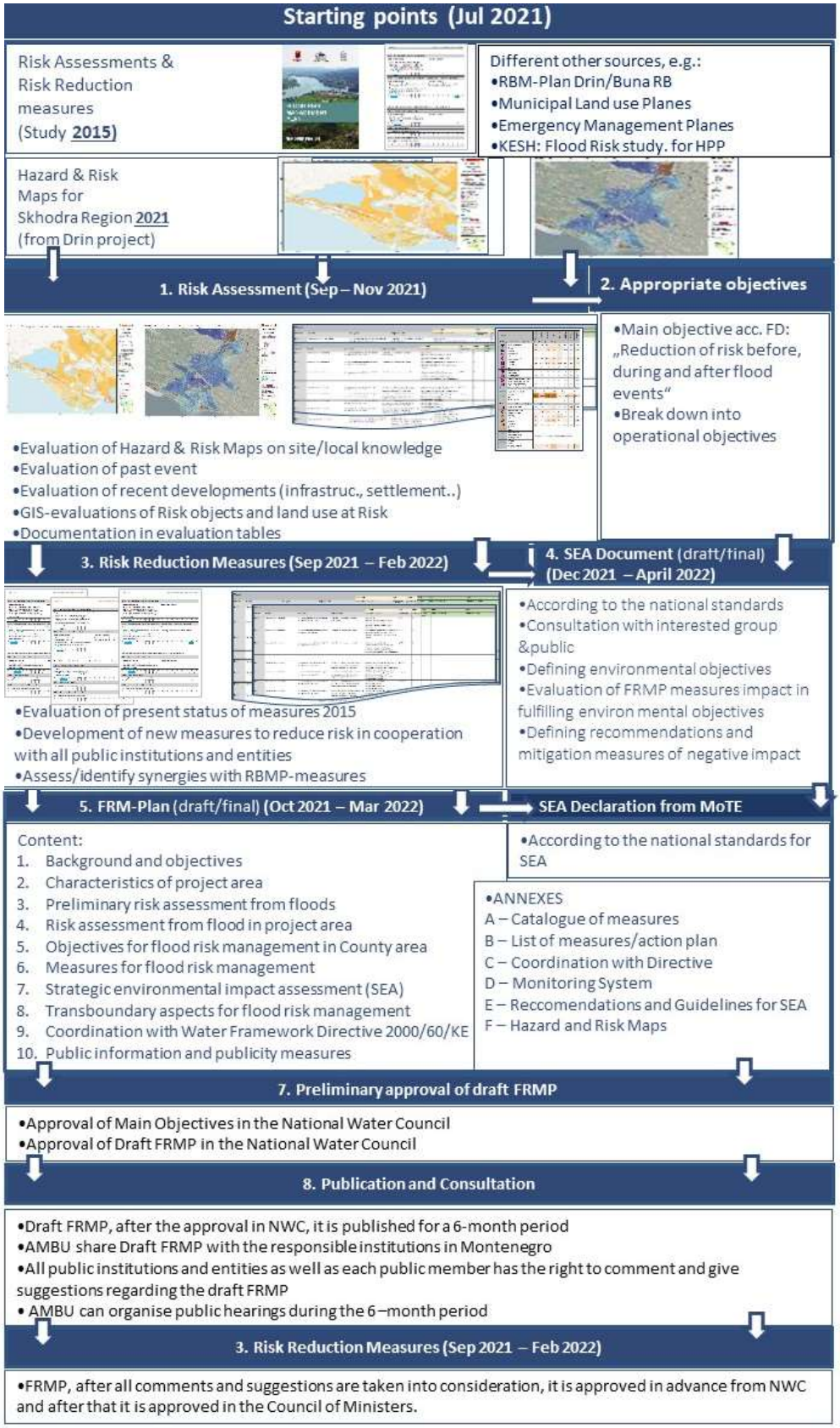


Figure 6: Working steps for the FRM-Plan

The main focus in these tasks was to identify and classify in a participatory process with relevant actors the potential measures and responsibilities for different types of measures. A joint indicative assessment for the measures regarding simple criteria (general impact of measures, bottlenecks for realisation, necessary resources), that is documented in the chapter “priorities”, makes transparent, that many different actors are involved and responsibilities for each measure have to be clearly defined. Not only structural cost intensive measures solve the problems, and many measures can be taken without great efforts within “normal” development planning steps.

Figure 6 gives an overview of the working steps and timeline for the FRM-Plan in Shkodër Region, considering the standards of the EU Flood Directive and according to DCM No. 1015, date 16/12/2020.

Within the first working step flood hazard and flood risk maps of 2021 were analysed regarding the flood extent (hazard maps) and land use as well as objects at risk (risk maps).

According to the EU Flood Directive the risks for objects of the following groups have been assessed and shown in risk maps and in the FRM-Plan (see chapter 4 for details):

- Human health (people, especially elderly people, children and disabled, residential buildings, educational facilities and basic supplies amongst others);
- Environment (protected landscape, birds and wildlife, sensible flora and fauna as well as groundwater quality);
- Cultural heritage (also churches, graveyards);
- Economic activities (businesses, farms, agricultural land).

Risk from following flood scenarios was taken into consideration according to EU Flood Directive: flooding with a statistically

- Frequent return period (short return period, once in < 10 years);
- Medium return period (once in 50 – 100 years);
- Extreme flood or long return period (highest possible flood or once in 200 or 500 years or more).

The assessment of the flood risk situation built on the first two working steps (PFRA and FHRM[7]) and delivered statistical and mapped description of the distribution of risks in the area. Based on the risk assessment appropriate objectives for flood risk management were developed, drafted and adjusted according to the consultation of the working group.

[7] In addition to the updated flood hazard and risk maps (produced in the GIZ CCAWB-Project from 2019-2021 in cooperation with a transnational technical working group from the four riparian countries of the Drin/Buna River Basin) existing information about former flood events were analysed. The assessment of the 2010 events as largest events in the past years - see also FRM Study (2014) and Mott McDonald (2012a) - was included in the analysis. Please refer to Chapter 2.4 for more information on relevant past and ongoing projects in the project area.

In a central working step, the catalogue of measures (which build on the EU Flood Directive) was used as a check list to select and define measures (administrative instruments, protection aspects, technical flood protection aspects, preparedness aspects, see Annex A). The subsequent identification of measures included both the selection and the description of measures and respective responsibilities. Important was the assessment of the status of implementation according to the status categories (from started and ongoing to completed) according to EU reporting nomenclature. Also, priorities were set, based on a joint indicative assessment of the measures regarding simple descriptive criteria (general impact of measures, bottlenecks for realisation, necessary resources, environmental criteria, and social criteria). The priorities of the action plan show:

- which low cost measures may be taken first,
- which additional evaluations may be necessary,
- which actors are mainly in charge and
- for which measures additional funds must be raised.

The last step was the documentation in terms of the final report and supplementary annexes. FRM-Plans are the summary of the risk assessment and the action plans.

According to national law and also according to EU directives a strategic environmental assessment (SEA) is obligatory when setting up an FRM-Plan. Thus, a SEA-document was drafted, published for the consultation of the working group and the public and finally completed.

2 Characteristics of the project area

2.1 Project area within the Drin-Buna River Basin

The project area is located in Northwest Albania at the border to Montenegro. It is characterised by the coastal floodplain of the rivers Drin and Buna, the surrounding mountains - foothills of the Albanian Alps - with heights up to more than 1,700 m (Mali i Cukalit, east of

Shkodër) and Shkodër Lake, a large inland lake which is shared between the two countries Albania and Montenegro. Buna River at the south end of the lake is the only outflow discharging to the Adriatic Sea after joining with Drin River close to the city of Shkodër.

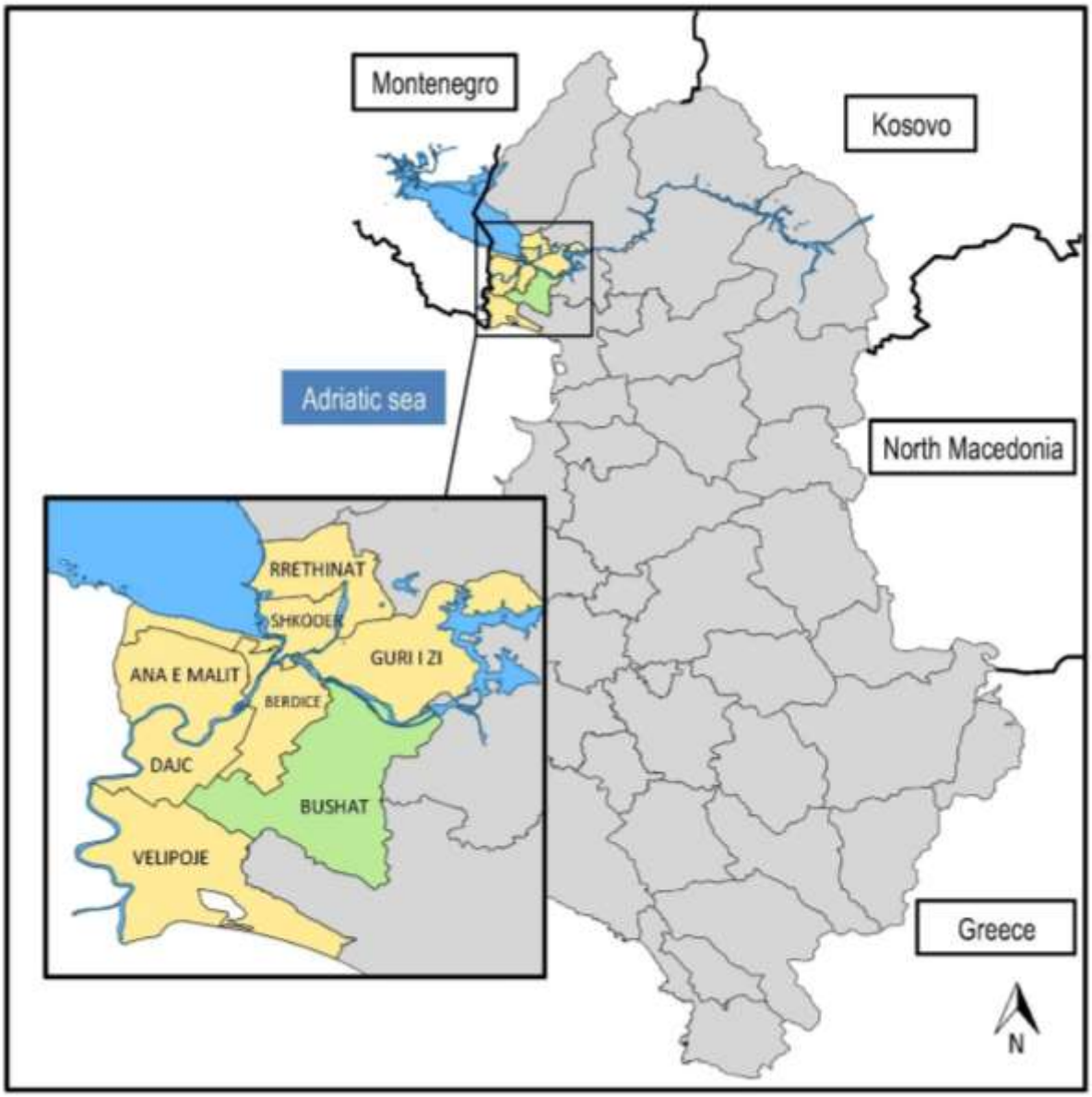


Figure 7: Administrative units of the project area: Municipality of Shkodër (yellow) with 7 LGU and Municipality of Vau i Dejës with 1 LGU in the flood risk area

Floods are frequent during the November-March period, when the region receives about 80-85 percent of its annual precipitation (Bogdani, 2006). This potential risk area in Shkodër Region covers the administrative units of the Municipality of Shkodër Ana e Malit, Bërdicë, Dajç, Guri i Zi, Rrethina, Shkodër and Velipojë and Bushat as the only considered affected administrative units of Municipality of Vau i Dejës, see Figure 8.

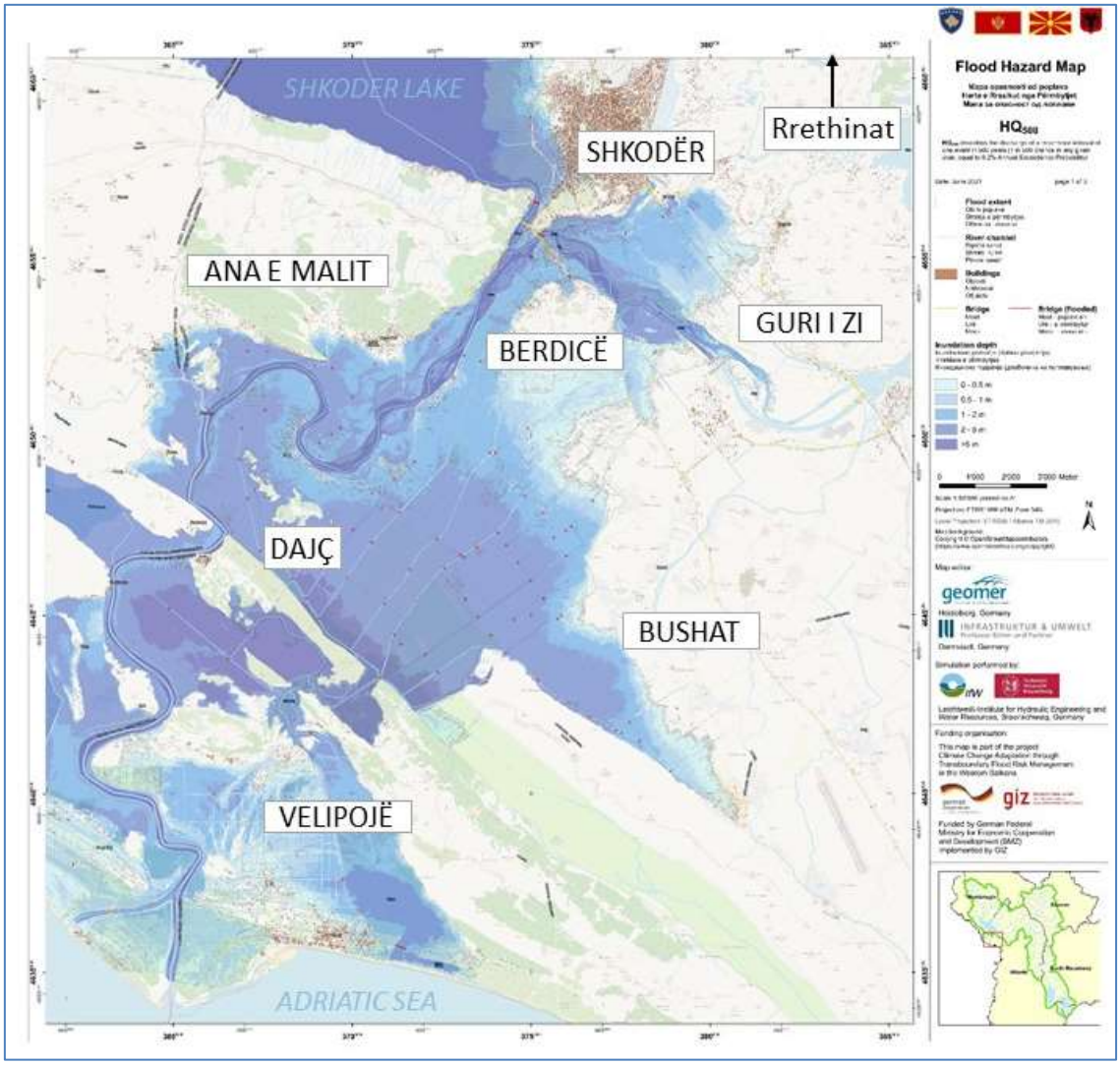


Figure 8: Flood Hazard Map at HQ500 of Shkodër Region with 8 administrative units of the project - confluence of Drin and Buna in the South of Shkodër

The Drin-Buna Lowland is part of the extended trans-boundary Drin with the riparian countries of Albania, Kosovo, North Macedonia, and Montenegro. The total catchment area of the basin is approximately 20,380 km² (LWI, 2014) and it includes the Black Drin, White Drin and Buna River, as well as the Shkodër, Ohrid and Prespa lakes. The Black Drin originates from Lake Ohrid and flows up north crossing the border between Macedonia and Albania. The White Drin rises in Kosovo. The two streams flow into the Fierzë reservoir. From there the Drin River passes the dam cascade of the three reservoirs Fierzë (73 km²), Koman (12 km²) and Vau i Dejës (25 km²) operated by the Albanian power corporation KESH (Korporata Elektroenergjitike Shqiptare). The dams have been constructed till 1975 (lowest dam Vau i Dejës), till 1978 (highest dam Fierzë) and till 1985 (Koman) (LWI, 2014). Hydropower production in the Drin River is highly important to Albania producing about 90 % of the country's electricity. Further downstream the Drin joins the outlet of Shkodër Lake, the Buna River and loses its name.

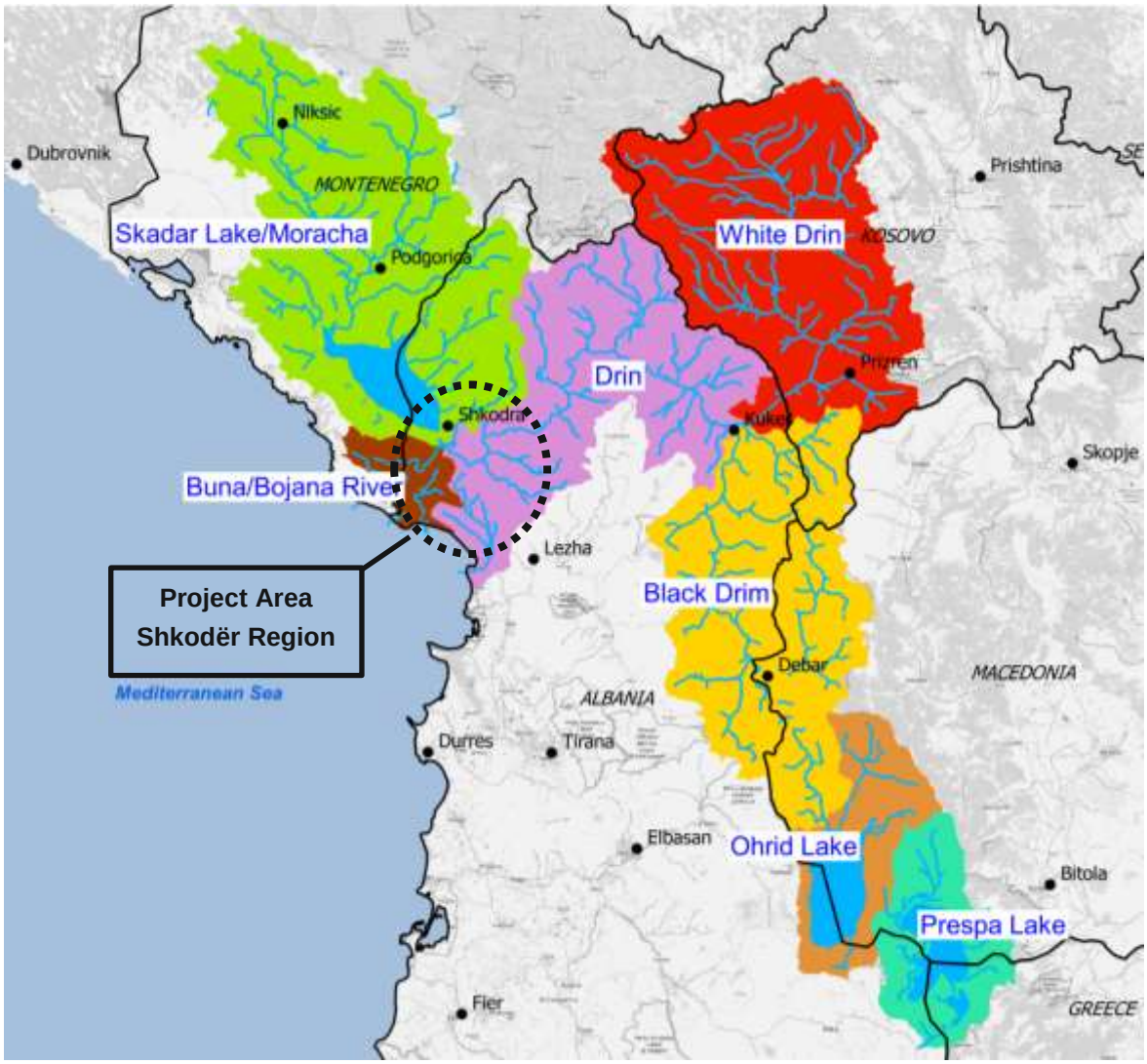


Figure 9: Sub-basins of the Drin-Buna River basin [graphic: INFRASTRUKTUR & UMWELT, based on open-source data]

The Buna River stretches from the outlet of Shkodër Lake to the Adriatic Sea and has a length of 44 km. On the last kilometers - before joining the sea - Buna River runs partly along the border between Montenegro and Albania. The Drin-Buna Lowland represents a very complex water system where rivers, lakes, wetlands and groundwater interact. Besides many natural values, the Drin Basin is important to the economy of riparian countries. The main users of water are energy, agriculture and livestock, water supply and sanitation, mining and industry, environment, fisheries, tourism and transport.

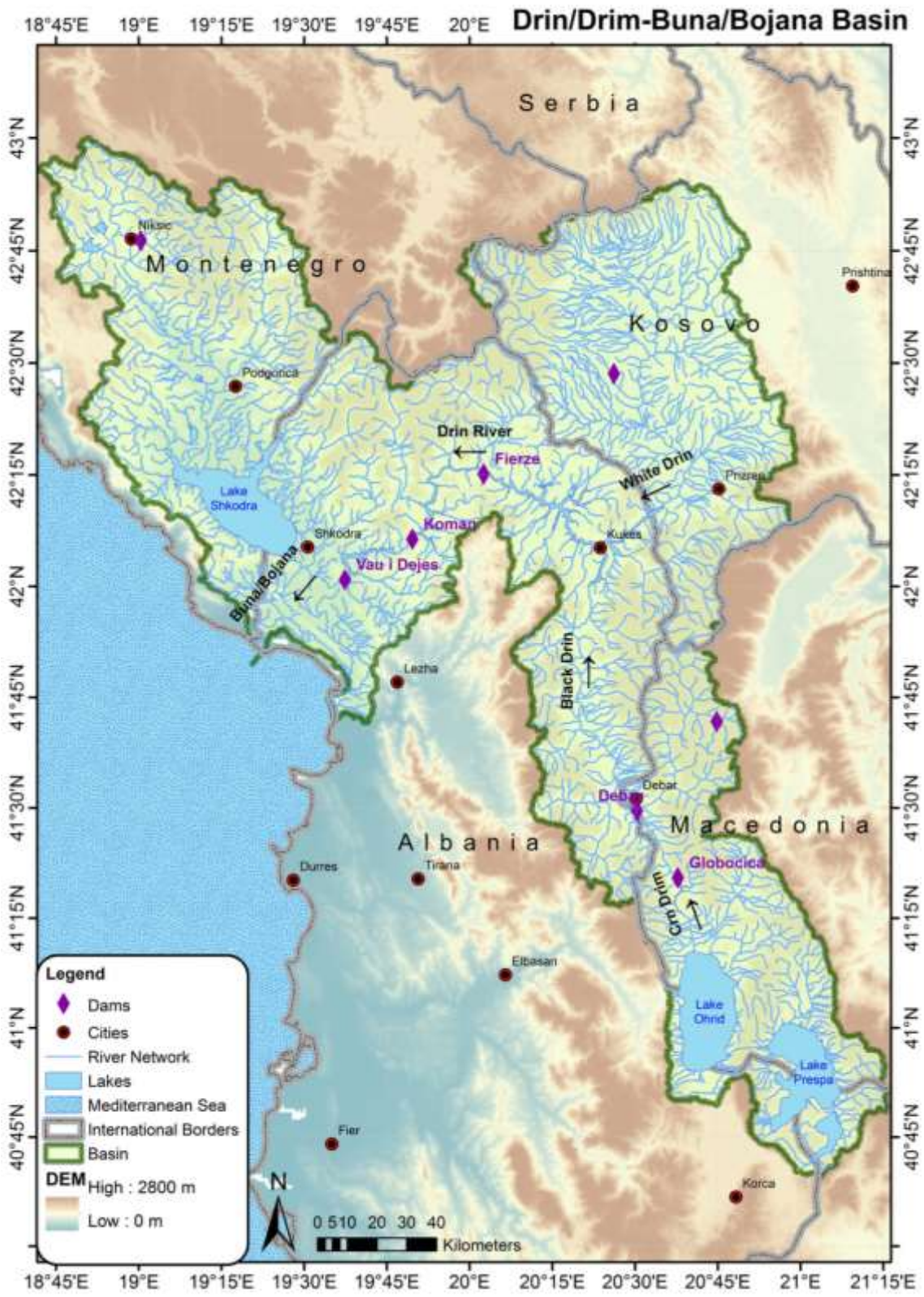


Figure 10: Drin and Buna River Basin – river network (LWI, 2014)

2.2 Climate, hydrology, and origin of floods

Due to the heavy rainfalls in the winter season on the one hand and the limited discharge potential on the other hand, flooding is a regular natural phenomenon in the Drin-Buna Lowland. The whole Drin-Buna catchment is characterised by a mainly Mediterranean climate with up to more than 3,000 mm of average annual precipitation in the mountainous parts of the catchment. Rainfall occurs mainly from November to March and there is a wide variation of the total amount and the spatial dispersion of rain in the different parts of the catchment.

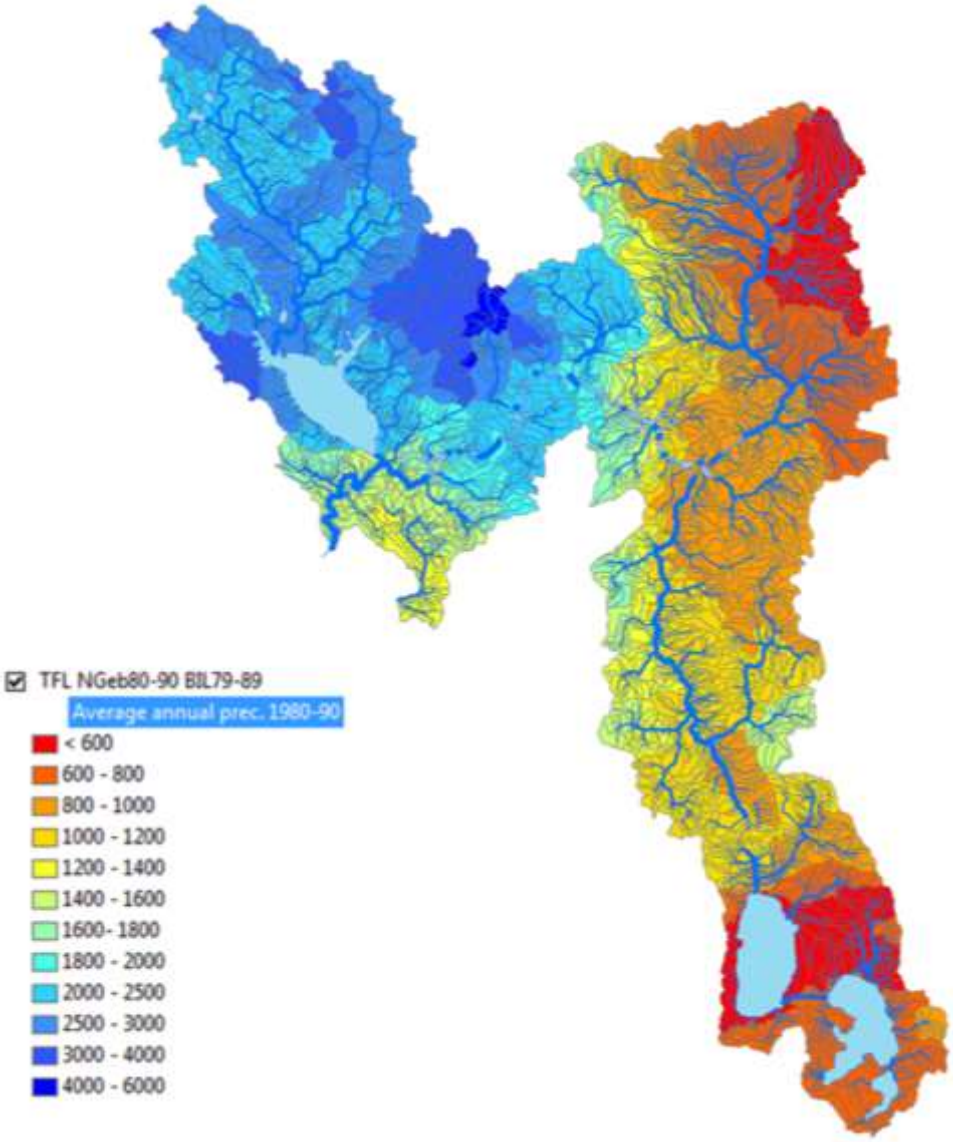


Figure 11: Rainfall map – average annual precipitation 1980-1990 (GIZ[8])

[8] Map prepared through hydrological model prepared for Flood Early Warning System under GIZ CCAWB-project based on precipitation data of National Hydrometeorological Services of Albania, Kosovo, Macedonia and Montenegro

The flood intensity therefore strongly depends on the interference of rainfall pattern in the different parts of the whole catchment. Melting snow in spring is another major contributor to floods. The Drin-Buna Lowland is especially affected by flooding when all tributaries have high loads of water at the same time: Drin and Gjadër River coming from the mountains east and southeast of Shkodër, Kir River coming from northeast and the Buna River which is the only outflow of Shkodër Lake, see Figure 12. Furthermore, the water balance of the Lake Shkodër (377-530 km²), shared by Albania and Montenegro, is highly influenced by the Morača and Zeta Rivers which drain the northern mountain range of the sub-basin Montenegro.

Figure 12: The tributary area in the Drin-Buna Lowland (INFRASTRUKTUR & UMWELT, 2013)

The high risk of flooding in this region originates, beside other impacts of deforestation, cascades, and climate change, from a flow diversion of Drin River in the 19th century. Until 1848 Drin River found its way to the Adriatic Sea passing Bushat, Gramsh (here joined by Gjadër River) and then flowing into the sea near Lezhë. Caused by flood events in 1848, 1858 and 1896 the flow of Drin diverted (REC, 2010). The natural channel shift was later on supported by the construction of canals to use hydropower for mills south of Shkodër and by the partial closure of the former Drin riverbed (Schwarz, 2009). Today, the Drin River mainly discharges via Buna River.

Its old bed is part of the drainage system but without high discharge potential, see Figure 13. According to Miho et al. (2021) the Kune-Vaini wetland complex was affected by the diversion. In their study Miho et al. (2021) the degradation of the ecosystem of the former

Drini of Lezha and the adverse effects on the hydrology and ecology in the whole system (Shkodër-Lezha). They stressed among other measures to consider the revitalization (controlled discharge) of the Drini of Lezha as an ecosystem-based adaptation.

The existing flood protection system in the Shkodër Region dates from the 1960ies and relies on a series of dikes and drainage channels (Mott MacDonald, 2012a). These have been constructed mainly after the catastrophic inundation of the years 1962-63. In this time huge investments have been carried out in the lower part of the rivers Drin and Buna. Although many of the technical flood protection measures have been beneficial during following flood events - like for example that one in winter 1970-71, they also triggered further expansion of settlements in river floodplains, thereby raising the potential for flood damage. This flood prone lowland is a natural retention area but settling and cultivating here was deliberately enforced in the time of the socialist regime when Albania was strongly depending on its own production and every patch of fertile land was used for agricultural purpose.

In the same time the hydropower cascade was realised in order to secure Albanians energy demand. The water flows of Drin have been subject to strong changes after the building of huge dams in the upper course beginning of 1970ies, the excessive gravel exploitation from the area just downstream of the main dam at Vau i Dejës and just recently by the construction of the river power plant in Ashta, see Figure 13. The latter changed the formerly braided river into a so-called ana branching river system thereby changing the watercourses, the sediment household and reducing the typical habitats (Schwarz, 2009).

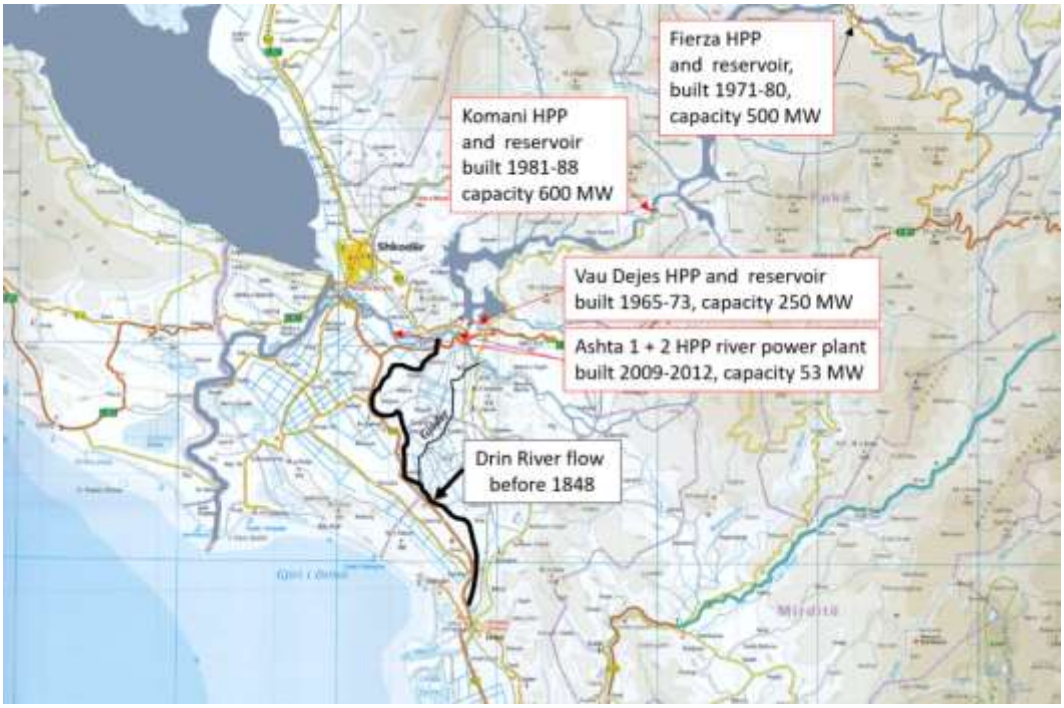


Figure 13: Flow of Drin and Gjadër River before diversion in 1848 and the Drin hydropower cascade including the river power plant Ashta (INFRASTRUKTUR & UMWELT, 2013)

Today, the hydraulic capacity of the actual downstream riverbed and its natural flood plains allow passage of minor floods only. On the first non-diked stretch of 9.5 km after merging with Drin the river Buna has a transport capacity of max. 1,500 m³/s (Mott MacDonald, 2012a). The lower 32 km until the Buna delta are protected by dikes and have a capacity of 2,200 m³/s. The mean annual discharge of Drin-Buna is about 680 m³/s, of which 360 m³/s come from the Drin itself and 320 m³/s from the Buna - from Lake Shkodër (Mott MacDonald, 2011). Medium to larger floods led to severe inundations and flood damage in the past.

Furthermore, along with the natural water courses, the area has been heavily modified by humans for the purpose of reclaiming the lowland by intensive drainage and irrigation. The drainage system itself can be considered as a groundwater management system which is connected with flood management in times of high water levels. The system plays an important role on water flow and pressure release, and it protects land and houses in the entire area from rising ground water. Once the surface of the area is flooded hydraulically the smaller drainage channels themselves have a minor impact on the flow of the surface water. The main channels that lead towards the sea (through Murtemza channel to Viluni Lake) can significantly contribute to increase the discharge from the lowland area into the sea and thus reduce the build-up of flood water within the Trushi field (Mott MacDonald, 2012b).

Table 1 lists some of the main manmade interventions of the Drin-Buna Lowland, see also Mott McDonald, 2012a.

Table 1: Design dike crest levels (Mott MacDonald, 2012a)

River	Location	Design Level
Drin River	Ashta	19.0
	Juban	18.38 - 16.15
	Vukatana	13.7 – 12.25
Buna River	Shirq	8.5
	KK5	7.5
	Belaj	6.5
	Pentar	6.2
	Luarz	5.1
	Rec	4.8
	Pulaj	3.6
Murtemza Collector	Cas	6.5
	Viluni	5.24 - 4.15

This system is composed of dams, dikes, barriers, and large drainage channels. These are mainly located along Buna River, Administrative Unit Bushat and Administrative Unit Velipojë. The most important infrastructure interventions are the dikes in Administrative

Unit Dajç, the primary drainage channels (K1 channels) in Bushat, the Dike of Selmanaj in Velipojë, the Dike of Torovica, the Murtemza Channel in Velipojë and the two dikes of Cas and Viluni.

The ability of this system to function as one interacting system depends much on the maintenance of the channels and other parts of it. It is reported by local responsible and farmers that due to missing maintenance smaller floods cause flooding of fields in some areas. On the other hand, e.g. the construction of a dike at Cas to protect agriculture land south of the Murtemza passage has cut off former retention area and might cause an additional bottleneck.

Moreover, the sea level alteration is another factor that influences the southern part of the Drin-Buna Lowland. The phenomenon of sea erosion is visible alongside the seacoast of the lagoon of Viluni up to the end flow of the Buna River. Along the coast the inroad of the sea is about 2 meters especially close to the delta of the river Buna. Given this progression by the sea, the loss of the coast may be much more dramatic than the average estimates of the last 50 years which place it at 500 meters. One of the factors favouring the advance of the sea toward the land and the intensification of erosion is the blockage of the alluviums that used to come from the River Drin and the construction of hydropower stations over its bed (REC, 2006).

Planned Skavica hydro power plant

If and how the hydrological situation will change when the planned Skavica hydro power plant at the upstream area of the Drin River Basin close to the border to North-Montenegro is completed cannot be assessed yet. It should be expected there no negative impacts on the flood risk will occur due to considering this fact in the planning and operation procedures. The detailed planning for construction started in 2021 with technical investigations, preliminary construction roads and the environmental and social impact assessment. Skavica HPP shall regulate the existing plants in the Drin Cascade and increase the domestic production of electricity by hydropower plants in Albania. According to the published project objectives the reservoir shall contribute to the minimization of floods in the area of Shkodër by optimising the cascade and controlling all flow and discharges during rainfall from autumn to spring.

2.3 Significant floods that have occurred in the past

The Drin-Buna Lowland in the North-western Albanian Region of Shkodër is prone to severe floods which occurred regularly in the past years and might increase in frequency and intensity due to climatic changes in the region (see chapter 2.5). The severe floods in Shkodër Region are the consequence of a combination of human and natural factors. As causes of major floods in the Drin-Buna Lowland several studies therefore list different aspects which in combination may lead to a situation of crisis. These are

as natural factors:

- heavy and long-lasting rainfalls in the winter season often in combination with
- snowmelt in late winter / early spring causing overflow in the rivers of Buna, Drin, Kir and the lake of Shkodër,
- fires that damage vegetation in the catchment area

as human factors:

- increasing vulnerable land use (agriculture, houses and settlements, economic objects etc.) in flood prone areas since 1950,
- structural changes (deforestation, poor land use) in the entire catchment area that lead to quicker and higher discharge in the tributaries of the catchment area,
- the sudden release of huge amounts of water from the hydropower reservoirs, and
- not properly working drainage system in the lowland.

Since some decades severe damage to vegetation cover within the entire catchment area (deforestation, overgrazing, fires, poor land use, etc.) have significant impact on the increasing discharge and flood waves. Natural and men made fires in the whole region cause adverse impacts on the flood situation not in the risk area but in the river basin.

Within the lowland area changes in the land ownership structure (farmland fragmentation) after the 1990's had led to serious damages in the irrigation and drainage schemes which are one of the components of the existing flood protection system. Due to the failure to maintain the systems especially the first and second level drainage channels are not functioning properly (e.g. channels are not cleaned or blocked by illegal building) - the drainage system is in a state of disrepair (Mott MacDonald, 2011).

In the case of flood, the water may stay in the floodplain from only some hours up to several weeks. The first is the case if the inundation is caused by flash floods, when the flooding is generated by heavy rainfall concentrated in a small area. Then the runoff is very high, but the water volume is comparing small. The latter occurs regularly from river flooding, especially during the winter and spring seasons, when the period of rainfall is longer or by snowmelt in the whole river basin. The water level of Lake Shkodër rises during flood season for up to 3 meters.

The latest major floods in January/ December 2010, March 2018 and January-February 2021 resulted in high economic and environmental losses. The damaged area of agricultural products was in total 2,023.5 ha caused by the floods in March 2018. The estimated value of damages was at 303,730,000 Lekë. For the floods in January-February 2021 the estimated damage value is at 801,700,000 Lekë in the administrative units of Ana e Malit, Berdicë, Dajç, Rrethinat and Velipojë.[9]

[9] For more information see http://www.bashkiashkoder.gov.al/web/prvendim_demet_nga_permbytjet_3867.pdf

In the January 2010 flood event, the water load on Buna was approximately 3,600 m³/s (3,000 m³/s coming from the Drin River). This flood was mainly caused by snowmelt in the Drin River basin. Detailed information on the impacts of this event can be found the DREF-report (International Federation of Red Cross and Red Crescent Societies) 2011[10] and Mott MacDonald (2012b).

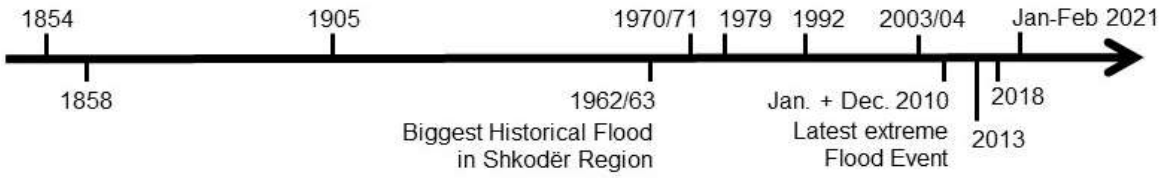


Figure 14: Historic major flood events since 1851[11] [graphic: INFRASTRUKTUR & UMWELT based on Mott MacDonald, 2012a, modified]

Even more dramatic was the flooding in December 2010 when there were heavy rainfalls from the second week in November on until the middle of December. In this period the region of Shkodër received about 900 mm rainfall which is half of the average annual rainfall. The water level of Lake Shkodër reached the maximum historic recorded level and the water load on Buna was higher than 4,000 m³/s. The inundation was one of the biggest remembered in terms of areal extent, depth, and duration (Mott MacDonald, 2011).

The hydroelectric power cascade, consisting of three consecutive reservoirs and dams (Fierza, Komani and Vau i Dejës), serves for hydropower generation. The dam authority aims at keeping high reservoir water levels all over the year. This constellation does not increase the downstream flood risk of natural floods unless high amounts of stored water have to be released either in order to reduce the reservoir water level as a precautionary measure for preparedness of increasing reservoir inflow or if the gates have to be opened because the maximum level is reached like in December 2010.

Inflow through release activities by the Albanian Power Corporation, KESH, in March 2018 was more moderate compared to the uncontrolled and mismanaged discharges in January and December 2010. Compared to the floods of 2010 no severe inundation was caused even though precipitation amount in March 2018 was 54% higher than the rainfall of January 2010, and 10% higher compared to the amount of December 2010. (energjia, 2018)

[10] International Federation of Red Cross and Red Crescent Societies: ALBANIA: SHKODRA FLOODS, 6 June 2011; https://reliefweb.int/sites/reliefweb.int/files/resources/Albania%20MDRAL003dfr.pdf

[11] Based on available data – no further mayor floods documented since 1851

Within the course of the floods in January-February 2021 rainfall for the total of Shkodër Region exceeded 120 mm in 24-hours – a very intensive rainfall that caused severe increase of inflows of Drin-Buna River. The inflows of Drin-Buna and Shkodër Lake were at their maximum level. A periodic field monitoring in the morning of the 13th Jan 2021 evaluated 6.42 m at Dajç, 8.70 m at Lake Shkodër and 7.05 m at Drin river hydrometer. (Bota Sot, 2021) The floods in January-February 2021 lasted 60 days.

2.4 Major actions/investments for flood risk management in the project area

During the last years some significant investments have been recently made in the project area either as a flood preventative or a post-disaster management activity. The following table provides an overview on national investments for flood protection and flood risk management. The comprehensive description of flood risk management measures in chapter 0 also indicates those measures with various implementation statuses according to EU-reporting schemes / CIS-process.

Table 2: Recent significant investments in the project area (selected list)

Item	Administrative Unit	Year of investment	Description of investment
1.	Dajç	2015	Construction of the embankment in Darragjat
2.	Shkodër	2015	Design Study for the construction of Western Bypass Road
3.	Lagjia Nr.1 NjA. Shkoder	2015	Construction of zootechnical water supply – House Mushkaja
4.	Guri i Zi	2015	Reconstruction of the embankment and the connection with the Spathari Bridge
5.	Shkodër	2015	Construction of the Western Bypass Road Lot 1
6.	Shkodër	2015	Construction of the Western Bypass Road Lot 2
7.	Ana e Malit	2015	Reconstruction of 9-year-school in Obot Village
8.	Shkodër	2015	Laboratory equipment for natural science faculty (physics, chemistry, biology) of University of Shkodër
9.	Berdicë	2015	Reconstruction of elementary school in Berdice e Madhe Village
10.	Berdicë	2015	Works in electrical substation for water supply in Trush
11.	Shkodër	2016	Construction of white water sewerage in Kir
12.	Dajc	2015	Repair of Darragjati embankment
13.	Shkodër	2017	Construction of the new building of the Shkodra Judicial District Court
14.	Shkodër	2017	Construction of the new building of the Shkodra Court of Appeal
15.	Ana e Malit	2018	Protection from erosion of Buna River in Oblike Village
16.	Berdicë	2018	Reconstruction of Shkodër-Velipojë Road (segment of the arch of Berdicë, Baks intersection)
17.	Velipojë	2019	Rehabilitation of the Buna River embankment
18.	Shkoder	2019	Investment on Water supply and wastewater
19.	Berdicë	2019	Reconstruction of the Arch of Berdica Road
20.	Shkodër	2019	Reconstruction of the Shiroka Square at lakeshore
21.	Shkodër	2020	Road construction of the Shkodra Western ByPass I
22.	Shkodër	2020	Road construction of the Shkodra Western ByPass II
23.	Shkodër	2020	Road construction of the Shkodra Western ByPass III

International projects / funding projects

This FRM-Plan is one of its first kind being developed in Albania. The development of the FRM-Plan is embedded within the scope of the GIZ programme “Adaptation to Climate Change through Transboundary Flood Risk Management in the Western Balkans” (CCAWB) on behalf of German Federal Ministry for Economic Cooperation and Development. The project beholds of three focal areas, such as the institutional support for national and local stakeholders of the Drin River Basin in Albania, Kosovo, Montenegro, and North Macedonia. The FRM-Plan earmarks the final phase of the ten-year-programme (2012-2021). Next to other important contributions, this project resulted in transboundary cooperation while developing FHRM (available from March 2022).

UNDP’s project “Integrated climate-resilient transboundary flood risk management in the Drin River basin in the Western Balkans (Albania, the Former Yugoslav Republic of Macedonia, Montenegro)” running from 2019 until 2024, financed by the UNDP Adaptation Fund, aims alike at assisting the riparian countries in the implementation of an integrated climate-resilient river basin flood risk management approach.

This would include strengthening of

- Hydrometric monitoring network and flood hazard and risk modelling capacity;
- Enhanced policy and risk financing framework for FRM;
- Climate-proof and cost-effective investment into flood protection and risk reduction measures (structural and non-structural FRM measures);
- Enhanced awareness, response and adaptation capacity of the population including private sector engagement.

Besides, some other important FRM-projects have been implemented in the past worth mentioning with relevance for the Albanian Drin-Buna River Basin:

- “Disaster does not know borders”, a project within IPA CBC Programme Montenegro and Albania, 2014-2020, aiming at improved protection for the people of the target area from hazards, i.a. flood hazard, through capacity building, awareness raising and cross-border cooperation in disaster risk reduction.
- “Comprehensive analysis of disaster risk reduction and management system for agriculture in Albania”, a result within FAO-project “Reducing disaster risk and strengthening resilience of farmers to natural hazards in the Western Balkans”, 2016-2017, that evaluated the legal and institutional framework for risk assessment in Albania in terms of the impact on the agricultural sector. This report underlines some of the recommendations that have been made in the flood risk management study of 2014 (see below).

- The Government of Albania, financially supported by World Bank within the framework of the “Disaster Risk Mitigation and Adaptation Project”, 2008-2013, started a programme of flood management studies and rehabilitation works. In this context several intercepts of flood protection dikes along Buna River have been repaired, raised, and strengthened.
- In a subsequent step a post-disaster comprehensive flood risk assessment and management study was commissioned by World Bank. Main aim of this study “The Flood Risk Management Plan for the Lower Drin & Buna River Basin” which was conducted by the international consultancy Mott McDonald was to show measures for flood protection and reduction of flood damage for the medium and long term. The proposed measures are mainly of technical nature and relate to the improvement of technical flood protection system at various locations in the flood risk area (strengthening and new construction of dikes, drainage channels, pumping stations). But the proposed midterm measures also cover aspects of flood damage reduction (e.g. by adapted building). Further detailed information on technical matters can be obtained in the final report of the study, Mott MacDonald, 2012a.
- Within the GIZ CCAWB-Project a Flood Risk management Study for Shkodër Region (hereafter: FRM Study 2014) has been conducted in 2014. In various stakeholder consultations at local level with expert support a draft on risk assessment and plan of measures have been developed. This FRM-Plan is based on that FRM Study 2014.

2.5 Impacts of climate change in the region

To assess the impacts of climate change in the region, the development of temperature, perception, wind and climate change-induced extreme weather events has been analysed within the Third National Communication of the Republic of Albania on Climate Change (TNC) to the UNFCCC[12]. The result is shown in climate change scenarios[13]. Related to 1990, projections reveal increased annual temperatures, decreasing annual precipitation and a rising sea level.

[12] Albania has ratified the United Nations Framework Convention on Climate Change. With UNDP and GEF support the TNC has been published and submitted to UNFCC in June 2016.

[13] Modelling for temperature and precipitation patterns are based on low resolution (50 km x 50 km).

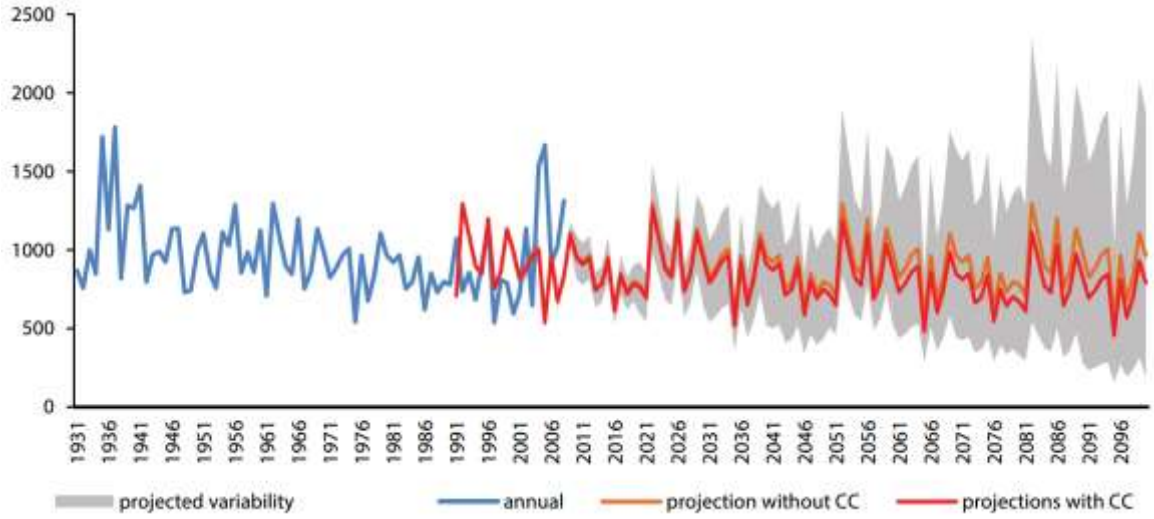


Figure 15: Annual precipitation projections [mm] without and with climate change (average scenario) in the northern coastal region of Albania (TNC, 2016)

According to the projections the annual precipitation will be around 1300 mm for the northern coastal region. Even though a decrease is projected, a high variability is expected as seen in the grey field shown in Figure 15.

Heavy rainfalls can be expected to intensify. Projections show that there will be an increase in hazardous rainfalls for Shkodër Region of about 1-2 days by 2030, about 2-3 days by 2050, 4-5 days by 2100 related to 1990. The 24-hours precipitation projections as seen in the table below result in above threshold values that are considered as dangerous able to cause economic damage. In the projections, levels of the rivers in the upper parts of the basin are expected to rise due to sea level rise exacerbating flood risk where huge amounts of arable land are predicted to become un-usable due to increased salinity. The increased tendency in frequency and intensity of heavy rains could aggravate the vulnerability of Shkodër Region to floods, urging for long-term strategies. (TNC, 2016)

Table 3: Expected 24-hours precipitation in [mm] for different return periods for the northern region of Albania (TNC, 2016, adapted)

	Return period		
	10 years	**50 years**	**100 years**
Precipitation [mm]	158 ± 14	215 ± 21	239 ± 25

Annual temperatures are expected to increase to 15.9°C in the North of Albania. By 2100 the annual temperature is likely to increase up to 17.8°C. This implies the reduction of the amount of snowfall and earlier melting is expected affecting runoff patterns, i. e. reduction in spring and a shift of peak values towards winter months, thus, floods in winter and droughts in summer are becoming more and more present in Albania (TNC, 2016).

2.6 Population, gender distribution, minorities and marginalised groups

Currently, the project area has a total population of ca. 139,000 inhabitants. While the Municipality of Shkodër accounts for ca. 125,000 inhabitants (89.2%), the remainder counts ca. 14,000 inhabitants living in Vau i Dejës Municipality.

Compared on a level of administrative units, Shkodër Administrative Unit is inhabited with more than half of the population of the project area (ca. 77,000 inhabitants). Thereafter, the administrative units of Rrehtinat (15,2%) and Bushat (10,2%) account for the second and third largest population. The smallest administrative units are Ana e Malit and Dajc with around 3,900 inhabitants each (see Table 4).

Table 4: Resident population by sex, age group and administrative unit according to INSTAT census data of 2011

Administrative Unit	Sex and age group						Total Administrative Unit	Percentage of the whole population
	Male			Female				
	0-14	15-64	65+	0-14	15-64	65+		
Municipality of Shkodër								
Ana e Malit	380	1,249	280	372	1,290	287	**3,858**	**≈ 2.8%**
Berdicë	661	1,919	343	593	1,891	366	**5,773**	**≈ 4.2%**
Dajç.	310	1,244	331	285	1,354	361	**3,885**	**≈ 2.8%**
Guri i Zi	946	2,677	444	952	2,567	499	**8,085**	**≈ 5.8%**
Rrethinat	2,870	6,708	1,040	2,632	6,836	1,113	**21,199**	**≈ 15.2%**
Shkodër	7,823	25,072	4,735	7,080	27,034	5,331	**77,075**	**≈ 55.4%**
Velipojë	550	1,662	310	494	1,693	322	**5,031**	**≈ 3.6%**
Municipality of Vau i Dejës								
Bushat	1,473	4,601	983	1,409	4,664	1,019	**14,149**	**≈ 10.2%**
Total (% of whole population)	**15,013 ≈ 10.8%**	**45,132 ≈ 32.5%**	**8,466 ≈ 6.1%**	**13,817 ≈ 10.0%**	**47,329 ≈ 34.0%**	**9,298 ≈ 6.7%**		**139,055 100%**

Table 4 presents the population dissemination by sex and age in the project area. The distribution between male and female residents is generally evenly. According to the age, there is a slight male overweight among young residents up to 14 years of age, while there is a female overweight with increasing age. Over the last few years, the total number of residents has decreased, with a discrete increase in the proportion of female residents.

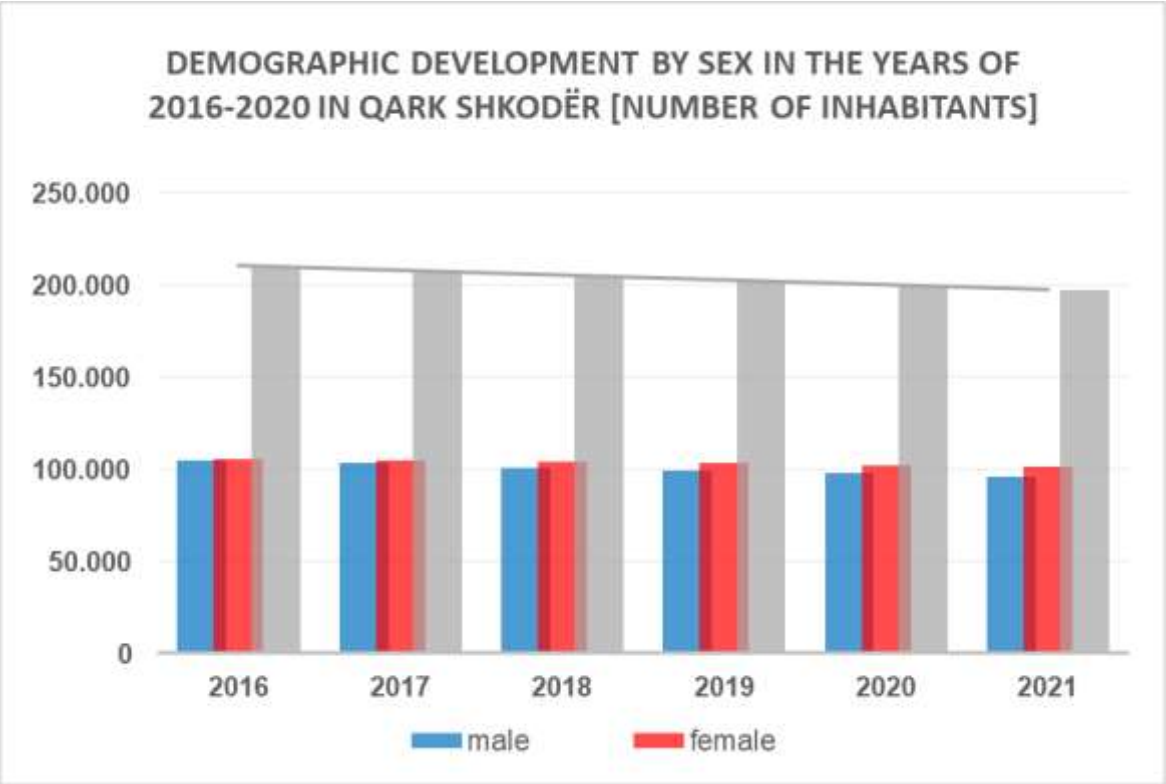


Figure 16: Demographic development by sex based on population on 1st January in the years 2016 to 2021 in Qark Shkodër based on INSTAT data

Within the project area, there is a worth mentioning proportion of minorities and marginalised groups. This involves Roma communities in general and those displaced from the mountainous areas. The acquisition and allocation of these groups are subjected to dynamic and fluctuation-induced forces. Thus, a quantitative risk assessment for these vulnerable groups of people and their homes is very difficult and subject of regular changes.

Currently, there is count of a total of ca. 170 families located around urban area, Lake Shkodër and the Drin River shore. Their main source of income is the collection and trade with reusable or recyclable materials from waste such as metals, paper, cardboard, and plastics next to alms and charity. As mostly informal settlements, these communities are only partially provided with public services as well as risk prevention instruments. They are only rarely included in the public information system. However, about 130 children from these families attend school.

Beside this general information on the population in the project area see chapter 4.4.2 for more information referring to flood risk of the population and these vulnerable groups. Chapter 4.4.2 provides additionally information on affected houses and dwelling of the population.

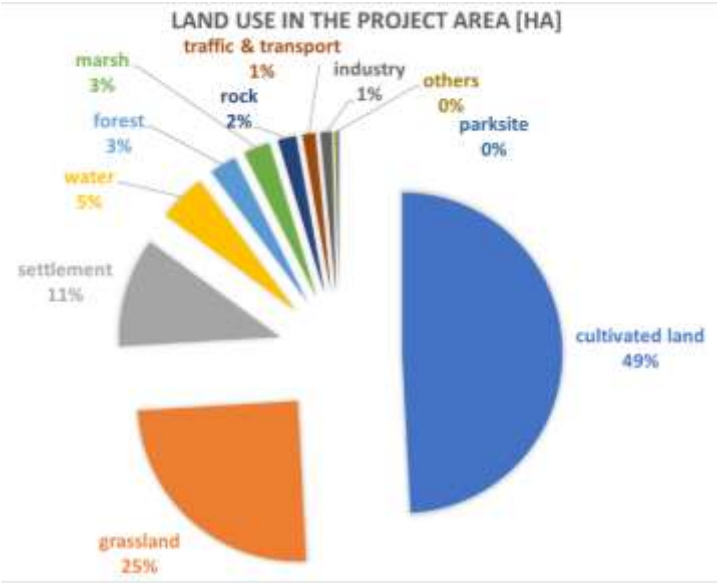
2.7 Land use and economic activities in the project area

The main land use categories in the project area are shown in Table 5 and in the according figure: almost half of the project area (49%) in the Shkodër Region is classified as cultivated land. One forth (25%) is grassland. Little more than 10% is covered by settlement areas. Most of the Rest is water, forest, marsh land and rock. Only 1% of the total area is used for traffic and transport infrastructure and 1% for industrial land use.

Ca. 40 % of the total area is at flood risk. Most of the flood prone area is cultivated land and 25-30% of the settlements and the industrial uses are also at flood risk. For detailed assessments and information on potentially affected land as well as objects at risk see chapter 4.4.1.

Table 5: Total land use in Shkodër Region

Land use class	Area of land use [ha]
cultivated land	22,538
grassland	11,407
settlement	5,055
water	2,204
forest	1,244
marsh	1,221
rock	858
traffic & transport	603
industry	544
others	106
parksite	60
Total	**45,840**



Economic activity in the Shkodër Region is dominated by agriculture, forestry and fishing which is reflected in the numbers of active entrepreneurs and land use data. Land use was analysed based on the European Corinne Land Cover dataset (2012), improved by Copernicus data of the Urban Atlas (2012) and Open Street Map.

Shkodër Region with its vicinity to Lake Shkodër is a popular tourist destination for national as well as international tourists. The arrival of foreign citizens has increased continuously between 2014 and 2021 according to INSTAT (except for a drop in 2020 and the subsequent recovery in 2021 due to the COVID-pandemic). Thus, tourism infrastructure has continuously increased in the surrounding areas of Shkodër and Velipojë – often uncontrolled and unsustainable urbanisation within the flood zone (Miho, 2018).

2.8 Land use and land use changes in the river basin

Since decades, the rivers and streams in the Drin/Buna River Basin and the land use in their catchment areas have repeatedly been subject to general changes caused by cultivation, settlements, construction of infrastructure and deforestation as well as consequent erosion. Since both the land surface and the river systems of large parts of the river basin have been exposed to far-reaching interventions in the past, these changes in the catchments are parts of the causes of extreme events and impacts of human responsibility. River training (straitening), surface sealing, intensive agricultural land use, consolidation of farmland and damages to forests (as well as clear cutting) are just a few examples. Consequences of these anthropogenic interventions in the landscape on the runoff situation and the flood risk have been subject of research but can only be estimated. Due to the diversity of the processes involved and their interactions, there are only estimates of how much the flood situation has changed as a result these impacts and by these interferences. However, it can be stated, that the changes of land use and treatment of soil and tributaries can have significant impacts on changes in the water balances and run-off situation in the catchment. Thus, decreasing retention facilities at streams and the surface of the catchment, caused by changing land use, soil, erosion and deforestation are part of the wider flood risk management in the river basin.

Table 6 and Figure 17 show the land use of the Drin-Buna River Basin according to the evaluation results of the Corinne Land Cover data and Copernicus data 2016.

Table 6: Land use in the Drin/Drim-Buna/Bojana River Basin (generated from CLC 2012 and Copernicus 2016)

Land use	Total		Macedonia		Kosovo		Albania		Montenegro	
	km²	%	km²	%	km²	%	km²	%	km²	%
Urban fabric	351,5	1,0%	32,7	1,0%	103,9	2,3%	115,2	1,5%	99,7	2,2%
Industrial areas	36,5	0,08%	2,6	0,08%	21,6	0,47%	2,5	0,03%	9,8	0,21%
Transport infrastructure	9,8	0,02%	0,7	0,02%	4,4	0,10%	2,9	0,04%	1,8	0,04%
Other urban land uses	15,8	0,1%	1,7	0,1%	7,5	0,2%	0,7	0,01%	5,9	0,1%
Agriculture	4.718,9	16,9%	554,5	16,9%	717,2	15,6%	1.466,2	18,7%	1.981,0	42,7%
Forests	6.728,9	38,4%	1.258,8	38,4%	1.665,6	36,1%	2.263,4	28,8%	1.541,2	33,2%
Non-forest vegetation	5.958,4	28,8%	944,7	28,8%	1.248,8	27,1%	2.866,6	36,5%	898,2	19,4%
Water bodies	1.316,9	14,0%	458,4	14,0%	409,2	8,9%	430,8	5,5%	18,5	0,4%
Other	1.231,7	0,7%	21,9	0,7%	431,0	9,4%	698,8	8,9%	80,0	1,7%
Total	**20.368,5**	**100,0%**	**3.276,0**	**100,0%**	**4.609,2**	**100,0%**	**7.847,1**	**100,0%**	**4.636,1**	**100,0%**

The land use in the sub-basin of Drin-Buna River Basin in Albania is mainly characterized by semi natural areas (natural grassland, sclerophyllous vegetation, transitional woodland-shrub and sparsely vegetated areas). Ca. 29% of the region is forest (mainly broad-leaved forest). Cultivation focuses on the Buna/Bojana Basin and the region of Lake Shkodër.

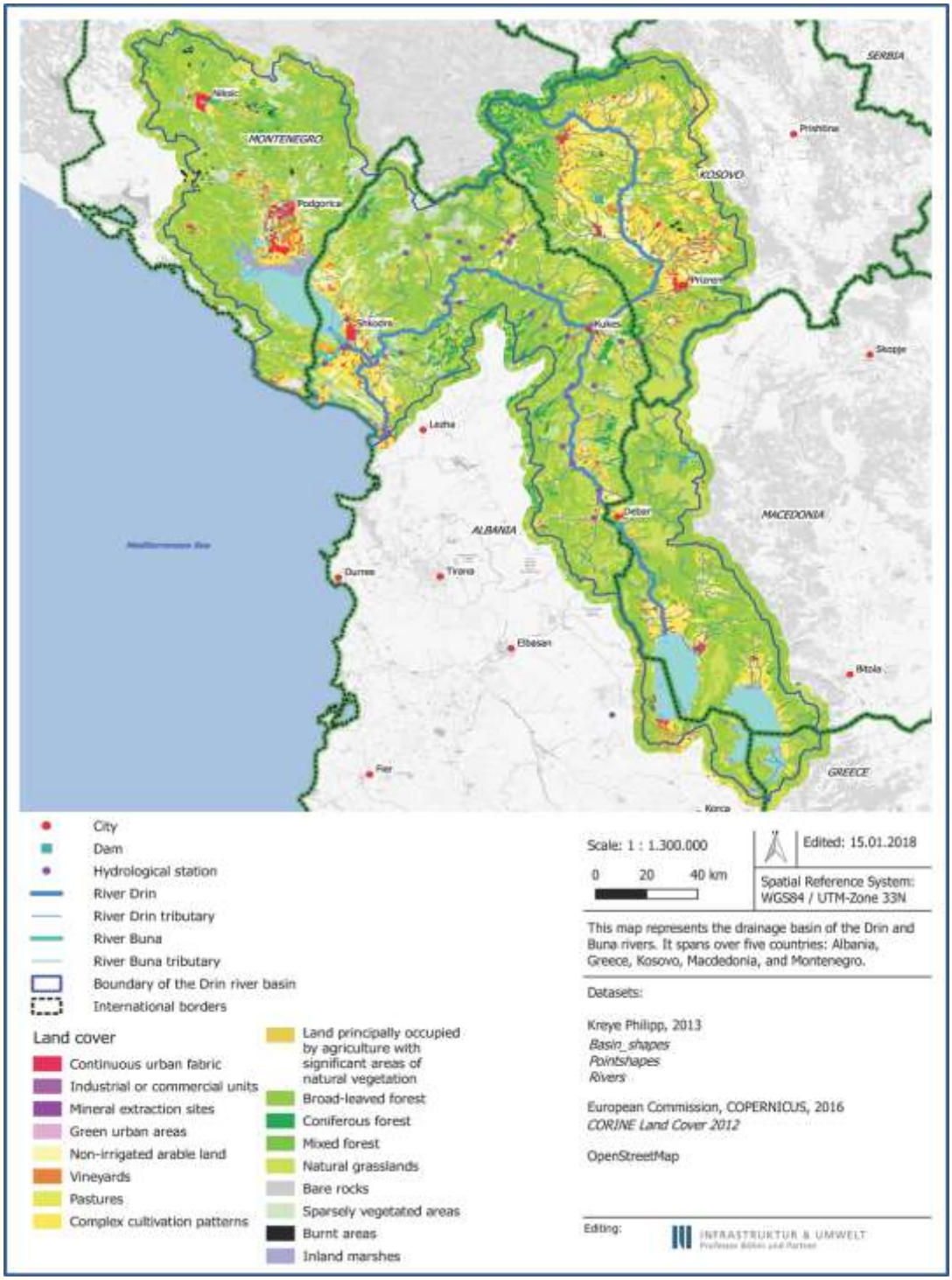


Figure 17: Land use map of the Drin-Buna River Basin [graphic: INFRASTRUKTUR & UMWELT based on EU-Copernicus and CORINE open-source data]

Although forests are the largest land cover within the Drin-Buna River Basin in 2016, there are two main trends when it comes to forest land change in the region: “deforestation and degradation in some areas (caused by intensive/uncontrolled use, as well as urbanization) and land abandonment in others (forests re-gaining ground). Historical observations with CORINE show that the net result is a minimal change in forest cover in the basin between

2006 and 2012 (-0.5%), and national statistics indicate increasing forest areas during the period 2005-2015. […] When it comes to forest stocks, country statistics report different trends: stable in North Macedonia, increasing in Montenegro and in Kosovo (according to a recent inventory report, and decreasing in Albania." (GWP 2020, Thematic report on the resource nexus)[14].

There is historical and scientific evidence that land use change in the Drin-Buna River Basin directly affects negative changes of the earth's crust and the soil, which cause erosion, and consequently become an important cause of strong and alluvial-borne torrents. This potentially causes flash floods primarily in the smaller catchments of the tributaries but can also have accumulation effects towards the project area of Shkodër Region.

2.9 Spatial Planning in the riparian area of the Drin-Buna River Basin

Spatial planning is an important instrument for flood protection and prevention. Focusing on flood risk management there are mainly four requirements which need to be considered when drafting development plans:

- Keep clear of drainage system: Long-term surface protection for retention areas; no constructions in areas that are necessary for the discharge;
- Risk reduction: Development of construction areas is in line with flood risk (inside and outside of main flood plains)
- Flood risk management infrastructure: Consideration in regional/urban planning procedures; protection of land for building these infrastructures
- Retention in the catchment: Regulation of land use and sealing, protection of retention areas

Therefore, when organising the region's land use and spatial development, information and data provided by flood hazard and risk maps should be applied as they have not only an implication on planning for flood adaptation and management but also on integrated territorial planning.

Albanian spatial planning is based on Law No. 107/2014 "On Planning and Territorial Development" amended with the following:

- Law No. 73/2015 "On some additions and amendments to the Law No. 107/2014"
- Law No. 28/2017 "On some additions and amendments to the Law No. 107/2014"
- Law No. 42/2019 "On some additions and amendments to the Law No. 107/2014"
- Law No. 119/2020 "On some additions and amendments to the Law No. 107/2014".

[14] Global Water Partnership (GWP), Convention on the Protection and Use of Transboundary: Working Group on Integrated Water Resources Management Thematic report on the resource nexus (Phase I of the water-food-energy-ecosystems nexus assessment of the Drin basin), Geneva 2020 (page 23)

The Decision of the Council of Ministers DCM No. 686, dated 22/11/2017 “On the Approval of the Regulation of Territorial Planning” as amended complements the regulatory framework on spatial planning in the Republic of Albania.

Figure 18 gives an overview on the spatial planning system on national and local level. On all levels, spatial planning is coordinated and supported by the National Territorial Planning Agency (NTPA). NTPA is the central level institution according to Law No. 107/2014 “On Planning and Territorial Development”. NTPA coordinates the planning documents on local and central level to assure that General Local Plans (GLPs) are in line with other sectorial plans, such as the FRM-Plan. NTPA provides the inter-institutional coordination including WRMA and others. Every type of sectorial plan drafted or approved by any other ministry or agency should fall in line with Law No. 107/2014.

The obligatory content for each type of territorial plans from national to local level is regulated by the Decision of the Council of Ministers DCM No. 686, date 22/11/2017, “On the Approval of the Regulation of Territorial Planning”. According to this DCM No. 686 Article 26 (3c), the Environmental Protection Plan includes:

- Landscape protection forecasts;
- Forecasts for improving water quality and for protection of water bodies;
- Forecasts for improving air quality;
- Forecasts for the addition and / or expansion of green spaces and
- Forecasts for solving environmental problems and identified spots, as the case may be.

Specifications to flood risk management are found directly in the General Local Plan of Shkodër Municipality (GLP Shkodër, 2017). The GLP for Shkodër Municipality foresees five strategic objectives where one of them particularly determines environmental protection and the ability to adapt, protect and recover from natural hazards as focal point of the municipality’s development in the coming years.

The threat by natural hazards like floods, erosions and landslides is acknowledged. Like that, eight different strategic programmes aim at the maintenance and improvement of existing protection structures against natural hazards to achieve the strategic objective. These programmes are as follows:

- OS5PS1 Strategic Program: Environmental Protection
- OS5PS2 Strategic Program: Flood Protection
- OS5PS3 Strategic Program: Improving Urban Waste Management Service
- OS5PS4 Strategic Program: Protection of aquifers from pollution
- OS5PS5 Strategic Program: Flood Risk Management Centre
- OS5PS6 Strategic Program: Natural Risk Management

- OS5PS7 Strategic Program: Forest and Pasture Management
- OS5PS8 Strategic Program: Climate Change

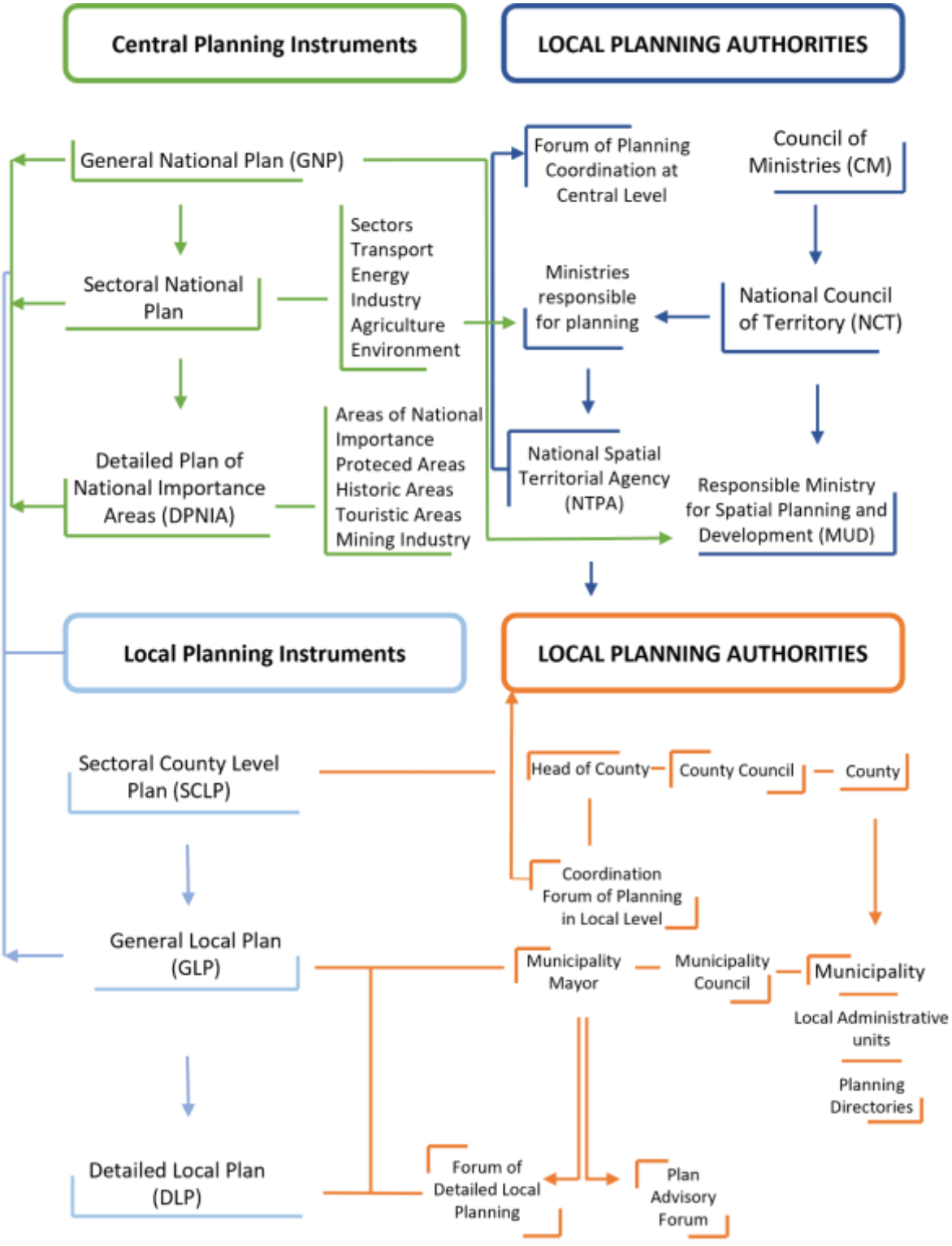


Figure 18: Albanian spatial planning system on national and local level (GNP, 2016)

The GLP Shkodër (2017) identifies two main objects that obviously facilitate adverse impacts from floods. These are on the one hand the new bridge at Buna River connecting the national road SH1 from Shkodër City to Velipojë with the national road SH41 to the Montenegrin border which represents an important transnational interconnection point; and on the other hand, the hydrotechnical construction as the western bypass of Shkodër, which was actually initiated to protect Shkodër City from floods (p. 90-91). As seen in the picture below, there is no flood protection from the bypass apparent.

Figure 19: View on the Western Bypass (under construction) of Shkodër City [photo: INFRASTRUKTUR & UMWELT]

Figure 20: View on the New Bridge connecting SH1 and SH41 to the Montenegrin Border [photo: INFRASTRUKTUR & UMWELT]

From this point of departure, the GLP identifies precautionary flood-related measures to be considered (p. 93):

- Consultation of engineering experts for the evaluation of the two constructions (New Bridge at Buna River and Western Bypass of Shkodër) to mitigate adverse effects that come from those in case of flooding

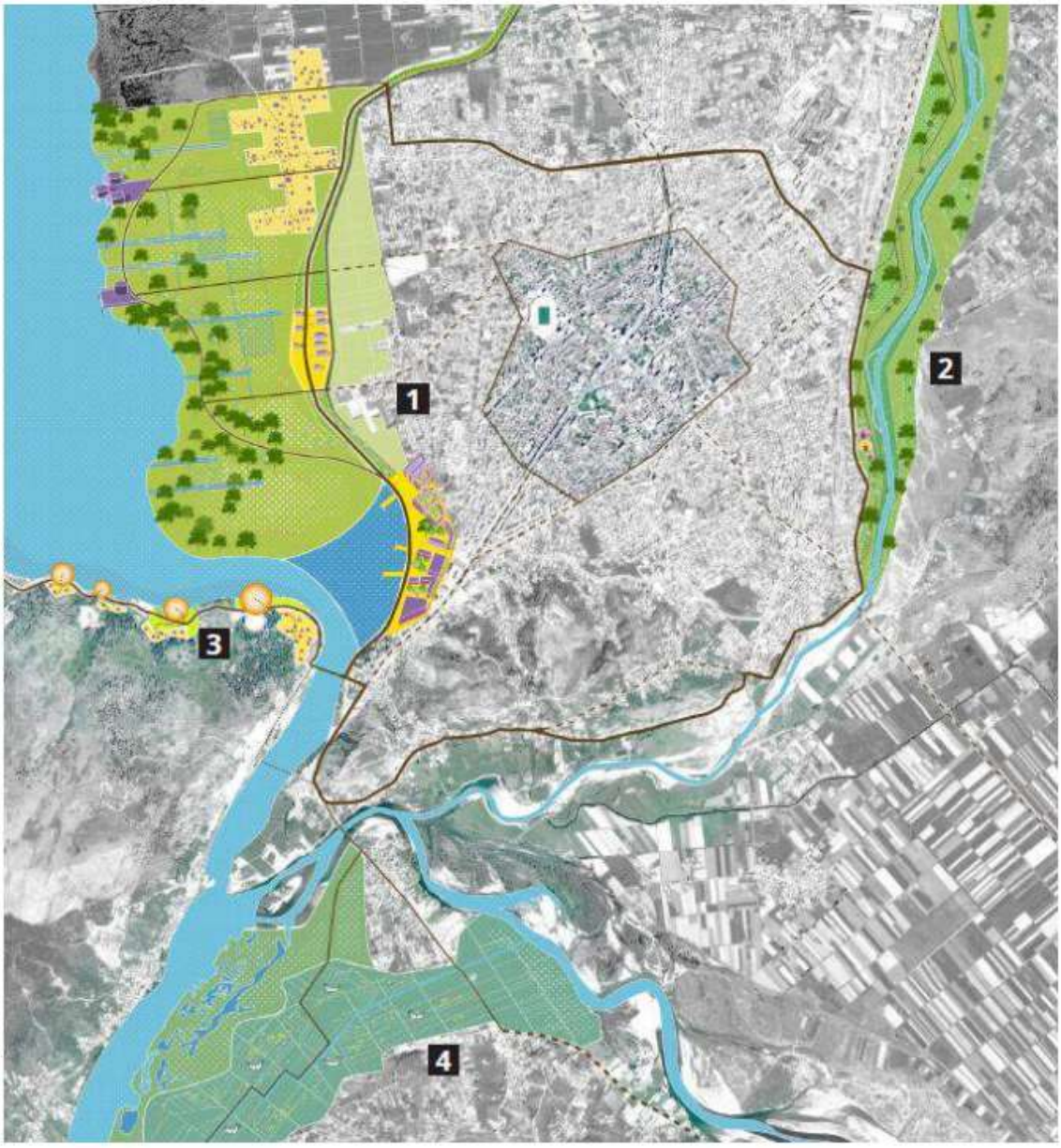


Figure 21: Location of potential landscape intervention areas (GLP Shkodër, 2017, p. 59)

Particularly for the sub-urban areas south of Shkodër the GLP Shkodër (2017) defines the following constructional concept to be relevant (p. 93-94):

- Raising of the level of the ground floor in accordance with the relevant regulations to guarantee accessibility
- Increasing greening of areas that can be used as retention areas in case of flooding
- Appropriate landscaping to retain and infiltrate precipitation water in decentral retention area or to direct flood waters to designated flood retention areas
- Enclosure of premises to protect buildings, e.g. impermeable boundary walls.

Additionally, the GLP Shkodër (2017) sets aside for landscape interventions (Figure 21) that include the strategic interconnection of the borders of Shkodër City with the relevant water bodies of the region, Lake Shkodër, Drin and Buna River in particular. Four areas have been identified to benefit from a transforming into multifunctional water landscapes (p. 58):

- Dam area of the western bypass
- River landscape
- Lakeshore
- Area subjected to flooding.

2.10 Protected areas

The entire project area within the Buna River Delta is recognised as a protected area both nationally and internationally. It is also a trans-boundary protected area shared with Montenegro. The Buna Delta together with Shkodër Lake is an internationally recognised Ramsar site designated in 2006. The Ramsar designation specifically alludes to the Buna River, wet woodland, freshwater marshes, and wet pastures. The principal threats to the site listed in the Ramsar citation include land reclamation through drainage, development for agriculture and changes in water regime. Plant species cited in the Ramsar designation include twelve endangered species, twelve vulnerable species and ten rare species. It also supports 36 globally threatened animal species. Domni Marsh adjacent to the Murtemza Collector is also recognised internationally as an important bird area (Mott MacDonald, 2012a). The Biodiversity Protection Plan of Shkodër Municipality (2017) emphasises through its approval by the Municipal Council, the obligatory sustainable use of areas designated as protected areas for the sake of the preservation of biodiversity.

Law No. 81/2017 “On Protected Areas” applies six protected area management categories for the protection of habitats or species in alignment with the International Union for Conservation of Nature (IUCN). For the entire area around Buna Delta and Lake Shkodër Category III, IV and V apply (RBMP, 2019):

- **Category IV Managed Natural Reserve/ Natural Park:** Liqeni i Shkodres (26,535.00 ha)
- **Category V Protected landscape:** Lumi Buna – Velipojë (23,027.00 ha)

Lake Shkodër as a 'Natural Managed Reservation / Area of Management for Habitats and Species of Category IV has been approved by the Decision of Council of Ministers DCM No. 684 in 02.11.2005, whereas the area around the Buna Delta (Lumi Buna – Velipojë) as a 'protected landscape' of Category V has been approved by DCM No. 682 in 02.11.2005.

Article 9 of Law No. 81/2017 defines objectives to all environmentally protected areas within the law. Article 9e declares for example the prevention of any "change of the natural state of water reservations, resources, lakes and wetland systems".

Such status makes compulsory the EIA for every intervention in the area, in both planning and investments. Especially this impacts the planning for the maintenance and flood protection measures in Buna River, which falls under stricter protection rules.

The situation of protected areas under EU-WFD for the Drin-Buna River Basin includes not only the aforementioned areas designated for the protection of habitats or species but likewise the following:

- **Sanitary Protected Areas:** Currently, wells used for abstraction of drinking water by water supply companies and private wells are not registered as sanitary protection areas for drinking water. This applies to some wells in the project area such as the wells in Trush/Velipojë, Badica Zogaj, Badica Zues and in Oblikë. (RBMP, 2019)
- **Areas designated for the protection of economically significant aquatic species:** The responsible authority is MARD which has not declared protected fishing areas but has established two areas of co-management to guarantee sustainable use of fishing resources and protect aquatic biodiversity, namely Lake Shkodër and Buna River next to Ohrid Lake (Ohrid Lake is not within the project area). (RBMP, 2019)
- **Bodies of water designated as recreational and bathing waters:** The declaration of areas for the sake of bathing is a task of Local Government, Ministry of Health and Social Protection and National Environment Agency, also the management of the area is in their responsibility. In the Drini-Buna River Basin District, the main bathing areas are the Beach of Velipojë and the Beach of Shengjin (Shengjin Beach is not in the project area) and Shiroka Beach (Shiroka-Zogaj) (RBMP, 2019).

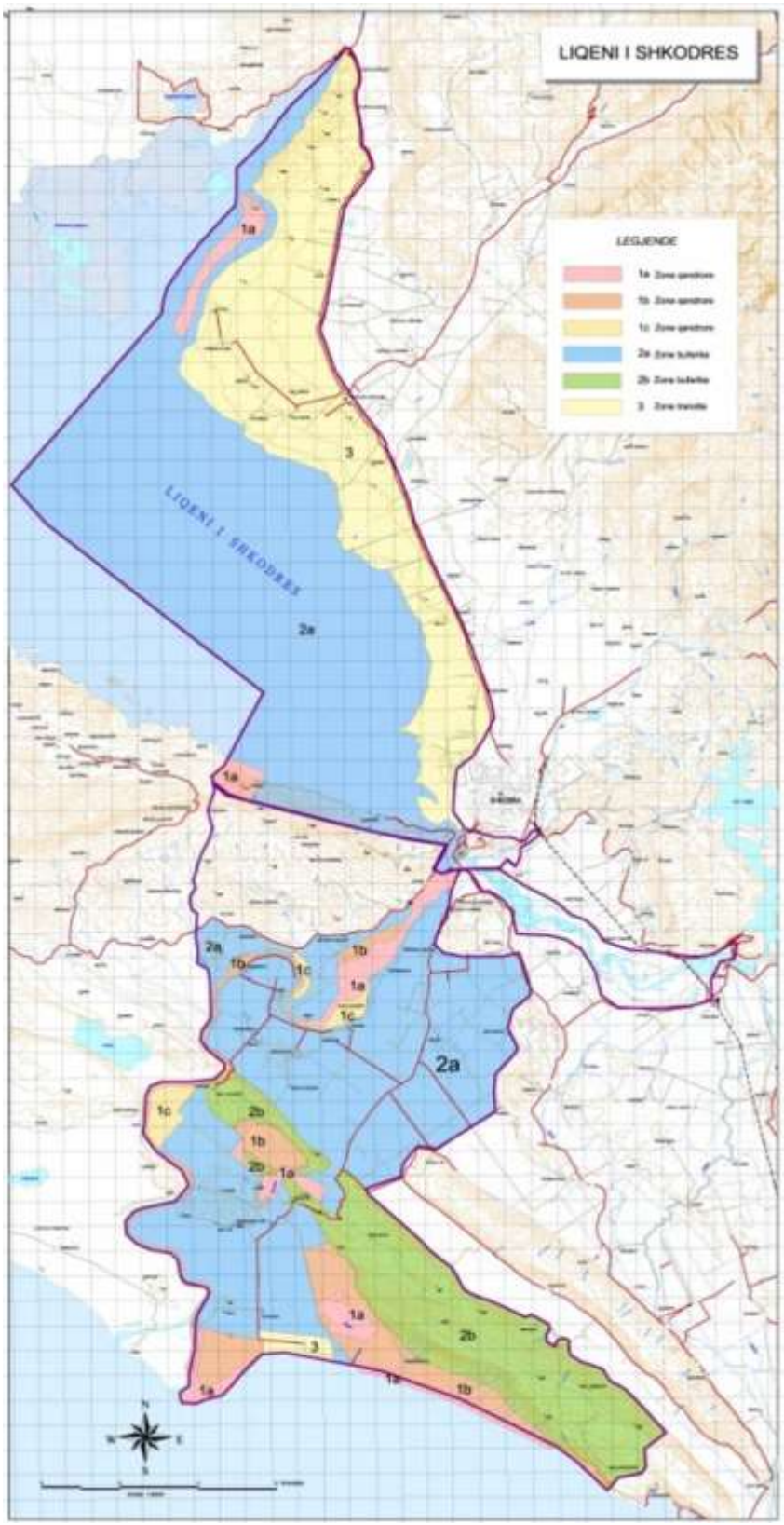


Figure 22: Map of the protected area in the project area (MoE, 2005)

Albania has not transposed the EU Nitrate Directive (91/676/EEC). Albanian law instead refers to the Law No. 9244/2004 “On the Protection of Agricultural Land” and Law No.

111/2012 “On Integrated Water Resources Management”. The former aims at the protection of water resources from agricultural inputs, whereas the latter defines institutional responsibilities such as WRMA being in charge for the protection of water resources from agricultural pollution. (RBMP, 2019)

3 Preliminary flood risk assessment

3.1 Methodology

Generally, the identification of areas at potential significant flood risk (APSFR) follows three main working steps, which are in line with processes for EU member states:

1. Determination of the initial river network: the river network is generated from the digital elevation models (DEM) of the river basin, and by validation with existing river network-data (only existing for some parts). In addition, a validation with Open Street Map (OSM) data and with satellite images ensured the correctness. The whole relevant river network is processed in one GIS project and validated to be used for the further filtering process.

2. Determination of the river network that might have flood risk (filtering out not relevant river stretches according to negative criteria like size of the catchment, length of the stretch or characteristics of the riverbanks or flood plains (very steep or canyons, only 100 % rural land uses). Here the threshold for the relevant catchment area was determined in an iteration using 50 km², 30 km², 20 km² and 10 km². The results show that for the characteristics of the Drin-Buna River Basin 50 and 30 km² reduce the network too much so that past river flood events would not be covered. The threshold of 10 km² results in a river network including many stretches which are dry for most of the year. In that way, 20 km² were determined as adequate threshold for relevant river stretches. Nevertheless, smaller river sections were evaluated. All flooding along river stretches with catchments < 20 km² the flood event can be defined as flash flooding or heavy rain event, while > 20 km² is defined as river floods.

3. Assessment of the remaining river network in terms of potentially affected assets at risk (for economic, human life, cultural heritage, and environment), land uses or risk of pollution in case of floods and comparison with agreed significance criteria. The results are river stretches at potential risk, named: “areas potential significant risk” (APSFR).

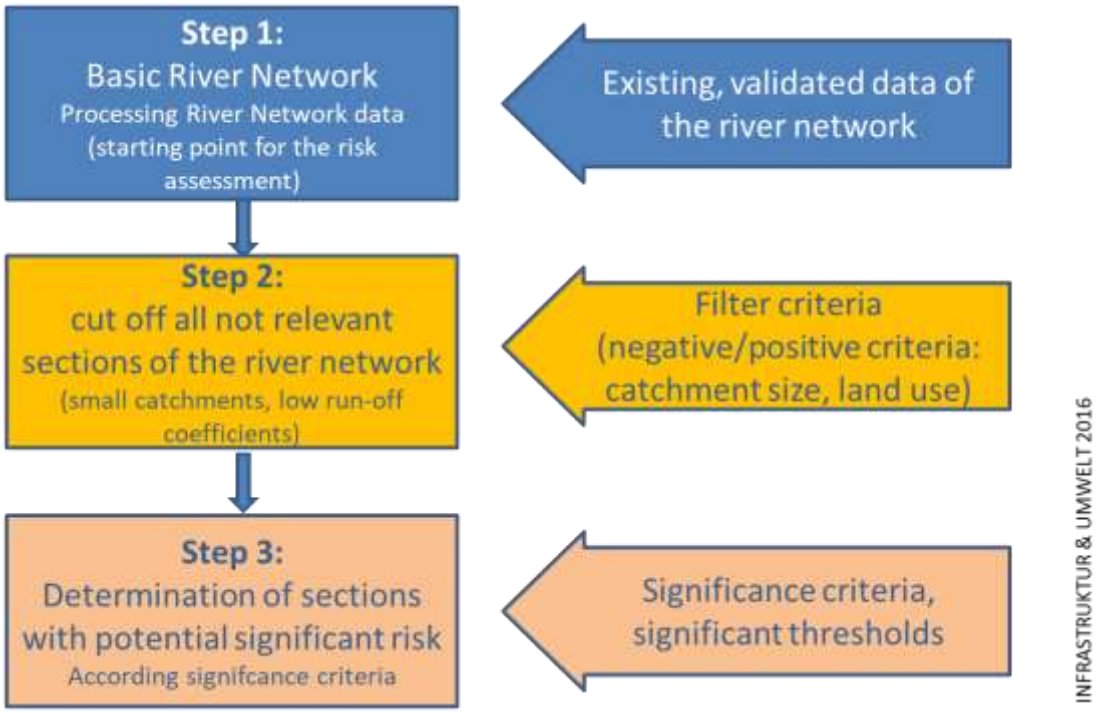


Figure 23: Work steps of the preliminary flood risk assessment for the identification of areas with potential significant flood risk (PFRA, 2018)

The quality of the single steps depends extremely on the available data and other information. The EU Flood Directive states that only existing information and data shall be used for the assessment. No modelling has been done for the PFRA.

The determination of the areas of potential significant flood risk is based on the analyses of the river sections (or lakes), for which from recent events damage potential has to be expected and added by those stretches of the river network in which floods may have adverse consequences on human life, economy, ecology or cultural heritage.

For the single assets at risk the significance of the risk is checked stepwise. The steps are visualized in the scheme below (Figure 24):

For the assessment steps the significance criteria according to Table 9 are used, which cover all considerable assets at risk. Each step (A-C as in Figure 24) is linked to one criterion. Thus, the potential significant risk in each area is systematically checked and documented with the respective criteria in fact sheets. See de detailed report of the PFRA (2018) for these fact sheets.

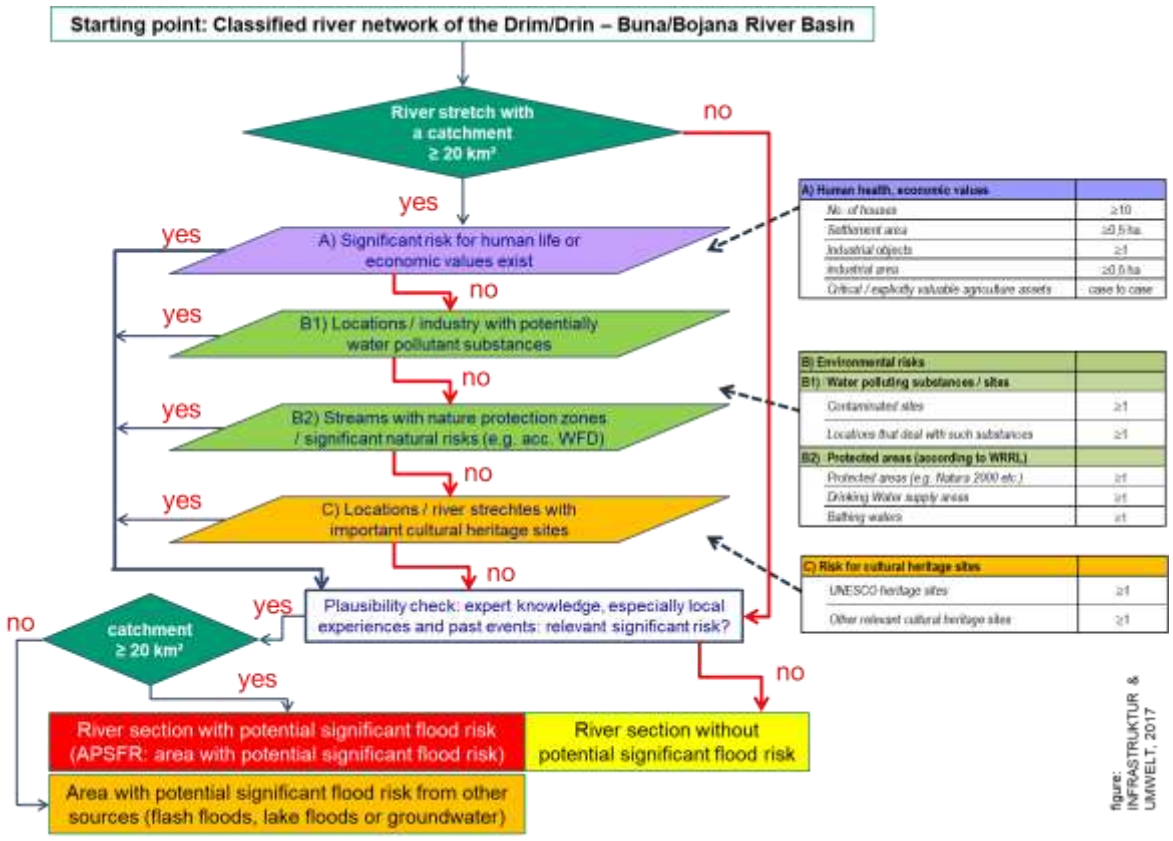


Figure 24: Steps for the assessment of potential significant risks (PFRA, 2018)

3.2 Considered types of flooding

The following types of floods (or: “source of flood”) may be considered when identifying the areas of potential significant flood risk within the preliminary flood risk assessment (according to the EU reporting guidance under the EU Flood Directive; EU 2013; Technical Report-2013-071) (Table 7).

The focus of the documented preliminary flood risk assessment was agreed to be on potential risks resulting through floods along surface waters from rivers and streams (fluvial). Other possible types of flooding are considered as follows:

<u>Pluvial / heavy rain / flash flooding (also: torrential flooding)</u>

For the Drin-Buna River Basin pluvial floods are not modelled and thus systematic risk assessment is not possible yet based on existing information. But due to the importance of this type of flood according to the increasing damages from these in the last years at least past flash flood events are documented and considered in the evaluation of potential risk areas. If recurrent past events hit one location or one region this shall be called significant risk in the light of the PFRA.

The determination of flash floods in the context of the PFRA is based on the characteristic of the specific location in which the flood occurs: if the size of the catchment that drains water to this location is < 20 km², and no permanent river or stream exists, it shall be defined as heavy rain event or flash flood. If the catchment is > 20 km² and a permanent river or stream exists, it is defined as river flood.

Table 7: Types of flood / sources (from: Guidance for reporting under the EU Flood Directive; EU 2013)

Type / Source	Description
Fluvial	Flooding of land by waters originating from part of a natural drainage system, including natural or modified drainage channels. This source could include flooding from rivers, streams, drainage channels, mountain torrents and ephemeral watercourses, lakes and floods arising from snow melt.
Pluvial	Flooding of land directly from rainfall water falling on, or flowing over, the land. This source could include urban storm water, rural overland flow or excess water, or overland floods arising from snowmelt.
Groundwater	Flooding of land by waters from underground rising to above the land surface. This source could include rising groundwater and underground flow from elevated surface waters.
Sea Water	Flooding of land by water from the sea, estuaries, or coastal lakes. This source could include flooding from the sea (e.g., extreme tidal level and / or storm surges) or arising from wave action or coastal tsunamis.
Artificial Water-Bearing Infrastructure	Flooding of land by water arising from artificial, water-bearing infrastructure or failure of such infrastructure. This source could include flooding arising from sewerage systems (including storm water, combined and foul sewers), water supply and wastewater treatment systems, artificial navigation canals and impoundments (e.g., dams and reservoirs).

Groundwater

Risks from groundwater often occur in lowland areas, marshland or meadows that are at the same time regularly flooded from rivers (fluvial floods). Thus, the potential risk areas are already identified under fluvial floods. If large areas that are not flooded from rivers have been flooded just from groundwater, and if these events have been recorded, those areas are additionally documented and evaluated according to the significance criteria.

Sea Water / coastal flooding

In the Drin-Buna River Basin the mouth of the Buna, where the Drin-Buna River feeds into the Adriatic Sea, coastal flood risk is relevant. According to local experiences and documentations flooding along the coast is not caused by sea water itself but by the combination of river flood (from Buna River) and high sea water levels. The origins of the flood risk are the coastal rivers that cannot discharge into the sea due to high sea water level. Thus, no potential significant flood risk areas can be identified just by sea water risk.

Artificial Water-Bearing Infrastructure

The risk of dam failure is considered as not significant risks because the probability of dam failure is lower than 1/10.000, according to dam design and dam failure studies. Compared with probabilities of fluvial floods (1/100, 1/500) this cannot be called significant in the methodology of the PFRA to determine APSFR for FRM. However, it was discussed and it shall be pointed out that there is a risk of dam failure around and below the numerous dams in the course of the Drin-Buna River, especially in Albania. This risk needs to be regularly assessed (dam failure studies) and considered in maintenance plans and risk management scenarios.

The retroactive effects of reservoir management upstream of the reservoirs (rising water levels upstream as consequence of small water consumption in HPP in wet seasons) is considered as fluvial floods due to rising lake/reservoir levels.

The effects of reservoir management downstream (release of water from reservoirs in flood situations) are also considered with fluvial flooding because the downstream channels of reservoirs are also in the focus of fluvial flood risk below the dams.

Drainage channels (like in Shkodër area or delta area of the Drin-Buna River) are considered as fluvial flooding since they are closely connected with the water levels and the floods in the main Drin/Buna channels and create no additional risk areas.

3.3 Significance of flood risk

According to the specifications of the EU Flood Directive four groups of assets at risk shall be considered in flood risk management and in the preliminary flood risk assessment. The risk assessment and consequent risk reduction measures shall aim at all four groups of receptors and according to indicators (Table 8 and Table 9):

Table 8: Risk receptors and risk indicators (PFRA, 2018)

Risk on:	**Example for flood risk indicators:**
Human Health	▪ Number of residential properties. ▪ Critical services (Hospitals, Police/Fire/Ambulance Stations, Schools, Nursing Homes, etc.).
Economic Activity	▪ Number of non-residential properties. ▪ Length of road or rail. ▪ Area of agricultural land.
Environment	▪ Designated sites (water protection areas, areas with water pollutant substances) and flora / fauna according to the EU-Habitat Directive
Cultural Heritage	▪ Cultural heritage sites (World Heritage Sites).

Assets at risk were determined to identify potential significant risks for all risk receptors. Significance criteria and the threshold define what is identified as potential significant (see following Table 9).

Table 9: Significance criteria for the PFRA (PFRA, 2018)

Assets at risk & significance criteria *for PFRA*	**Receptors**				**Significance** Criteria	**Treshold** of significance
	Human health	Economic activity	Environ-ment	Cultural heritage		
A) Human health, economic values						
No. of houses	x	x			existing objects or area in the flood area of the extreme event	≥10
Settlement area	x	x				≥0,5 ha
Industrial objects		x				≥1
industrial area		x				≥0,5 ha
Critical / explicitly valuable agriculture assets		x				case to case
B) Environmental risks						
B1) Water polluting substances / sites						
Contaminated sites			x		existing objects at risk (extreme event scenario)	≥1
Locations that deal with such substances			x			≥1
B2) Protected areas (according to WRRL)						
Protected areas (e.g. Natura 2000 etc.)			x		existing assets at risk (extreme event scenario)	≥1
Drinking Water supply areas	x		x			≥1
Bathing waters	x					≥1
C) Risk for cultural heritage sites						
UNESCO heritage sites				x	existing assets at risk (extreme event scenario)	≥1
Other relevant cultural heritage sites				x		≥1

For all areas in which floods have ever been observed and in which flood risk can be expected evaluations are done to assess if the risk for one of the receptors exceeds the threshold (=significant) on not (=not significant).

3.4 Results of the PFRA for the project area

The following Figure 25 gives an overview of the locations of evaluated areas as result of the screening of the whole river network in the Drin-Buna River Basin regarding past events and local knowledge on potential risks.

Of all evaluated river stretches 43 areas were assessed to be Areas of Potential Significant Flood Risk (APSFR). 33 of these fulfilled the significance criteria by far (red colour in the map). 10 of these just reach the significance criteria but were identified as APSFR according to the methodology. Especially for those the determination as APSFR might be critically examined and revised based on more detailed risk assessments within the FHRM and FRM-Plan.

Figure 25 gives an overview of the areas in the whole Drin-Buna River Basin and Table 10 depicts APSFR of the project area. Detailed information and data for these APSFR are documented in the fact sheets in Annex 4 of the PFRA (2018).

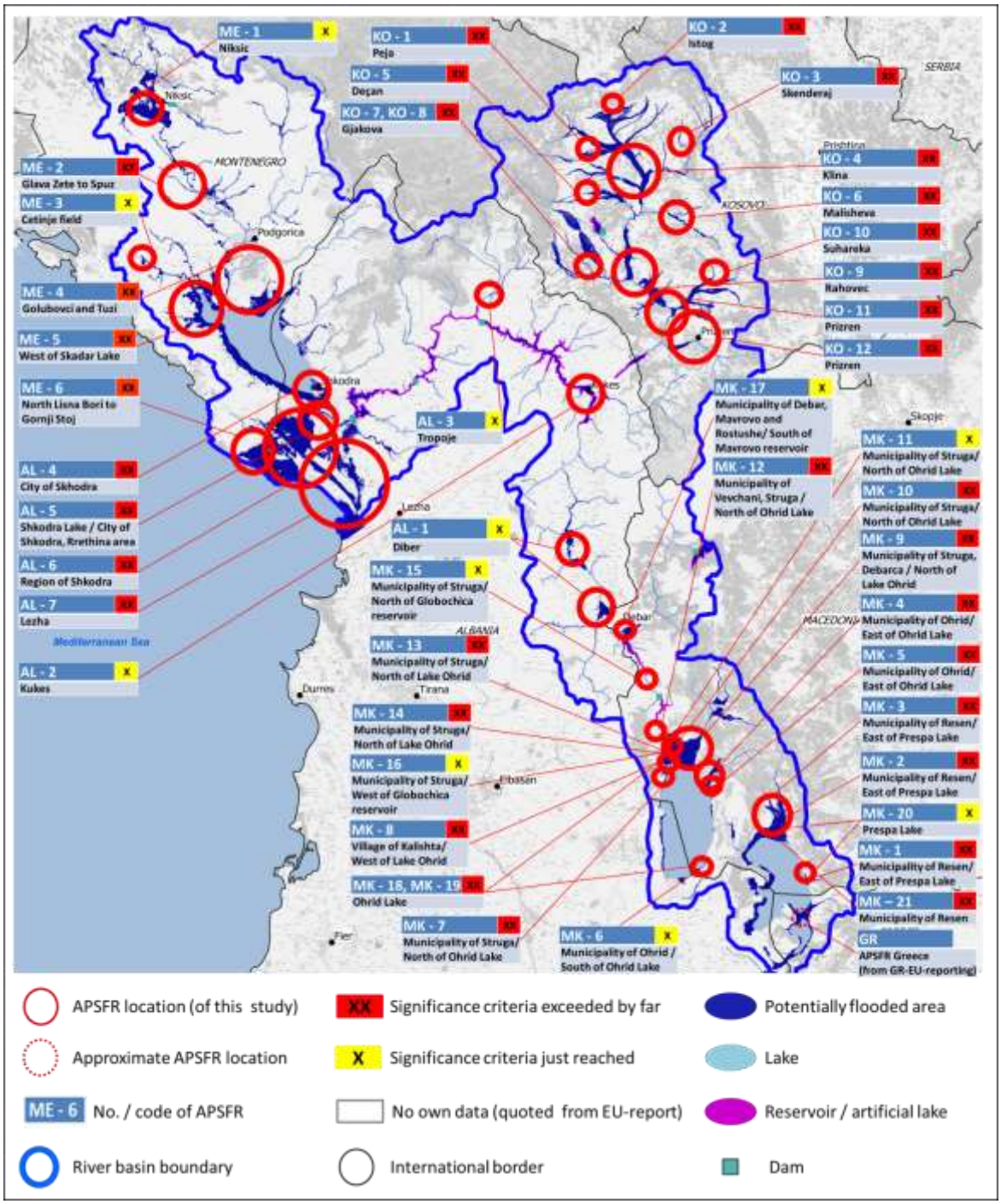


Figure 25: Geographic (map) overview of the APSFR in the Drin-Buna River Basin covering the countries Montenegro, Kosovo, North Macedonia, and Albania (PFRA, 2018)

Table 10: Areas with potential significant flood risk in Albania of the Drin-Buna River Basin (AL-4 to AL-7 for the project area) (PFRA, 2018)

No.	Country – no.	Location	River / Lake	Type of flood	APSFR
1.	AL - 1	Diber	Black Drin	River-flood	X
2.	AL - 2	Kukes	Black Drin	HPP-reservoir-management	X
3.	AL - 3	Tropoje	Valbona River (Drin tributary)	Flashflood	X
4.	AL - 4	City of Shkodër	Kiri River	River-flood	XX
	AL - 5	Lake Shkodër / City of Shkodër, Rrethina area	Lake Shkodër	Lake-flood	XX
5.	AL - 6	Region of Shkodër	Drin, Buna	River-flood	XX
6.	AL - 7	Lezhë	Old (former) Drin River	River-flood	XX

Explanations:

XX	APSFR / Risk exceeds the value of 2 or more significance criteria clearly
X	APSFR / Risk exceed the value 1 or 2 significance criteria slightly
O	No APSFR / Risk does not exceed the value of the significance criteria
	Not assessed in this study; here quoted to complete the information (source: PFRA-report Greece; EEA, 2018)

Not included in the preliminary flood risk assessment is the risk of dam failure, due to the definition of significant flood risk and return periods: dam failure follows another definition of failure scenarios. Please refer to chapter 4.5 for potential risk from dams/hydro power plants, such as in Koman-Vau i Dejës Region, inside and outside of the project area.

4 Flood Risk Assessment in the project area

4.1 Relevance of past floods for the future

In chapter 2.3 most relevant past flood events are listed and described. When assessing the flood risk in the area and reviewing the past events it can be stated that significant events similar to the event from 2010 or those of the last years can potentially occur in future again. Taking the expected climate change impacts in consideration (see chapter 2.5) the hydrometeorological situation will make river floods and flooding as consequence of heavy rain events even more likely in terms of both smaller return periods and intensity. Projections show that there will be an increase in hazardous rainfalls for Shkodër Region of about 1-2 days by 2030, about 2-3 days by 2050, 4-5 days by 2100 related to 1990 (TNC, 2016).

Since the flood event in 2010 was significantly impacted by the coincidence of a flood wave coming from the upstream areas of the Drin River Basin[15], the experiences of 2010 can be prevented or mitigated, when operation schemes and improved forecasting can be ensured for similar future circumstances. Although improvements were made during the

[15] Flooding from northern to eastern directions with origins in Buna/Bojana River Basin, Lake Shkodër and operation of the dams with the necessity to release water at the maximum level because tributaries already caused high water levels.

last years (see chapter 2.4), as long as significant flood forecasting schemes and the improvement of forecast-based operation is not finally proofed to improve the risk situation, it cannot be finally concluded that flood situations like in 2010 may not occur in future and have to be considered to happen more often and with more intensity when developing flood risk management measures for the risk area.

For the other recent flood events, it must be assumed that these can also occur again in the future to a similar extent or more violently, and above all more frequently. Although significant investments were implemented for the improvement of riverbanks and cleaning water courses, no major or fundamental flood protection measures could be realised that may change the risk situation compared with the recent flood events significantly. It remains that adverse consequences of climate change can potentially increase flood risk in the area compared with past events.

4.2 Flood hazard maps

Flood hazard and risk maps are an important information basis for all flood risk management activities and for different user groups to reduce the risk and damages caused by flood events. This FRM-Plan is based on the latest flood hazard and risk maps that were completed for the project area in 2022. The content, scenarios, modelling approaches and mapping methods are described in detail in the “Guidebook for Flood Hazard and Risk Mapping for the Drin/Drim – Buna/Bojana River Basin”, that was produced in the context of the GIZ CCAWB-Project, GIZ and the Technical Working Group with experts from all four countries that share the Drin River Basin.

Content of the Flood Hazard Maps is defined according to the EU Flood Directive (European Parliament and Council 2007):

> *“Chapter III Flood Hazard Maps and Flood Risk Maps*
>
> *Article 6*
>
> *3. Flood hazard maps shall cover the geographical areas which could be flooded according to the following scenarios:*
>
> *(a) floods with a low probability, or extreme event scenarios;*
>
> *(b) floods with a medium probability (likely return period≥100 years);*
>
> *(c) floods with a high probability, where appropriate.*
>
> *4. For each scenario referred to in paragraph 3 the following elements shall be shown:*
>
> *(a) the flood extent;*
>
> *(b) water depths or water level, as appropriate;*
>
> *(c) where appropriate, the flow velocity or the relevant waterflow.”*

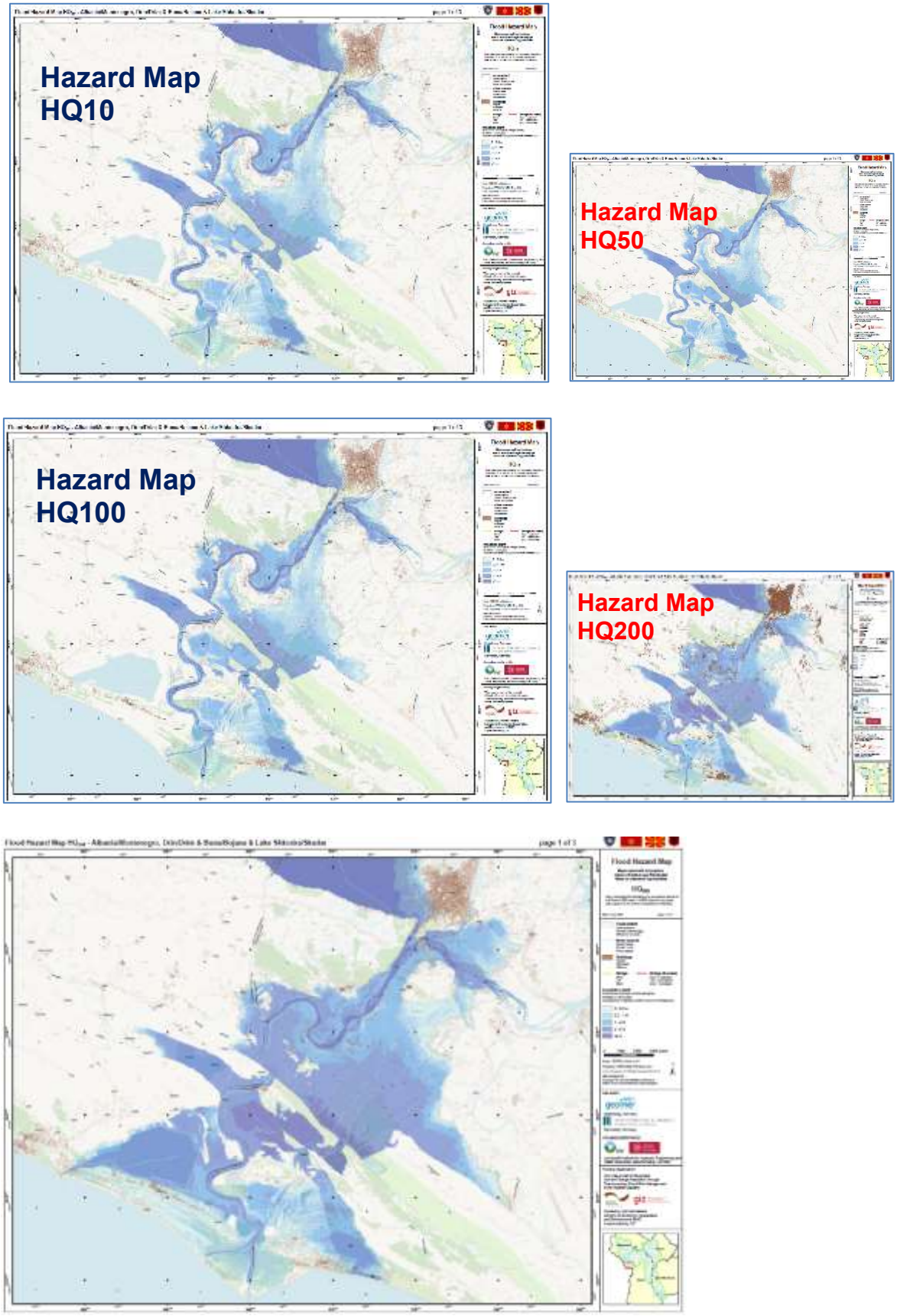


Figure 26: Flood Hazard Maps for Shkodër Region (2021): three types of maps according to EU Flood Directive and two additional types according to national law

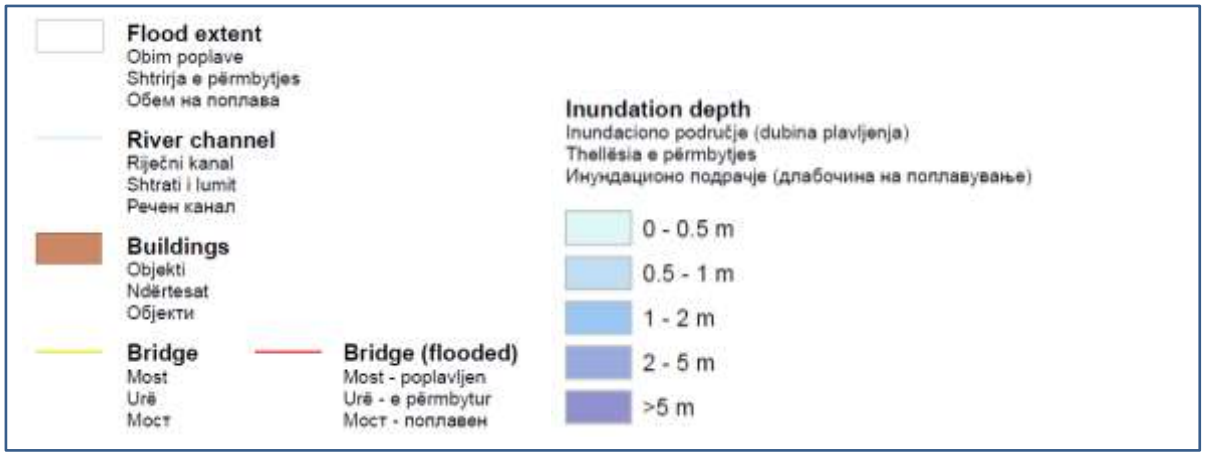


Figure 27: Content / legend of flood hazard maps

For all three scenarios flood hazard maps capture the flood extent, inundation depth and where appropriate the flow velocity (Article 6 EU Flood Directive, European Parliament and Council 2007). These parameters describe the intensity and character of a flood:

- The flood extent shows the inundated area for different flood scenarios.
- The inundation depth indicates, for example, up to which height a building will be flooded and on which floors assets and persons will not be affected by the flood.
- Velocity describes how fast the water is moving. Depending on the flow velocity the risk of negative consequences to human health, the environment, cultural heritage and economic activity might increase. At high velocities, people and objects are more likely affected by floods. According to Article 6 of the EU Flood Directive velocity shall be shown in hazard maps where appropriate which means if data exist and if velocities are significant.

Figure 26 and Figure 27 show exemplary flood harzard maps of the project area that are the basis for this FRM-Plan: Three maps with the scenarios HQ10, HQ100, HQ500 have been developed according to the EU Flood Directive; additional types with scenarios HQ50 and HQ200 were produced according to Albanian national requirements.

4.3 Flood risk maps

Flood risk maps show the potential adverse consequences associated with flood scenarios referred to in the flood hazard maps (Article 6 EU Flood Directive, European Parliament and Council 2007) describe the impacts on human health, the environment, cultural heritage and economic activities:

- the indicative number of inhabitants potentially affected;
- type of economic activity of the area potentially affected;

- installations as referred to in Annex I to Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control which might cause accidental pollution in case of flooding and potentially affected protected areas identified in Annex IV(1)(i), (iii) and (v) to Directive 2000/60/EC;
- other information which the Member State considers useful such as the indication of areas where floods with a high content of transported sediments and debris floods can occur and information on other significant sources of pollution.

The EU Flood Directive (European Parliament and Council 2007) defines the content of Flood Risk Maps in Article 6:

> *"Flood risk maps shall show the potential adverse consequences associated with flood scenarios referred to in paragraph 3 and expressed in terms of the following:*
>
> *(a) the indicative number of inhabitants potentially affected;*
>
> *(b) type of economic activity of the area potentially affected;*
>
> *(c) installations as referred to in Annex I to Council Directive96/61/EC of 24 September 1996 concerning integrated pollution prevention and control (1) which might cause accidental pollution in case of flooding and potentially affected protected areas identified in Annex IV(1)(i), (iii) and (v) to Directive 2000/60/EC;*
>
> *(d) other information which the Member State considers useful such as the indication of areas where floods with a high content of transported sediments and debris floods can occur and information on other significant sources of pollution."*

Figure 28 shows an exemplary flood risk map of the project area that is one basis for this FRM-Plan: Like for the Flood Hazard maps three scenarios HQ10, HQ100, HQ500 have been mapped according to EU Flood Directive; additional types with scenarios HQ50 and HQ200 were produced according to Albanian national requirements.

The risk maps show all assets as risk as far as known in the area. The assets are listed in Table 11. The symbols and the ID are named in the maps. All categories have a vulnerable level that is the basis for further vulnerability assessments. They are also the starting point for the risk assessment as documented in the following chapters.

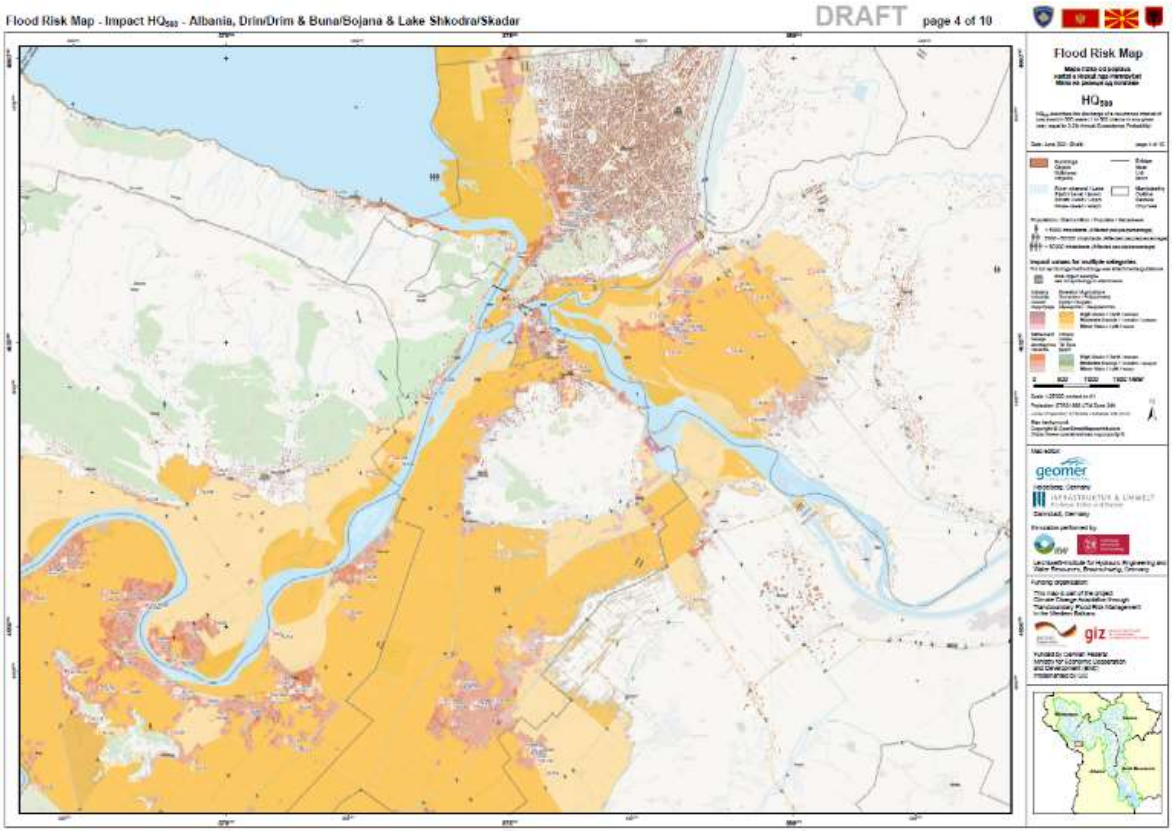
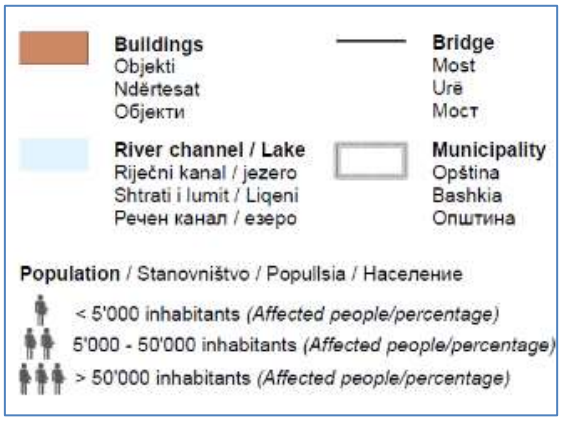


Figure 28: Exemplary Flood Risk Map for one part of the Shkodër area (2021)



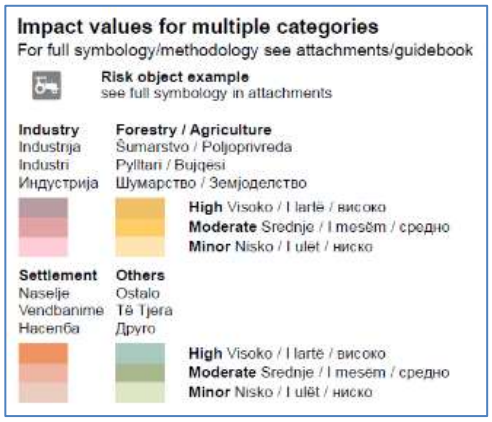


Table 11: Categories of risk objects with vulnerabiltiy values (1 = low, 2 = medium, 3 = high)

Main category		ID (class)	Name	Vulnerability value
100	**Agriculture**	101	polytunnel, greenhouse, agricultural building or stable	3
		102	plantation, farming, special crop	2
		106	livestock	2
400	**Industry & Production**	401	airport, airfield	3
		402	high tech industry, warehouse, factory	2
500	**Service & Trade**	501	restaurant, café, bar	1
		502	hotel/ guest house	1
		503	campground	2
		504	commercial supermarket	2
		505	school/ education building	2
		506	post-office	1
		507	police station	3
		508	medical care	3
		510	water supply	2
		511	kindergarten	3
		512	administration	3
		513	tourist attraction, info	2
		514	service station, electric charging station	1
		515	antenna (radio and telecommunication)	2
		516	transformer	1
		517	wastewater treatment	2
		518	hospital	3
		519	fire department	3
		520	waste disposal	2
		521	retirement home	3
600	**Traffic & Transport**	601	train station	2
		606	tunnel entrance	3
700	**Different functional-ity (settlement)**	701	cultural & community center	1
		703	church	2
		704	cultural heritage, UNESCO site	3
		705	cemetery	2
		706	bathing place, public swimming pool	1
		707	museum, ruin	2
		708	light house	1
		709	mosque	2
		710	sport building	2

4.4 Description and assessment of existing flood risk

4.4.1. Overview: Potentially affected land use in the risk area

A detailed cartographic map-based illustration of the potential existing flood risk of the project area is available in the comprehensive flood risk maps.

The following descriptions are derived from the hydrological modelling and its intersection with the aforementioned land use, census, building and vulnerable objects data within a statistical analysis (GIS-analysis). The plausibility and some corrections were made based on stakeholder consultations, detailed analysis of aerial photos/satellite images for some areas and field visits.

For the project area of Shkodër Region the table below gives an overview of potentially affected land classified by land use.

Table 12: Land use in potentially flooded area in the Drin-Buna River Basin of Shkodër Region

Land use class	Area of land use [ha]	Area of affected land use [ha]			Percentage of affected land use [%]		
	-	HQ010	HQ100	HQ500	HQ010	HQ100	HQ500
cultivated land	22,538	9,485	12,980	13,524	42.1%	57.6%	60.0%
forest	1,244	830	960	1,000	66.9%	77.1%	80.4%
grassland	11,407	970	1118	1,165	8.5%	9.8%	10.2%
industry	544	70	147	160	12.9%	27.0%	29.4%
marsh	1,221	1,088	1,098	1,100	89.1%	89.9%	90.1%
others	106	11	28	31	10.0%	26.3%	29.4%
parksite	60	4	6	6	7.5%	10.5%	10.8%
rock	858	91	111	118	10.6%	12.9%	13.7%
settlement	5,055	411	1,082	1,174	8.1%	21.4%	23.2%
traffic & transport	603	75	166	179	12.4%	27.4%	29.7%
water	2,204	1,128	1,179	1,184	51.2%	53.5%	53.7%
Total	**45,840**	**13,333**	**17,915**	**18,643**	**29.1%**	**39.1%**	**40.7%**

The most flood affected land use class is cultivated land - about 9,500 ha at HQ010, 13,000 ha at HQ100, and 13,500 ha at HQ500 (see separate Figure 29). According to the evidence of the Directorate of Agriculture, Rural Development and Treatment of AMTP of Municipality of Shkoder, during the past flood event in March 2018 the cultivated land and cropland were highly affected with an economic damage of about 303,729,000 Lek all together in Ana e Malit, Bërdicë, Dajç, Rrethina and Velipojë.

Adding up valued grassland for cattle of about 1,100 ha, the sum of potentially affected land for agricultural economic activity equals 10,600 ha at HQ010, 13,100 ha at HQ100 and 13,600 ha respectively at flood scenario HQ500. In the flood event of December 2010

even some cattle were surrounded by water and drowned (about 32,634 animals were evacuated).

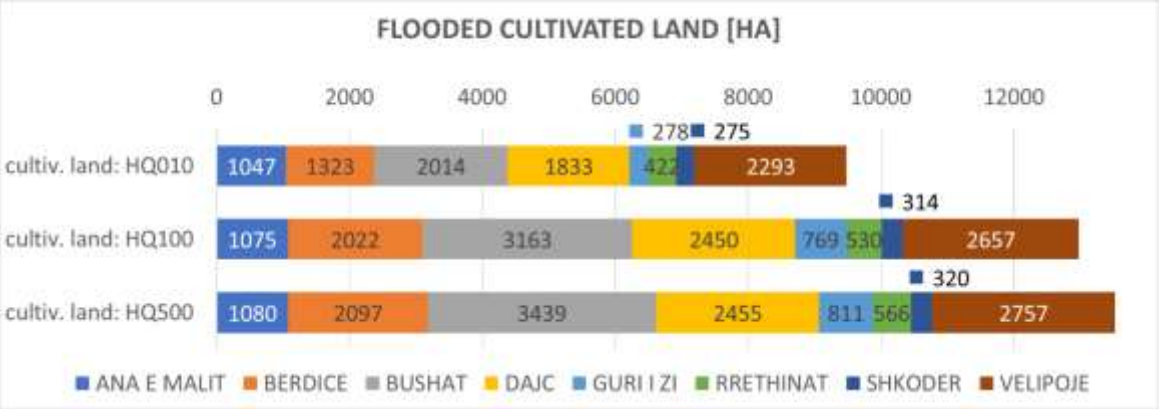


Figure 29: Potentially flooded cultivated land at relevant flood scenarios HQ010, HQ100 and HQ500 per administrative unit of Shkodër Region

Compared to the results of the FRM Study 2014, the risk of corn production has decreased tremendously as farmers on the one hand harvest corn before flood season and on the other hand for Velipojë Administrative Unit, for example, the construction of Selmanaj embankment mitigated flood risk.

Exposure to flood has increased for ornamental and decorative plants as they have augmented the area for example in Ana e Malit and Dajç Administrative Unit. In that area hydrophilic vegetation has been planted.

The subsequent sub-chapters describe the flood risk situation for the relevant risk receptors according to EU Flood Directive human health, environment, cultural heritage and economic activity.

4.4.2. Human health

For the description of flood risk referring to the risk receptor “human health” the outlining of potentially affected inhabitants, houses and dwellings are of importance. These are as follows.

Table 13: Potentially affected inhabitants (by flood scenarios HQ010, HQ100, HQ500)

Administrative Unit	Affected inhabitants HQ010	HQ100	HQ500
Municipality of Shkodër			
Ana e Malit	490	510	510
Berdicë	800	2,990	3,140
Dajç	700	3,350	3,390
Guri i Zi	340	1,210	1,350
Rrethinat	50	210	240
Shkodër	2,730	9,660	11,140
Velipojë	850	1,430	1,690
Municipality of Vau i Dejës			
Bushat	470	1,410	1,720
Total	**6,430**	**20,770**	**23,180**
Percentage of whole population (= 139,055 inhabitants)	**≈ 4.6%**	**≈ 14,9%**	**≈ 16,7%**

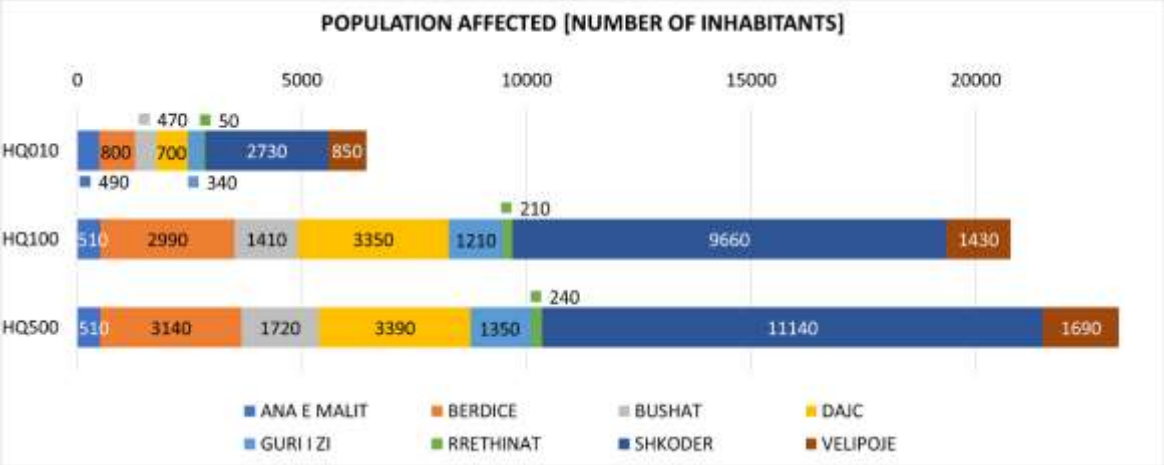


Figure 30: Potentially flood affected population of Shkodër Region illustrated per administrative unit and flood scenario

Table 14: Potentially affected buildings (by flood scenarios HQ010, HQ100, HQ500)

Administrative Unit	Affected buildings HQ010	HQ100	HQ500
Municipality of Shkodër			
Ana e Malit	125	130	130
Berdicë	223	830	871
Dajç	433	2,065	2,093
Guri i Zi	81	292	325
Rrethinat	19	88	99
Shkodër	672	2380	2,743
Velipojë	770	1289	1,520
Municipality of Vau i Dejës			
Bushat	282	856	1,043
Total	**2,605**	**7,930**	**8,824**

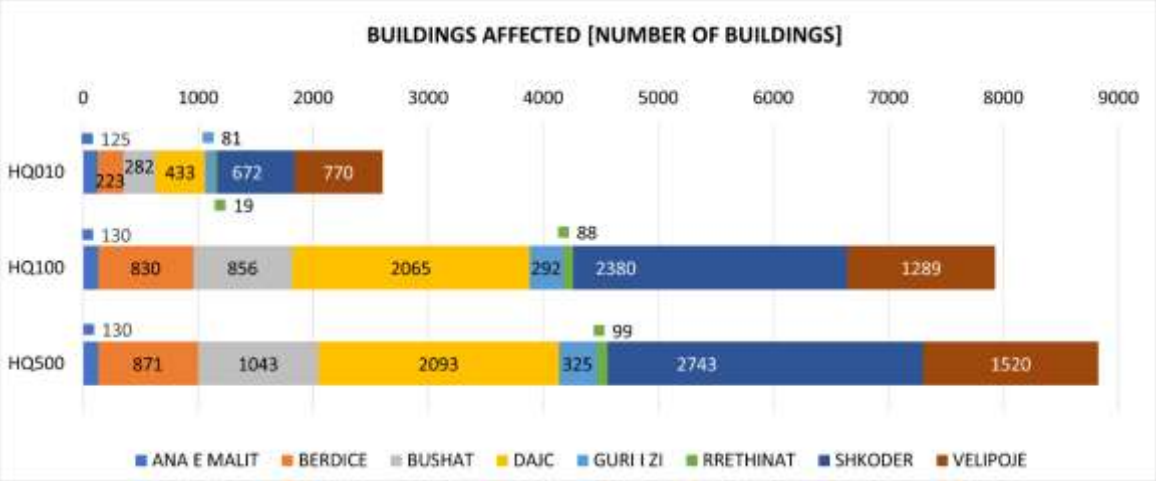


Figure 31: Potentially flood affected buildings of Shkodër Region illustrated per administrative unit and flood scenario

During the flood event in December 2010 (regarded as extreme flood event) the documented total number of affected resp. evacuated inhabitants in this area was about 12,145 and the number of affected houses was about 7,120 (4,540 flooded houses and 2,580 houses surrounded by water). With these data the GIS-assessments seem to be plausible.

Referring to the whole population of Shkodër Region affected population in all flood scenarios is severe even though one the one hand high emigration is noted in the areas of Ana e Malit (Obot village) and Guri i Zi (Kuç and Rrencë; on the other hand, flood adaptation to buildings and housing have been realised for example in Berdicë and Dajç. Lifting foundations of new buildings in the villages of Fshat i Ri, Mali i Jushit, Hoten Rranxa and Konej in the administrative unit of Bushat are currently ongoing (see chapter 0 for other currently ongoing measures).

Informal buildings and special vulnerable population/groups

The abovementioned figures are based on an GIS-assessment by overlaying OSM-data of buildings with the flood risk areas according to the 3 scenarios. Thus, they do include informal buildings which have increased in the recent years, often located in the flood risk area. The dwellings are often very vulnerable against floods, completely unsuitable for flood protection and have no features to provide protection from floods. However, as explained in chapter 2.6, informal buildings are not well documented and thus subject of changes.

The most important conclusion here is that people living in these informal settlements are especially vulnerable groups (often Roma communities in general and displaced from mountainous areas). They are extremely exposed to floods for several reasons:

- The locations are in areas that are regularly flooded (City of Shkodër, Neighborhood No. 1 and No. 4 and Administrative Unit Berdicë)
- Dwellings are completely unsuitable when floods occur and they have no facilities to provide protection from floods. They are located below flood level and do not have as resilient structures.
- The social and economic situation of the families of these groups (communities) does not allow adaptation of protection activities, nor do they have any financial means to recover after being affected by floods.

These groups are located around the urban area, Lake Shkodër and the shore of the Buna River (see Figure 32). Through knowledge of local experts there is a count of 173 families who are more exposed to floods (at the lake shore and along Buna River).

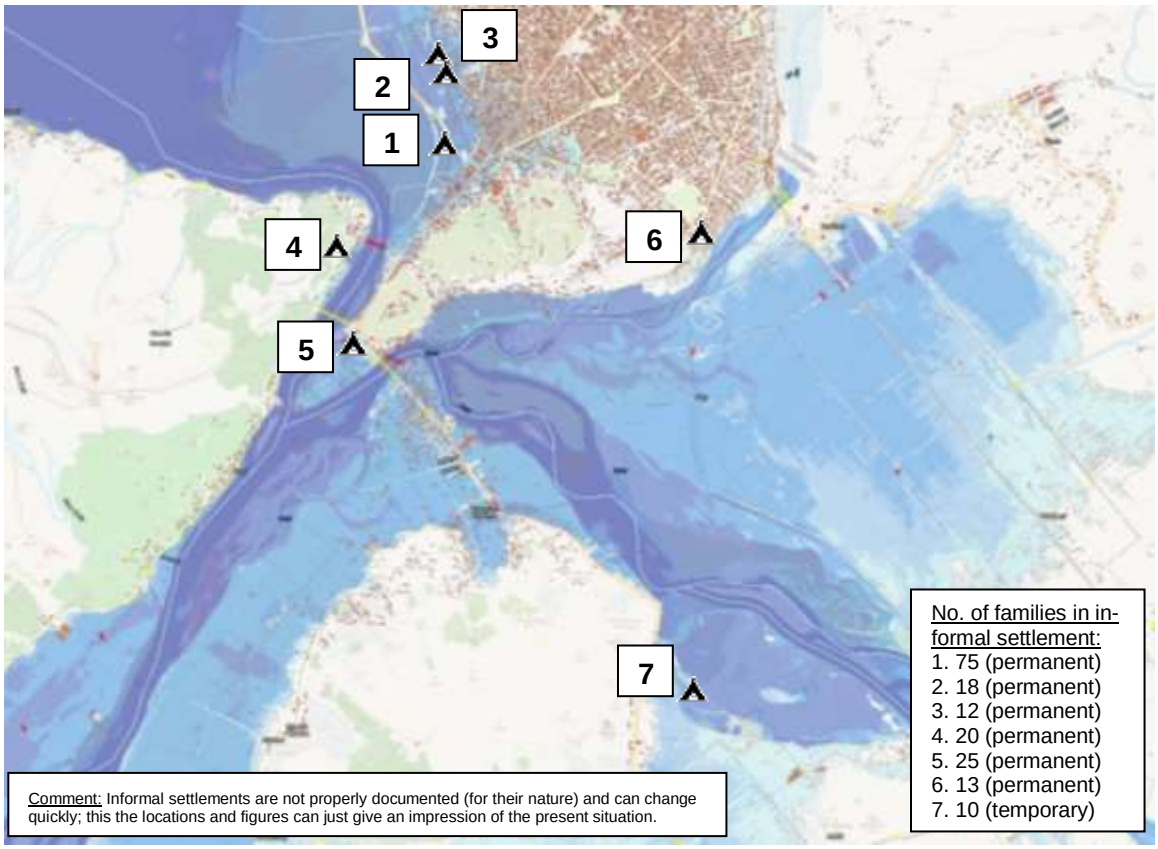


Figure 32: Location of informal constructions and marginalised groups within the project area illustrated at flood scenario HQ500

About 130 children from these families attend school. In these informal settlements there is a lack of public services in the premises. It cannot be expected that risk awareness and self-precautions regarding flood protection are on a high level.

Assets at risk in the risk receptor category “human health”

Other important aspects in this risk receptor category “human health” are parts of the social infrastructure and basic supplies as follows

- Basic supplies: water supply
- Educational facilities: schools
- Welfare facilities: kindergarten, retirement homes
- Health care facilities: hospitals, medical care such as doctors, health care centres, pharmacies
- Recreational area: Parks and sports areas.

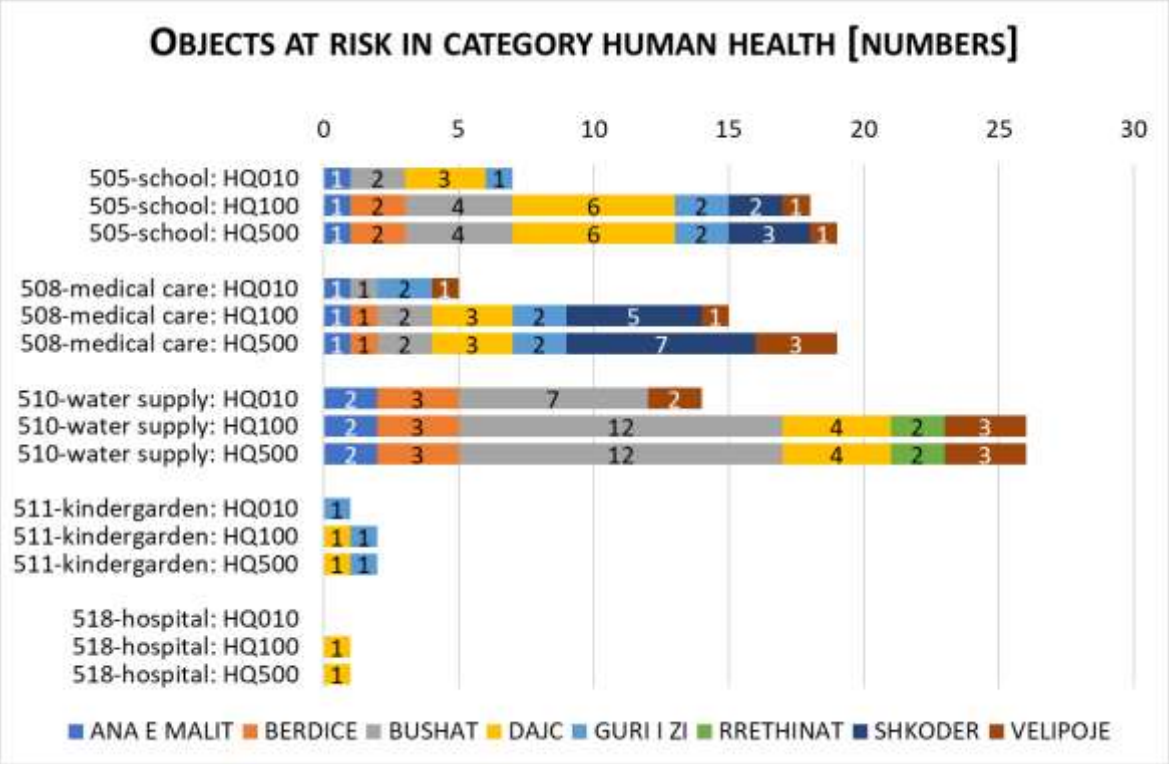


Figure 33: Potentially flood affected objects at risk in category human health for Shkodër Region illustrated per administrative unit and flood scenario

Out of the stakeholder consultations, contaminated drinking water[16] is a critical consequence during and after flood events. This is based on twofold reasons: Wastewater in the entire project region is not treated properly. Shkodër City discharges directly into Lake Shkodër and Buran River. In Dajç wastewater is drained in a free flow sewerage channel system where water is trapped for a long period of time (see next subchapter outlining wastewater treatment). In case of a flood event untreated wastewater is then mixed with

[16] Drinking water is mainly derived from groundwater in Albania.

drinking water like the wells of Pentar Mushan and Shirq in Dajç which are heavily affected. Contamination of drinking water is thereby high in microbial and nitrate rates.

In other cases, in the entire area of Dajç and Guri i Zi water supply is mainly based on individual solutions as family wells are installed. Water supply for the City of Shkodër mainly relies on the water pumping station in Rrethina and Berdicë. These stations are highly affected in cases of extreme floods like the one in December 2010. The risk situation remains unchanged despite the investment of retaining walls. The risk of damage to these wells from flooding is identified as very high causing lack of (safe) drinking water.

On the other hand, the reconstruction of the Shirq Belaj embankment in Dajç has helped to reduce the exposure of three schools to frequent and medium floods. Due to emigration and other reasons schools in Obot village (Ana e Malit), Berdicë and Dajç, kindergarten in Obot village (Ana e Malit) and Dajç have ceased their business thereby reducing the risk to flood exposure.

Only 2.5 ha of park area is at flood risk at the entrance on Shkodër City and two football fields in Velipojë. Besides, there is no exposure to flood for retirement homes.

4.4.3. Environment

Special attention is on wastewater treatment plants and landfills in this category of risk receptor “environment”. The total number of objects in flood risk areas can be seen in Figure 34 referring to the GIS assessment of wastewater treatment facilities (plants and smaller decentralised basins or ponds). However, from evaluation on site is can be stated that following major plants have to be considered for flood risk assessment:

- Wastewater treatment plant in Velipojë (in operation); partly in flood risk area.
- Bushati Landfill (in operation); not in flood risk area.
- Sewage plant in Shkodër (starting construction soon); in flood risk area.

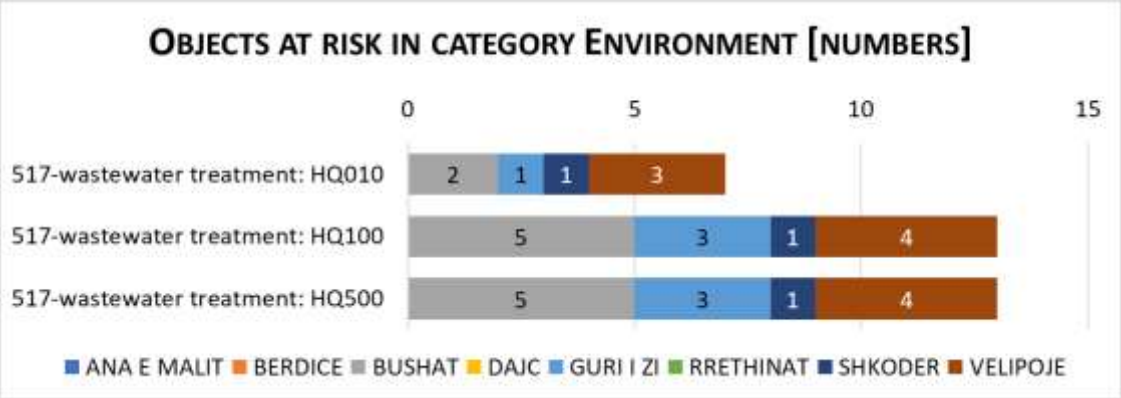


Figure 34: Potentially flood affected objects at risk in category environment for Shkodër Region illustrated per administrative unit and flood scenario

As mentioned before proper installation of wastewater treatment plants is not state of the art for Shkodër Region. It is prevalent in the region to discharge directly to water bodies through the drainage channel system that is occurrent. Most of the time these channels are not fully functional in need of cleaning exacerbating backwater in case of a flood event.

The other option to treat or discharge wastewater is through individual and private septic tanks or a village-based allotment of septic tanks. The correct number of such tanks in the risk areas is not documented yet. In any case during a flood event these tanks are prone to overspill impacting the contamination of groundwater.

Apart from groundwater as worth protecting, there are bodies of water designated as recreational and bathing waters and areas designated for the protection of habitats or species at risk of flood exposure. Bathing water at risk to flood exposure in Dajç refers to Bregica at Buna River near Belaj, Zalli i Dajçit at Buna River, Pentar and Shirq, whereas for Shkodër flood risk refers to the beach area in the villages of Shiroka and Zogaj.

Law No. 81/2017 “on protected areas” applies six protected are management categories in alignment with the International Union for Conservation of Nature (IUCN). In Shkodër Region Category III, IV and V (see chapter 2.10) are at flood risk. This refers to the whole Lumi Bunës – Velipojë Protected Landscape encompassing the whole Buna Rriver starting from Drin-Buna junction at Bahcallek in Berdicë administrative unit to the delta area in Velipojë Administrative Unit and Lake Shkodër.

Fluvial erosion activity through large outflows is an additional environmental stress on the riverbed not only of Buna River but also on Kir river in Rrethinat Administrative Unit.

4.4.4. Cultural heritage

As part of the risk receptor „cultural heritage”, objects at risk identified here are

- Religious sites, namely mosques and churches,
- Cemeteries and
- Cultural monuments

In total there is risk to 13 objects at HQ010, 36 at HQ100 and 37 objects at the event of extreme floods (HQ500). The risk situation has not changed for all risk objects in this category remaining the same as of FRM Study in 2014.

Table 15: Potentially affected risk objects of risk receptor "cultural heritage" differentiated by flood scenarios HQ010, HQ100, HQ500

Risk Object/ Flood Scenario	HQ010	HQ100	HQ500
703-church	6	12	13
704-cultural hotspot	2	5	5
705-cemetery	3	8	8
709-mosque	2	11	11
Sum	**13**	**36**	**37**

There has a new mosque been built in Guri i Zi with flood adapted features. The level of risk is estimated to be low.

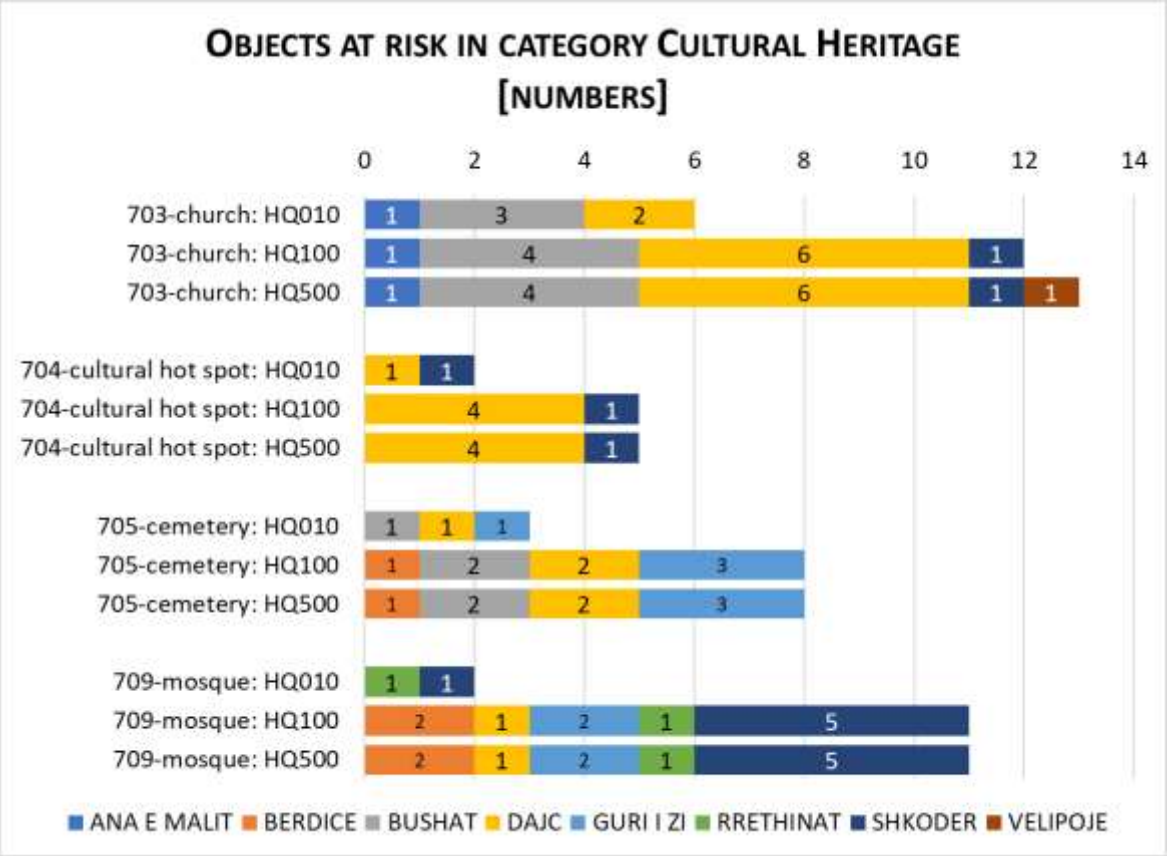


Figure 35: Potentially flood affected objects at risk in category cultural heritage for Shkodër Region illustrated per administrative unit and flood scenario

4.4.5. Economic activity

The risk assessment for the risk receptor “economic activity” considers

- Technical infrastructure: power generation/distribution, waste disposal/treatment, communication, transportation infrastructure that includes airways, roads and railways
- Public services and security: administration buildings, fire departments, police stations, emergency stations
- Agricultural activities/ facilities
- Industry and trade, wholesale, retail and services
- Touristic facilities

The numbers of the statistical evaluation in the figure below do not reflect the whole situation compared with the results of the stakeholder consultation. For example, small family stables are not listed. There is yet already a total of 650 small stables in the administrative unit of Berdicë in the villages of Trush, Berdicë e Siperme, Berdicë e Mesme, Berdicë e Madhe and Beltoje exposed to floods (referring to extreme floods). These figures are marked with a decreasing trend though due to emigration, leaving the stables out of function. For the same reason, there is a decrease of other family run businesses registered. Understandably, the families are likely to leave the business area because financial loss through the floods is not compensable.

Please refer to chapter 4.4.1 for more information of agricultural land that is potentially affected by floods.

There is some other mismatch of the statistical allocations of industry and factory sites. For the project area there are the following relevant flood affected facilities:

- One gravel processing plant in Oblikë (Ana e Malit Administrative Unit)
- One agricultural chemical storage and wholesale at Berdicë Arch at the entrance of the village, one in Konaj village in Bushat Administrative Unit and one in Dajç Administrative Unit.
- One industry storage for aluminium material production in Kasape Block in the administrative unit of Guri i Zi.

Other industry and trade activities such as environmentally hazardous companies are not identified.

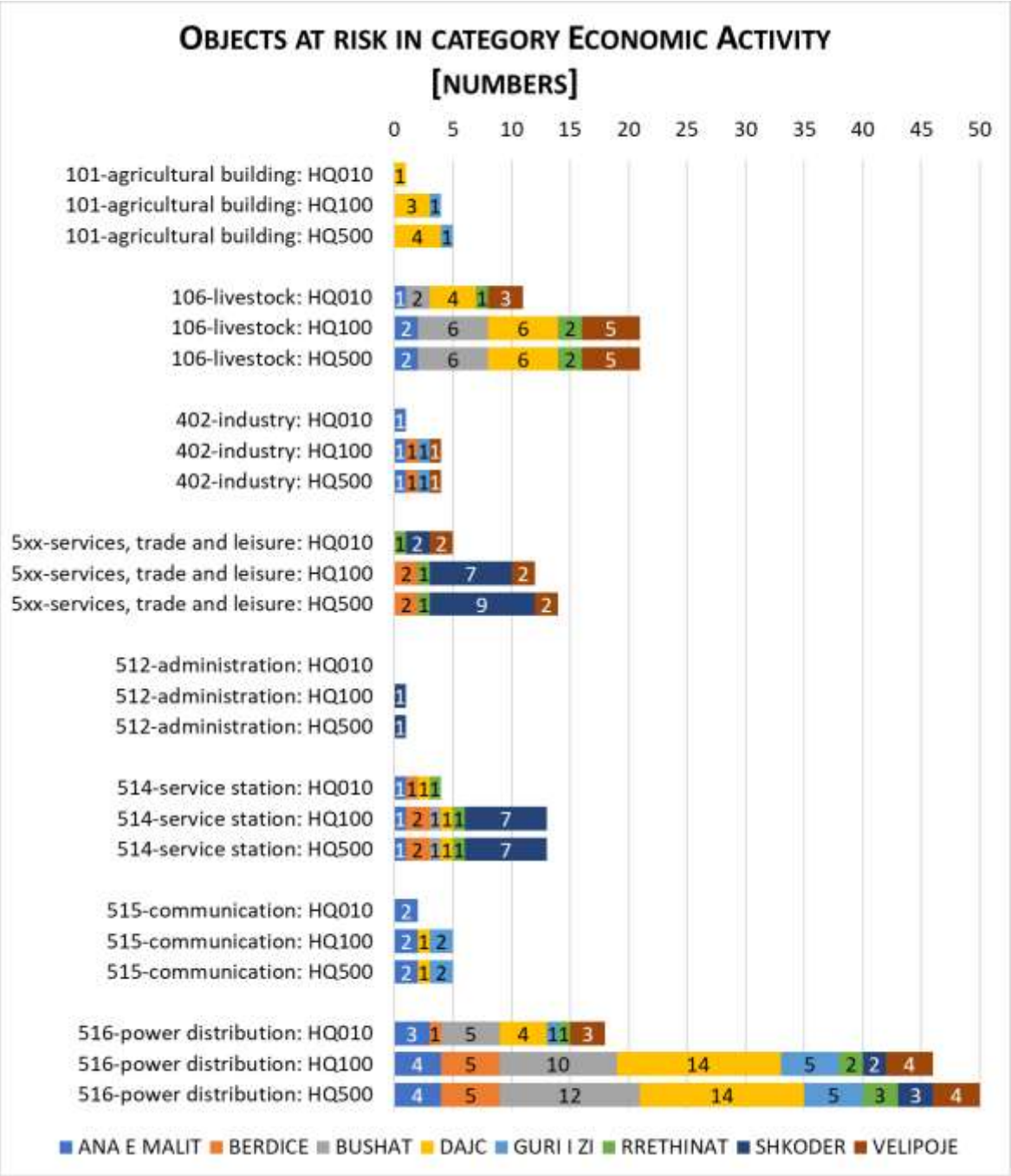


Figure 36: Potentially flood affected objects at risk in category economic activity for Shkodër Region illustrated per administrative unit and flood scenario

Considering the technical infrastructure informal waste disposal locations for municipal solid waste in Guri i Zi and Rrethinat Administrative Unit are unfortunately affected by floods.

The figure below illustrates the affected road infrastructure. Both national roads such as SH-41 and SH-27 as well as secondary roads like Rruga Oblikë Obot in Ana e Malit Ad-

ministrative Unit are affected by floods. Some elevations have been made but without mitigation to the exposure of flood risk. Only in Velipojë Selmanaj and Pentar-Luarz embankment reduces apparently flood exposure of the road between Baks-Rrjoll, Luarz-Cas and the national road Shkodër-Velipojë.

There is a marginal number of railroads in Guri i Zi and Shkodër affected by floods (less than 1 km).

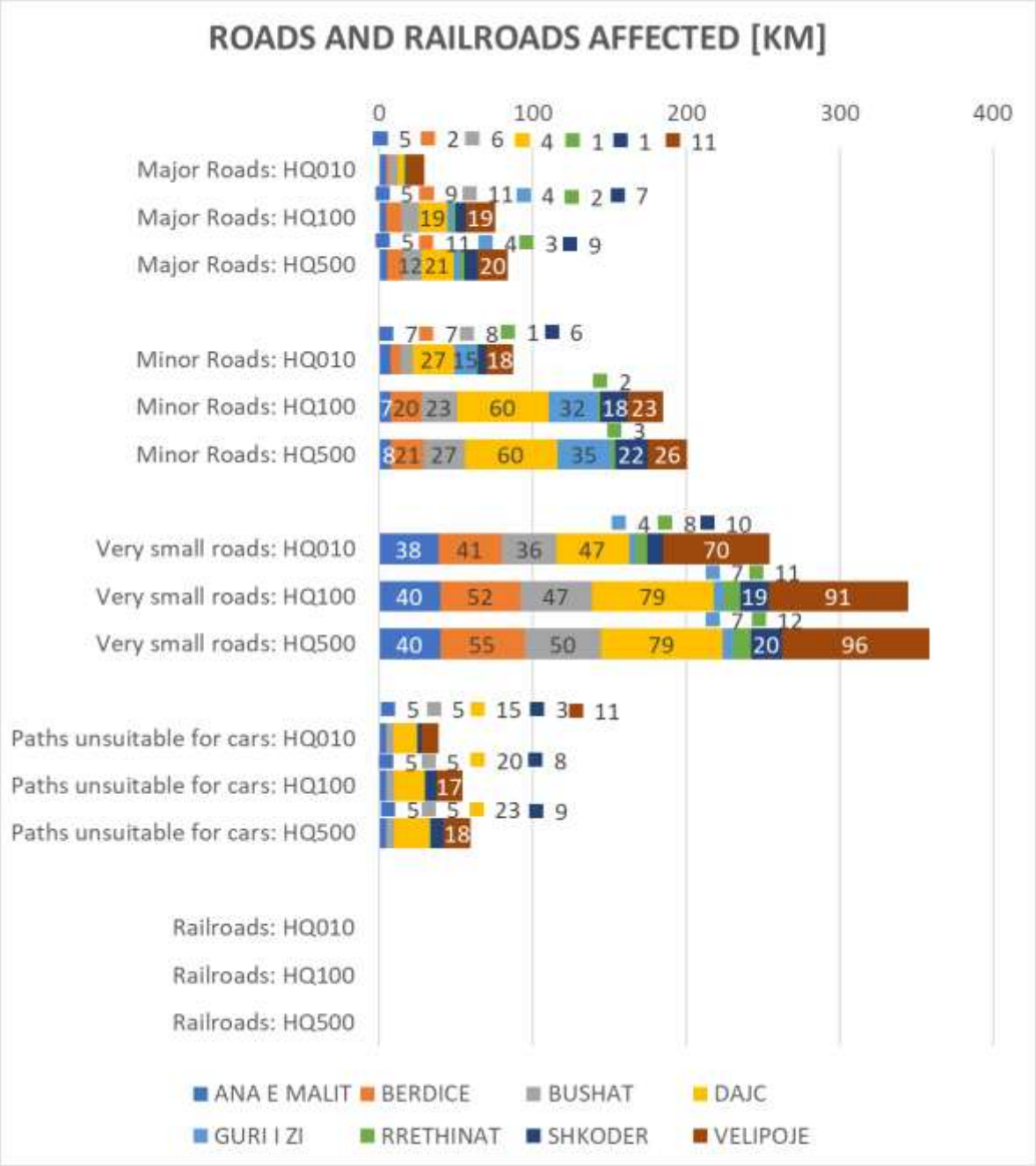


Figure 37: Potentially flood affected roads and railroads in Shkodër Region illustrated per administrative unit and flood scenario

Referring to facilities for public security there are no facilities exposed to floods.

4.5 Flood risk from hydropower plants in the project area

As mentioned before flood severity in Shkodër Region is the consequence of a combination of natural and management factors. All releases from the cascades are regulated according to the Regulation on discharge of overflows of Drin River Cascade. Discharges start with small openings of the gates and in certain cases their full opening can be done. Referring to the hydrometeorological conditions and forecasts, the proposal of the technical secretariat and the decision of the Special Commission for the Complete Treatment of the Drin River cascade are implemented. When full release is necessary due to dam safety the release of huge amounts of water from the hydropower reservoirs are accounted as a management factor that can cause flooding in the downstream region.

Table 16: Persons at risk downstream of Vau i Dejës dams at worst case scenario (KESH, 2015)

Administrative Unit	Inundated area [ha]	Persons at risk
Ana e Malit	-	-
Muriqan	682.8	1,078
Oblikë e Siperme	213.3	46
Oblikë e Madhe	599.5	2,327
Obot	284	439
Shtuf	194.6	89
Velinaj	134	297
Berdicë	-	-
Berdicë e Siperme	225.6	1,230
Berdicë e Mesme	228.8	922
Beltoje	283	708
Berdicë e Madhe	483.4	1,306
Mali Hebej	4,013.6	545
Plepan	177	494
Trush	1,440.4	2,657
Zus	810.8	685
Dajç.	238.3	1,191
Belaj	304.9	268
Darragjate	321	294
Gramsh	372	656
Mali i Gjymtit	459.5	62
Mushan	211.8	959
Pentar	152.2	269
Rrushkull	257.7	247
Samrisht i Ri	161.8	441
Shirq	151.6	746
Suka-Dajç	332	347
Guri i Zi	133.5	524
Ganjollë	509.4	364
Juban	409.3	1,120
Kuc	761	996

Administrative Unit	Inundated area [ha]	Persons at risk
Sheldija	30.2	28
Spathar	167.4	339
Vukatanë	381.2	1,002
Rrethinat	-	-
Bardhaj	366.4	384
Bleran	11.9	108
Shkodër	1,330.1	110,202
Golem	184.2	1,084
Dobrac	424.7	1,608
Shtoj i ri	121.1	273
Velipojë	622.4	1,288
Boks i Ri	299.4	301
Cas	1,071.5	363
Gomsiqe e Re	562.3	984
Luarz	958.5	328
Mali Kolaj	187.1	126
Rec	478.2	177
Rec i Ri	795.2	556
Pulaj	1,199.8	501
Bushat	590.7	1,738
Ashtë	445.4	903
Barbullush	1,153.2	2,626
Fshat i Ri	360.3	433
Kosmac	442.4	1,931
Kukel	38.5	52
Melgushe	188.4	797
Pistull	395.6	498
Plezhë	305.9	689
Rranxe	1,732.6	3,338
Shelqet	419.9	1,226
Shkjezë	429.6	1,057

Administrative Unit	Inundated area [ha]	Persons at risk
Renc	377	431

Administrative Unit	Inundated area [ha]	Persons at risk
Stajkë	561.6	2,178

Results of hydraulic models show that a break of Fierze dam would lead to a cascade break of Koman dam and one or all of Vau i Dejës dams, inundating large areas affecting many people and infrastructure.

Three different regions are potentially flooded in case dam failure

- Fierze-Koman Region
- Koman- Vau i Dejës Region
- Flood plain downstream of Vau i Dejës dam

Within the worst-case scenario that all three dams break due to overtopping, the number of people at risk downstream of Vau i Dejës dams and Gojc dam within the project area are as per Table 16. For details for people at risk in Fierze-Koman and Koman-Vau i Dejës Region please refer to KESH (2015).

5 Appropriate objectives for flood risk management in the region

5.1 Overall objectives for the management of flood risk in the area

The main objective of flood risk management according to the EU Flood Directive is: “To establish a framework for the assessment and management of flood risks, aiming at the reduction of the adverse consequences for

- Human health,
- Environment,
- Cultural heritage and
- Economic activity”.

This main objective is underlined by four risk related objectives of FRM which tackle the stages of floods (before, during, after floods) as well as the improvement of existing situations and prevention of new negative impacts (see Figure 38).

One additional objective refers to improvements in the inter-institutional cooperation, information exchange and data sharing to reduce risks by organisational measures according to the National Water Resources Management Strategy 2018-2027 (SKMIBU) as well as the Drin-Buna Basin Management Plan 2020-2026 (RBMP).

5.2 Specific objectives

From the main objectives for FRM, developed from the EU Flood Directive and Albanian Water Policies, more detailed, specific objectives were drafted to cover the fields of action. The proposals were presented and discussed with the inter-institutional working group in Nov./Dec. 2021. Thus, the following “adequate objectives for FRM in the Shkodër Region” were agreed to form a joint understanding of the goals of all activities in the FRM-Plan. The objectives are the starting point for the development of measures for risk reduction. Each measure must contribute to reaching at least one specified adequate objective.

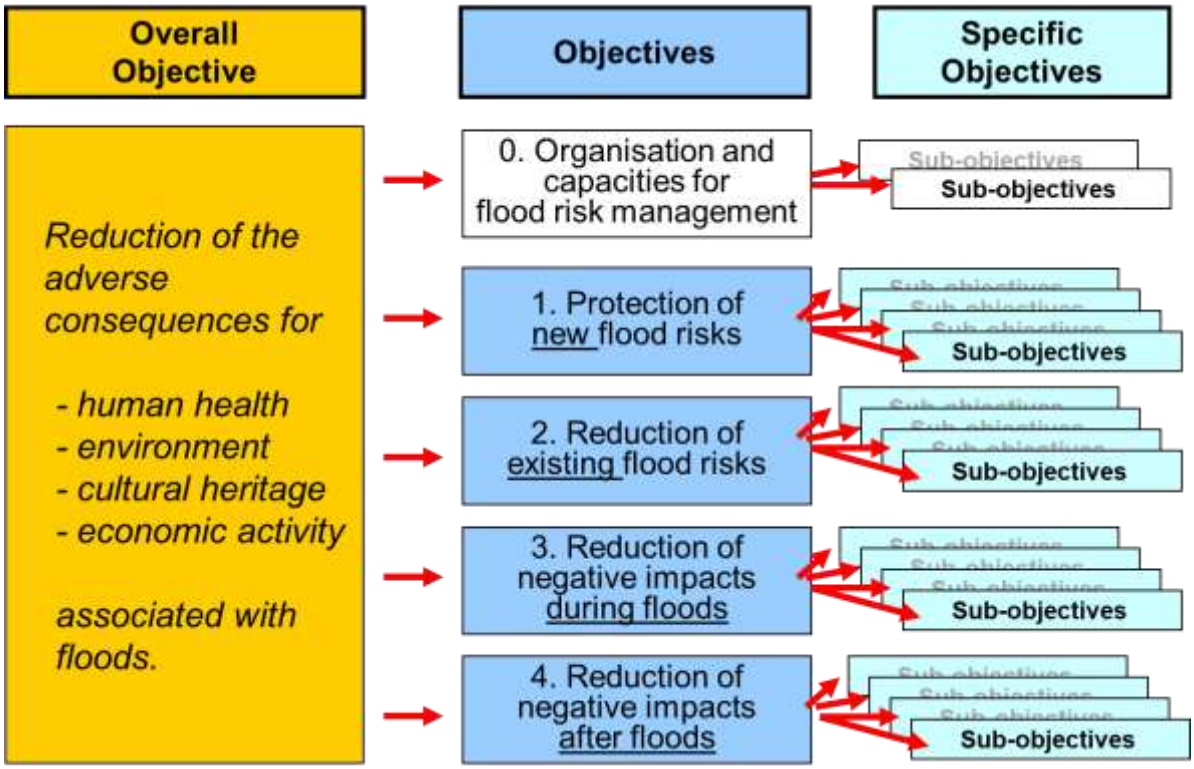


Figure 38: Objectives of flood risk management (according to the EU Flood Directive)

The following table (Table 17 shows all specific objectives:

Table 17: List of adequate objectives for flood risk management in the Shkodër Region

Specific Objective		Reference receptors			
		humans	Environ-ment	cultural heritage	economy
0. Overall objectives: organisation and capacities for flood risk management (acc. to National Water Resources Management Strategy 2018-2027 - SKMIBU)					
0.1	Improved inter-institutional cooperation, information exchange and data sharing in the field of water related risk reduction.	x	x	x	x
0.2	Increased technical and professional capacities and skills to prepare for and to respond to flood events.	x	x	x	x
1. Prevention of new risks in the flood risk areas					
1.1	No increase of existing discharge. Protection of retention functions (flood plains) in and at the rivers / streams.	x	x	x	x
1.2	Prevention of new settlement activities in the flood prone areas if precautionary measures and flood protection cannot be ensured (HQ_{100}/$HQ_{extreme}$).	x	x	x	x
1.3	Prevention of additional risks in all flood risk areas ($HQ_{extreme}$); regarding new buildings and new infrastructure facilities (water supply, wastewater, energy, telecommunication etc.).	x	x	x	x
1.4	Prevent industrial practices in flood-risk areas that could cause hazardous chemicals to leak into waterways during floods (explicitly prevention of non-flood-adapted handling for water-endangering substances).	x	x	x	x
1.5	Prevention of new erosion risks and landslides in flood risk areas with priority for non-structural approaches, considering the important function of trees/forests		x		
1.6	Inspection, maintenance and, when appropriate, improvement of technical flood protection works.	x		x	x
2. Reduction of existing risks in the flood-prone areas					
2.1	Assessment and reduction of the damage potential in flood risk areas (adaptation and raising resistance of existing land use and buildings, transport systems, infrastructure, land use, protection works etc.).	x	x	x	x
2.2	Strengthening of awareness regarding flood risks in the planning process and in building projects.	x	x	x	x
2.3	Improvement of the natural water storage with positive effects on the flood situation (reduction of the peak flows, increasing of the flood retention capacity).	x	x	x	x
2.4	Assessment and protection of storages from environment-endangering substances in flood risk areas and of water/ groundwater from wastewater treatment and agricultural/ farming activities.		x		
2.5	Improvement and identification of technical flood protection measures that do not have negative impact on others, considering the principles of solidarity.	x		x	x
3. Reduction of adverse consequences during a flood event					
3.1	Improvement of the ability to react of the affected population and of facilities managers.	x	x	x	x
3.2	Improvement of the ability to react of administrations and safety organizations at local and regional level.	x	x	x	x
3.3	Improvement of the organizational principles and resources for civil protection and disaster management.	x	x	x	x
4. Reduction of adverse consequences after a flood event					
4.1	Improvement of the damage post-processing by administrations and safety organizations at local and regional levels; also for population and facilities managers.	x	x	x	x
4.2	Protecting against existential financial disasters by insurances and fonds.	x		x	x
4.3	Preparation of flood adapted restoration / rebuilding after damages; preparation of flood related waste management.	x	x	x	x

* Comment: The objectives are developed from the objectives of FRM according to EU Flood Directive. Objectives are linked with the catalogue of types of measures (see Annex A); all selected measures shall contribute to at least one objective. In most cases one measure contributes to more than one objective which indicates its efficiency.

5.2.1. Overall objectives for the organisation of flood risk management

Overall objectives aim at the improvement of working structures in the water sector including flood risk management, especially cooperation, information, and data-management. The objectives are in line with the requirements of the National Water Resources Management Strategy 2018-2027 (SKMIBU) as well as the Drin-Buna Basin Management Plan 2020-2026 (RBMP). Specifically, SKMIBU objectives related to floods are:

- Water risks: reduction of water risks (floods and droughts) through management and investment, which serves all interests, through the application of national legal acts and by-laws, which transpose the relevant EU directives;
- Water information: providing widely recognized models and data on water and climate to all stakeholders and advising the government on water policy-making based on the respective institutions that own these data.

The overall objectives also include the goal raise capacities and skills in all relevant institutions to prepare for and to respond to flood events as well as to improve flood risk management in regard to technical and professional capacities. This includes explicitly the objective to increase the level of expertise of the administration and organizations at the central and local level to improve the cost calculation of flood damage, including the population and administrators of objects.

5.2.2. Objectives for prevention of new risks in the flood risk areas

The objectives assigned to the overall objective prevention or avoidance of new risks aim at first at the maintenance of the runoff and retention function in and along water bodies as well as in the catchment area, so that an increase of discharge and hazards can be prevented (not negative impacts compared with the status quo).

The increasing flood risk shall further be avoided, particularly by prevention of increasing damage potential. Thus, new settlement areas, new houses and new infrastructure should be regulated as long as no flood risk adaptation and flood protection are possible and explicitly foreseen. Also, all other kinds of improvements in flood protection for new objects at risk are covered by this objective.

The avoidance of settlement activities or the adaptation of uses in flood-prone areas prevents particularly the increase of damage potentials and affected persons and thus of risks. The objective also includes the prevention of additional implementation of industrial practices that bring hazardous chemicals into flood risk areas (for extreme events).

To reach the objective of avoiding erosion risk the contribution of afforestation and forestry related with their protective function of slopes, landslides, erosion and stabilizing the slopes shall be considered.

The objective also covers the goals of environmental protection and the ability to adapt, protect and recover from natural hazards. With the decision of the National Council of the Territory No. 5, date 16/10/2017, the "Territorial Development Strategy" was approved. One of the Strategic Objectives of this strategy (No. 5) is: Environmental protection and the ability to adapt, protect and recover from natural hazards. Considering this a very important strategic document (which has passed all the legal stages of approval), this objective is also integrated in the flood risk management plan. In this regard the local strategies and plans of the LGUs are functionally interlinked with the strategies and plans of the central government.

5.2.3. Objectives for reduction of existing risks in the flood-prone areas

Objectives resulting from the overall objective "Reduction of existing risks" focus on the improvement of natural water retention to reduce the risk of flooding as well as the reduction of susceptibility to damage (adaptation to risks) and the reduction of already existing damage potentials.

The objective includes the goals of adaption of the current land use to reduce the risk for urban land use as well as for agricultural land in flood risk areas. This policy was already approved by the Municipality of Shkodër with the Decision of the Municipal Council No. 19, date 24.03.2017, and is also in line with No. 12 of EU-WFD 2000/60 EC.

To reduce existing risk the flood hazard and risk maps (see chapter 4.2/4.3) are of highest importance. If necessary specific maps and assessments regarding critical infrastructure such as warehouses, petrol stations or landfills as well as locations in which chemical fertilizers or other chemicals are stored in flood risk areas should make this objective operational.

5.2.4. Objectives for reduction of adverse consequences during a flood event

The main objective "Reduction of adverse consequences during a flood event" results in objectives focussing on preparedness of the population and the disaster risk management units, information management and organisational as well as operational aspects. Essentially, this is about preparing for a flood event so that the right activities can be taken quickly and in a targeted manner to avoid adverse consequences.

Long term risk communication and setting up alarm and rescue schemes is one most important action field that should be developed with detailed measures under this set of objectives.

5.2.5. Objectives for Reduction of adverse consequences after a flood event

The objectives derived from the overall objective "Reduction of adverse consequences after a flood event" focus on improving the possibilities for post-damage care to quickly overcome the consequences of a flood event. This includes organisational, operational, financial and reconstruction aspects as well as monitoring and documentation of events.

5.3 Crosslinks of specific objectives and risk receptors

According to Article 7(2) of the EU Flood Directive (Annex A.3 of the EU Flood Directive) the FRM-Plan shall document the established appropriate objectives for the management of flood risks for the area of the FRM-Plan. These shall focus on the reduction of potential adverse consequences of flooding for human health, the environment, cultural heritage and economic activity, and, if considered appropriate, on non-structural initiatives and/or on the reduction of the likelihood of flooding. Here the relation of the established objectives with the risk receptors is verified as indicated in

Table 17.

5.3.1. Human health

Basically, all of the established specific objectives for flood risk management in

Table 17 refer to the reduction of risk for “human health” as an asset that is particularly worthy of protection:

- The protection of the individual from harmful exposure that is implying hazard, severe detriments, or disturbance for the public or vicinity in its manner, magnitude or permanence.
- On the other hand, the protection of human health is objectified by a permanent safeguarding of the quality of living in terms of housing, immediate and mediate residential environment and recreational function.

5.3.2. Environment

The risk receptor „environment” is subdivided in various worth protecting goods relevant in flood risk management, namely

- Flora & fauna: protection of biological diversity of flora and fauna and their habitat, especially of forests and nature reserves ensuring functionality and capability.
- Ground & soil: preservation of soil structure from erosion and compaction to safeguard the soil’s natural functions (i.a. biotope development, filtering, and buffering)
- Water: Safeguarding of a good ecological, chemical condition of surface waters and groundwater and the preservation of its quantities within the limits of its regenerative capacity

The specific flood risk management objectives here differ from the other risk receptors leaving out the protection and maintenance of technical flood protection works and specific objectives of financial matter (see

Table 17).

5.3.3. Cultural heritage

The preservation of cultural heritage is accounted as another important focal area. This regards the preservation of historically evolved cultural landscape that includes historic buildings, cultural and archaeological monuments from deformation, fragmentation and other impairment as monuments and memorials are ought to be reasonably used and scientifically explored.

The specific flood risk management objectives of the risk receptor “human health” apply analogously for this risk receptor, leaving out the prevention of erosion and the protection from hazardous substances to water as they are objectified by the category “environment”.

5.3.4. Economic activity

Economic activity as a worth protecting good includes material good in industry and trade, agricultural and forestry businesses and technical infrastructure that are of importance to serve for the public complementing to the quality of life.

As such, the specific flood risk management objectives do not differ from the one in the category “human health” considering for example the protection of retention functions/ flood plains, reduction of damage potential in flood risk areas and the protection from financial disasters.

6 Flood Risk Management Measures

The flood risk assessment (Chapter 4) and the derived objectives for flood risk management (Chapter 5) are the basis for a structured action plan. An elaborated plan of measures serves as a validated framework of action in the catchment area of the Drin-Buna River Basin to achieve the objectives set individually set for the project region. As such, the plan of measures includes theses linkages next to the indication of the priority for implementation, implementation status, responsible and supporting institutions/ entities to take action, as well as the location according to the PFRA (2018) and potential cross border impacts.

For the compilation and documentation of the measures to reduce the flood risk based on the risk analysis and the identification of necessary activities to reduce the identified risks, a catalogue of types of measures was used, which was derived from the types of measures of the EU nomenclature (CIS-process, reporting schemes, evaluation schemes). The catalogue was tailored according to the regional conditions and needs. The catalogue corresponds with the appropriate objectives as for all specific objectives there are types of measures that may contribute to reach the specific objective (see Table 18 and Annex A).

This catalogue of measures was firstly developed and agreed upon in a former regional project on flood risk management in Shkodër Region with the responsible authorities and stakeholders in 2013-2015 (FRM Study 2014). The catalogue was adapted for this FRM-plan due to changed framework conditions and requirements at individual level.

All fields of action were worked through based on the catalogue of types of measures by all involved organisations and in several workshops of the inter-institutional working group (2021-2022). The specific, adequate and necessary local and regional measures were selected together with the regional and local responsible parties. The final action plan (Annex B) contains measures from most fields of action that have been discussed with all relevant stakeholders at local and regional level.

6.1 Catalogue of type of measures

A standard catalogue of types of measures (according to the EU types of measures and according to the EU aspects of flood risk management) was used to select specific measures to reduce flood risk in the project area. The selected measures were specified and localised as local, regional or national measures. Each type of measure contributes to reach one or more specific objectives (see

Table 17 and table 18). This structure and the catalogue of measures were the starting point for the identification of measures to reduce the flood risk in all fields of action.

Table 18: Fields of action: Catalogue of types measures for FRM in the Shkodër Region

No.	Structure of the catalogue of measures: fields of action	Link to FRM Objective (chap. 5.2)
1.	**Aspect: Prevention of risks**	
1.1.	**Administrative Instruments** (for avoidance of risk)	
1.1.1.	*Mapping of flood risk areas*	0.1., 0.2., 1.2., 2.2.
1.1.2.	*Restriction for building in risk areas (in spatial planning / urban planning)*	0.1., 0.2., 1.2., 1.3., 2.1., 2.2.
1.1.3.	*Protection of the flood plains and retention areas*	1.1., 1.3., 1.5., 2.1., 2.3.
1.2.	**Adaptation of Land Use** (for avoidance of risk, removal or relocation and reduction of risk)	
1.2.1.	*Adaptation of existing land use in flood risk areas (including agriculture and forestry)*	1.3., 2.1.
1.2.2.	*Adaptation of constructions and infrastructure in risk areas (flood adapted planning and building)*	1.3., 2.1.
1.2.3.	*Consultation of agriculture and forestry for awareness-raising*	1.5., 2.2.
1.3.	**Risk prevention by flood adapted building**	
1.3.1.	*Flood adapted handling for water imperilling substances*	1.4., 2.1., 2.4.
2.	**Aspect: Natural Flood Protection**	
2.1.	**Natural flood management, water flow regulation**	
2.1.1.	*Revitalisation of river beds and river banks / former flood plains*	1.3., 2.1.
2.1.2.	*Changing of river courses and slope conditions*	1.1., 1.3., 1.5., 2.1.
2.1.3.	*Protection of zones along river banks*	1.1., 1.3., 1.5., 2.1.
2.1.4.	*Support of the development of natural floodplains*	1.1., 1.3., 2.1.
2.1.5.	*Modified extensive river maintenance*	1.1., 1.3., 1.5., 2.1.
2.1.6.	*Disconnection / Removal of pavements in urban areas / Rainwater management*	1.3., 2.1.
2.2.	**Reactivation of retention areas** (runoff regulation / water flow regulation)	
2.2.1.	*Deconstruction a dike or dam*	1.3., 2.1., 2.3.
2.2.2.	*Setting back dikes*	1.3., 2.1., 2.3.
2.2.3.	*Removal of an artificial bank*	1.3., 2.1., 2.3.
2.2.4.	*Connection of a retention-relevant terrain (e.g. back waters, old river arms)*	1.3., 2.1., 2.3.
3.	**Aspect: Technical Flood Protection**	
3.1.	**Water Flow Regulation / Flood plain works** (Retention measures)	
3.1.1.	*Construction of a retention pond*	1.3., 2.1., 2.3.
3.1.2.	*Creation of a retention polder*	1.3., 2.1., 2.3.
3.1.3.	*Restoration, expansion or improvement of existing retention systems (dams / ponds / polders)*	1.1., 1.3., 1.6., 2.1., 2.3.
3.2.	**Water Flow Regulation / Channels** (Dikes, Dams, Flood Walls and Mobile Flood Protection)	
3.2.1.	*Flood protection works (dike, dam or flood wall)*	1.3., 2.1.
3.2.2.	*Strengthening of existing flood protection works*	1.3., 1.6., 2.1.
3.2.3.	*Adoption of a mobile (stationary) flood protection system*	1.3., 2.1.
3.2.4.	*Drainage in diked area and backflow protection*	1.3., 1.6., 2.1.
3.3.	**Water Flow Regulation / Channels** (Measures in the rivers / river training)	
3.3.1.	*Keeping clear cross-sections in settlement areas*	1.3., 1.6., 2.1.
3.3.2.	*Removal of bottlenecks / narrow passages in rivers*	1.3., 1.6., 2.1.
3.3.3.	*Construction and strengthening of a bypass channel*	1.3., 1.6., 2.1.
3.4.	**Surface water management** (Measures of urban water management)	
3.4.1.	*Rainwater management*	1.1., 1.3., 2.1., 2.3.
3.4.2.	*Development of a municipal retention system (e.g. rainwater storage canal*	1.3., 2.1., 2.3.
3.4.3.	*Flood-adapted improvement of a drainage system (e.g. bar screen, non-return flap)*	1.3., 1.6., 2.1., 2.3.
3.5.	**Protection of object / facilities**	
3.5.1.	*Object / Facility protection of individual buildings*	1.3., 2.1.
3.5.2.	*Object / Facility protection of infrastructure facilities (e.g. transport, energy, water systems)*	1.3., 2.1.
3.6.	**Other protection measures**	
3.6.1.	*Improvement of the storage management of dammed river systems / reservoirs*	1.3., 1.6., 2.1., 2.3.
3.6.2.	*Protection against seepage and ground water*	1.4., 2.1., 2.4.
4.	**Aspect: Preparedness and Information**	
4.1.	**Economical / financial preparedness**	
4.1.1.	*Financial precautions by reserves and insurances (insurance against natural hazards)*	4.2.
4.2.	**Informational preparedness**	
4.2.1.	*Improvement of flood forecast and flood warning / messaging*	0.2., 3.2., 3.3.
4.3.	**Behavior-related preparedness**	
4.3.1.	*Publication of flood hazard and flood risk maps close to the spot*	3.1.
4.3.2.	*Continuing advancement of awareness raising and publicity*	3.1.
4.4.	**Allowance, preparation and post-processing of hazard control**	
4.4.1.	*Alignment or optimization of alert and operation schemes (disaster management schemes)*	0.2., 3.2., 3.3.
4.4.2.	*Civil Protection*	0.2., 3.2., 3.3.
4.4.3.	*Collection and analysis of experiences concerning flood events*	0.1., 0.2., 2.2., 3.2., 3.3., 4.1.

6.2 Implementation status of measures

All measures are assessed regarding their status of implementation. The following statuses are used (according to the categories of the EU-reporting schemes, CIS-process):

Table 19: Description of status of implementation of measures in the action plan

Status / name	Explanation
All status:	The measure is identified to be necessary or to be potentially helpful to reduce the flood risk according to the appropriate objectives, it is listed in the action plan, and it is/has …
(NS) - Not started	… not started yet (not planned in detail, no study exists on effectiveness or feasibility of this specific measure).
(P) - Planned	… planned in more detail including concept for implementation, but implementation has not started (e.g. funds are not available or permissions are pending).
(OGM) - Ongoing maintenance	… in the regular or recurrent implementation phase (the type of measure has no fixed completion date or never determines, but has to be implemented periodically or ongoing, like cleaning activities, or information campaigns, periodical publication of information, regular meetings etc.).
(OGC) - Ongoing construction	… a construction measure that is in the realisation phase before the completion (for types of measure that are constructions or other activities with a clear end date of completion, not recurrent).

The status “Com – Completed” was not used because in this first FRM-Plan for the region only those measures shall be documented, that are planned to be taken at present or in future to reduce the risk. Already completed measures are described in the documentation of the hydrologic situation of the river network and the land use in chapter 2.4. The status C”COM – completed” will be used in the 2nd cycle of the FRM-Plan for the region to allow the assessment of progress of all measures (including those that will be completed by then).

All 128 measures are specified as good as possible with information on locations, implementation status and further details (see list of measures in Annex B).

6.3 Selected measures in the area

Measures distributed according to local government units in total are 144 . In this total number all measures are counted per LGU which means that a measure that shall be implemented in more than one LGU is counted for all named LGUs (just a measure that is implemented once for the whole region (“all LGU”) is counted as one single measure.

The action plan (Annex B) consists of 128 different measures, of which 10 are named for 2 or more locations in different LGU. The distribution of the measures among the four aspects of flood risk management is shown in Table 20.

Table 20: Distribution of all flood risk management measures among EU-aspects of FRM

EU-aspect of FRM	Count of measures in EU-aspect of FRM [number]	Count of measures in EU-aspect of FRM [%]
1. Aspect: Prevention of Risk	41	32 %
2. Aspect: Natural Flood Protection	24	19 %
3. Aspect: Technical Flood Protection	45	35 %
4. Aspect: Preparedness and Information	18	14 %

The overview in Figure 39 shows measures correspondent to the four EU-aspects of flood risk management and also their status of implementation.

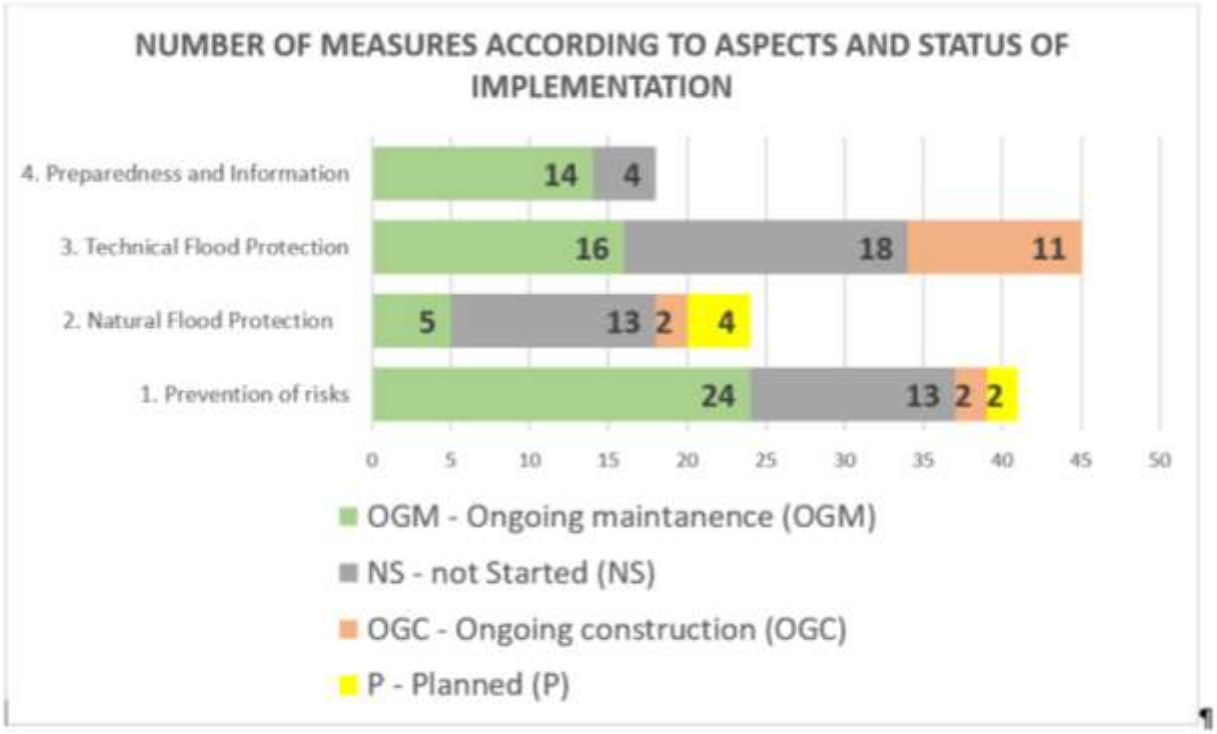


Figure 39: Flood risk management measures and their status of implementation

The figure illustrates a high count of ongoing measures (ca. 58%) and of measures that have not yet started (ca. 38%). This reflects the already progressing efforts and commitment towards flood risk management of responsible authorities in Shkodër Region.

Amongst these ongoing activities, the relatively high count of measures of ‘ongoing maintenance’ status especially in the categories “prevention of risks” and “Preparedness/Information” but also “Technical Flood Protection” results from ongoing or maintenance activities that have no defined completion date but which have to be repeated regularly. This high numbers with that status are in line with the strategy of the EU Flood Directive to give priority to non-structural measures as they are most cost-effective. There are some structural measures that are accounted as an ‘ongoing maintenance’ activity, which refer to regular cleaning and maintenance works.

Structural measures in general, mainly common in the categories of natural and technical flood protection (2. and 3. aspect), are mostly cost-intensive, need detailed planning and formal approval procedures and these are thus depending on funds as well as planning and permission procedures. Less progress in implementation is quite common for these fields of action. At a first glance, Figure 39 does not reflect this standard for the case of Shkodër Region.

However, with a closer look (please refer to the respective sub-chapter for further details), low implementation in these aspects is apparent. It is recommended for measures that have not yet been started to be considered for the FRM-cycle 2023-2028; in the best case with prioritisation for planning, financing and implementation given to the most effective measures in terms of risk reduction.

Next to this focus, measures that have not yet started in the field of action ‘prevention of risks’ (1. aspect) and ‘preparedness and information’ (4. aspect) should be imperatively addressed for the FRM-cycle 2023-2028 as they are most-likely cost-efficient.

Figure 40 gives a more detailed overview considering the distribution of the measures among the specific fields of action and their status of implementation of each aspect.

Detailed documentation of all measures can be found in the annex. The following sub-chapters provide further analysis of measures for each of the four EU-aspects of FRM.

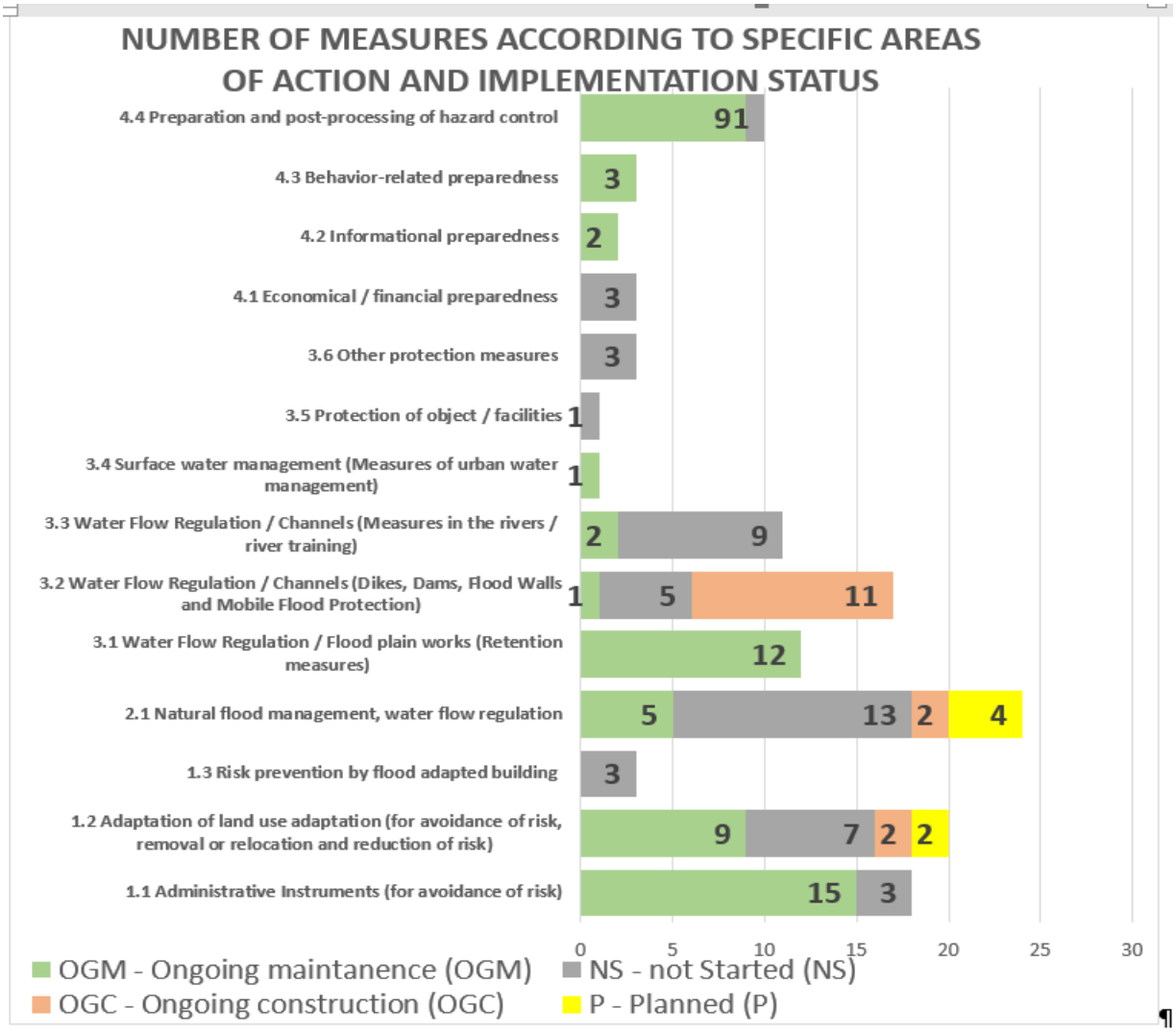


Figure 40: Flood risk management measures in the specific fields of action and their status of implementation

The following tables 21 and 22 list the number of selected measures on LGU level and on APSFR level as well as the total number of selected measures for the project area in the different types of measures and risk management aspects.

Note:
the total numbers of selected measures seem to differ between the tables 21 and 22. This results from different break down of the counting: e.g. one measure per APSFR includes several measures if counted on LGU-level. And 1 measure in the column "all LGU" includes 8 measures if counted per LGU. If consequently counting on LGU level the total number of measures would be 522 (90 specific measures that can be allocated in single LGU plus 54 measures that are allocated in 8 LGU; 90+(8X54)=522).
This observation also indicates that counting the measures may be supportive for statistical purposes or the give an overview on the content and focus of the plan, but is has no further indication regarding e.g. the quality of the plan etc.

Table 21: Number of selected measures on local and regional level (allocation per LGU)

No.	Type of Measure (Shkodër Region)	Total number of measures									
		Ana e Malit	Berdicë	Bushat	Dajç	Gur i Zi	Rre-	Shko-	Velipoj ë	All LGU	**Total**
1.	**Aspect: Prevention of risks**	**4**	**1**	**4**	**2**	**1**	**1**		**3**	**30**	**46**
1.1	**Administrative Instruments**			**2**	**1**				**1**	**15**	**19**
1.1.1.	Mapping of flood risk areas									6	6
1.1.2.	Restriction for building in risk areas									6	6
1.1.3.	Protection of the flood plains and retention areas			2	1				1	3	7
1.2	**Adaptation of Land Use**	**4**	**1**	**2**	**1**	**1**	**1**		**2**	**12**	**24**
1.2.1.	Adaptation of existing land use in flood risk areas		1	1	1	1	1		2	3	10
1.2.2.	Adaptation of constructions and infrastructure in risk areas	3		1						7	11
1.2.3.	Consultation of agriculture and forestry for awareness-raising	1								2	3
1.3	**Risk prevention by flood adapted building**									**3**	**3**
1.3.1.	Flood adapted handling for water imperilling substances									3	3
2.	**Aspect: Natural Flood Protection**	**6**	**3**	**1**	**5**	**5**	**1**	**3**	**2**	**3**	**29**
2.1	**Natural flood management**	**6**	**3**	**1**	**5**	**5**	**1**	**3**	**2**	**3**	**29**
2.1.1.	Revitalisation of river beds and river banks / former flood plains	1			2	2					5
2.1.2.	Changing of river courses and slope conditions	2	1				1			1	5
2.1.3.	Protection of zones along river banks		1		1	3				1	6
2.1.4.	Support of the development of natural floodplains	1		1	1				1	1	5
2.1.5.	Modified extensive river maintenance	1	1		1			1	1		5
2.1.6.	Disconnection / Removal pavements in urban areas / Rainw. man.	1						2			3
2.2	**Reactivation of retention areas**										
2.2.1.	Deconstruction a dike or dam										
2.2.2.	Setting back dikes										
2.2.3.	Removal of an artificial bank										
2.2.4.	Connection of a retention-relevant terrain										
3.	**Aspect: Technical Flood Protection**	**5**	**8**	**1**	**10**	**5**	**3**	**3**	**11**	**6**	**52**
3.1	**Water Flow Regulation / Flood plain works**	**1**	**2**	**1**	**3**	**1**	**2**	**2**	**3**		**15**
3.1.1.	Construction of a retention pond										
3.1.2.	Creation of a retention polder										
3.1.3.	Restoration, expansion or improvement of existing retention systems	1	2	1	3	1	2	2	3		15
3.2	**Water Flow Regulation (e.g. dikes)**	**1**	**2**		**5**	**3**	**1**	**1**	**5**	**2**	**20**
3.2.1.	Flood protection works	1									1
3.2.2.	Strengthening of existing flood protection works					1				2	3
3.2.3.	Adoption of a mobile (stationary) flood protection system										
3.2.4.	Drainage in diked area and backflow protection		2		5	2	1	1	5		16
3.3	**Water Flow Regulation (e.g. river training)**	**1**	**4**		**2**	**1**			**2**	**2**	**12**
3.3.1.	Keeping clear cross-sections in settlement areas	1	1			1				2	5
3.3.2.	Removal of bottlenecks / narrow passages in rivers		1								1
3.3.3.	Construction and strengthening of a bypass channel		2		2				2		6
3.4	**Surface water management**									**1**	**1**
3.4.1.	Rain water management									1	1
3.4.2.	Development of a municipal retention system										
3.4.3.	Flood-adapted improvement of a drainage system										
3.5	**Protection of object / facilities**	**1**									**1**
3.5.1.	Object / Facility protection of individual buildings										
3.5.2.	Object / Facility protection of infrastructure facilities	1									1
3.6	**Other protection measures**	**1**							**1**	**1**	**3**
3.6.1.	Improvement of the storage management of dams/reservoirs										
3.6.2.	Protection against seepage and ground water	1							1	1	3
4.	**Aspect: Preparedness and information**	**2**								**15**	**17**
4.1	**Economical / financial preparedness**									**3**	**3**
4.1.1.	Financial precautions by reserves and insurances									3	3
4.2	**Informational preparedness**									**2**	**2**
4.2.1.	Improvement of flood forecast and flood warning / messaging									2	2
4.3	**Behavior-related preparedness**									**3**	**3**
4.3.1.	Publication of flood hazard and flood risk maps close to the spot									2	2
4.3.2.	Continuing advancement of awareness raising and publicity									1	1
4.4	**Allowance, preparation, post-processing**	**2**								**8**	**10**
4.4.1.	Alignment or optimization of alert and operation schemes									2	2
4.4.2.	Civil Protection	2								5	7
4.4.3.	Collection and analysis of experiences concerning flood events									1	1
	Total: measures per LGU	**17**	**11**	**6**	**17**	**11**	**5**	**6**	**16**	**54**	**144**

Table 22: Number of selected measures on local and regional level (allocation per APSFR)

No.	Type of Measure (Shkodër Region)	number of measures in APSFR			
		AL-4	AL-5	AL-6	Total
1.	**Aspect: Prevention of risks**	29	29	41	99
1.1	**Administrative Instruments**	14	14	18	46
1.1.1.	Mapping of flood risk areas	6	6	6	18
1.1.2.	Restriction for building in risk areas	6	6	6	18
1.1.3.	Protection of the flood plains and retention areas	2	2	6	10
1.2	**Adaptation of Land Use**	**12**	**12**	**20**	**44**
1.2.1.	Adaptation of existing land use in flood risk areas	3	3	6	12
1.2.2.	Adaptation of constructions and infrastructure in risk areas	7	7	11	25
1.2.3.	Consultation of agriculture and forestry for awareness-raising	2	2	3	7
1.3	**Risk prevention by flood adapted building**	**3**	**3**	**3**	**9**
1.3.1.	Flood adapted handling for water imperilling substances	3	3	3	9
2.	**Aspect: Natural Flood Protection**	**5**	**6**	**21**	**32**
2.1	**Natural flood management**	**5**	**6**	**21**	**32**
2.1.1.	Revitalisation of river beds and river banks / former flood plains			5	5
2.1.2.	Changing of river courses and slope conditions	1	2	4	7
2.1.3.	Protection of zones along river banks	1	1	6	8
2.1.4.	Support of the development of natural floodplains	1	1	4	6
2.1.5.	Modified extensive river maintenance			1	1
2.1.6.	Disconnection / Removal pavements in urban areas / Rainw. man.	2	2	1	5
2.2	**Reactivation of retention areas**				
2.2.1.	Deconstruction a dike or dam				
2.2.2.	Setting back dikes				
2.2.3.	Removal of an artificial bank				
2.2.4.	Connection of a retention-relevant terrain				
3.	**Aspect: Technical Flood Protection**	**4**	**8**	**41**	**53**
3.1	**Water Flow Regulation / Flood plain works**	**1**	**2**	**10**	**13**
3.1.1.	Construction of a retention pond				
3.1.2.	Creation of a retention polder				
3.1.3.	Restoration, expansion or improvement of existing retention systems	1	2	10	13
3.2	**Water Flow Regulation (e.g. dikes)**	**2**	**4**	**16**	**22**
3.2.1.	Flood protection works			1	1
3.2.2.	Strengthening of existing flood protection works	2	2	3	7
3.2.3.	Adoption of a mobile (stationary) flood protection system				
3.2.4.	Drainage in diked area and backflow protection		2	12	14
3.3	**Water Flow Regulation (e.g. river training)**			**11**	**11**
3.3.1.	Keeping clear cross-sections in settlement areas			5	5
3.3.2.	Removal of bottlenecks / narrow passages in rivers			1	1
3.3.3.	Construction and strengthening of a bypass channel			5	5
3.4	**Surface water management**		**1**		**1**
3.4.1.	Rain water management		1		1
3.4.2.	Development of a municipal retention system				
3.4.3.	Flood-adapted improvement of a drainage system				
3.5	**Protection of object / facilities**			**1**	**1**
3.5.1.	Object / Facility protection of individual buildings				
3.5.2.	Object / Facility protection of infrastructure facilities			1	1
3.6	**Other protection measures**	**1**	**1**	**3**	**5**
3.6.1.	Improvement of the storage management of dams/reservoirs				
3.6.2.	Protection against seepage and ground water	1	1	3	5
4.	**Aspect: Preparedness and information**	**15**	**15**	**18**	**48**
4.1	**Economical / financial preparedness**	**3**	**3**	**3**	**9**
4.1.1.	Financial precautions by reserves and insurances	3	3	3	9
4.2	**Informational preparedness**	**2**	**2**	**2**	**6**
4.2.1.	Improvement of flood forecast and flood warning / messaging	2	2	2	6
4.3	**Behavior-related preparedness**	**3**	**3**	**3**	**9**
4.3.1.	Publication of flood hazard and flood risk maps close to the spot	2	2	2	6
4.3.2.	Continuing advancement of awareness raising and publicity	1	1	1	3
4.4	**Allowance, preparation, post-processing**	**7**	**7**	**10**	**24**
4.4.1.	Alignment or optimization of alert and operation schemes	2	2	2	6
4.4.2.	Civil Protection	4	4	7	15
4.4.3.	Collection and analysis of experiences concerning flood events	1	1	1	3
	Total: measures per LGU	**53**	**58**	**121**	**232**

Note:
Type of measures "marked in grey" are not foreseen to be implemented in Annex B of measures to be implemented in FRMP.

According to the allocation of measures in the APSFR per aspect of flood risk management Table 23 gives an overview (the total number of measures is higher due to measures that are allocated in more than one measure; summarised in the action plan as one measure for "all LGU"):

Table 23: Number of selected measures according to their allocation in the APSFR

No. of measures in the APSFR	AL-4	AL-5	AL-6
1: Aspect: Prevention of risks	29	29	41
2: Aspect: Natural Flood Protection	5	6	21
3: Aspect: Technical Flood Protection	4	8	41
4: Aspect: Preparedness and Information	15	15	18
Total	**53**	**58**	**121**

From the tables above it becomes obvious that not for all types of measures of the catalogue specific measures have been selected for the project area. This is reasonable since the situation and the need for flood risk reduction is not the same in all flood risk areas. E.g. the type 2.2 (reactivation of retention areas) was not identified a appropriate measure at the moment for this FRM-Plan, because retention is a measure for the upstream areas but not in the lowland and the delta area. For Shkodër Region measures have been selected for most types of measures, but not for all.

6.3.1. Aspect 1: Risk Prevention

Risk prevention measures are divided into three categories (1.1.-1.3.):

- Administrative instruments to create/ improve the policy basis for avoidance of risk,
- Measures for adaptation of land use and
- Risk prevention by flood adapted building

Figure 41 gives an overview on the measures that have been considered necessary on communal, regional and national level for FRM in Shkodër Region (all LGU).

The FRM-Plan includes 41 measures that focus on flood risk prevention and avoidance of new risks. The majority of measures in this field of action have an 'ongoing maintenance'

character. The figure illustrates that 17 measures are identified as supportive to reduce risk and should be initiated and implemented within this upcoming 6-years-cycle.

Comparing the three categories within this EU-aspect of FRM, the protection of the environment from potentially water polluting substances in case of floods (1.3.) plays yet a minor role. Therefore, it is recommended to have further studies to be initiated to not to neglect this prevention category.

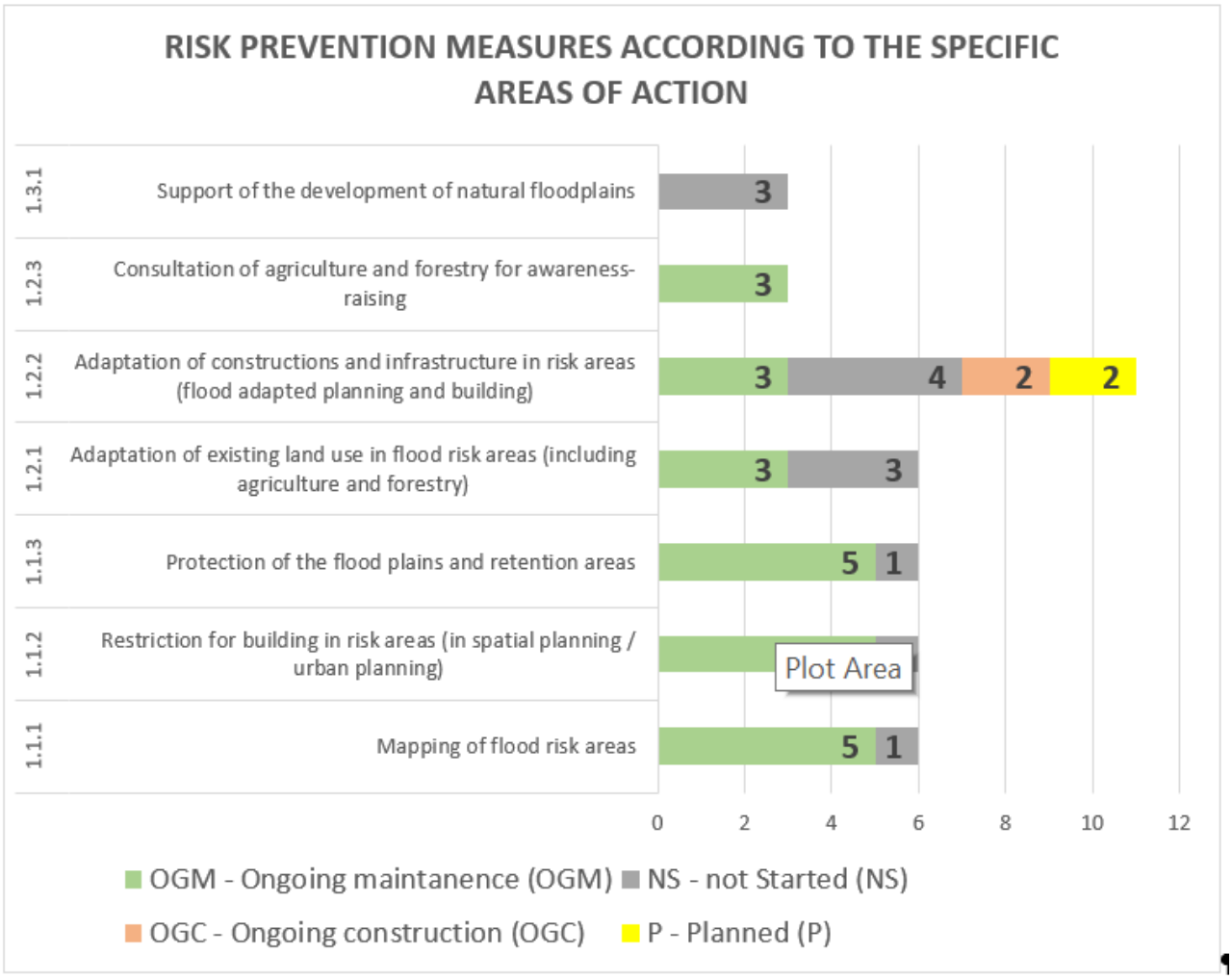


Figure 41: Risk prevention measures and their status of implementation

6.3.2. Aspect 2: Natural Flood Protection

Natural flood protection measures are divided into two categories (2.1. and 2.2.):

- Natural flood management and
- Reactivation of retention areas

Each category of natural protection measures contains several specific measures, which are shown in Figure 42. In addition, the figure shows the implementation status of the measures in each field of action for the Shkodër Region.

For this field of action (natural flood protection measures) the figure illustrates the focus on riverbed maintenance, keeping clear of water bodies and channels and the revitalisation of riverbanks, as well as nature-based solutions for the improvement of embankments and the protection of riverbanks and zones along the water courses. Re-developing natural flood plains to protect the riverbanks and also to increasing retention capacities have an additional major importance in this action field.

Water retention in the catchment, nature-based solutions for water storage in retention areas, rainwater storage and infiltration as well as the disconnection and removal of paved surfaces or constructions on riverbanks are not yet part of the FRM-agenda. Here, further studies might help to initiate solutions and measures.

Compared to all other EU-aspects of FRM, this field is low in implementation. The realisation of measures in this action field often requires funds for detailed planning, feasibility and impact studies and constructions. To further progress in this field of action, additional capacities in terms of staff and budgets need to be appointed.

Planning and permission procedures cause slower progress in this field of action compared with less structural measures additionally. This is, compared with similar studies and FRM-Plans from other river basins and regions throughout Europe, typical. To progress in this field, it is recommended to focus on the most effective measures that have not yet started in terms of flood risk reduction for the next FRM-period.

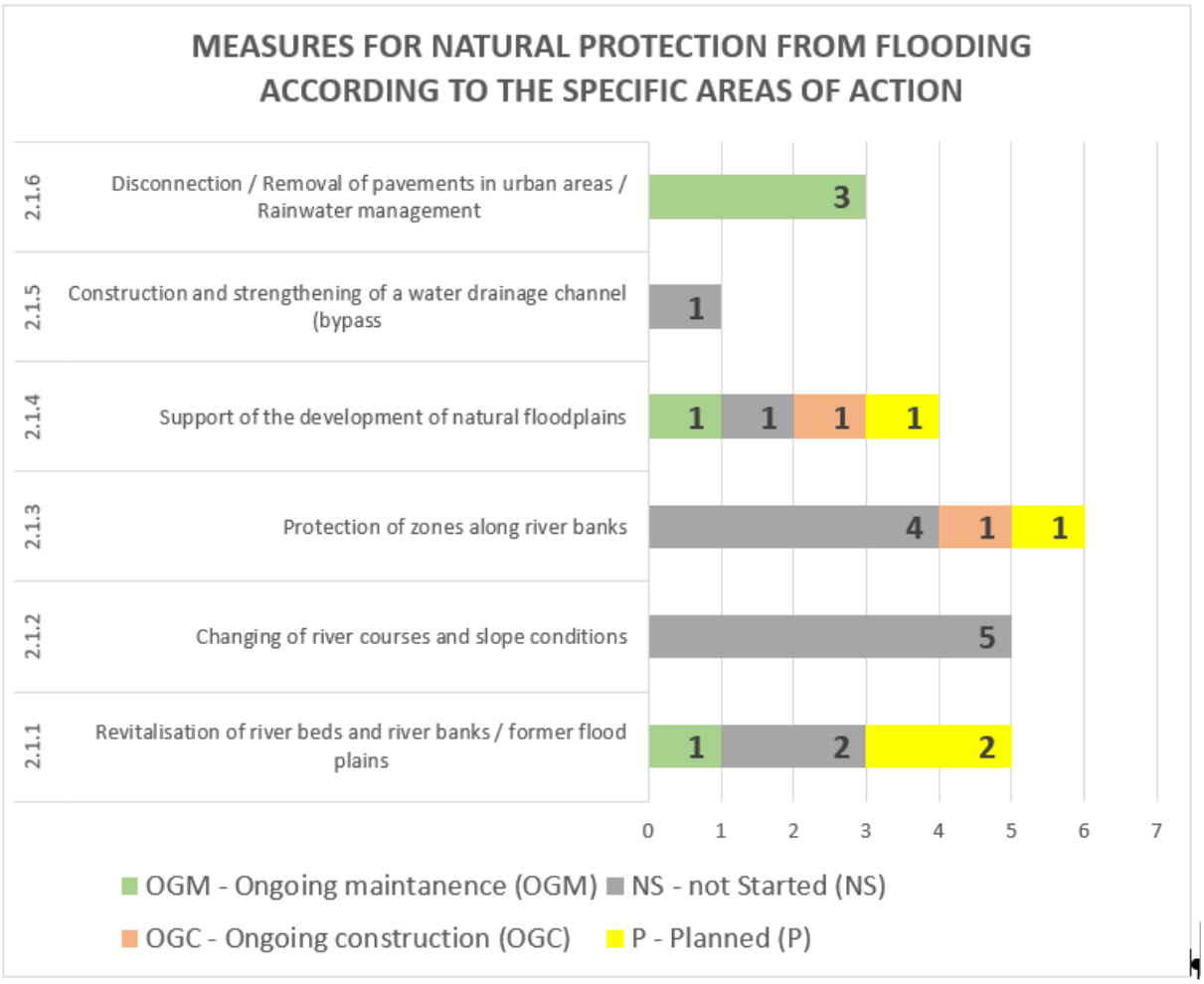


Figure 42: Natural flood protection measures and their status of implementation

6.3.3. Aspect 3: Technical flood protection

Technical flood protection measures are divided into six categories (3.1.-3.6.):

- Water flow regulation regarding increased retention (in flood plains)
- Water flow regulation regarding protection (dike, dams, flood walls)
- Water flow regulation regarding increased/ ensuring river/channel discharge
- Surface water management regarding storm water in the catchment (urban, rural)
- Technical protection of objects and facilities/infrastructure and
- Other protection measures

Each category of technical protection measures contains several specific fields of action and specified measures, which are illustrated in Figure 43 including their status of implementation.

For this field of action (technical flood protection measures) the total number of measures 45) and the implementation status is low or the lowest compared with the other fields of action, taking out measures in the category 3.1.3. as these refer to regular maintenance works in the drainage channels in different flooded areas and measures in category 3.2.4. as these refer to the reconstruction of existing embankments in different relevant areas.

Leaving out ongoing measures in 3.1.3. and 3.2.4. allows an in-depth analysis as follows.

It is not surprising that a high number of measures not yet started are dominating this category as technical flood protection measures, similar as natural flood protection measures, often require funds for detailed planning, feasibility and impact studies and constructions. Additionally, planning and permission procedures cause slower progress in this field of action compared with less structural measures. This is, compared with similar studies and FRM-Plans from other river basins and regions throughout Europe typical.

Furthermore, hazard and risk maps for the region of Shkodër clearly show the large risk area that includes several villages, houses, and infrastructure. As a region in the downstream area of the Drin/Buna-River Basin the flood risk is mainly a result of upstream activities and impacts. Thus, technical protection in this region has either

- limited effectiveness in terms of significant flood risk reduction, because local protection measures that are feasible have limited local risk reduction potential or
- technical measures for such an extensive and flat risk area are cost-intensive (i. e. high dams, comprehensive change of water courses, large retention ponds, profound technical protection works at objects etc.), with still limited impact.

The additional challenge is to design technical flood protection at one location without negative impacts for another location (downstream, cross-border).

Hence, the small number of technical flood protection measures in the FRM-Plan until today reflects the specialities of this region, i. e. characteristics of a downstream area/ Delta region and specific origin of flood risk upstream, so that cost-effective technical measures are difficult to identify. The EU Flood Directive calls for a priority on the most cost-effective non-structural measures, which is reflected in this FRM-Plan.

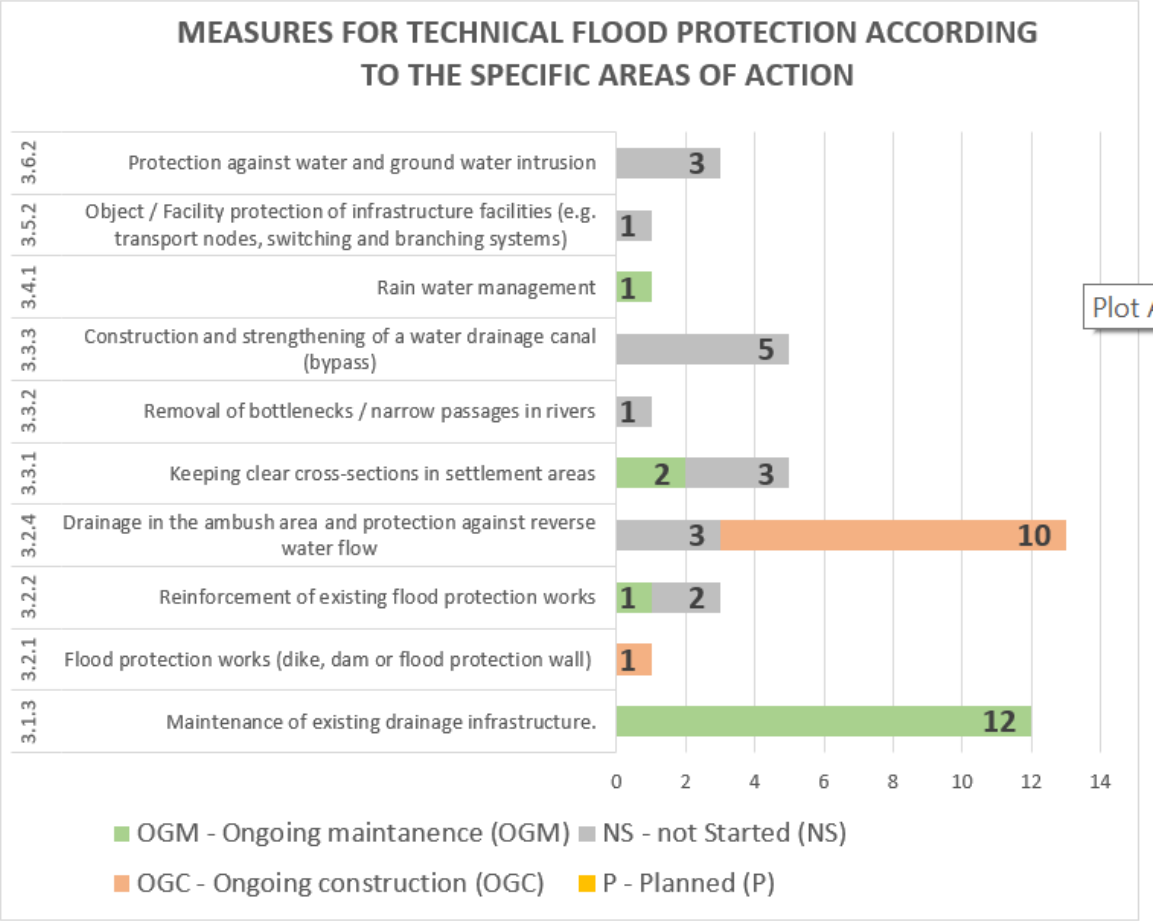


Figure 43: Technical flood protection measures and their status of implementation

As consequence the technical measures that have already been initiated and are of 'on-going character' (see Figure 43) focus on the maintenance and improvement/ strengthening of existing flood protection works and the maintenance of the riverbanks and channels.

All in all, to progress in this field of action by tackling measure not yet started, additional capacities in terms of staff and budgets need to be appointed. Further investigations need to review the feasibility and financing of the implementation of listed protection measures, especially when it comes to protect certain critical infrastructure, i. e. protection of specific objects, like water supply infrastructure, energy and communication infrastructure etc.) and to increase and management the retention capacities to reduce the flood risk in the area such as controlled flooding of sections to protect more valuable other sections.

6.3.4. Aspect 4: Preparedness and information

Preparedness and information measures are divided into four categories (4.1.-4.4.):

- Economical preparedness,

- Informational preparedness (forecast and warning),
- Behaviour-related preparedness and allowance and
- Preparation and post-processing of hazard control.

Each of these fields of action contains several specific measures, which are shown in Figure 44 including the respective status of implementation of the measures.

In this field of action 18 measures are relevant for the whole project area. Most of the measures that have already been initiated are related to flood forecasting, warning and alarm schemes/ systems as wells as to different task for the improvement of the preparedness of civil protection and emergency/ disaster management. A fundamental prerequisite for all activities in this field of action is the regular updating and provision of flood hazard and risk maps.

Amongst the other three EU-aspects of FRM, this field of action has the relatively highest percentage of ongoing measures compared to measures not yet started. The status of the implementation of the measures in this field of action indicates an ongoing process of improvements. Inherently, for this category, the majority of respective measures are of 'ongoing maintenance' character which allows the interpretation that measures have been started, are periodically recurrent and in regular review and improvement. However, the quality of the implementation may differ from one measure to the other.

All in all, the high number of ongoing measures in this action field reflects the proofed high importance of preparedness and information for the reduction of damages and casualties in extreme flood situations. Only with proper information and awareness on the one hand, and preparation of the public and of civil emergencies as well as other responsible organisations on the other hand, damage reducing activities can be carried out properly and effectively.

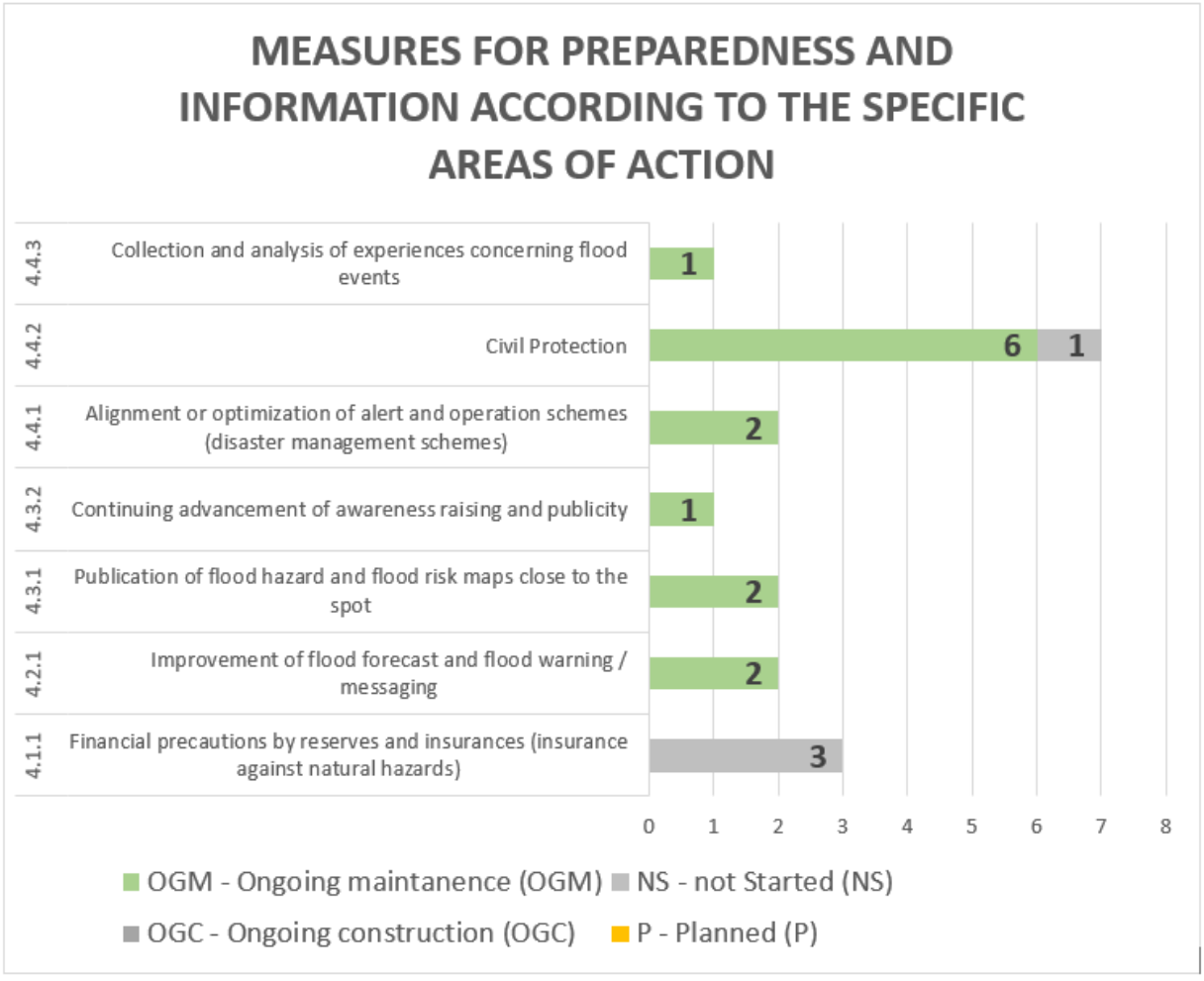


Figure 44: Preparedness and information measures and their status of implementation

Next to measures considering financial preparedness, i. e. insurance schemes, especially regular monitoring of the progress of all instruments, campaigns, trainings and improvements of schemes and structures remain relevant also for the next period 2023-2028 in this field of action.

6.4 Measures according to risk areas and selected measures and status of implementation per LGU

The following Figure 45 gives an overview of the distribution of the measures according to the 4 main aspects and the territory of the areas identified with the risk of flooding Drin-Buna 4, 5 and 6 and Figure 46 gives the distribution of the measures

in the four main fields of action allocated to the different LGUs in the project area and those measures that cover all LGUs. All details on the selected measures per LGU, per

specific field of action, the implementation status and the responsibility for implementation is listed in the Annex B.

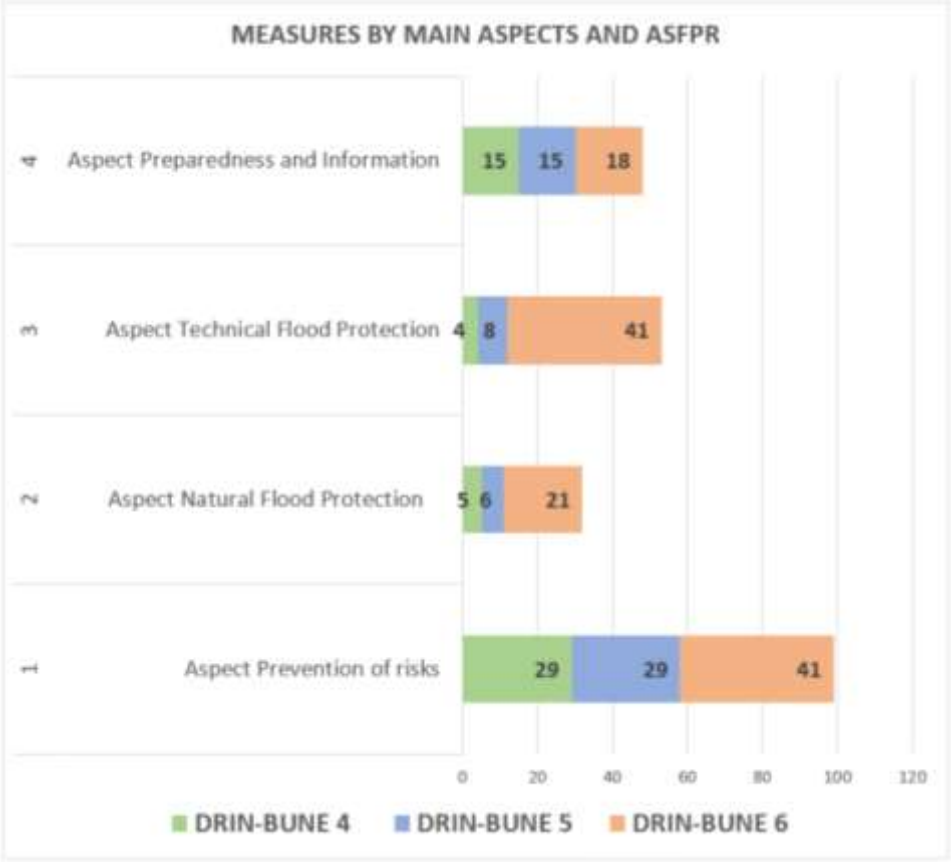
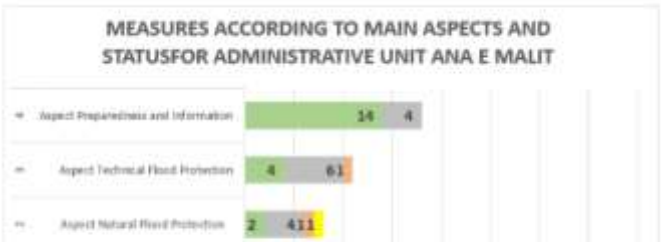
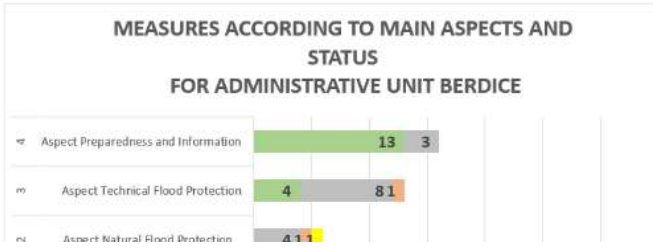
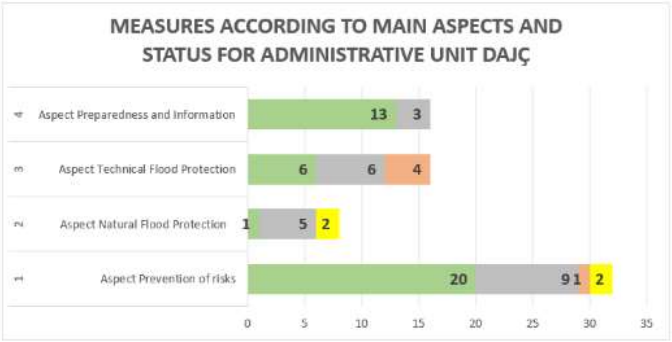


Figure 45: Measures according to areas with a risk of flooding







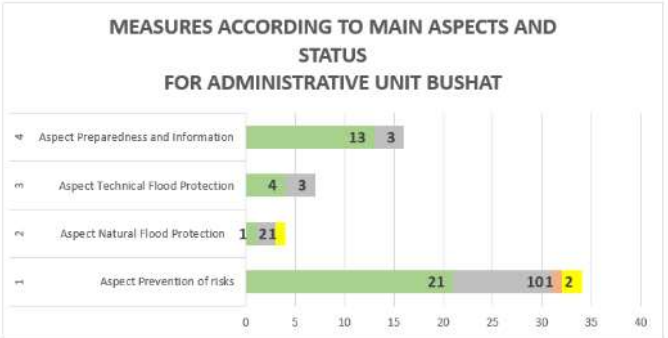


Figure 46: Measures and implementation status in the fields of action in the different LGU

6.5 Priorities for implementation of measures

The selected measures are rated regarding the following criteria:

- Positive impacts (regarding the objects of FRM);
- (Indirect) negative impacts (potential ecological effects or negative effects on others);
- Complexity / costs (easy to realize or difficult / cost intensive).

The following assessment scheme delivers the criteria:

Criteria	**positive**	**neutral / medium**	**negative**
Effects on risk reduction	• Clear contribution to one or more objective can be expected within 12 months. • Reduction of risk / of damage in the next flood event can be expected.	• Impacts are not clear. • Contributions to one or more objective can be expected on a medium or long term.	• In total realistically in the named area no positive effects are expected.

Criteria	positive	neutral / medium	negative
Negative (ecologic) effects	• No negative impact can be seen based on present knowledge.	• Impacts cannot be assessed based on the present state of planning / knowledge.	• Potentially negative impacts on ecology or on other areas / regions.
Complexity of realisation / chance to be realised	• Realisation is not complex. • Can be realised within 12 months mainly with own resources.	• Can be realised within 12 – 24 months. • Realisation mainly with own resources; additional resources are necessary but might be activated.	• Very complex. • Additional studies / planning are necessary. • Cannot be done with own resources. • Additional / external actors have to be involved.
Costs	• No major costs arise (< 1,000 €). • Can be paid of existing budgets.	• Costs of 1,000 – 10,000 € • External budgets have to found. • It seems possible to find budgets (idea existing).	• High costs (> 10,000 €) • External budgets necessary. • Not clear if budgets can be found (no idea existing).
Result: Priority	**Priority 1**	**Priority 2**	**Priority 3**
Result: Priority	• Short term realisation (1-2 years); within the next FRM-cycle • Mainly with own resources	• Medium term realisation (3-6 years); within the next FRM-cycle • Additional resources have to be found	• Long term realisation (>6 years); after the next FRM-cycle • Budgets necessary, funds / donors have to be found

The priority is a combination of the above-mentioned criteria. Based on the assessment of all measures the priorities were discussed and agreed together with the local and regional project partners in a consensual process.

The prioritization of the selected types of measures (priority 1-3) is illustrated in the following figure (for details please refer to the list of measures in the Annex B).

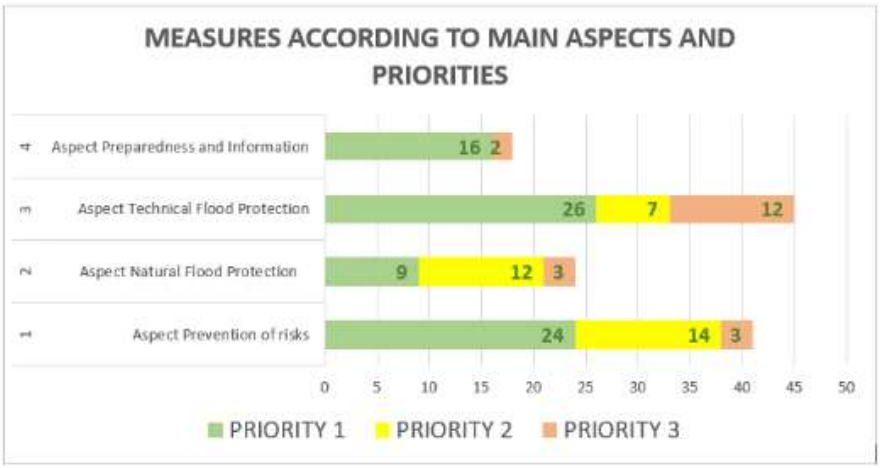


Figure 47: Number of selected measures according to the main aspects for each priority

6.6. Responsibility for implementation

For the realisation of defined measures different institutions according to their mandate and responsibilities are allocated on the local, regional and national level (see list of measures in Annex B).

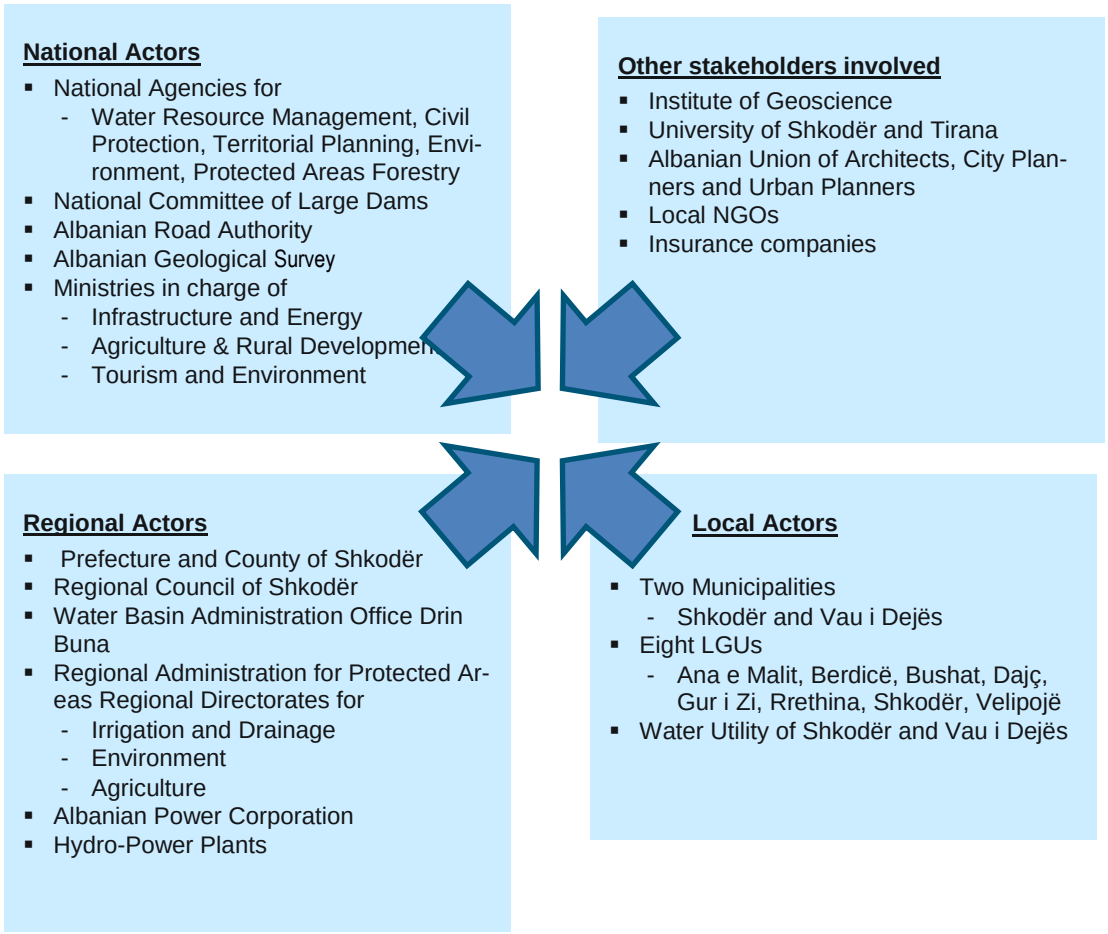


Figure 48: Responsibilities on national, regional or local level

The agreed responsibilities for the realisation of the specific identified measures are indicated in the list of measures in the annex B.

6.7 Implementation and monitoring

6.7.1. Implementation schedule

Regarding the EU Flood Directive FRM-Plans shall be updated in a six-years-cycle. However, this is just the schedule for monitoring and revision of the plans. The realisation of the measures should be started and completed depending on their set priority. As listed in the prioritisation criteria following periods for the realisation should be the goal:

- Priority 1: Should be realised within 12 months; mainly with own resources.
- Priority 2: Should be realised within 12 – 24 months; the time until is necessary for further planning, preparations and fund raising.

- Priority 3: Realisation time cannot be determined; additional studies or planning are necessary. Most of these measures cannot be done with own resources and additional or external actors have to be involved. These measures should be followed up, monitored and updated at the best every 12 months, at least every 2-3 years.

6.7.2. General funding opportunities for implementation

As many identified measures do not need extensive funding, financing the implementation of such measures should be provided by the normal budget of the local governments, Prefecture, Qark etc. and should be considered in the annual budget planning. Besides this, there are several funding opportunities on regional, national and international level that Qark and Local Government Units can use to implement adaptation measures.

On regional level Shkodër Qark profit from:

- Funding portfolio of the Regional Development Programme - Northern Albania (small and medium size projects) (http://www.rdpnorthernalbania.org/);
- Decentralization and Local Development Programme (support on waste management and project proposal writing) (http://www.dldp.al/dldp/);
- Mountain Area Development Agency (providing support for farmers) (http://en.redeval.org/).

On national level there is the Fund for Regions Development[17] and the Albanian Development Fund (http://www.albaniandf.org). Both these funds as well as funds coming from Ministry of Agriculture and Rural Development can be used for infrastructure interventions.

On international level, LGUs and Qark can benefit from the following funding opportunities:

- IPA Cross border Cooperation Programme Albania – Montenegro (http://www.albania-montenegro.org/index.html) and
- IPA Adriatic (http://www.adriaticipacbc.org/) both with a focus on technical assistance;
- Critical Ecosystem partnership Fund (for measures dealing mostly with natural flood protection) (http://www.cepf.net/Pages/default.aspx).

Furthermore, other funding opportunities might be available and should be proactively assessed.

[17] http://www.kryeministria.al/al/newsroom/lajme/nje-fond-i-qeverise-per-rilindjen-urbane-si-asnjehere-me-pare

6.8 Monitoring

The monitoring framework sets out the measures that could be used by the responsible organisations (WRMA and WBAO; partly municipality for measures in their responsibility) to monitor the implementation of the plan and its measures together with the local government units.

The uncertainties associated with the strategic character of the measures make monitoring even more important since in a periodical reviewing process details for implementation can be regularly added. Monitoring allows for periodic checks

- of the implementation progress
- to confirm the accuracy of the assumptions on which the original plan was based on
- to ensure that the proposed mitigation measures remain relevant and are being effectively implemented and
- to review and revise the action plan periodically.

Monitoring should measure the following:

Monitoring criteria	Questions to be answered
Realisation status of planned measures	• Were planned measures started or completed? (see status categories in the list of measures) • What are bottlenecks if measures were not started?
Effectiveness of realised measures	• Did the measures change the risk situation? • How can the mitigation effects be described or quantified? • If no positive effects are visible: why? What could be improved to raise the mitigation effects? • Did (unforeseen) negative effects occur?
Changing framework or assumptions	• Did important changes affect the action plan? (Administrative? Physical? Population? Etc.) • Have projects of others been started that change the framework for the action plan? • Are projects of others upcoming that should take FRM-actions into account (need for communication)?
Update the action plan	• Which measures should be changed / adjusted / deleted from the action plan? • Are adjustments in the responsibilities necessary?
Environmental effects	• Are ecologic effects visible that change the environmental assessment results?

Communication; administrative / personal changes	• Is the communication and coordination process on track? Or has it to be adjusted or improved? • Did administrative or personal changes occur that call for adjustments in the action plan (or in communication)?

Monitoring tools

The following actions have been suggested as monitoring tools for the plan measure types.

Table 24: Suggested Monitoring Tools

Action	Deliverables to monitor / tools	Timescales
Checks and information gathering according to the monitoring criteria	Reports on the status of risk-areas, measures, communication etc. (see criteria). → table / format to be regularly updated; comments	Every 24 months (from agreement on FRM-Plan in working group)
Coordination between actors and with the other bodies associated with flood risk management.	• 6 monthly meetings of the regional FRM working group • 12 monthly flood risk management planning meetings (extended work group meetings)	Every 6 to 12 months from plan adoption and for duration of plan.
Updating the Flood Risk Management Plan every six years	• Update the risk assessment • Update the list or measures (new measures, status of measures, adjust descriptions/comments)	Every 6 years according to EU Flood Directive

Review period

In order to ensure that flood risk reduction will be actively and successfully realised and that respective measures are put in place, the action plan should be reviewed regarding the realisation of measures and updated with a defined review period. An adequate review period is 24 months or shorter if capacities are available. However, for some measures ongoing reviews should be in place.

The working group should meet every 6 months to periodically discuss upcoming projects and coordinate the implementation actions. The wider stakeholder group (or: extended working group) should meet not less than once a year (every 12 months).

Every 6 year the FRM-Plan is to be reviewed and updated, especially regarding the assessment of the risk situation, the status of implementation of the measures and regarding the progress of FRM regarding the adequate objectives (see also Annex B of EU Flood Directive).

Cross-border aspects

Coordination of the monitoring and updating process should be ensured for example with representatives of the Montenegrin FRM-processes and neighbouring local authorities. This can be done either within local/regional working group or in a special transboundary working group.

Review and monitoring responsibilities

Responsibility for the FRM-processes including the monitoring and updating activities is within WRMA. Secondary key actors and regional/ local coordinators for the implementation of measures of the FRM-Plan should be (1) the Prefecture and (2) the Municipalities of Shkodër and Vau i Dejës. They are also key actors for the review, monitoring and regular updating of the regional FRM-Plan in close cooperation with the responsible national institution WRMA. The inter-institutional (national-regional-local) FRM-working group should function as “reviewing and monitoring group”, coordinated by WRMA. The Prefecture may coordinate the local monitoring tools.

Monitoring of environmental impacts according to SEA

The monitoring of potential environmental impacts of flood risk management measures based on the FRM-Plan follows the guideline according to the SEA document. Environmental monitoring criteria have been set up to be used for the monitoring (see Annex D and E).

7 Strategic Environmental Impact Assessment (SEA)

This chapter provides a summary of the SEA process and document. Findings and recommendation of the SEA can be found in the Annex D and E. Details of the assessments and results of the SEA can be found in the SEA document (separate report).

For the FRM-Plan an environmental impact assessment and respective mitigation concept according to international standards and Albanian regulations is to be conducted, i.e. a Strategic Environmental Assessment (SEA). The international standard to be applied is the “EU Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment” (SEA Directive).

The national environmental legislation relevant to the SEA procedure is as follows:

- Law No. 91/2013 “On Strategic Environmental Assessment" has ratified the EU SEA Directive 2001/42/EC, which requires a series of plans and programs to be undertaken for a Strategic Environmental Assessment progress. The overall pur-

pose of this process is to reconcile environmental requirements in planning preparations and decision-making process, but also increase public participation in the decision-making process

- Strategic Environmental Assessment is one of the requirements for the approval of any spatial plan (or plans with territorial impact) in Albania based on Law No.107/2014 “On Planning and Territorial Development” and in compliance with the requirements of Law No. 91/2013 “On Strategic Environmental Assessment" and Law No. 10440/2011 “On Environmental Impact Assessment"
- DCM No. 219, date 11/03/2015, “For the definition of rules and procedures for consultation with stakeholders and the public as well as the public hearing during the strategic environmental assessment process” in support of Article 100 of the Constitution and point 9 of Article 10 of Law No. 91/2013, dated 28/02/2013, “On Strategic Environmental Assessment"
- DCM No. 507, date 10/06/2015, “For the approval of a detailed list of plans or programs with negative environmental impacts that will undergo the strategic environmental assessment process.”

The objectives of the SEA are to identify, describe and assess:

- The likely significant effects on the environment of implementing the FRM-Plan
- The most important environmental, natural resource-related and climate change-related constraints bearing on the performance of the sector
- The opportunities for the FRM-Plan to contribute to enhancing the state of the environment, building climate resilience of the sector and the population, and promoting low carbon development and the transition to the green economy.

This information helps to ensure that environmental concerns are appropriately integrated in the decision-making and implementation processes. The general steps for the SEA are presented in the Figure 49.

Through a screening procedure, prescribed criteria and documents determined the necessity to conduct a SEA for the FRM-Plan as it potentially bears significant impact on the environment and human health. The SEA is composed of two main parts – a scoping study and a SEA study.

The SEA scoping study provides:

- A description of the sector
- A brief description of the sector policy, institutional and legal framework
- An identification of key stakeholders and an overview of their interests and concerns with regards to the FRM-Plan

- An identification of the key interactions between the strategic document and the environment
- An indication of the scope of the environmental baseline to be prepared
- An indication of the main impact identification and evaluation methodologies to be used in the SEA study

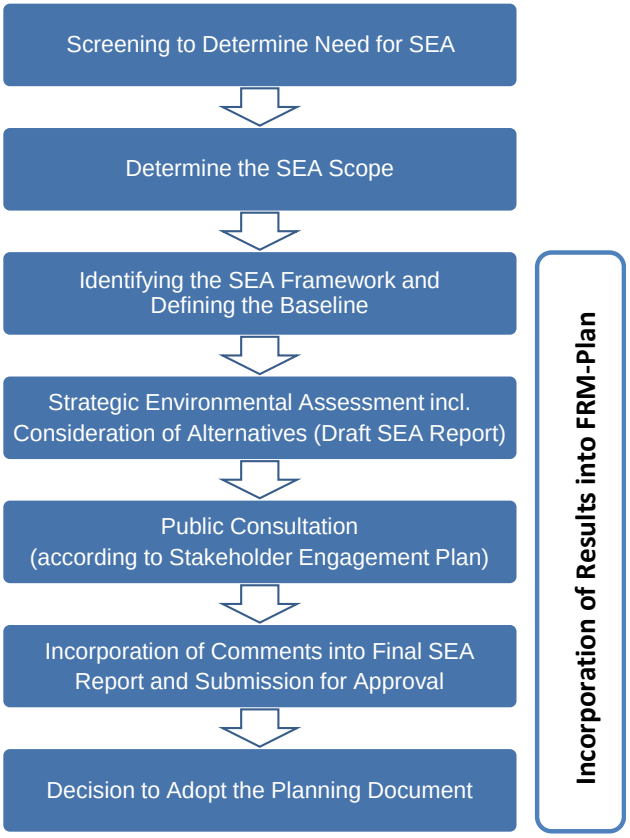


Figure 49 General steps of the Strategic Environmental Assessment (SEA)

The results of the scoping study were compiled in a Scoping Report.

The SEA study is based on the results of the scoping phase (following approval of the scoping study report) and includes an environmental baseline study, the identification of environmental constraints and opportunities, the identification and assessment of the potential environmental impacts, an analysis of performance indicators, an appreciation of the institutional capacities to address the environmental identified, and conclusions and recommendations. The SEA study delivers the following results:

- An environmental assessment of the FRM-Plan, taking into account the environment-related risks, constraints and opportunities
- Recommendations for the formulation of the FRM-Plan and for the enhancement of the environmental performance of the FRM-Plan.

The results of the SEA study are compiled in a SEA Report.

Annex D gives an overview of environmental objectives and their corresponding indicators for monitoring purposes whereas Annex E summarises the recommendations for the following relevant areas

- Population and human health
- Biodiversity
- Soil
- Water
- Climatic Factors
- Material Assets
- Cultural Heritage
- Landscape.

8 Transboundary flood risk management aspects

8.1 Potential transboundary impacts of flood risk management

The project area and the relevant flood risk area have different transboundary dimensions:

- The Drin River Basin is a transboundary river basin as described in chapter 2.
- The Buna River is the border between Albania and Montenegro on the last ca. 20 km before it meets the Adriatic Sea.
- The flood risk area of Drin and Buna covers beside Albanian territory also Montenegrin.
- Lake Shkodër and by this the discharge in Drin and Buna rivers are influenced by Albanian and Montenegrin tributaries.

Not only in the light of the EU Flood Directive transboundary flood risk management aspects have to be integrated into the FRM planning process in international river basins. The EU Flood Directive requires explicitly the mutual information about the FRM approaches and coordination of FRM measures to prevent adverse consequences of FRM measures on neighbouring countries. Formally this requirement is valid only for EU member states; but however, since this FRM-Plan conforms with the EU Flood Directive, cross-border related aspects are sensible. In detail the transboundary flood effects (beside different transboundary effects in the upstream areas) are:

- Influence of the (international) Lake Shkodër on the flood situation in the region;
- Downstream border river situation, which means, that all measures for maintenance and reconstruction of the river, dikes or other protections works might have

an influence on the neighbouring territory (both ways: Albania to Montenegro and vice versa);

- Forecast and prevention measures are closely connected between the Albanian and Montenegrin part of the flood risk area in the Delta; Montenegro depends on flood forecast and preparedness measures of Albanian stakeholders.

Transboundary flood risk management calls for different steps of cooperation:

- Mutual information on risks and actions;
- Joint risk assessment, modelling and warning system;
- Joint or mutually adjusted flood risk management planning;
- Joint emergency response planning;
- Communication and cooperation during flood events / joint emergency response actions.

8.2 Specific measures with potential transboundary impacts

The action plan / plan of measures (see chapter 0) includes an allocation of potential cross-border impacts of measures: in total 30 out of 128 measures were identified to have potentially transboundary impacts. These are generally measures with transboundary effects from structural changes, maintenance, and reconstruction of the rivers. And dikes or other protections works can have transboundary impacts. Thus, the measures with potential transboundary impacts can be found in the action fields “natural flood protection” and “technical flood protection” (see Table 25).

Table 25: Distribution of measures with potential cross-border impacts among EU-aspects of FRM

EU-aspect of FRM	No. of measures with potential cross-border impact [number]	Measures with potential cross-border impact [percentage]
1. Aspect: Prevention of Risk	1	2 %
2. Aspect: Natural Flood Protection	14	58 %
3. Aspect: Technical Flood Protection	15	33 %
4. Aspect: Preparedness and Information	0	0 %

The transboundary impacts can be positive (e.g. if retention facilities reduce the flood wave on both sides of the river in two countries) or negative (if the improvement of flood protection works or dikes/dams on one side of a river in one country raises the risk of flooding on the other side of the river in another country). Table 23 specifies the selected measures of this FRM-Plan that may have potential transboundary impacts and that should be coordinated or even jointly planned and implemented in cooperation with the neighbouring country.

Table 26: Characteristics of potential cross-border impacts of measures in this FRM-Plan

Type of measure with potential transboundary impact (details see Annex B**)**		**Explanation: characteristics of potential cross-border impact**	**No. of measures (annex B)**
1.2	Adaptation of existing Land Use to flood risk (including agriculture and forestry) Specific measures e.g.: planting of hydrophilic vegetation on riverbanks / alluvial plains, afforestation of riversides.	By changing land use in the catchment area and along rivers and streams retention can be increased or decreased. The difference in the retention capacity can have impacts on the flood waves downstream. If downstream areas within the River Basin are the territory of neighbouring countries (here: Montenegro in the Shkodër area along the Buna River) transboundary impacts are possible. Significant changes in the retention capacity throughout the catchments of international River Basins should be subject of transboundary cooperation.	1
2.1	Natural flood management, water flow regulation	The regulation of water flows has potential impacts on the flood risk (lowering flood waves, heightening flood waves). Natural or structural (technical) measures with impacts on the discharge and the torrents in or along rivers in border regions regularly have potential (positive or negative transboundary impacts. Raising embankments and/or dikes/dams always has negative impacts on the flood risk on the opposite river bank. If this is the territory of a neighbouring country potential significant transboundary impacts have to be considered. Specific measures in this FRM-Plan are e.g.: rehabilitation of existing embankments along Buna River and riverbed maintenance of Drin River in Berdicë. Respective measures should be subject to transboundary cooperation and joint planning of measures along such rivers and banks.	14
3.2	Water Flow Regulation / Channels (Dikes, Dams, Flood Walls and Mobile Flood Protection)		8
3.3	Water Flow Regulation / Channels (Measures in the rivers / river training)		7
Total			**30**

Please refer to Annex B with the plan of measures for further details of measures with potential cross-border impacts.

8.3 Status and perspective of transboundary risk management

The following cooperation framework has been set up already in the transboundary cooperation with the neighbouring responsible institutions of Montenegro and could be developed further in future regarding the improvement of cross-border cooperation:

Table 27: Status and perspective of cross-border-cooperation in the region

Aspect (joint approach)	Status	Perspective
Cooperation, information	Existing on national level	Local cooperation on FRM-Plan level among municipalities and LGUs
Regular working group	Existing on national level	Local working groups among municipalities and LGUs on FRM and emergency response
Risk Assessment / Mapping	Existing on national level	Joint regular review and update of risk maps; joint risk assessment
Joint modelling / joint forecast	Partly under development; forecast system within GIZ project	Further development; training
Emergency response	In small scale on case-to-case basis	Joint emergency response plan; regular trainings

9 Coordination with the water framework directive 2000/60/EC

Flood risk management plans shall take into account the environmental objectives of Article 4 of the Water Framework Directive (2000/60/EC). According to Article 9 of EU Flood Directive the development of FRM-Plans shall be carried out in coordination with, and may be integrated into, the reviews of the river basin management plans provided for in Article 13(7) of Directive 2000/60/EC.

The “Drini-Buna River Basin Management Plan” of June 2019 was prepared under the responsibility of the Ministry of Agriculture and Rural Development. This plan was evaluated in the FRM-drafting process to identify links and synergies or conflicts that may occur from setting up the FRM-Plan. The long-term goal of integration of both plans is not tackled by this review.

The reviews and evaluation focussed especially on following chapters, which were analysed and integrated into the specific parts of the FRM-Plan:

2 Legal and Institutional Framework for Water Management

3 General Characteristics of the Drini-Buna River Basin

4 Pressures and Impacts

5 Protected Areas

9 Flood Management

10 Environmental Objectives

12 Programme of Measures

Regarding flood risk management the RBMP includes RBM-measures and reference to flood risk management based on preliminary flood risk assessments including recommendation from other projects. It does explicitly not refer to the flood hazard and risk maps since these were not completed by 2019, when the RBMP was published.

To ensure the necessary coordination with the last management plan 2019 according to the EU-WFD during the development of the FRM-Plan Shkodër Region, the mutual impact, synergies or potential conflicts of RBM-Measures and FRM-Measures were assessed. The method used follows a EU working group flood's approach, which is also applied for all FRM-Plans in Germany: Depending on their impact, measures are identified to be relevant for coordinating of the directives and assigned to the groups M1, M2 and M3:

M1: Measures that support the objectives of the other directive.

In the case of FRM planning, these measures are generally suitable for achieving the objectives of the EU-WFD. The extent of synergy between the two directives depends on the further design of measures in the detailed planning. A further examination of the synergies of these measures can therefore generally be dispensed with. Examples include keeping floodplains free of buildings through legally defined floodplains or measures to increase natural water retention in the area, e.g. by relocating dikes.

M2: Measures that may lead to a conflict of objectives and must be examined on a case-by-case basis.

This category includes, on the one hand, measures that cannot be clearly assigned to categories M1 and M3 and, on the other hand, measures that may, under certain circumstances, counteract the objectives of the other directive. These include, for example, EU-WFD measures for natural watercourse development in local areas that could lead to an increased flood risk, or land reclamation measures that contribute to a reduction in pollution and subsequently compete with coastal protection measures. With regard to FRM measures, the most important ones are technical-infrastructural flood protection measures or river engineering measures.

M3: Measures that are not relevant to the objectives of the other directive

As a rule, these measures have neither a positive nor a negative effect on the objectives of the other directive. Further examination of the synergies and conflicts of these measures in the context of FRM planning can therefore be dispensed with. With regard to the EU-WFD, non-structural measures such as conceptual studies, monitoring programmes and administrative measures, as well as measures to reduce diffuse substance inputs, should be mentioned in particular. In the case of FRM, most non-structural measures fall into this category, such as warning and reporting services, planning and

preparations for hazard prevention and disaster control, or concepts for aftercare and re-generation.

In Annex C there is a tabular overview of identified synergies and conflicts of RBM objectives and FRM-Plan of measures. To this end, both plans mainly follow consistent paths. Quantitatively, there is more likely a synergistic coherence of RBM objectives and FRM plan of measures than conflicting ones. The following summarises the analysis of their reciprocal interaction. For each type of measure the category of potential synergies is shown in the catalogue of measures in Annex A; for each selected measure the category is named in the list of measures in Annex B.

Consistency between RBM and FRM

Proposed measures in the RBMP are principally characterised by prevention measures mitigating deterioration of the status of all bodies of surface water as it follows the paradigm of the EU-WFD. As such, most (16 out of 21) environmental objectives proposed in the RBMP are somewhat intertwined with FRM measures.

Nonetheless, all through consistent interactions are present which concern the promotion of sustainable use of water resources, i.e. measures concerning the water supply system, the sustainable development of aquaculture in specified zones of the Drin-Buna River Basin as well as the enhancement of industrial water management requirements.

There are two other environmental objectives dedicated to the preservation and achievement of good ecological and chemical status on the one hand of surface water bodies and on the other hand of bathing waters focusing on coastal areas. The proposed measures can be evaluated as an overall consistent objective with FRM measures as well.

To assess consistency from FRM perspective, there is a total of five FRM categories of measures which are entirely consistent with all RBM objectives with no synergistic or conflicting character. These are measures concerning:

- 2.2. Reactivation of retention areas
- 3.4. Surface water management
- 3.5. Protection of object facilities
- 4.1. Economical/ financial preparedness
- 4.3. Behaviour-related preparedness

Synergies between RBM and FRM

The most synergising category of FRM measures with RBM measures is evaluated for the prevention of flood risk. This includes proposed measures in the RBMP such as:

- The improvement of monitoring for all water bodies through records and the registry of water monitoring parameters which can be enabling for elaborating future FHRM.
- In the same manner, the proposed registration of all industrial farms and their surface of agricultural land is beneficial for updating risk areas and objects.
- The contamination from use of pesticides in agriculture is a specific concern in the RBMP, as for the Drin-Buna River Basin, Shkodër has the most developed agriculture sector, moving away from family-based systems to intensive agriculture that utilises more pesticides, herbicides and nutrients (RBMP, 2019), stressing soil. The reduction of pesticides uses through either strengthening local authorities on controlling and monitoring the use of inputs in agriculture or awareness raising programmes for farmers could be benefitting for achieving good quality of soil possibly enabling alternative flood adapted cultivation of arable land.

Another worth mentioning category of FRM measures concerns natural flood management that is reinforced by measures of the RBMP if pursued. The RBMP proposes, namely, the reduction of illegal use of inert and river gravels and stresses the importance of the reduction erosion in rivers.

Last but not least, the relevance of the water flow in the channels as a technical flood protection measure implies the need for clear cross-sections. There are several measures proposed in the RMBP which aim at the improvement of the drainage network. This includes direct improvement of the drainage system and depending on the technical design an improvement of the sewerage network in urban as well as rural areas.

Conflicts between RBM and FRM

Even if there are only two objectives that potentially bear a conflicting interaction between FRM and RBM measures, its implications are severe as it concerns the technical flood protection system. There is apparently a strong need for the rehabilitation and development of the irrigation network for agricultural land that includes dams according to the RMBP. Such interference could counteract with the installed and pursued water flow regulation system that aims at mitigating flood risk. Inevitably, this requires a case-by-case examination.

On the other hand, the RBMP proposes the maximising use of hydro energy potential promoting sustainable use of water resources. This includes investigations on the optimisation of existing hydro energy production schemes and the potential of SHPPs (small hydro power plants) for river branches. Depending on the results of these studies, these could counteract with any natural flood protection measure.

10 Public Information and publicity measures

10.1 Summary of the consultation process

Involvement of stakeholders at all levels and the public into FRM processes is crucial for the success of the FRM approach. The FRM-Plan is based on the strategy to share the duties with all relevant organisations and persons in their respective responsibility. This is also the approach of the EU Flood Directive and Strategy.

Following this approach, relevant communal, regional and national organisations were involved within the FRM process in the Shkodër Region in 2021/2022. The process, thus far:

- Preparation of first draft FRM-Plan for review of inter-institutional working group members (October until December 2021)
- First revision of inter-institutional working group (January 2022)
- Preparation of second draft FRM-Plan for review of inter-institutional working group members (February 2022)
- Second revision of inter-institutional working group (March 2022)
- Preparation of final draft FRM-Plan for review of inter-institutional working group members (April 2022)
- Final revision of draft FRM-Plan of inter-institutional working group (May 2022)

From this stage onwards, the consultation process is nationally stipulated in DCM No. 1015, date 16/12/2020 “On the Content, Development and Implementation of the National Water Resources Management Strategy, Water Basin Management Plans and Flood Risk Management Plans”.

NWC approves before official publication of the second draft FRM-Plan. Subsequently, based on Appendix III, Chapter 4, Number 6 of DCM No. 1015/2020, a 6-month period for the revision of relevant authorities, the public and comments from neighbouring countries of the cross-border water basin is defined. During this period of time public hearings may be organised by WRMA.

The second draft FRM-Plan publication is envisaged for June 2022.

10.2 Public awareness rising and information activities

In addition, following activities are proposed to be realised to inform the public and to raise awareness for the FRM issues (see also list of measures in the annex):

- Publication of the regional flood hazard and risk maps in the local government units; as one of the basic awareness raising measures information was developed on where and in which intensity the flood risk potentially occurs (large maps in the municipality center; leaflets to be distributed in settlements at risk, publication in the internet etc.)).
- Development and distribution of leaflets including information about flood risk mitigation measures, individual precautions, and preparation for the flood event itself.
- For the future these activities should be regularly updated, continued, and repeated in a permanent process. The list of measures contains some priority measures on communication and information that are important regarding the public contributions, self-preparedness, protection of flood plains by everyone, preparation for the next flood event. The measures under “Preparedness and Information” (4. aspect / action field of measures) of the catalogue should have a high importance in a short-, medium- and long-term strategy. Actors are mainly the municipalities, Prefecture and Qark (see specific determination of responsible actors in the action plan tables, which have been named by them; thus, the process has reached a high level of commitment with the action plan).

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Law No. 73/2015 “On some additions and amendments to the Law No. 107/2014”

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12 Glossary[18]

Basin (river) - The surface of the earth from where rivers or even lakes and all surface streams flow into a river, which flows into the sea, into a wide estuary alone, in a delta or another stream. The definition refers to Article 4 (7) of Law No. 111/2012 “On the integrated management of water resources”.

Characterisation - The process of expressing the observed/predicted behaviour of a system and its components for optimal use in decision making.

Consequence - An impact such as economic, social or environmental damage/improvement that may result from a flood. May be expressed quantitatively
(e.g. monetary value), by category (e.g. High, Medium, Low) or descriptively.

Damage potential - A description of the value of social, economic and ecological impacts (harm) that would be caused in the event of a flood.

Dependence - The extent to which one variable depends on another variable. Dependence affects the likelihood of two or more thresholds being exceeded simultaneously. When it is not known whether dependence exists between two variables or parameters, guidance on the importance of any assumption can be provided by assessing the fully dependent and independent cases (see also correlation).

Discharge (stream, river) - As measured by volume per unit of time.

Efficiency - In everyday language, the ratio of outputs to inputs; in economics, optimality.

Emergency management - The ensemble of the activities covering emergency planning, emergency control and post-event assessment.

Evacuation scheme - Plan for the combination of actions needed for evacuation (warning, communication, transport etc.).

Exposure - Quantification of the receptors that may be influenced by a hazard (flood), for example, number of people and their demographics, number and type of properties etc.

Expectation - Or expected value - of a variable, refers to the mean value the variable takes. For example, in a 100 year period, a 1 in 100 year event is expected to be equalled or exceeded once.

Expected annual frequency - Expected number of occurrences per year (reciprocal of the return period of a given event).

[18] See www.floodsite.net

Flood - A temporary water coverage of a land not normally covered by water. This includes floods from rivers, mountain streams, dam discharges, fleeting water flows and sea floods in coastal areas, except floods from water sewer systems polluting. The definition refers to Article 4 (39) of Law No. 111/2012 “On the integrated management of water resources”.

Flood control (measure) - A structural intervention to limit flooding and so an example of a risk management measure.

Flood damage - Damage to receptors (buildings, infrastructure, goods), production and intangibles (life, cultural and ecological assets) caused by a flood.

Flood forecasting system - A system designed to forecast flood levels before they occur:

Flood hazard map - Map with the predicted or documented extent of flooding, with or without an indication of the flood probability.

Flood level - Water level during a flood.

Flood management measures - Actions that are taken to reduce either the probability of flooding or the consequences of flooding or some combination of the two.

Flood peak - Highest water level recorded in the river during a flood.

Floodplain - Part of alluvial plain that would be naturally flooded in the absence of engineered interventions.

Flood prevention - actions to prevent the occurrence of an extreme discharge peak.

Flood protection (measure) - To protect a certain area from inundation (using dikes etc.).

Flood risk management - Continuous and holistic societal analysis, assessment and mitigation of flood risk.

Flood warning system - A system designed to warn members of the public of the potential of imminent flooding. Typically linked to a flood forecasting system.

Governance - The processes of decision making and implementation

Hazard - A physical event, phenomenon or human activity with the *potential* to result in harm. A hazard does not necessarily lead to harm.

Hazard mapping - The process of establishing the spatial extents of hazardous phenomena.

Integrated risk management - An approach to risk management that embraces all sources, pathways and receptors of risk and considers combinations of structural and non-structural solutions.

Intervention - A planned activity designed to effect an improvement in an existing natural or engineered system (including social, organisation/defence systems).

Inundation - Flooding of land with water. (NB: In certain European languages this can refer to deliberate flooding, to reduce the consequences of flooding on nearby areas, for example. The general definition is preferred here.)

Mitigation - *see Flood management measures*

Pathway - Route that a hazard takes to reach Receptors. A pathway must exist for a Hazard to be realised.

Preparedness - The ability to ensure effective response to the impact of hazards, including the provision of timely and effective early warnings and the temporary evacuation of people and property from threatened locations.

Resilience - The ability of a system/community/society/defence to react to and recover from the damaging effect of realised hazards.

Resistance - The ability of a system to remain unchanged by external events.

Response (in context) - The reaction of a defence or system to environmental loading or changed policy.

Risk - Risk is a function of probability, exposure and vulnerability. Often, in practice, exposure is incorporated in the assessment of consequences, therefore risk can be considered as having two components. The probability that an event will occur and the impact (or *consequence)* associated with that event.

Risk assessment - Comprises understanding, evaluating and interpreting the perceptions of risk and societal tolerances of risk to inform decisions and actions in the flood risk management process.

Risk management - The complete process of risk analysis, risk assessment, options appraisal and implementation of risk management measures

Risk management measure - An action that is taken to reduce either the probability of flooding or the consequences of flooding or some combination of the two

Risk mapping - The process of establishing the spatial extent of risk (combining information on probability and consequences). Risk mapping requires combining maps of hazards and vulnerabilities. The results of these analyses are usually presented in the form of maps that show the magnitude and nature of the risk.

Risk reduction - The reduction of the likelihood of harm, by either reduction in the probability of a flood occurring or a reduction in the exposure or vulnerability of the receptors.

Spatial planning - Public policy and actions intended to influence the distribution of activities in space and the linkages between them. It will operate at EU, national and local levels and embraces land use planning and regional policy.

Stakeholders - Parties/persons with a direct interest (stake) in an issue.

Strategy (flood risk management-) - A strategy is a combination of long-term goals, aims, specific targets, technical measures, policy instruments, and process which are continuously aligned with the societal context.

Sustainable Development - Is development that meets the needs of the present without compromising the ability of future generations to meet their own needs

System - An assembly of elements, and the interconnections between them, constituting a whole and generally characterised by its behaviour. Applied also for social and human systems.

Uncertainty - A general concept that reflects our lack of sureness about someone or something, ranging from just short of complete sureness to an almost complete lack of conviction about an outcome.

Vulnerability - Characteristic of a system that describes its potential to be harmed. This can be considered as a combination of susceptibility and value.

Annex A

Catalogue of types of measures for flood risk management referring to EU

For Flood Risk Management Planning (FRM) in the SHKODËR AREA
(in accordance with the types of measures; EU guidance document No. 29-2013,
in the framework of the EU Flood Directive 2007/60/EC)

No. (type)	Type of measures	Description	Implementation by (generally)*	Synergies WFD / RBMP**	Structural measures	Potential cross border impact	Contribution to FRM objective
1.	**Aspect: Prevention of risks**						
1.1.	**Administrative Instruments (for avoidance of risk)**						
1.1.1.	Mapping of flood risk areas	• Mapping of areas with flood risk (low, medium, frequent floods) • Public notice on maps and active information by the relevant municipality	Water Management, Civil Protection, Spatial Planning, Municipalities	M1/M3	Non-structural	no	0.1., 0.2., 1.2., 2.2.
1.1.2.	Restriction for building in risk areas (in spatial planning / urban planning)	• Publishing of risk areas / risk maps for urban planners and housing permissions • Fixing protection areas to prevent constructions in risk areas (e.g. priority and reserve zones)	Municipalities, Spatial Planning	M1/M3	Non-structural	no	0.1., 0.2., 1.2., 1.3., 2.1., 2.2.
1.1.3.	Protection of the flood plains and retention areas	• Restrictions and regulations for land use in flood plains that might cause new risks or that cause negative effects for flooding or run off • Determination and publication of retention areas. • Protection by restrictions for buildings	Municipalities, LGUs; Water Management; Spatial Planning and Water Agencies	M1/M3	Non-structural	no	1.1., 1.3., 1.5., 2.1., 2.3.
1.2.	**Adaptation of Land Use (for avoidance of risk, removal or relocation and reduction of risk)**						
1.2.1.	Adaptation of existing land use in flood risk areas (including agriculture and forestry)	• Systematic assessment of assets at risk • Development of adapted land uses in risk areas • Promotion of alternatives for urban development in flood safe areas • Adaptation of land uses and objects at risk by precautionary measures, protection works, changes in land use or changes in maintenance / operation • E.g. medium-term conversion of arable land in permanent green grassland, change of production methods (e.g. conservation soil cultivation) and of machine use	Municipalities, Agriculture, Forest Agencies; LGUs;	M1/M3	Non-structural	no	1.3., 2.1.
1.2.2.	Adaptation of constructions and infrastructure in risk areas (flood adapted planning and building)	• Inclusion of measures of the flood-adapted construction and facility protection • Retention of water in urban and rural areas. • Flood-safe construction of transport infrastructure (e.g. raising, protection walls, switchgears) • E.g. water and pressure resistant windows in flood standard, flood resistant facades, flood adapted room use in living quarters (avoiding damage causing use of cellar rooms), supporting parts of buildings	Municipalities, Water Utility, Road Infrastructure Authorities	M1/M3	mainly structural	no	1.3., 2.1.
1.2.3.	Consultation of agriculture and forestry for awareness-raising	• E.g. status analysis, targeted advice for agriculture and forestry for sustainable management, public information events	Municipalities, LGUs, Agriculture and Environment Authority	M1/M3	non-structural	no	1.5., 2.2.
1.3.	**Risk prevention by flood adapted building**						
1.3.1.	Flood adapted handling for water imperilling substances	• E.g. storage and handling according to respective technical guidelines	Agriculture and Environment Authority, Municipalities, LGUs	M1/M2/M3	structural or non-structural	no	1.4., 2.1., 2.4.
2.	**Aspect: Natural Flood Protection**						
2.1.	**Natural flood management, water flow regulation** (in coordination with river basin management / Water Framework Directive)						
2.1.1.	Revitalisation of river beds and river banks / former flood plains	• E.g. Bank flattening, structuring of the river shores, removal of reinforcement constructions • Installation of nature oriented river beds • Development of site-typical vegetation in and at the water	Municipalities	M1/M2/M3	structural	possible (+/-)	1.3., 2.1.
2.1.2.	Changing of river courses and slope conditions	• Changing of river courses corresponding to the morphological approach (e.g. branched, meandering) • Mere demand of an initial channel with an initial lock, excavation masses suitable for raising the bed section	Water Management, Agriculture Authority, Municipalities	M1/M2/M3	structural	possible (+/-)	1.1., 1.3., 1.5., 2.1.
2.1.3.	Protection of zones along river banks	• Classification and local marking of a bank border strip • Securing of a water compatible use or an entire abandonment • Support for nature-oriented water body development	Water Management, Municipalities	M1/M2/M3	non-structural	no	1.1., 1.3., 1.5., 2.1.
2.1.4.	Support of the development of natural floodplains	• Site-appropriate agriculture and forestry along rivers • Extensive use of the floodplains, leaving them for natural succession	Municipality, Agriculture, Forestry	M1/M2/M3	non-structural	possible (+/-)	1.1., 1.3., 2.1.

No. (type)	Type of measures	Description	Implementation by (generally)*	Synergies WFD / RBMP**	Structural measures	Potential cross border impact	Contribution to FRM objective
2.1.5.	Modified extensive river maintenance	• Adequate river maintenance with reference to environmental aspects (e.g. equipment choice, consideration of spatial and temporal aspects)	Municipality, Water Management	M1/M2/M3	structural	no	1.1., 1.3., 1.5., 2.1.
2.1.6.	Disconnection / Removal of pavements in urban areas / Rainwater management	• Parking spaces / footpaths can be conducted permeable for water (e.g. with gravel or rubble surface) • Rainwater can be collected and superficial drained in ground depressions	Municipality, Water Management	M1/M2/M3	structural	no	1.3., 2.1.
2.2.	**Reactivation of retention areas** (Runoff regulation / water flow regulation)						
2.2.1.	Deconstruction a dike or dam	• Deconstruction of old dikes or dams, which do not fulfil their intended use or were no longer required	Municipality, Water Management	M1/M3	structural	possible (+)	1.3., 2.1., 2.3.
2.2.2.	Setting back dikes	• Construction of a new dike in the interior and complete deconstruction of old dikes • Principle: Replace dikes in front of the protectable object instead of right at the river bank, create retention area	Municipality, Water Management	M1/M3	structural	possible (+)	1.3., 2.1., 2.3.
2.2.3.	Removal of an artificial bank	• Reactivation of originally existing flood areas, which have been raised flood-free by constructions in the past; lowering the banks if possible	Municipality, Principal	M1/M3	structural	possible (+)	1.3., 2.1., 2.3.
2.2.4.	Connection of a retention-relevant terrain (e.g. back waters, old river arms)	• Reactivation of potentially natural flood areas by rising the base or installation of ground sills formed as bed pitches • Planting of water adapted forest which causes an increase of the water level at that cross-section but opens additional retention area for the river system	Municipality, Organisations	M1/M3	structural	possible (+/-)	1.3., 2.1., 2.3.
3.	**<u>Aspect:</u> Technical Flood Protection**						
3.1.	**Water Flow Regulation / Flood plain works** (Retention measures)						
3.1.1.	Construction of a retention pond	• Construction of a (small) retention pond: dam and pond in or along a river	Municipality, Water Management	M1/M2/M3	structural	possible (+)	1.3., 2.1., 2.3.
3.1.2.	Creation of a retention polder	• Construction of a retention polder in former flood plain, with inlet and outlet structures, to be flooded and operated in flood situations	Municipality, Water Management	M1/M2/M3	structural	possible (+)	1.3., 2.1., 2.3.
3.1.3.	Restoration, expansion or improvement of existing retention systems (dams, ponds, polders)	• E.g. Strengthening of the retention system and / or rising or extension of the dams, restoration of main plant components to rise the hydrological effectiveness • Operational improvement, control optimization and technical optimization of the whole system	Municipality, Water Management	M1/M2/M3	structural	possible (+/-)	1.1., 1.3., 1.6., 2.1., 2.3.
3.2.	**Water Flow Regulation / Channels** (Dikes, Dams, Flood Walls and Mobile Flood Protection)						
3.2.1.	Flood protection works (dike, dam or flood wall)	• Protection of risk objects or areas by dikes, dams or flood walls	Municipality, Water Management	M1/M2/M3	structural	possible (-)	1.3., 2.1.
3.2.2.	Strengthening of existing flood protection works	• Strengthening or heightening of dikes, dams or flood walls based	Municipality, Water Management	M1/M2/M3	structural	possible (-)	1.3., 1.6., 2.1.
3.2.3.	Adoption of a mobile (stationary) flood protection system	• Mobile and stationary flood protection system (stocking and setting up in the event of a flood) • In accordance with an disaster action plan, regular trainings of the emergency services	Municipality, Water Management	M1/M2/M3	structural	possible (-)	1.3., 2.1.
3.2.4.	Drainage in diked area and backflow protection	• Construction and strengthening of appropriate pumping stations; backflow protection systems as punctual interferences	Municipality, Water Management	M1/M2/M3	structural	no	1.3., 1.6., 2.1.
3.3.	**Water Flow Regulation / Channels** (Measures in the rivers / river training)						
3.3.1.	Keeping clear cross-sections in settlement areas	• Clearance of the river section from vegetation or sedimentation	Municipality, Water Management, LGUs	M1/M2/M3	structural	possible (+)	1.3., 1.6., 2.1.
3.3.2.	Removal of bottlenecks / narrow passages in rivers	• Physical removal of obstacles and narrow passages by river profiling / alternative bank reinforcements	Municipality, Water Man., Civil Protection	M1/M2/M3	structural	possible (+)	1.3., 1.6., 2.1.
3.3.3.	Construction and strengthening of a bypass channel	• Construction of a bypass channel in areas of lower restriction by utilizing historical water courses	Municipality, Water Man., Civil Protection	M1/M2/M3	structural	possible (+/-)	1.3., 1.6., 2.1.
3.4.	**Surface water management** (Measures of urban water management)						
3.4.1.	Rain water management	• Assessment and adaptation of the local rainwater collection / retention strategies	Municipality, Water Management	M1/M3	structural or non-structural	no	1.1., 1.3., 2.1., 2.3.

No. (type)	Type of measures	Description	Implementation by (generally)*	Synergies WFD / RBMP**	Structural measures	Potential cross border impact	Contribution to FRM objective
		• Preparation of information material					
3.4.2.	Development of a municipal retention system (e.g. rainwater storage canal)	• Development of local retention systems, • Disconnection of rainwater pipes from the sewage • Construction of retention and infiltration ponds	Municipality, Water Management	M1/M3	structural	no	1.3., 2.1., 2.3.
3.4.3.	Flood-adapted improvement of a drainage system (e.g. bar screen, non-return flap)	• Development/ Improvement of flood safe local drainage systems, e.g. large valves in sewer systems	Municipality, Water Management	M1/M3	structural	no	1.3., 1.6., 2.1., 2.3.
3.5.	**Protection of object / facilities**						
3.5.1.	Object / Facility protection of individual buildings	• Construction of dikes, dams or flood walls for facility protection (pressure-tight windows, displacement of concrete shells)	Municipality, Operators, Privates	M1/M3	structural	no	1.3., 2.1.
3.5.2.	Object / Facility protection of infrastructure facilities (e.g. transport nodes, switching and branching systems)	• Construction of dikes, dams or flood walls for facility protection, strengthening of protection works, infrastructure relocation from flood risk areas	Municipality, Operators, utilities companies	M1/M3	structural	no	1.3., 2.1.
3.6.	**Other protection measures**						
3.6.1.	Improvement of the storage management of dammed river systems / reservoirs	• Assessment and improvement of maintenance and operation concepts of reservoirs, uses of reservoirs and hydropower plants to increase retention effects • Communication with operators about their contributions to flood risk management • Increase retention volume / create additional retention volume by appropriate management concepts	Operator of storages and reservoirs	M1/M2/M3	structural or non-structural	no	1.3., 1.6., 2.1., 2.3.
3.6.2.	Protection against seepage and ground water	• Accompanying measures for protection of existing buildings against ground and pressure water e.g. by protection wells and deep diaphragm walls, whereat building of protection wells is only allowed in exceptional cases and after an examination of aspects of groundwater protection	Municipalities, Water Utility, Organisations	M1/M2/M3	structural	no	1.4., 2.1., 2.4.
4.	**<u>Aspect</u>: Preparedness and information**						
4.1.	**Economical / financial preparedness**						
4.1.1.	Financial precautions by reserves and insurances (insurance against natural hazards)	• E.g. generation reserve funds and / or contract insurances against damages due to natural hazards	Municipalities, property owners, insurance companies	M1/M2/M3	non-structural	no	4.2.
4.2.	**Informational preparedness**						
4.2.1.	Improvement of flood forecast and flood warning / messaging	• E.g. development of long-distance data transmission as well as optimization of data management and allocation in the internet • E.g. optimization of communication chain • Actualization of contact persons • Examination of signal levels, • Examination of local alert services • E.g. establishing new flood prediction models for river basins • Improvement of quality of predictions (particularly for small river basins) by optimization of precipitation discharge models and integration of additional metering or prediction data of precipitation • Linking precipitation discharge models to hydrodynamic procedures to determine and communicate the predicted and discharge specified water levels	Water Management, Civil Protection, , meteorological services, river basin management	M1/M2/M3	non-structural	no	0.2., 3.2., 3.3.
4.3	**Behavior-related preparedness**						
4.3.1.	Publication of flood hazard and flood risk maps close to the spot	• Publication of digital and analog data of flood hazard and flood risk maps to a raise of awareness and to change behavior in preparedness and in case of floods	Water Management, Civil Protection, Municipalities, LGUs	M1/M2/M3	non-structural	no	3.1.

No. (type)	Type of measures	Description	Implementation by (generally)*	Synergies WFD / RBMP**	Structural measures	Potential cross border impact	Contribution to FRM objective
4.3.2.	Continuing advancement of awareness raising and publicity	• Continuing advancement of awareness raising and publicity by allocation of digital and analog information (e.g. also by local visualization of expected water levels), as well as organization of symposia, workshops and advanced trainings	Water Authorities, Municipalities, LGUs	M1/M2/M3	non-structural	no	3.1.
4.4	**Allowance, preparation and post-processing of hazard control**						
4.4.1.	Alignment or optimization of alert and operation schemes (disaster management schemes)	• Examination and actualization of existing alert and operation schedules among others by allocation of flood risk and flood hazard maps	Municipalities, Civil Protection and Emergency Services	M1/M2/M3	non-structural	possible (+)	0.2., 3.2., 3.3.
4.4.2.	Civil Protection	• Examination and improvement of existing resource plans and crisis management systems by conduction of flood exercises, advanced training, definition of organisation structures • Setup of mobile protection dams and local warning systems for the population and allocation of infrastructure and material	Municipalities, Civil Protection and Emergency Services. LGUs	M1/M2/M3	non-structural	possible (+)	0.2., 3.2., 3.3.
4.4.3.	Collection and analysis of experiences concerning flood events	• Central collection and editing of past flood events for analysis and eventually necessary optimizations of the flood risk management • The collection contains information of flood events (Photos, water levels, times, hydrological conditions) as well as information concerning damage to persons and property (e.g. on buildings and areas), a documentation of the operational commitment (process of flood risk prognosis and flood risk warnings, hazard control, Civil Protection) and an evaluation of the influence of technical flood prevention facilities (barriers, banks, dams, mobile constructions)	Water Authorities, Municipalities, Organisations, Civil Protection, Emergency Services, Residents	M1/M2/M3	non-structural	possible (+)	0.1., 0.2., 2.2., 3.2., 3.3., 4.1.

Annex B

List of identified FRM Measures

Action Plan

Abbreviation of national and regional actors

ADZM	Administration Office of Protected Areas Shkodra
AGS	Albanian Geological Survey
ARA	Albanian Road Authority
AREB	Regional Agriculture Extension Agency in Shkodra
DID	Directorate of Drainage and Irrigation
HPP	Hydro Power Plant
IGEO	Institute of Geoscience
KESH	Korporata Elektroenergjitike Shqiptare
MARD	Ministry of Agriculture
MIE	Ministry of Infrastructure and Energy
MoSH	Municipality of Shkodër
MoVD	Municipality of Vau i Dejës
MoTE	Ministry of Tourism and Environment

NACP	National Civil Protection Agency
NCLD	National Committee of Large Dams
NEA	National Environment Agency
NFA	National Forest Agency
NTPA	National Territorial Planning Agency
P	Prefecture
Q	Regional Council of Shkodër (Qark)
RAEA	Regional Agri. Extension Agency Shkodër
RED	Regional Environment Directorate
WBAO	Water Basin Administration Office Drin Buna
WRMA	Water Resource Management Agency
WU Shkodër	Water Utility Shkodër
WU Vau Dejës	Water Utility Vau I Dejës
AUCPUP	Albanian Union of Architects, City Planners and Urban Planners

DRAFT FLOOD RISK MANAGEMENT PLAN FOR SHKODRA AREA

For Areas where there is a potential flood risk or floods are likely to occur, Drin-Buna 4, 5 and 6, declared with the Decision no. 1, dated 15.6.2021 of the National Water Council (territory of administrative units Shkodra, Ana e Malit, Bërdicë, Dajç, Guri i Zi, Rrethinat, Velipojë of Shkodër Municipality and the Bushat administrative unit of Vau i Dejës municipality)

Main Aspect/ Category	Type of Measures	Measures description	Institutions/ Entity responsible for implementation	Other important Institution/ entity involved in the implementation	Priority	Status	Location (LGU) of implementation	Location according to ASPFR	Potential cross border impact	Character of measure
A	B	C	D	E	F	G	H	I	J	K
1	**Aspect: Prevention of risks**									
1.1	**Administrative Instruments** (for avoidance of risk)									
1.1.1-1	Mapping of flood risk areas	Awareness-raising projects in high schools and secondary schools	WRMA, WBAO	MoSH	2	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.1.1-2	Mapping of flood risk areas	Carry out regular updates of Hazard and Risk maps according to the legal provision or in cases when significant changes occur that need to be considered and integrated / further development of database	WRMA, WBAO		2	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.1.1-3	Mapping of flood risk areas	Provision of digital flood hazard and risk maps based on a web-GIS platform to facilitate decision-making on flood risk management (including regular updating).	WRMA, WBAO	MoSH, MoVD, NTPA	2	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.1.1-4	Mapping of flood risk areas	Distribution of information leaflets, including flood risk maps and guidance information for the population in case of emergency (combined with measure 4.4.1-1 related with evacuation maps/points/streets in case of emergency)	WRMA, WBAO	NACP	1	OGM - Ongoing maintanence (OGM)	ALL LGU	AL-4/5/6	No	non-structural
1.1.1-5	Mapping of flood risk areas	Distribution flood risk maps in the local administration at all levels	WRMA, WBAO	MoSH, MoVD	1	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.1.1-6	Mapping of flood risk areas	Maintaining, supplementing and updating on the websites of central and local institutions information on flood risk management, self-protection, flood hazard maps, flood risk assets, new flood events, water access levels and relevant scenarios for each area, and interactive guidance.	WRMA, WBAO	P	1	NS - not Started (NS)	All LGU	AL-4/5/6	No	non-structural
1.1.2-1	Restriction of construction in irradiated areas (in spatial planning / urbanism)	Analysis of flood risk and risk maps with the aim of integrating the conclusions of the analysis into urban / territorial / land planning (definition of area with restrictions for construction / housing, defining mandatory precautions for implementation for the protection of buildings), strategic objectives of municipalities or local development passports.	MoSH, MoVD	NTPA	1	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.1.2-2	Restriction for building in risk areas (in spatial planning / urban planning)	Description / explanation of risk areas / dissemination of risk information to urban planners and town planning administrations through technical meetings and seminars, including economic aspects.	WRMA, WBAO, MoSH, MoVD	ASSOCIATION OF ALBANIAN ARCHITECTS AND URBAN PLANNERS	1	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.1.2-3	Restriction for building in risk areas (in spatial planning / urban planning)	Drafting guidelines (for criteria for construction, land use or development activities) based on the analysis and conclusions of the measure 1.1.2-1, to limit land use in risk areas and their publication through information leaflets from the municipality as part of the general local plan)	MoSH, MoVD		1	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.1.2-4	Restriction for building in risk areas (in spatial planning / urban planning)	Review of local development plans/policies with respect to integrate measures of flood risk management plan 2023-2028	MoSH, MoVD	NTPA	2	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural

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1.1.2-5	Restriction for building in risk areas (in spatial planning / urban planning)	Set up effective mechanisms to control constructions in risk areas (new constructions, existing constructions)	MoSH, MoVD	ADZM , WBAO	1	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.1.2-6	Restriction for building in risk areas (in spatial planning / urban planning)	Support inhabitants, who had built illegal constructions, to move from flood risk areas (information, consultation and support in finding land).	MoSH, MoVD		2	NS - not Started (NS)	All LGU	AL-4/5/6	No	non-structural
1.1.3-1	Protection of the flood plains and retention areas	Adequate use of agricultural land and prevention of construction in the wetland area between Dajç and Bushat.	MoSH, MoVD	LGU Dajç, BUSHAT	2	OGM - Ongoing maintanence (OGM)	Bushat, Dajç	AL-6	No	non-structural
1.1.3-2	Protection of the flood plains and retention areas	Appropriate information about the importance of preserving wetland areas through meetings, seminars etc.	MoVD	LGU BUSHAT	2	OGM - Ongoing maintanence (OGM)	Bushat	AL-6	No	non-structural
1.1.3-3	Protection of the flood plains and retention areas	Control and limitation of new constructions in any type of alluvial fields and catchment areas, especially with priority control and limitation on the bank of the Kir River and the shore of the lake (to be taken into consideration in the Analysis defined according to measure 1.1.2-1	MoSH, MoVD	All LGU, ADZM , WBAO, NTPA	3	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.1.3-4	Protection of the flood plains and retention areas	Prevent construction of any type of facility in the area of Viluni channel as a measure to be foreseen in the General Local Plan and Development Passports of Shkodra Municipality	MoSH	LGU Velipojë	1	OGM - Ongoing maintanence (OGM)	Velipojë	AL-6	No	non-structural
1.1.3-5	Protection of the flood plains and retention areas	Raise community awareness on the importance of flood prevention and protection by communicating and publishing maps in places accessible to the public (in public places in municipalities, in administrative units, in public places of other institutions that provide public services, public places, etc.).	MoSH, MoVD, P, Q	WRMA, WBAO	1	OGM - Ongoing maintanence (OGM)	All LGU	AL-6	No	non-structural
1.1.3-6	Protection of the flood plains and retention areas	Creating the conditions and ensuring effective control/ enforcement of the ban on waste dumping in flood-prone areas including information to the public and businesses	MoSH, MoVD	ALL LGU	1	NS - not Started (NS)	All LGU	AL-4/5/6	No	non-structural
1.2	**Adaptation of land use adaptation (for avoidance of risk, removal or relocation and reduction of risk)**									
1.2.1-1	Adaptation of existing land use in flood risk areas (including agriculture and forestry)	Assessment of soil composition in flood areas, outlining measures to cultivate suitable crops to prevent erosions (based on the soil survey conducted in 2004 in cooperation with the Land Institute).	MARD, MoSH	UNIVERSITIES	2	NS - not Started (NS)	Dajç, Bërdicë, Guri i Zi, Rrethina, Velipojë	AL-6	No	non-structural
1.2.1-2	Adaptation of existing land use in flood risk areas (including agriculture and forestry)	Regular updates of inventories of pubic and private assets in risk areas and risk assessments on assets at risk (bridges, roads, protective works, livestock settlements, drinking water and food reserve facilities, houses etc.)	MoSH, MoVD	MARD, ARA, WU Shkodër, WU VAU DEJES	1	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.2.1-3	Adaptation of existing land use in flood risk areas (including agriculture and forestry)	Cultivation of spring crops and planting of crops that are easily removed from the soil, such as corn, green beans, vegetables, etc. Informing the population especially in areas with potential flood risk in the area of Velipoja (consideration of this conclusion in the assessment of soil composition defined in measure no. 1.2.1-1)	MoSH (MARD with regional agricultural proposed by MoSH)	LGU Velipojë	1	OGM - Ongoing maintanence (OGM)	Velipojë	AL-6	No	non-structural
1.2.1-4	Adaptation of existing land use in flood risk areas (including agriculture and forestry)	Update od the land use study in the Strategic Development Plan of 2012, aiming management of agricultural land use for the risk areas	MoVD	LGU BUSHAT	2	NS - not Started (NS)	Bushat	AL-6	No	non-structural

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1.2.1-5	Adaptation of existing land use in flood risk areas (including agriculture and forestry)	Develop “agro-maps” in flood oriented digital format for soil suitability and crops that are suitable (mainly spring crops) and those not suitable for planting in flood-prone areas	MoSH (MARD with regional agricultural)	ALL LGU	2	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.2.1-6	Adaptation of existing land use in flood risk areas (including agriculture and forestry)	Drafting (or reviewing and integrating into existing plans) a program / plan for the identification, mapping and afforestation of all areas covered by the Drini-Bune Basin, in particular river banks, embankments, alluvial plains and catchment areas to enhance river protection or erosion (planting indigenous hydrophilic plants or in areas around agricultural farms, planting suitable fruit trees, or allowing the development of spontaneous vegetation on the shores). Implementation of the program.	MoSH, MoVD	MTE, NFA, MARD will assist soil analysis through Agricultural Technology Transfer Center in Fushe Kruje	1	NS - not Started (NS)	All LGU	AL-4/5/6	Potential (+/-)	non-structural
1.2.2-1	Adaptation of constructions and infrastructure in risk areas (flood adapted planning and building)	Evaluation and reduction of potential damage in flood risk areas based on "best practices" and "best available technologies" in the field of flood risk management	WRMA, WBAO	MoSH, MoVD, P	2	NS - not Started (NS)	All LGU	AL-4/5/6	No	non-structural
1.2.2-2	Adaptation of constructions and infrastructure in risk areas (flood adapted planning and building)	Assessment of flood risk and discharge obstacles of bridges in Ana e Malit, administered by Shkodra Municipality; improve stability of bridges with a higher discharge capacity	MoSH		1	NS - not Started (NS)	Ana e Malit	AL-6	No	non-structural
1.2.2-3	Adaptation of constructions and infrastructure in risk areas (flood adapted planning and building)	Assessment of flood risk assessment and discharge obstacles on bridges on the national road Ura e Bunës-Murriqan (SH-41); improving the durability of bridges with higher discharge capacity.	ARA		1	NS - not Started (NS)	Ana e Malit	AL-6	No	non-structural
1.2.2-4	Adaptation of constructions and infrastructure in risk areas (flood adapted planning and building)	Education of inhabitants to ensure safety in case of flood events in existing buildings: - limitation of equipment in the ground-floor - usage of first and second floor for living facilities - barriers on doors and windows - Protection of facade by insulation materials	MoSH, MoVD	WRMA, WBAO	3	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.2.2-5	Adaptation of constructions and infrastructure in risk areas (flood adapted planning and building)	Raising public awareness for new constructions to be adapted to flood risk; the foundations of new buildings should be raised from the ground (above the maximum recorded level of flooding in all flood risk villages by referring to flood risk maps)	MoSH, MoVD		2	OGC - Ongoing construction (OGC)	All LGU	AL-4/5/6	No	non-structural
1.2.2-6	Adaptation of constructions and infrastructure in risk areas (flood adapted planning and building)	Drafting guidelines for the protection of structures / constructions / houses and for development of territory and infrastructure, to consider in practice the flood effects in these areas; take these guidelines into consideration when planning new structures.	MoSH		1	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.2.2-7	Adaptation of constructions and infrastructure in risk areas (flood adapted planning and building)	In every study and design of roads, in areas with flood risk, the report of the hydrological study (required in the DCM for technical rules of design of road construction) must necessarily contain the analysis of the assessment component of inflows and maximum level of flood water (specifically risk maps), in order to preserve the works and determine the final quota of the passing parts, as well as to avoid water obstacles.	ARA, MoSH, MoVD		1	P - planned (P)	All LGU	AL-4/5/6	No	non-structural

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1.2.2-8	Adaptation of constructions and infrastructure in risk areas (flood adapted planning and building)	Review and re-evaluation of hydrological study reports or their drafting in case there are none, in any road and bridge construction that is in process or planned and designed to be built in flood risk areas, in order to analyze the assessment component of inflows and maximum level of flood water (specifically risk maps)	ARA, MoSH, MoVD		1	P - planned (P)	All LGU	AL-4/5/6	No	non-structural
1.2.2-9	Adaptation of constructions and infrastructure in risk areas (flood adapted planning and building)	Protect/Elevate pumping stations for public water supply (Oblika 1 and 2) to the flood level extent of HQ10/HQ50/HQ100/HQ200/HQ500 according to sector standards	MoSH	WU Shkodër	1	OGC - Ongoing construction (OGC)	Ana e Malit	AL-6	No	structural
1.2.2-10	Adaptation of constructions and infrastructure in risk areas (flood adapted planning and building)	Widening of twp bridges in Ranxë and Mali i Jushit (widening the distance between bridge legs)	MoSH		2	NS - not Started (NS)	Bushat	AL-6	No	structural
1.2.2-11	Adaptation of constructions and infrastructure in risk areas (flood adapted planning and building)	Flood risk assessement for water supply and wastewater collection / treatment to avoid damages in flood situatins and to guarantee the provision of public water supply and sewerage services in villages, by adapting infrastructure according to the risk for flood. (In combination with measure 3.6.2-1 for structural adaptation for protection against infiltration into groundwater)	WU Shkodër, WU Vau i Dejes	MoSH, MoVD	3	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural & structural
1.2.3-1	Consultation of agriculture and forestry for awareness-raising	Informing, awareness raising and educating farmers throgh leaflets, meetings on the economic and sustainable use of land and the planting of agricultural crops in risk areas in accordance with the provisions of agricultural maps (created according to measure 1.2.1-7), with focus on cultivating sustainable crops, new forms of crop rotation, as well as operating with large farms or agricultural cooperation enterprises, to optimize land management.	MoSH, MoVD	LGU, MARDA with RAEA	1	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.2.3-2	Consultation of agriculture and forestry for awareness-raising	Design and implementation of monitoring programs for soil pollution as a result of floods and dissemination of information to the community on the results of monitoring	MARD with RAEA, MoSH (for informing)	LGU Ana e Malit	1	OGM - Ongoing maintanence (OGM)	Ana e Malit	AL-6	No	non-structural
1.2.3-3	Consultation of agriculture and forestry for awareness-raising	Preparation and distribution of informational and educational materials about the influence of agriculture crops and forestry vegetation regarding riverbank and silt area protection from flooding emergencies.	MARD, AREB, MTE, RAEA	LGU, MoSH, MoVD	2	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non-structural
1.3	**Risk prevention by flood adapted building**									
1.3.1-1	Flood adapted handling with water imperilling substances	Educate farmers on proper land management in order to reduce risk of economic loss in case of flooding and to ensure productive yields. Carry out public meetings to discuss about new forms of crop rotation.	MARD with RAEA, NEA (Chemical office)	LGU, MoSH, MoVD	1	NS - not Started (NS)	All LGU	AL-4/5/6	No	non-structural
1.3.1-2	Support of the development of natural floodplains	Planning of measures to be undertaken for the protection/minimization/elimination of emissions of persisten organic pollutants in environment, based on the results of analyzes performed in the implementation of environmental monitoring programs.	MTE, NEA, RED	UNIVERSITIES, MoSH, MoVD, LGU	1	NS - not Started (NS)	All LGU	AL-4/5/6	No	non-structural
1.3.1-3	Support of the development of natural floodplains	Assess, list and provide an overview e.g. (mapping) of areas and objects with dangerous substances in flood risk areas (including storage level/flood levels in case of flood and protection needs)	NEA, RED	LGU, MoSH, MoVD	1	NS - not Started (NS)	All LGU	AL-4/5/6	No	non-structural
2	**Aspect: Natural Flood Protection**									

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2.1	**Natural flood management, water flow regulation**									
2.1.1-1	Strengthening of existing flood protection works	Afforestation along mountain streams in Ana e Malit oto reinforce embankments (to be considered in the Program /Plan for afforestation defined in measure 1.2.1-6). (In combination with measure 2.1.4-3 for coastal afforestation to reduce erosion in this zone)	MoSH		1	OGM - Ongoing maintanence (OGM)	Ana e Malit	AL-6	Potential (+/-)	structural
2.1.1-2	Revitalisation of river beds and river banks / former flood plains	Carrying out hydrological studies on which to determine special protection measures (focusing on areas with active erosion such as Darragjat, Shirq-Mushan, Dajç, Samrish i Vjetër and Rrushkull) and to carry out relevant engineering surveys based on studies	MoSH	P, DID, WBAO	1	NS - not Started (NS)	Dajç	AL-6	Potential (+/-)	non-structural & structural
2.1.1-3	Revitalisation of river beds and river banks / former flood plains	Planting on the banks of the Kir River suitable indigenous hydrophilic vegetation and increasing the surface of green areas to protect the shores from erosion and enable rapid discharge of water (to be considered in the Program / Plan for afforestation defined in measure 1.2. 1-6)	MoSH		1	NS - not Started (NS)	Guri i Zi	AL-6	Potential (+/-)	structural
2.1.1-4	Revitalisation of river beds and river banks / former flood plains	Plant riversides (Drini river starting from Ganjolle village to Ashta hydropower) with suitable vegetation to protect the riverbanks from erosion and to enable quick water discharge. (to be considered in the Program /Plan for afforestation defined in measure 1.2.1-6)	MoSH		1	P - planned (P)	Guri i Zi	AL-6	Potential (+/-)	structural
2.1.1-5	Revitalisation of river beds and river banks / former flood plains	Planting on the banks of the Buna River in Dajç area with vegetation suitable to protect river banks from erosion and to enable rapid discharge of water. (autochthonous hydrophilic plants) (to be considered in the Program / Plan for afforestation defined in measure 1.2.1-6)	MoSH		2	P - planned (P)	Dajç	AL-6	Potential (+/-)	structural
2.1.2-1	Changing of river courses and slope conditions	Adjustment and cleaning of obstacles (constructions, crossings, tombs) in the canal in Upper Bërdicë where alluvial material is collected, in order to increase its transport capacity.	MoSH	DID Lezhe	2	NS - not Started (NS)	Bërdicë	AL-6	Potential (+/-)	structural
2.1.2 - 2	Changing of river courses and slope conditions	Extension to increase the river discharge capacity by agreement between states of Belaj bottleneck in Buna River	WRMA, MTE, MoSH		3	NS - not Started (NS)	Ana e Malit	AL-6	Potential (+/-)	structural
2.1.2-3	Changing of river courses and slope conditions	Construction of a 2.5 km embankment in the village of Kuc, which joins the 2 existing embankments on the left bank of the Kir River and the construction of a pumping station that will pump water from the field in case of rising water level during floods. These 2 facilities should be built in parallel, and to ensure efficiency in use bypass should be commanded with gates for discharge of water with free flow at the time when the water level in the river allows	WRMA, MARD	MoSH	1	NS - not Started (NS)	Rrethina	AL-5	No	structural
2.1.2-4	Changing of river courses and slope conditions	Investigate the possibility to increase discharge capacities from Murtemza channels (in combination with measure 3.1.3.11 for cleanning channels)	MoSH, DID Lezhe	WRMA, WBAO	2	NS - not Started (NS)	Ana e Malit	AL-6	Potential (+/-)	non structural
2.1.2-5	Changing of river courses and slope conditions	Compilation of studies in order to determine the areas where river inerts may or may not be used to reduce the effects of floods and use their conclusions as mandatory guidelines for implementation.	AGS, WRMA, WBAO		1	NS - not Started (NS)	All LGU	AL-4, 5, 6	Potential (+/-)	non structural
2.1.3-1	Protection of zones along river banks	Adjustment and cleaning of the Kir riverbed in general and near the village of Kuç in particular through the cleaning of inerts from the banks and the riverbed to manage water discharge and prevent soil erosion.	MoSH	LGU Guri i Zi	1	NS - not Started (NS)	Guri i Zi	AL-6	No	structural
2.1.3-2	Protection of zones along river banks	Defining of dosiposal places for solid inert materials in order to avoid dumping of inerts into the shores or water bodies (Drin, Bune, Kir)	MoSH, MoVD		1	NS - not Started (NS)	All LGU	AL-4,5,6	No	non structural

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2.1.3-3	Flood protection works (dike, dam or flood wall)	Building of "protection green belts" with 3-5 rows of dense vegetation in the Pistalli stream to avoid flood in case of heavy rainfall.	MoSH	LGU Guri i Zi	3	NS - not Started (NS)	Guri i Zi	AL-6	No	structural
2.1.3-4	Protection of zones along river banks	Conduction of integrated feasibility study on the prevention of erosion of riverbeds in 9/11 villages in Dajç (Darragjat, Shirq, Mushan, Dajç, Samrish, Samrish I Vjeter, Rrushkull, Belaj, Pentar)	WRMA, AGS		2	NS - not Started (NS)	Dajç	AL-6	No	non structural
2.1.3-5	Protection of zones along river banks	Protection of Drin River banks from erosion from the area of Ganjolla to Vukatana - Kuç, with a length of about 3.5 km through the planting of autochthonous hydrophilic vegetation. (to be considered in the Program / Plan for afforestation defined in measure 1.2.1-6)	MoSH		2	P - planned (P)	Guri i Zi	AL-6	No	structural
2.1.3-6	Protection of zones along river banks	Protection of river Buna banks in the area of Bërdicë e Mesme (along distance of about 1.5 km) by reinforcing the banks of the river with embankment or with autochthonous hydrophilic vegetation. (to be considered in the Program / Plan for afforestation defined in measure 1.2.1-6)	MoSH		2	OGC - Ongoing construction (OGC)	Bërdicë	AL-6	Potential (+/-)	structural
2.1.4-1	Support of the development of natural floodplains	Education / cooperation with landowners or land users to encourage livestock integration in alluvial fields/wetlands in Dajç and Bushati (pasture for small livestock) to ensure soil compaction and improve soil protection	MoSH, MoVD	MARD through RAEA, LGU Dajç, LGU BUSHAT	2	OGM - Ongoing maintanence (OGM)	Dajç, Bushat	AL-6	Potential (+/-)	non structural
2.1.4-2	Support of the development of natural floodplains	Improvement of forest vegetation in areas of alluvial plains by planting autochthonous hydrophilic seedlings with strong root system in the area of Velipoja (to be considered in the Program / Plan for afforestation defined in measure 1.2.1-9)	MoSH	MARD support soil analysis through Agriculture Technology Transfer Center in Fushe Kruje	2	NS - not Started (NS)	Velipojë	AL-6	Potential (+/-)	structural
2.1.4-3	Protection of zones along river banks	Planting willows, acacias and poplars in the areas along the river side to reduce erosion in Ana e Malit. (to be considered in the Program / Plan for afforestation defined in measure 1.2.1-6) (In combination with measure 2.1.1-1 for coastal afforestation to reduce erosion in this area)	MoSH		1	OGC - Ongoing construction (OGC)	Ana e Malit	AL-6	Potential (+/-)	structural
2.1.4-4	Support of the development of natural floodplains	Environmental assessment of flooded areas, to guide responsible institutions to assess the environmental situation before land use decisions etc., not just after a flood.	MoSH, MoVD	MARD support soil analysis through Agriculture Technology Transfer Center in Fushe Kruje, NEA & RED adding monitoring stations depending risk area in the National environment program	2	P - planned (P)	All LGU	AL-4/5/6	No	non structural
2.1.5-1	Construction and strengthening of a water drainage channel (bypass)	Reconstruction of the Buna riverbed (from Bahcallek to the Estuary to the sea)	WRMA, MARD, MIE, MTE	MoSH	3	NS - not Started (NS)	Shkodër, Bërdicë, Ana e Malit, Dajç, Velipojë	Al-6	Potential (+/-)	structural
2.1.6-1	Disconnection / Removal of pavements in urban areas / Rainwater management	Annual routine for review and maintenance of urban drainage systems by JSC Water Supply and Sewerage Shkodra (in the context of ADF & GIZ project).	WU Shkodër		2	OGM - Ongoing maintanence (OGM)	Ana e Malit	AL-6	No	non stuctural & structural
2.1.6-2	Disconnection / Removal of pavements in urban areas / Rainwater management	Extension and regular maintenance of the drainages system/sewers, execially in areas that face regular backwaters and urban flooding.	MoSH	DID Shkodër	2	OGM - Ongoing maintanence (OGM)	Shkodër	AL-4/5	No	structural

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2.1.6-3	Disconnection / Removal of pavements in urban areas / Rainwater management	Removal of obstacles (surrounding walls, alleys, roads, bridges, crossings, inerts, etc.) that block surface runoff water from residential areas; increase the retention- and infiltration capacities of public and private areas.	MoSH	WU Shkodër	2	OGM - Ongoing maintanence (OGM)	Shkodër	AL-4/5	No	structural
3	**Aspect: Technical Flood Protection**									
3.1	**Water Flow Regulation / Flood plain works (Retention measures)**									
3.1.3-1	Maintenance of existing drainage infrastructure.	Cleaning the network of drainage channels in the areas that are flooded in Dajç	DID Lezhe, MoSH		1	OGM - Ongoing maintanence (OGM)	Dajç	AL-6	No	structural
3.1.3-2	Maintenance of existing drainage infrastructure.	Cleaning the network of drainage channels in the areas that are flooded in Bërdicë	DID Lezhe, MoSH		1	OGM - Ongoing maintanence (OGM)	Bërdicë	AL-6	No	structural
3.1.3-3	Maintenance of existing drainage infrastructure.	Cleaning the network of drainage channels in the areas that are flooded in Kir river area	DID Lezhe, MoSH		1	OGM - Ongoing maintanence (OGM)	Zona e lumit Kir, Shkodër, Rrethinat	AL-4/5	No	structural
3.1.3-4	Maintenance of existing drainage infrastructure.	Cleaning the network of drainage channels in the areas that are flooded in Rrethina	DID Lezhe, MoSH		1	OGM - Ongoing maintanence (OGM)	Rrethian, Shkodër	AL-5	No	structural
3.1.3-5	Maintenance of existing drainage infrastructure.	Cleaning the network of drainage channels in the areas that are flooded in ne Velipojë	DID Lezhe, MoSH		1	OGM - Ongoing maintanence (OGM)	Velipojë	AL-6	No	structural
3.1.3-6	Maintenance of existing drainage infrastructure.	Cleaning the network of drainage channels in the areas that are flooded in Ças	DID Lezhe, MoSH		1	OGM - Ongoing maintanence (OGM)	Cas, Velipojë	Al-6	No	structural
3.1.3-7	Maintenance of existing drainage infrastructure.	Cleaning the network of drainage channels in the areas that are flooded in Gur te Zi	DID Lezhe, MoSH		1	OGM - Ongoing maintanence (OGM)	Guri I Zi	AL-6	No	structural
3.1.3-8	Maintenance of existing drainage infrastructure.	Cleaning the network of drainage channels in the areas that are flooded in Bushat	DID Lezhe, MoVD		1	OGM - Ongoing maintanence (OGM)	Bushat	al-6	No	structural
3.1.3-9	Maintenance of existing drainage infrastructure.	Cleaning the network of drainage channels in the areas that are flooded in Darragjat	DID Lezhe, MoSH		1	OGM - Ongoing maintanence (OGM)	Darragjat, Dajç	Al-6	No	structural
3.1.3-10	Maintenance of existing drainage infrastructure.	Cleaning the network of drainage channels in the areas that are flooded in ne Oblike	DID Lezhe, MoSH		1	OGM - Ongoing maintanence (OGM)	Oblike, Ana e Malit	Al-6	No	structural
3.1.3-11	Maintenance of existing drainage infrastructure.	Cleaning of the network of drainage channels in the flooded areas in Murtemz (Combined with the measure 2.1.2-4 for the evaluation of the possibility to increase capacities)	DID Lezhe, MoSH		1	OGM - Ongoing maintanence (OGM)	Murtemze, Velipojë	Al-6	No	structural
3.1.3-12	Maintenance of existing drainage infrastructure.	Cleaning the network of drainage channels in the areas that are flooded in Shirq (Shirgj)	DID Lezhe, MoSH		1	OGM - Ongoing maintanence (OGM)	Shirgj, Dajç	AL-6	No	structural
3.2	**Water Flow Regulation / Channels (Dikes, Dams, Flood Walls and Mobile Flood Protection)**									
3.2.1-1	Flood protection works (dike, dam or flood protection wall)	Realisation of protection measures against soil erosion in 5 active erosion points of the Buna River (1 in Oblikë, 2 in Obot and 2 in Muriqan) by placing concrete panels and embankments along the river combined with tree planting.	MoSH	WRMA, MARD	1	OGC - Ongoing construction (OGC)	Ana e Malit	AL-6	Potential (+/-)	structural
3.2.2-1	Reinforcement of existing flood protection works	Protection /monitoring of the existing embankment in Guri i Zi (using observers, guards, etc.)	DID, MARD	MoSH, LGU Guri i Zi	1	OGM - Ongoing maintanence (OGM)	Guri i Zi	AL-6	Potential (+/-)	structural
3.2.2-2	Flood protection works (dike, dam or	Repair, strengthening and maintenance of pumping stations	DID, MARD		2	NS - not Started (NS)	ALL LGU	AL-4/5/6	No	structural

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A	B	C	D	E	F	G	H	I	J	K
	flood protection wall)									
3.2.2-3	Flood protection works (dike, dam or flood protection wall)	Repair, strengthening and maintenance of the reservoirs in the catchments to ensure the propper functioning of reservoirs according the hydraulic modelling	MoSH, MoVD	DID	2	NS - not Started (NS)	ALL LGU	AL-4/5/6	No	structural
3.2.4-1	Drainage in the ambush area and protection against reverse water flow	Building of a pumping station to remove surface water / upcoming ground water from the area of Cas.	DID, MARD		3	NS - not Started (NS)	Velipojë	AL-6	No	structural
3.2.4-2	Reinforcement of existing flood protection works	Complete /partial rehabilitation /reconstruction of the existing embankment of the Buna River in Darragjat (3.6 km)	DID, MARD	WRMA, MoSH	1	OGC - Ongoing construction (OGC)	Dajç	AL-6	Potential (+/-)	structural
3.2.4-3	Reinforcement of existing flood protection works	Complete /partial rehabilitation /reconstruction of the existing embankment of the Buna River in Dajç (Belaj-Dajç-Shirq total 13.2 km)	DID, MARD	WRMA, MoSH	1	OGC - Ongoing construction (OGC)	Dajç	AL-6	Potential (+/-)	structural
3.2.4-4	Reinforcement of existing flood protection works	Complete /partial rehabilitation /reconstruction of the existing embankment of the Buna River in Pentar - Luarez area (6.8km)	DID, MARD	WRMA, MoSH	1	OGC - Ongoing construction (OGC)	Dajç, Velipojë	AL-6	Potential (+/-)	structural
3.2.4-5	Reinforcement of existing flood protection works	Complete /partial rehabilitation /reconstruction of the existing embankment of the Buna River in Rec-Pulaj area (7km)	DID, MARD	WRMA, MoSH	1	OGC - Ongoing construction (OGC)	Velipojë	AL-6	Potential (+/-)	structural
3.2.4-6	Reinforcement of existing flood protection works	Complete /partial rehabilitation /reconstruction of the existing embankment of the Buna River in Shirgj area	DID, MARD	WRMA, MoSH	1	OGC - Ongoing construction (OGC)	Dajç	Al-6	Potential (+/-)	structural
3.2.4-7	Reinforcement of existing flood protection works	Complete /partial rehabilitation /reconstruction of the existing embankment of the Buna River in Cas area	DID, MARD	WRMA, MoSH	1	OGC - Ongoing construction (OGC)	Velipojë	Al-6	No	structural
3.2.4-8	Construction and strengthening of a water drainage channel (bypass)	Rehabilitation of embankment Pentar-Pulaj in Buna River	DID, MARD	WRMA, MoSH	1	NS - not Started (NS)	Velipojë, Dajç	Al-6	Potential (+/-)	structural
3.2.4-9	Reinforcement of existing flood protection works	Complete /partial rehabilitation /reconstruction of the existing embankment or protection construction against erosion of the Drin River, in Bërdicë, especially on the left bank in the Bërdicë area	DID, MARD	WRMA, MoSH	1	OGC - Ongoing construction (OGC)	Bërdicë	Al-6	No	structural
3.2.4-10	Reinforcement of existing flood protection works	Complete /partial rehabilitation /reconstruction of the existing embankment or protection construction against erosion of the Drin River, in Juban	DID, MARD	WRMA, MoSH	1	OGC - Ongoing construction (OGC)	Guri I Zi	Al-6	No	structural
3.2.4-11	Reinforcement of existing flood protection works	Complete /partial rehabilitation /reconstruction of the existing embankment or protection construction against erosion of the Drin River in Bahcallek	DID, MARD	WRMA, MoSH	1	OGC - Ongoing construction (OGC)	Shkodër	AL-5	No	structural
3.2.4-12	Reinforcement of existing flood protection works	Complete /partial rehabilitation /reconstruction of the existing embankment or protection construction of Kir river in Kuc, Bleran, Bardhaj	DID, MARD	WRMA, MoSH	1	OGC - Ongoing construction (OGC)	Rrethinat, Guri i Zi	Al-5/6	No	structural
3.2.4-13	Construction and strengthening of a water drainage canal (bypass)	Rehabilitation works in the Drin riverbed (Protection of Drin banks on the right side (Vukatana embankment)	DID, MARD	AMBU, MoSH	1	NS - not Started (NS)	Bërdicë	Al-6	No	structural
3.3	**Water Flow Regulation / Channels (Measures in the rivers / river training)**									
3.3.1-1	Keeping clear cross-sections in settlement areas	Clearing of the Buna River in the territory of Ana e Malit, from solid, deposits trees and special islands that divert the water flow.	WRMA, MoSH	LGU Ana e Malit, DID	3	NS - not Started (NS)	Ana e Malit	AL-6	Potential (+/-)	structural
3.3.1-2	Keeping clear cross-sections in settlement areas	Clean up the riverbed of Drin River (from Ashta Hydro-Power (HPP) water outflow to Bahcalleku bridge) to ensure water flow in the upper side of the old natural waterbed.	WRMA, MoSH	LGU Bërdicë, DID	3	NS - not Started (NS)	Bërdicë	AL-6	Potential (+/-)	structural

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3.3.1-3	Keeping clear cross-sections in settlement areas	Clean up the riverbed of Drin River (starting from Ganjolle village to the entrance of Ashta hydropower plant) to manage the water discharge and to prevent soil erosion.	WRMA, MoSH	LGU Guri i Zi, DID	3	NS - not Started (NS)	Guri i Zi	AL-6	Potential (+/-)	structural
3.3.1-4	Keeping clear cross-sections in settlement areas	Continuous cleaning of tertiary drainage channels	WRMA, MoVD		3	OGM - Ongoing maintanence (OGM)	All LGU	AL-6	No	structural
3.3.1-5	Keeping clear cross-sections in settlement areas	Education of farmers about maintenance of drainage channels (third level).	WRMA, MoVD		1	OGM - Ongoing maintanence (OGM)	All LGU	AL-6	No	non structural
3.3.2-1	Removal of bottlenecks / narrow passages in rivers	Further assessment of positive and negative effects of the controlled discharge into the Drini of Lezha / Drinasa	WRMA, WBAO, NCLD, KESH		2	NS - not Started (NS)	Bërdicë	AL-6	No	non structural
3.3.3-1	Construction and strengthening of a water drainage canal (bypass)	Construction and strengthening of water drainage canals (bypasses) in Bërdicë	MoSH, MoVD, DID		3	NS - not Started (NS)	Bërdicë	AL-6	Potential (+/-)	structural
3.3.3-2	Construction and strengthening of a water drainage canal (bypass)	Rehabilitation of the Murtemza collector (Clearing the large vegetation and expanding the drainage through the Murtemza collector to Lake Vilun aiming to reduce as much as possible the water level and the duration of the floods of the Trush field.)	DID, MARD	MoSH	2	NS - not Started (NS)	Velipojë	Al-6	Potential (+/-)	structural
3.3.3-3	Construction and strengthening of a water drainage canal (bypass)	Construction of the Shirqi discharger with a fixed quota structure which will control the discharged inflows depending on the already rehabilitated embankments	DID, MARD	MoSH	2	NS - not Started (NS)	Dajç	AL-6	Potential (+/-)	structural
3.3.3-4	Construction and strengthening of a water drainage canal (bypass)	Rehabilitation of the Irrigation channel Bank U 33 and the embankment of K5 channel	DID, MARD	MoSH	2	NS - not Started (NS)	Bërdicë, Dajç	AL-6	No	structural
3.3.3-5	Construction and strengthening of a water drainage canal (bypass)	Direct discharge of water into the Murtemza gorge as well as the drainage with pumping station of the plain on both sides of the embankment limits. (Adaptation and reconstruction of enbakements of irrigation channels and roads along the drainage channels to discipline the current flow from Shirqi discharger through the Trush field towards the Murtemza gorge)	DID, MARD	MoSH	2	NS - not Started (NS)	Velipojë	Al-6	Potential (+/-)	structural
3.4	**Surface water management (Measures of urban water management)**									
3.4.1-1	Rain water management	Assess the existing rain water collection system and management of its functioning defined by regulation.	MoSH, MoVD		1	OGM - Ongoing maintanence (OGM)	All LGU	AL-5	No	non structural
3.5	**Protection of object / facilities**									
3.5.1-1	Object / Facility protection of infrastructure facilities (e.g. transport nodes, switching and branching systems)	In the case of forecasting works on the Obot-Oblikë and Goricë-Muriqan roads, retaining walls and bridges should be considered and implemented to increase flood resistance as well as to avoid obstacles in water circulation.	MoSH, Q		2	NS - not Started (NS)	Ana e Malit	AL-6	No	non structural & structural
3.6	**Other protection measures**									
3.6.1-1	Protection against water and ground water intrusion	Structural adaptation of pumping stations to guarantee water supply in flood situations as well as their protection from floods in flooded territories	WU Shkodër, WU Vau i Dejes	MoSH, MoVD	2	NS - not Started (NS)	Ana e Malit	AL-6	No	structural

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A	B	C	D	E	F	G	H	I	J	K
3.6.1-2	Protection against water and ground water intrusion	Raising community awareness on the protection of individual wells by buiding the conductor and installing a special cork to insulate the well from surface water filtration in the event of flooding	WU Shkodër, WU Vau i Dejes		2	NS - not Started (NS)	All LGU	AL-4, 5, 6	No	non structural
3.6.1-3	Protection against water and ground water intrusion	Protection of water works (pumping station that supplies drinking water to Velipoja and some villages)	MoSH	WU Shkodër	2	NS - not Started (NS)	Velipojë	AL-6	No	structural
4	**Aspect: Preparedness and Information**									
4.1	**Economical / financial preparedness**									
4.1.1-1	Financial precautions by reserves and insurances (insurance against natural hazards)	Organisation of technical seminars (in cooperation with insurance companies) for precautionary measures to be implemented in order to reach safety standards that allows insurance companies to offer insurances in risk areas.	P, Q	MoSH, MoVD, private insurance institutions	1	NS - not Started (NS)	All LGU	AL-4/5/6	No	non structural
4.1.1-2	Financial precautions by reserves and insurances (insurance against natural hazards)	Identify opportunities and mechanisms to include in insurance schemes residents of areas whose properties have been identified with a very high risk of flooding	P, Q	MoSH, MoVD, private insurance institutions	3	NS - not Started (NS)	All LGU	AL-4/5/6	No	non structural
4.1.1-3	Financial precautions by reserves and insurances (insurance against natural hazards)	Raising awareness of residents about the need for insurance in case of flood consequences	P, Q	MoSH, MoVD, private insurance institutions	3	NS - not Started (NS)	All LGU	AL-4/5/6	No	non structural
4.2	**Informational preparedness**									
4.2.1-1	Improvement of flood forecast and flood warning / messaging	Formalization of the relationship of information and cooperation in case of future floods and emergencies, between public entities that have information regarding weather forecasting and discharge management in the Drini cascade.	P, NACP, WRMA, IGEO, KESH	HPP Ashta, HPP Fierzë, HPP Koman, HPP Vau i Dejës, MoSH, MoVD	1	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non structural
4.2.1-2	Improvement of flood forecast and flood warning / messaging	Propper distribution of rainfall and weather forecasting bulletins. Carry out direct access to weather forecasting online data. Establish contact / communication / mutual cooperation with the monitoring and warning institution.	P, NACP, WRMA, IGEO, KESH	HPP Ashta, HPP Fierzë, HPP Koman, HPP Vau i Dejës, MoSH, MoVD	1	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non structural
4.3	**Behavior-related preparedness**									
4.3.1-1	Publication of flood hazard and flood risk maps close to the spot	Advertising charts or billboards with relevant mapping of vulnerable areas. Maps should be associated with explanatory tables on rainfalls and runoffs and should be placed inside glass frames, so that residents can continuously be informed about flood hazard areas and flooding levels.	WRMA, NACP	MoSH, MoVD	1	OGM - Ongoing maintanence (OGM)	ALl LGU	AL-4/5/6	No	non structural
4.3.1-2	Publication of flood hazard and flood risk maps close to the spot	Information/training of population, farmers, businesses etc. on individula risks and individual actitivies in a flood event; based on the publication of flood risk maps	MoSH, MoVD	LGU	1	OGM - Ongoing maintanence (OGM)	ALl LGU	AL-4/5/6	No	non structural
4.3.2-1	Continuing advancement of awareness raising and publicity	Education of inhabitants to ensure safety in case of flood events: - limitation of equipment in the ground-floor - usage of first and second floor for living facilities	MoSH, MoVD	LGU	1	OGM - Ongoing maintanence (OGM)	ALl LGU	AL-4/5/6	No	non structural
4.4	**Preparation and post-processing of hazard control**									

Main Aspect/ Category	Type of Measures	Measures description	Institutions/ Entity responsible for implementation	Other important Institution/ entity involved in the implementation	Priority	Status	Location (LGU) of implementation	Location according to ASPFR	Potential cross border impact	Character of measure
A	B	C	D	E	F	G	H	I	J	K
4.4.1-1	Alignment or optimization of alert and operation schemes (disaster management schemes)	Regular drafting and updating of the emergency response plan and database, emergency response scheme, including development of operational evacuation maps, evacuation points / locations and routes, and time when alarms should be issued, according to the flood forecast of the situation of 2010. (in combination with measure 1.1.1-4 for information leaflets)	MoSH, MoVD	P, NACP	1	OGM - Ongoing maintanence (OGM)	ALL LGU	AL-4/5/6	No	non structural
4.4.1-2	Alignment or optimization of alert and operation schemes (disaster management schemes)	Updating information (database) twice a year regarding contacts and persons to be engaged in the flood warning process and emergency situations and its communication in all institutions and entities involved.	MoSH, MoVD	P, NACP	1	OGM - Ongoing maintanence (OGM)	ALL LGU	AL-4/5/6	No	non structural
4.4.2-1	Civil Protection	Advertise evacuation plans with operational maps in the center of the villages, to ensure easy and fast orientation of people and their distribution with representatives of local communities (local administrators, elders, school principals, etc.)	MoSH, MoVD	P, Q, LGU	1	OGM - Ongoing maintanence (OGM)	ALL LGU	AL-4/5/6	No	non structural
4.4.2-2	Civil Protection	Carry out trainings with the communities on emergency response, knowledge about safe areas and modes of movement in case of emergencies, in order to maximise evacuation efficiency and safety.	MoSH, MoVD, NACP	P, Q, LGU	1	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non structural
4.4.2-3	Civil Protection	Construction of stations (the pod type) to be utilised for first aid and the safety of people, livestock and machineries in case of emergencies;	MoSH	LGU Ana e Malit, Q	1	NS - not Started (NS)	Ana e Malit	AL-6	No	non structural
4.4.2-4	Civil Protection	Maintenance of the alarm system installed by KESH, for areas at risk of flooding according to the scenarios provided in the Emergency Preparedness Plan, realized by KESH sh.a.	KESH		1	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	structural
4.4.2-5	Civil Protection	Maintenance of hydrometeorological monitoring and forecasting systems in the Drin river cascade	KESH		1	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/7	NO	non structural
4.4.2-6	Civil Protection	Provision and maintenance of optional means of movement (metal boats, etc.)	MoSH, P	LGU	1	COM - Completed (COM)	All LGU	AL-6	No	non structural
4.4.2-7	Civil Protection	Utilization of safe mobility means for quickly evacuation of people, livestock, food, etc.	MoSH, P	LGU Ana e Malit	1	OGM - Ongoing maintanence (OGM)	Ana e Malit	AL-6	No	non structural
4.4.3-1	Collection and analysis of experiences concerning flood events	Maintaining and updating documentation protocols (for all flood events, including events, damage, casualties, etc.) for professional use (in a central database)	MoSH, MoVD	P	1	OGM - Ongoing maintanence (OGM)	All LGU	AL-4/5/6	No	non structural

Annex C

Coordination with EU Water Framework Directive 2000/60/EC, Water Basin Management Plan Drin-Bunë

M1 Measures that support the objectives of the other directive
M2 Measures that may lead to a conflict of objectives and must be examined on a case-by-case basis
M3 Measures that are not relevant to the objectives of the other directive

type of measure is not used

Item no.	Environmental Objectives for the Drin-Buna Basin (RBMP)		Interaction with type of measures (FRM-Plan)															Explanation / comment
			1.1.	1.2.	1.3.	2.1.	2.2.	3.1.	3.2.	3.3.	3.4.	3.5.	3.6.	4.1.	4.2.	4.3.	4.4.	
1	1. To promote the sustainable use of water resources, their fair distribution among users, maximizing economic benefits in respect of environmental conditions and sustainable management principles	1.a) Continuous improvement in the water supply	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	The RBMP proposes water supply investment projects such as rehabilitation, extension or new network works in urban and rural areas for water supply purposes. This is all through consistent with FRM measures.
2		1.b) Improved collection of waste water	M3	M3	M3	M3	M3	M3	M3	M3	M1	M3	M3	M3	M3	M3	M3	The RBMP proposes the rehabilitation and development of the sewerage network in urban and rural areas. For the Municipality of Shkoder a WWTP with a separate collection system for rain and waste water is planned. Either a separate collection of storm water or the rehabilitation of the channel system is enabling smooth drainage in case of flooding.
3		1.c) Water for irrigation for agriculture land	M3	M3	M3	M3	M3	M2	M2	M2	M3	M3	M3	M3	M3	M3	M3	The RBMP proposes the rehabilitation and development of the irrigation network which includes dams for increasing the agriculture irrigated land. Such interference could counteract with the installed and pursued water flow regulation system that aims at mitigating flood risk in case of flooding.
4		1.d) Improvement of drainage network for irrigated agricultural land	M3	M3	M3	M3	M3	M3	M3	M1	M3	M3	M3	M3	M3	M3	M3	The RBMP proposes the rehabilitation and development of the drainage network and modernisation of drainage pumping stations. Such investments could reinforce "rapid" drainage in case of flooding.
5		1.e) Sustainable development aquaculture in specified zones	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	The propsed measures of this objective are consistent with the FRM measures. Conflicts or synergies can only result from significant contruction measures within the aquaculture-zones which is not expected.
6		1.f) Maximising the use of hydro energy potential	M3	M3	M3	M2	M3	M1	M3	M1	M3	M3	M2	M3	M3	M3	M2	The RBMP proposes amongst others investigations on the optimisation of existing hydro energy production schemes, and the finalisation of studies regarding the potential of hydro energy production for river branches considering SHPPs (small hydro power plants). Depending on assessment criteria, the results of the studies could counteract with mitigating FRM measures. An emphasis should be additionally drawn to authorisation and duties of hydro power plant operators. Despite these investigations the proposal to review existing hydropower permits in order to restore ecological flow/ river continuity downstream can be of enabling character to flood management measures.
7		1.g) Fulfilling of industrial water requirements	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	The proposed measures of this objective have not mutual impact on FRM measures.

Item no.	Environmental Objectives for theDrin-Buna Basin (RBMP)		Interaction with type of measures (FRM-Plan)															Explanation / comment
			1.1.	1.2.	1.3.	2.1.	2.2.	3.1.	3.2.	3.3.	3.4.	3.5.	3.6.	4.1.	4.2.	4.3.	4.4.	
8	2. Preservation and achievement of minimal "good" ecological and chemical status for surface water bodies	2.a) Improvement of monitoring for all water bodies	M1	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M1	M1	M1	The RBMP proposes the set up of monitoring stations for all surface and groundwater bodies (in accordance with EU-requirements), continuous records and a register on water monitoring parameters. Such application contributes significantly to preventative FRM measures if processes for flood forecasting information distribution work appropriately.
9	that have "less than good", "poor" or "very poor" status. (rivers, lakes, transitional / transitional waters, coastal, artificial and highly modified water bodies)	2.b) Improvement of ecological status and chemical quality for all surface water body types	M3	M3	M3	M1	M1	M3	M2	M2	M3	M3	M3	M3	M3	M3	M3	The RBMP objectives of good ecollogical and good chemical quality are significantly influenced by the water courses, natural retention areas and natural river banks. Thus, FRM measures for revitalisation can create significant positive synergies with the RBMP objectives. Technical protection works and technical improvements on river banks and dams can have reverse impacts. Such measures should therefore be planned and implemented in close cooperation and consultation of water management and ecologic planning institutions.
10		2.c) Introduction of good agricultural practices – assessment, monitoring and management	M3	M1	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	The RBMP proposes on the one hand the launch of awareness programmes regarding pesticides use and alternatives; on the other hand the facilitation of pilot projects regarding common agriculture associations. Both measures are likely to contribute to FRM measures referring to awareness-raising of farmers for appropriate adaption of agricultural land use in the flood area.
11		2.d) Reduction of contamination from use of pesticides in agriculture	M3	M1	M3	M1	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	The RBMP proposes reinforced controlling and monitoring mechanisms for the use of pesticides. This measure possibly contributes to adapted land use in potentially flooded agricultural land through alternative cultivation of arable land as well as to natural flood protection measures as soil might not be as stressed as with excessive exposure to pesticides.
12		2.e) Reduction of illegal use of inert and river gravels	M3	M3	M3	M1	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	The RBMP proposes the enforcement and implementation of a permit regime for the use of river gravel and inert material and an assessment on rehabilitation of river beds in the Drin-Buna River Basin. This is an indivisible objective to meet the positive effects of i.a. the revitalisation of river beds and the protection of zones along the river bed in the category of natural flood protection measures.

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			1.1.	1.2.	1.3.	2.1.	2.2.	3.1.	3.2.	3.3.	3.4.	3.5.	3.6.	4.1.	4.2.	4.3.	4.4.	
13	3. Prevention of pollution in order to avoid a deterioration of groundwater quality andto attain a good chemical status in GWBs	3.a) Elimination/reduction of the amount of hazardous substancesand nitrates entering groundwater bodies	M1	M3	M1	M3	M3	M3	M3	M3	M3	M3	M1	M3	M3	M3	M3	The RBMP proposes the registration of all industrial farms and their surface of agricultural land. This is coherent with land surveying measures to keep flood risk areas and their respective objects up to date. Synergies may be developed by integrated data bases on relevant locations and use of hazardous substances.
14		3.b) Increase of wastewater treatment efficiency in order to avoid GW pollution from urban & industrial pollutions sources	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	Wastewater treatment and flood protection measures do not have significant joint or mutual impacts.
15	4. Preservation and achievement of minimal "good" quality for bathing water (internal, coastal and transitional)	4.a) Increasing the number of coastal monitoring stations for microbiological elements	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	The RBMP measures aiming at coastal monitoring do not have any impacts on flood risk management or vice versa.
16		4.b) Increase the number of monitoring parameters according to the requirements of the European directives	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	The RBMP measures aiming at the number of monitoring parameters do not have any impacts on flood risk management or vice versa.
17	5.Reduction of flood risk and losses for life, livelihoods, health, economy, cultural and environmental assets of persons, businesses and communities	5.a) Reducing the number of residents affected by flooding	M1	M1	M1	M3	M3	M3	M1	M3	M3	M1	M3	M3	M1	M1	M3	This objective in the RBMP is specifically dedicated to flood risk prevention. All FRM measures aim at reducing flood affected people and objects. Hovewer, direkt synergies can be named for those measures that aim at protection or prepardnes of people that my be affected by flooding.In that way it has a specific enforcing character for administrative FRM and civil protection schemes.
18		5.b) Reducing the agriculture land affectedby floods	M3	M1	M2	M2	M3	M1	M1	M3	M3	M3	M3	M3	M3	M3	M3	The RBMP proposes the reduction of agricultural land at flood risk; therefore the FRM measures for adaptation of land uses, precautionary measurs, information and construction of flood protection infrastructure have significant impacts on this RBMP abjective and vice versa. Extension or revitalisation of natural retention areas (today often agricultural areas) may have negative impacts on the reduction goal for agricultural land at risk.
19	6.Improvement of the safety of irrigation dams	6.a) Assessment and the provision of measures to improve the safety of dams	M1	M1	M3	M3	M3	M3	M3	M3	M3	M3	M1	M3	M3	M3	M3	As the RBMP proposes the investigation of irrigation dam conditions for rehabilitation (especially for those at risk) this could amplify local knowledge for awareness raising measures and has synergies with FRM measures that aim atrisk assessment and optimisation of the operation of reservoirs and dams.

Item no.	Environmental Objectives for theDrin-Buna Basin (RBMP)		Interaction with type of measures (FRM-Plan)														Explanation / comment
			1.1.	1.2.	1.3.	2.1.	2.2.	3.1.	3.2.	3.3.	3.4.	3.5.	3.6.	4.1.	4.2.	4.3.	4.4.	
20	7.Preservation and/or reduction of the rate of erosion in rivers	7.a) Less vulnerableareas (20% of the territory)	M3	M1	M3	M1	M3	M3	M1	M3	M3	M3	M3	M3	M3	M3	M3	The RBMP proposes on the one hand the preparation of a land vulnerability map of the area with special focus on eroded area, a study on low cost forestation projects for areas in the risk of erosion as well as the implementation of pilot activities against erosion phenomena. This is an indivisible objective strongly connected to i.a. the protection of zones of river banks.
21		7.b) Highly endangered areas (70% of the territory	M3	M1	M3	M1	M3	M3	M1	M3	M3	M3	M3	M3	M3	M3	M3	The RBMP proposes on the one hand the preparation of a land vulnerability map of the area with special focus on eroded area, a study on low cost forestation projects for areas in the risk of erosion as well as the implementation of pilot activities against erosion phenomena. This is an indivisible objective strongly connected to i.a. the protection of zones of river banks.

Annex D

Monitoring system of significant environmental impacts referring to SEA and the Environmental Declaration of the Minister Responsible for the Environment

Monitoring system of significant environmental impacts

(referring to the recommendations of the Strategic Environmental Assessment)

The monitoring system of significant environmental impacts, which come as a result of the implementation of the plan, is a simple tool of effective monitoring.

The purpose of the monitoring program under this report is to have a set of data related to FRMP measures, as well as actions related to them, for which potential negative impacts on the environment can be identified.

Monitoring is based on indicators that measure changes in the environment, especially changes that are critical in terms of environmental quality. The indicators used should be realistic and easily measurable. *"An environmental indicator is a numerical value that helps to give an overview of the state of the environment or human health. Indicators are developed based on quantitative measurements or statistics of environmental status that are traced over time. Environmental indicators can be developed and used in a wide range of geographical areas, from the local to the regional and national level."*[1]

Monitoring of impact is extremely important for the implementation of the plan, and as per law 91/2013 "On strategic environmental assessment", the implementation of a plan or program should be monitored in order to identify significant effects or unintended negative effects, which make it possibleto neutralize them in a timely manner and adjust as far as possible.

Several types of indicators can be used to perform specific functions and to measure the quality / quantity of environmental resources:

- Indicators on the state of the environment, which reflect the quality of the environment, or the quantity of physical, biological or chemical phenomena;
- Stress indicators, which reflect the effects of development;
- Performance indicators, which can be used to assess long-term achievements in environmental management and protection;
- Sustainable development indicators, which bring a new dimension to the provision of information on what they seek to describe and measure key relationships between economic, social and environmental factors.

[1] http://www.epa.gov/igateway/whatIndicator.html

In all cases, indicators need to quantify and simplify information, making it more accessible to policy makers and the public.

Data collection is suggested to be based on two sources:

(a) in the primary data generated by the measurement of environmental parameters; AND

(b) in the assessment of environmental indicators.

The process of obtaining data through measurement may involve regional authorities (counties), butalso national authorities (eg Ministry of Tourism and Environment), local authorities, scientific and professional bodies, as well as public service bodies (e.g. .sh landfill management bodies, RAPA, public health directorates, etc.). Measuring environmental indicators is a complex process; i.e. is a regular process or an ongoing process.

A number of parameters are monitored through environmental permit conditions and through monitoring programs at national / county / local level; this data can be useful. It is important to note that the environmental data generated by the monitoring program should be reported, published and made available to the public.

The following measures are proposed as part of this SEA to monitor the effects on the environment as a result of the implementation of the plan. They (measures) are designed in relation to the environmental objectives and the expected impacts of the plan on environmental factors. Measures include goals and thresholds that determine where corrective action may be needed in order to achieve the stated goal and meet the environmental objective.

Table Annex-D-1: Model of significant environmental impact monitoring program by FRMP

Environmental objectives (EO)	Indicators	ResponsibleAu-thorities	Frequency ofMonitor-ing	Goals	Corrective Actions
Population and Human Health					
EO1 Protecting and improving the health and well-being of people through improving the qualityof the environment	▪ Data on changes in the number of households and businesses at flood risk ▪ Years of longevity in good health ▪ Number of flood related incidents ▪ Percentage of people living below the minimum living limit	Prefecture Relevant directorate in themunicipality	Every year	- Increasing safety of life and coping with flood risks - Increaseing the quality of life for communities in the area - Increasing the quality of services provided	✓ Review of the measures foreseen in the plan ✓ Frequent and regular consultations with the affected communities ✓ Capacity building at the level of drafting and implementing policies and plans.
Biodiversity					
EO2 Conservation and, where appropriate, species, habitat and biodiversity improvement	▪ Habitat and species protection status as required by the relevant legislation ▪ Number of important habitats that are in satisfactory condition ▪ Biodiversity status, compared to the EU (number of endemic and rare species) ▪ Number and size of natural	Protected areas management structures Competent directorates of municipalities	According to management plan Every year	- Maintaining a favorable protection status for all protected habitats and speciesaccording to national and international legislation - Identification at the local level of areas with high biodiversity and ecological corridors.	✓ Review the plan including objectives and measures in support of Natura 2000 areas ✓ Obligation to implement relevant laws and regulations.

	surface				
Soil					
EO3 Protect and, where possible, improve soil function and quality	▪ Amount of degraded land ▪ Reuse of structures, which is the most basic principle of land conservation in urban areas ▪ Quantities of waste produced, collected and disposed of in landfills ▪ Monitoring of chemical aspects of soil content and impacts	Competent authorities of the district / municipality Landfill managementstructures	Every year	- Concentration of development (implementation of measures) in designated areas and encourage reuse of areas whereinterventions are currently carried out	✓ Review the plan (measures), as needed ✓ Obligation to enforce regulations, where necessary
Water					
EO4 Deterioration prevention, protectionand, where possible, improvement of the aquatic environment	▪ Surface water quality monitoring ▪ Groundwater quality monitoring ▪ Water use by sector ▪ Percentage of population connected to wastewater treatment plants (WWTP)	Competent directorates of municipalities WWTP managementbodies MTE	Sampling and measurements in accordance with theenvironmental conditions of each WWTP. National monitoring system of water quality	- Protection and restoration of areas identified in the Drin-Buna Basin Management Plan, which are required to achieve "good" status for water quality in accordance with the objectives of NSIWRM and the Water Framework Directive - There should be no deterioration of levels of compliance with drinking waterquality standards.	✓ Increase the frequency of monitoring, as needed ✓ Improving WWTP and continuous monitoring on the fulfillment of the license conditions related to their discharges

Climatic Factors					
EO5 Contribution to mitigation and adaptation to climate change	▪ Number of structures / buildings improved in the context of adaptation to climate change ▪ Adoption of renewable technologies	Competent directorates of municipalities MTE	Continuation	- Increasing the number of improved structures / buildingsin the framework of adaptationto climate change - Adding and improving the means and ways of producing energy from renewable resources.	✓ Strict fulfillment of specific requirements ✓ Review the plan as needed
Material Assets					

EO6 Contribution to the protection of property and infrastructure EO7 Reduction of resource consumption	▪ Number of assets (public, private, infrastructure) protected from flood risk ▪ Assessment of the quantity and quality of resources used to implement the measures of the plan	Relevant structures of theregion / municipalities	Continuation	- Increasing the number of assets protected from flood risk - Application of engineering / construction practices that require minimal use of resources.	✓ Modification / revision of the plan,as needed
Cultural Haritage					
EO8 Protect and, where possible, improve the character, diversity and special qualities of cultural heritage and the historic environment	▪ Number of Monuments listed in the FRMP and areas with archaeological potential that have been registered or are subject to exploration as a resultof the implementation of the plan ▪ Number of monuments and archeological sites damaged dueto the implementation of the plan	Relevant directorates ofdistrict / municipality National Institute of Cultural Heritage	Continuation	- Preservation and increase of the number of archeological features registered and protected - Un damage to structures or monuments and areas around them due to the implementation of the plan - Increase the number and maintain the protection status of cultural monuments in the	✓ Any damage to the registered cultural monuments, or any other element of the cultural and archaeological heritage, as well as the area around them, will be considered as a violation and
	▪ Number and protection status of the structures included in the list of cultural monuments ▪ Number of buildings preserved and reused ▪ Number of protected structures damaged due to plan implementation.			area.	sanctions will be applied according to the legislation in force.

Landscape					
EO9 Protect and, where possible, improve the character, diversity and special qualities of landscapes	▪ Quality of urban and rural environment	Competent directorates of municipalities	Continuation	- Increasing the quality of urban and rural environment	✓ Obligation to implement the provisions in the General Local Plan and other development plans for each municipality.

Requirements for environmental monitoring, periodic reporting to the ministry during the implementation of the Plan

- To draw up the Environmental Monitoring Program during the implementation of the Plan, to collect data on concrete impacts and consequences on the environment during their implementation, as well as verify the impacts and take additional mitigating measures, which must be implemented to guarantee the protection of the environment. This program should be drawn up within 6 months of receiving the Environmental Declaration and get the approval of the authorities responsible for environmental protection.
- To facilitate the realization of the environmental monitoring program of the Plan, existing monitoring programs can be used, that match the purpose of the environmental monitoring program of this Plan.
- If the consequences on the environment and health exceed the environmental standards in force, then the ministry asks the approving and implementing authorities of the plan to take appropriate measures to avoid/minimize negative impacts, or to evaluate the change of the plan, to meet the environmental standards;
- The responsible authority, which implements and supervises the implementation of the FRMP, must periodically draw up once a year, an annual report on the measures taken to protect the environment during implementation, which must be filed with the Ministry responsible for the Environment, no later than the last week of November.

Monitoring of environmental impacts for each measure provided in the FRMP will be done according to the monitoring program and may include information expressed in table form,according to the model in the table below.

Measures implemented according to FRMP	**Environmental indicators**	**Prediction of cumulative impacts (as appropriate)**	**Total impact of the plan**
Measure 001			
Measure 002			
Measure 003			
Measure...			

Annex E

Recommendations & instructions for the implementation FRM-Plan Measures referring to the:

- Recommendations of the SEA

- Environmental Declaration of the Minister Responsible for the Environment

RECOMMENDATIONS & INSTRUCTIONS WHICH MUST BE CONSIDERED FOR THE IMPLEMENTATION OF EACH PMRP MEASURE in order to increase the positive effects and mitigate any negative environmental effects.

(referring to the recommendations of the Strategic Environmental Assessment)

Detailing ore determination of more specific and direct measures will be done during the drafting of the respective ESIAs related to the implementation of each of the measures proposed in the PMRRP (when the ESIA is necessary)

I. GENERAL

1. For more technical and construction measures, which often have a clear effect on risk reduction, but which create negative effects on flora, fauna, biodiversity, soil and cultural heritageas, the landscape, as well some other small effects, an further environmental analysis and assessment during the planning and implementation process, must be part of the approval procedures (relevant ESIAs). This evaluation process will help identify ways to avoid, reduce, mitigate or compensate any negative effect identified;

2. As the financial resources for integrated civil protection, as required by the relevant law, are limited at both levels of government, even fewer at the local level, the following should be done: (1) a thorough analysis of resilience actions, implemented during the provision of local services and the respective costs would be tracked, most likely the costs of resilience would be higher than are currently conceived; (2) cross-sectoral planning for local sustainability in order for cooperation and coordination between sectors to lead to some simple actions that guarantee financial sustainability and efficiency within current budgets;

3. The new infrastructure to be installed must take into account the predicted climate change regimes. Flood risk management measures should be designed/detailed in such a way as to take into account the long-term impacts of climate change;

4. The allocation of new funds and funding for risk management should maintain a level of prioritization related to funding for risk management in high-risk areas. This should be reflected in relevant budget planning at all levels;

5. Naturalization of rivers and watercourses to restore them to their natural state, where current interventions in rivers and riparian areas are old, unnecessary or causing further destruction. Providing a mechanism for acquiring / purchasing riparian zones to enable natural flood zones and to change policy regarding the protection of riparian zones, thus enabling rivers to transport sediments naturally;

6. Encouraging the implementation of the Flood Risk Management Plan to achieve low or zero-carbon access. This would serve to formalize and give effect to one of the principles used in development processes today, the aspiration to be carbon neutral.

II. RECOMMENDATIONS WITH FOCUS - POPULATION AND HUMAN HEALTH

1. When designing for the implementation of the proposed measures, it is recommended to take into account local population data and deprivation indices. This will help align priorities for areas at higher risk of flooding and communities and social groups more vulnerable.

2. In developing flood studies and designing appropriate measures and works, opportunities for recreational benefits and improved access to the natural environment and green space, to improve the quality of life, should be considered. The measures should aim to support local proposals and aim at regeneration and providing opportunities to the most disadvantaged communities.
3. It is recommended to pay more attention to the beneficiary role of the natural environment in urban areas. This may include, for example, the expansion and improvement of green infrastructure networks and the application of sustainable drainage systems that use green space.
4. To ensure that all community groups engage in an inclusive manner, additional support and action at the local level may be needed to facilitate this, while this support and action should be adapted to the specific context.
5. Detailed mitigation measures related to the implementation of each of the measures proposed in the Plan with focus population and human health:
   a) To have access in the area of works, an agreement should be made (when necessary) with stakeholders (owners, tenants, users / owners of business facilities / household).
   b) Where existing access cannot be used, this should be considered prior to the commencement of works and the necessary structures should be set up before any action is taken that may cause interruption of work.
   c) All construction and maintenance works will be carried out in accordance with Albanian legal provisions regarding the control of noise and vibration in construction works, and the contractor must take appropriate mitigation measures in this regard.
   d) Design elements should promote an integrated and sustainable approach, both at the local level and at the catchment level, to manage the flood risk in order to protect the natural environment and the efficient use of economic resources.
   e) Before starting the works, the access of the inhabitants should be taken into consideration, e.g. on agricultural land or other services. Where access can be temporarily interrupted, temporary but secure access points will be provided.
   f) Collection, storage, treatment, transportation of construction waste should be done according to the provisions in force and in cooperation with the relevant authorities.
   g) Appropriate infrastructure needs to be set up so that the population and businesses know how and where they will be evacuated, how to secure their facilities, and when they can return to them.
   h) Maintenance of existing access to agricultural areas, private properties and movement along public road axes should be considered. If this is not possible, alternative means of access should be provided during the construction period.

i) Minimize the land acquisition (permanent and temporary) where possible, especially within the boundaries of private residential and commercial properties, as well as within public recreational areas.
j) Access and maintenance time should be minimized as much as possible.
k) Guidelines should be developed and disseminated to help tourism businesses, residents and businesses prepare for flood events.
l) Information will be disseminated on how farmers should react during flood event, including safe areas to move livestock and lands that should be left barren due to flooding.
m) Restoration of all affected areas, including private ones, and landscaping, where appropriate
n) Land temporarily taken during the construction period should be returned to its previous condition after the completion of works.
o) The work schedule should be communicated to landowners / users, in order to minimize the effects on agricultural work.

III. RECOMMENDATIONS WITH FOCUS - BIODIVERSITY

1. Potential negative effects can be mitigated by identifying the impact, appropriately designing a timetable for implementing flood control measures, in order to avoid or minimize effects on habitats and wildlife; accompanied by consultation with relevant organizations.
2. The elaboration and design of implementation projects for the proposed measures should include tools that have the potential to bring benefits to biodiversity. This includes elements of adoption / resilience related to natural processes, using the natural flood management approach and adopting sustainable land management. At regional / local level their further development should also involve regional / local environmental authorities. Floods should also comply with the requirements set out in the relevant ESIAs.

3. Advice and practical support for an adoption approach in the plan should promote tools that have the potential to bring biodiversity benefits. Similar advice should also be included in the plans of other sectors (agriculture, forestry, etc.) related to flood risk management, in order to ensure funding assessment, sustainable development and planning.
4. In addressing new ways of financing flood risk management activities, it is recommended that the requirement to demonstrate a net profit for biodiversity has to be included as part of the fundraising and insurance procedures.
5. To help achieve a net benefit to biodiversity, it is recommended that elements of biodiversity has to be included in future training and continuing professional development, as well as in interaction with communities. They should also be considered in developing practical skills and resources across the sector. This includes consulting with experts in the field, such as biologists specializing in freshwater and marine ecology and fisheries experts.
6. Detailed mitigation measures related to the implementation of each of the measures proposed in the Plan with focus biodiversity:
a) Adherence to pollution prevention guidelines and best practices regarding construction materials and work practices near water courses.
b) NEA / RED and relevant municipalities should be assisted in detailing the proposed measures in the FRMP to address how the objectives of the protected area after the

flood event will be met.

c) Removal of vegetation / trees will be undertaken outside the poultry breeding season, where possible, to ensure that poultry nests with young or eggs are not destroyed. In any case, if vegetation removal is required, trees and shrubs should be inspected by a qualified biologist for the presence of active breeding birds / nests.
d) Removal of vegetation / trees should be avoided as much as possible.
e) Before starting the works, an assessment of the habitats in the area should be performed by a qualified and experienced expert.
f) Habitat improvement measures should be considered since the design phase for the implementation of the proposed measures.
g) Construction should follow all pollution prevention guidelines and statements for work method should be agreed with RAPA in areas where nationally and internationally protected species may be encountered.
h) Leakage control from work areas should be performed.
i) Measures shoud be foressen for sediment control during the works, so that no sediments are released, which may affect habitats and species along water courses.
j) Any intervention should be carried out in consultation and with the engagement of NEA /RED/ Municipality (environmental directorate) and RAPA, as well as with other stakeholders.
k) The developer must provide:
    - Proper protection of existing aquatic habitats from flood events.
    - Forecasting in the project of necessary crossings for fauna species, using best design practices and construction methods.
    - Maintaining natural water flow and sediment transport regimes, including this in design parameters and minimizing hazards at this stage.
l) Identify, implement and manage habitat improvement works where possible.
m) For the works to be carried out in the watercourse should be planned to minimize impacts on all types of water.
n) Monitoring to ensure that all mitigation measures are working properly.
o) Monitoring to ensure that works do not cause harmful effects on habitats and species of flora and fauna.
p) Planting trees helps, as much as possible, in restoring the vegetation of the soil and increasing the forest areas.
q) Scheduling of works so as not to coincide with high or low flow time, or in periods when the area is used by protected species.
r) The implementation project is designed in such a way as to ensure the improvement of the water flow regime, not to change the existing normal regime.
s) Maintenance activities should be planned to be carried out in the period when the impacts on vegetation are minimal.
t) Scheduling of works in such a way as to avoid / minimize conflicts with protected and / or aquatic species that may be found in the works area.

VI. RECOMMENDATIONS WITH FOCUS - SOIL

1. During flood studies and in the design and implementation of flood risk management

measures, modeling of natural processes which can help in better forecasting and mitigation of possible negative effects on the soil should be considered.

2. The design and further elaboration of the proposed measures should include consideration of possible interactions related to land protection and conservation. The involvement of national and regional / local farmers' organizations is also recommended.

3. Advice and practical support for an adoption approach in the Plan should promote tools that have the potential to bring benefits to the land. Similar advice should also be included in the plans of other sectors (agriculture, forestry, etc.) related to flood risk management, in order to ensure funding assessment, sustainable development and planning.

4. Early engagement with the agricultural community is also recommended. This will help to tailor support and maximize opportunities offered by strengthening the link between land management and risk management practices.
5. At the local level, strengthening cooperation within a watershed/river basin will facilitate the identification of land conservation priorities and how different risk management tools can best support these priorities. It is also recommended to engage in the early stages of key stakeholders, in order to inform and assist in the decision-making process.
6. Investing in training, education and continuing professional development should include knowledge of how different flood risk management tools can bring benefits to sustainable land management. Environmental authorities at all levels, through their strategic role must also demonstrate how infrastructure can be designed and implemented to reduce waste and maximize resource efficiency.
7. Detailed mitigation measures related to the implementation of each of the measures proposed in the Plan with focus - soil:
   a) Application of good practice procedures related to excavation, treatment and careful disposal of soil during scaling, construction and restoration processes.
   b) Drafting and implementation of working methods statement including sediment control measures.
   c) Ensuring that no invasive type enters or leaves the area during ground movements.
   d) Implement erosion and sediment control measures.
   e) Limit the period of works during the weather time is appropriate.
   f) Limit, as far as possible, the expansion and location of work sites and storage spaces.
   g) Recovery of affected / damaged areas.
   h) Preservation of vegetation in channels to maximize protection from erosion
   i) Reuse of excavated materials, where possible, in embankments and landscaping.
   j) Use of guidelines and best practices to minimize sediment leakage during works.

V. RECOMMENDATIONS WITH FOCUS WATER

1. Potential negative effects on the aquatic environment can be mitigated by understanding the effects on physical processes, including watercourses and erosion in riparian and coastal areas, minimizing habitat loss, and creating habitats through the implementation of

proposed measures. Negative effects should be addressed during flood studies and the design of appropriate measures.

2. Existing regulatory provisions require the assessment of water resources to ensure compliance with relevant objectives where possible. It is recommended that examples of good practice in WFD assessments be widely distributed to all actors involved in flood risk management activities.

3. It is recommended to pay more attention to the beneficiary role of the natural environment in urban areas. This may include, for example, the expansion and improvement of green infrastructure networks and the application of sustainable drainage systems that green space use.

4. Investing in training, education and continuing professional development should include knowledge of how different flood risk management tools can bring benefits to water quality and water resources. It is also advisable that engagement activities at the local level take into account the management of water resources.

5. Measures that may affect the freshwater environment (such as floodwater collection measures) aimed at protecting the aquatic environment are regulated under the relevant legal framework and mitigation is considered part of the assessment process. Some measures, especially those considered as development, are regulated according to the land use planning system; and environmental effects will be addressed through ESIAs, at the specific project level.

6. Detailed mitigation measures related to the implementation of each of the measures proposed in the Plan with focus - Water:

a) Adherence to guidelines related to mitigation of effects during construction, for example ensuring that the impermeability of the area is not temporarily increased during construction.
b) A survey of public service companies should be conducted to determine the location of existing services throughout the development area. Subsequent adherence to best construction practices should ensure that construction processes take into account the location of services, so that these are not damaged as a result of not knowing the location and causing localized flooding.
c) Temporary drainage systems should be studied and used by applying construction practices, where possible, or other methods to control and treat sludge-laden flows.
d) Construction should be carried out in accordance with best practices. This will include fuel storage areas and designated areas for refueling.
e) New retaining walls and embankments should be streamlined to protect against corrosion.
f) Drafting and implementation of working methods statement including sediment and pollution control measures.
g) Before positioning the protective walls, embankments and channels, a study should be conducted to minimize the risk of contaminants and other sediments affecting water flow near these structures.
h) Construction activities should be planned in such a way that the surface and duration of soil exposure are minimized where possible, dividing construction time into phases, so that sections are restored before moving on to the other section / phase. other;

i) On-site movement of machinery, plants and other construction equipment should be reduced as much as possible.
j) Various collected materials should be deposited away from existing watercourses.
k) Construction processes (eg deposition of materials) will take into account the impact on groundwater.
l) Leaks must be blocked before their treatment and discharging / depositing.
m) Use of guidelines and best practices to minimize sediment leakage during works.
n) Adopt appropriate pollution control procedures, in accordance with relevant guidelines, to reduce the risk of surface water leakage loaded with sediments that enter in watercourses and groundwater.
o) Implementation of technical guidelines for the preservation and restoration of floodplains and natural watercourses as a form of flood mitigation and an important environmental and social resource. Ensuring that this also applies to the decision-making process.

VI. RECOMMENDATIONS WITH FOCUS - CLIMATIC FACTORS

1. New sources of funding for risk management should be fully informed and based on sustainable standards for adapting to climate change.
2. When designing/detailing flood risk management measures, engineering solutions should be avoided which may adversely affect greenhouse gas emissions and minimize the use of non-renewable energy sources in construction and maintenance processes.
3. Detailed mitigation measures related to the implementation of each of the measures proposed in the Plan with focus – Climate factors:
a) The following approaches can be used to adapt to climate change, including combining them when necessary and / or possible:
- concepts of "gray" infrastructure, i.e. physical intervention or construction measures against emergency events, through the use of engineering services, to increase the flexibility of buildings and infrastructure,
- “green” and “blue” structural approaches, which contribute to greater ecosystem flexibility, in order to prevent biodiversity loss and ecosystem degradation and to restore water cycles, while utilizing the functions and services provided from ecosystems;
- “moderate” non-structural concepts, according to which land use strategies, information dissemination and economic incentives to reduce or prevent disaster risk are designed and implemented.

b) "Green" and "moderate" approaches are preferred, and a combination of them in the quality of mitigation measures is convenient.
- Currently, a number of proposals for adaptation measures are available in some documents, but given the many doubts about climate change forecasts and current limited information on this phenomenon, monitoring of developments and flexible respond towars new information will be needed. Based on new information and knowledge, current information needs to be corrected / updated, or

new adaptation measures need to be taken.

c) The contractor must guarantee regular use and maintenance of machinery and equipment, in order to minimize air emissions.

VII. RECOMMENDATIONS WITH FOCUS MATERIAL ASSETS

1. When development/elaboration/detailing proposed flood risk management measures, opportunities to minimize waste generation and resource use should be considered.

2. Detailed mitigation measures related to the implementation of each of the measures proposed in the Plan with focus – Material assets:

a) Before starting the works, consultations and studies will be carried out on the extension of the network of electrical cables and public services (water supply, sewerage, etc.).
b) Drafting a Traffic Management Plan.
c) Communication / consultation with public service companies regarding excavations and other works.
d) The implementation project will aim to minimize waste and maximize the reuse of appropriate materials on site.
e) A Waste Management Plan will be drafted and implemented, where required.
f) To minimize waste, where required for access roads and work areas, topsoil will be scarred prior to work and collected on site. Upon completion of construction, they will be restored to their previous location and therefore no topsoil will be removed from the works area.
g) Waste collection, transport and disposal will be done in designated areas and licensed by local authorities
h) Land acquisition (permanent or temporary) will be minimized as much as possible.
i) Design elements should promote an integrated and sustainable approach, both at the local level and at the catchment level, to manage flood risk, which (approach) contributes to the efficient use of economic resources and aims to protect investment within flood risk areas, ensuring that adequate and appropriate measures are in place to mitigate and manage flood risks.
j) Local authorities as well as public service companies will be consulted and informed on the diversion of transport to untouched areas and the management of public services during the construction period, in order to minimize service disruption.

VIII. RECOMMENDATIONS WITH FOCUS CULTURAL HERITAGE

1. Potential negative effects on cultural heritage can be mitigated by identifying each element of heritage (including archeology) and assessing them in the early stages of detailing and implementing proposed flood risk management measures.

2. The degree of net environmental benefit delivery should also include the historical / cultural aspect. Also, this would help the implementation of the measures and the achievement of the objectives of the plan to reflect all relevant environmental and sustainability aspects.

3. The inclusion of requirements for flood protection measures in the standards of buildings and construction materials should also take into account the sensitivity of historic buildings.
4. Engagement at the local level should involve key stakeholders, both at the national and regional/local levels. This would provide the opportunity to use a range of data available about the historic environment, which informs and assists in decision-making. This includes data on the character of the historical and urban landscape.
5. Measures can be improved by clearly recognizing the role of stakeholders, in terms of supporting and contributing to the response and recovery of any incident.

6. It is recommended that elements of cultural heritage has to be included in future training and continuing professional development, as well as in interaction with communities. They should also be considered in developing practical skills and resources across the sector. This includes consulting with experts in the field such as archaeologists and cultural heritage specialists.

7. Detailed mitigation measures related to the implementation of each of the measures proposed in the Plan with focus – Cultural heritage:
   a) The construction contract should include general measures to be implemented by the Contractor to protect known and unknown features and areas of interest.
   b) If necessary, according to the legal provisions in force, the services of an archaeologist or cultural heritage expert will be required.
   c) Regular consultations will be held, in the early stages of the study and design of the proposed measures, with the National Institute of Cultural Heritage as a statutory body in this field.
   d) Design elements should promote an integrated and sustainable approach, both locally and at the catchment level, to manage flood risk, which (approach) contributes to the preservation of archeology and construction heritage.
   e) The role of the authority responsible for the flood situation will be continuously promoted, including the dissemination of information to vulnerable communities regarding their self-action and the adoption of properties / buildings to protect against floods.
   f) A flood action plan will be developed for historic buildings and cultural monuments. Also, the necessary tools and resources (human, legal / institutional, financial) must be provided to implement this plan.
   g) If artifacts / relics are to be preserved / stored, a workforce and a safe place to pack and move them must be identified prior to the evacuation notice.

IX. RECOMMENDATIONS WITH FOCUS THE LANDSCAPE

1. Potential negative effects on the landscape should be addressed during the detail/implementation project of the proposed flood risk management measures.
2. Consultation with environmental authorities and affected communities is recommended.
3. Opportunities for improving the local landscape and public spaces should be considered including expanding the green network infrastructure, where appropriate. Measures related to river/catchment areas should also identify opportunities for landscape improvement.
4. It would be useful to clarify the degree of net environmental benefit delivery, which may also include benefits for urban and rural landscapes. This would help the implementation of the measures and the achievement of the plan objectives to reflect all relevant environmental and sustainability aspects.
5. It is recommended to pay more attention to the urban context and how the character of the landscape can be improved through ways that also help reduce the risk of flooding. This may include, for example, upgrading green infrastructure networks and introducing sustainable drainage systems that use green space.
6. It is recommended that landscape elements be included in future training and ongoing professional development, as well as in interaction with communities. They should also be considered in developing practical skills and resources across the sector. This includes consulting with experts in the field such as architects and landscape designers
7. Detailed mitigation measures related to the implementation of each of the measures proposed in the Plan with focus – Landscape:
   a) The plan for the restoration of the affected / altered / damaged landscape will be foreseen in the works contract documents.
   b) In the areas where the vegetation has been scarred and the landscape has been affected, the vegetation will be replaced and planted with plants of the area, in order to improve and integrate the landscape and visual elements.
   c) Excavated and deposited soil will be reused in order to minimize interference with visual elements.
   d) Landscape elements will be applied in the channel areas or where there is a tombstone in order to integrate them in the landscape area.
   e) Design elements should promote an integrated and sustainable approach, both at the local level and at the catchment level, to manage flood risk, which (approach) contributes to the protection of the natural environment.
   f) The role of the responsible authorities for the flood situation will be continuously promoted, including the dissemination of information to vulnerable communities regarding their self-action and the adoption of properties / buildings to protect against floods.

MITIGATION MEASURES TO BE TAKEN FOR ENVIRONMENTAL PROTECTION

(referred to the Environmental Declaration of the Minister of Tourism and Environment)

To avoid, minimize, control, and manage the negative environmental impacts of the Project-plan in all its phases, all the following measures must be strictly implemented:

- The proposed measures and activities provided for in the FRMP must ensure cohesion, efficiency, and sustainability in the prevention and reduction of flood risk;
- During project planning, priority should be given to the reconstruction of existing infrastructures before new constructions;
- In the framework of management planning, special parts should be devoted to the integration of flood and wetland areas, while afforestation measures aim to stabilize the landscape from floods (to be implemented by connecting with indigenous vegetation types that also resist floods);
- To take measures for the protection and non-damage of surface and underground water resources found in the territory where this plan will be implemented;
- The projects that will reach the water resources must not have the ecological status to flow or cannot develop activities that reduce water conservation areas and produce cumulative impacts on the biodiversity of the area and its ecosystem services;
- To protect the natural values of the areas in which the study is located and to avoid maximum damage to the surfaces with natural vegetation;
- Specific projects must be designed in harmony with the legal framework for the protection of nature, respecting the degree of protection of the protected area or sub-area where intervention will take place, as well as the status of the species and habitats found in the area, as well as communicate/cooperate with National Agency of Protected Areas (NAPA)to take the necessary measures not to violate the status of these areas;
- During the design phase and especially before the start of the implementation phase of individual specific projects or plans of the Plan, measures must be included that will enable the preservation of migratory animal corridors, especially in the case when the projects to be implemented may affect areas of protected or can be located near them;
- Apply mitigating measures for the development of infrastructure, during rehabilitation/construction they should also provide protection from air pollution and noise by applying "best practices". In no case should it be designed inside, nor in the vicinity of the territory of the protected areas when the impacts from emissions in the air and noise affect the ecosystems and habitats of the species under protection;

- The plan should promote the implementation of projects for urban wastewater treatment plants and on a wider scale, extending this measure to other industrial activities that create discharges of polluted industrial water and that especially affect the quality of surface water and underground. To design the contemporary and long-term infrastructure of urban wastewater drainage;
- Before starting the implementation of projects, resolve the issue of managing the inert volume that will be generated by the construction operations;
- As a whole, specific projects must be designed in harmony with the standards of landscape conservation and cultural heritage protection, where together with elements of environmental quality, they should be primary by applying "best practices";
- During the implementation of the plan, the mitigating measures proposed in the Strategic environmental assessment (SEA) report should be implemented to minimize or avoid negative impacts on the environment;
- Despite the measures and recommendations of this Environmental Statement, during the implementation of the plan it is mandatory to apply the requirements of the environmental legislation in force;
- The appearance of new unknown ecological elements, at the time this Environmental Statement was issued, obliges its reassessment;
- If the consequences on the environment and health exceed the environmental standards in force, then the ministry takes the appropriate measures to avoid/minimize the negative impacts or evaluate the change of the FRMP to meet the environmental standards;
- If the Authority Responsible for the implementation of the plan assesses that during its implementation, there may be a real possibility of negatively affecting the environment of neighboring countries or there are data on concrete impacts and consequences on the environment for that country, then immediately notify the responsible Ministry for the environment, to start the process and consultation with the party affected by this plan and stop its implementation until the end of the cross-border consultations;
- There are legal and sub-legal sanctions for non-compliance with the obligations arising from this Environmental Statement and the environmental legislation in force.

Annex F

Flood hazard and risk maps of the Shkoder Area

Detailed maps can be found for download here:

http://kadastraujore.gov.al/