

GEF/UNDP/GWP-Med Project “Enabling  
Transboundary Cooperation and Integrated  
Water Resources Management in the  
Extended Drin River Basin”

Draft Terms of Reference  
*Preparation of a wastewater management  
decision support tool*

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## Introduction - Background

### The Drin Memorandum of Understanding

1. Coordinated action at the Drin Basin level has been absent until the development of the Shared Vision for the sustainable management of the Drin Basin and the signing of a related Memorandum of Understanding (Tirana, 25 November 2011) by the Ministers of the water and environment management competent ministries of the Drin Riparians i.e. Albania, The Former Yugoslav Republic of Macedonia, Greece, Kosovo\* and Montenegro. This was the outcome of the Drin Dialogue supported by the Swedish Environmental Protection Agency and coordinated by UNECE and Global Water Partnership Mediterranean (GWP-Med).
2. The **ultimate goal** of the work in the Drin Basin is to reach a point in the future where the scale of management lifts from single water bodies to the hydrological interconnected system of the Drin Basin, eventually leading from the sharing of waters among Riparians and conflicting uses, to the sharing of benefits among stakeholders in an area that is physically, culturally and historically interconnected.
3. The main objective of the Drin MoU is the attainment of the Shared Vision: *“Promote joint action for the coordinated integrated management of the shared water resources in the Drin Basin, as a means to safeguard and restore, to the extent possible, the ecosystems and the services they provide, and to promote sustainable development across the Drin Basin”*.

### The Drin Coordinated Action

4. While the process is on-going, a number of activities have already been implemented under the Drin Coordinated Action for the implementation of the Drin MoU.
5. Following the provisions of the MoU an institutional structure was established in 2012. It includes:
  - The **Meeting of the Parties**.
  - The **Drin Core Group** (DCG). This body is given the mandate to coordinate actions for the implementation of the MoU.
  - Three **Expert Working Groups** (EWG) to assist the DCG in its work:
    - Water Framework Directive implementation EWG.
    - Monitoring and Information exchange EWG.
    - Biodiversity and Ecosystem EWG.

The **DCG Secretariat** provides technical and administrative support to the DCG; Global Water Partnership – Mediterranean (GWP-Med) serves by appointment of the Parties through the MoU as the Secretariat.

6. The Drin Action Plan (DAP) was prepared to facilitate implementation of the Drin MoU and operationalize the Drin Coordinated Action. This is considered as an ‘evolving document’ and has been subject to updates and amendments in accordance with the decisions of the Meeting of the Parties to the Drin MoU and the DCG. The DCG and its Secretariat guides the implementation of the DAP. The DAP is already being implemented using resources made available by various donors active in the basin.

## The GEF Drin Project

7. The Global Environment Facility<sup>1</sup> supported Full Size Project “Enabling transboundary cooperation and integrated water resources management in the extended Drin River Basin” (GEF Drin Project) is aligned in content, aims and objectives with the DAP and the activities under the Drin Coordinated Action.
8. The objective of the project is to *promote joint management of the shared water resources of the transboundary Drin River Basin, including coordination mechanisms among the various sub-basin joint Commissions and Committees*. Albania, The Former Yugoslav Republic of Macedonia and Montenegro are the Project beneficiaries.
9. The same goal will be fostered by the GEF supported Medium Size Project “Enabling transboundary cooperation and integrated water resources management in the White Drin and the extended Drin Basin”. Kosovo is the beneficiary of that Project.
10. The GEF Drin Project is structured around five components:
  1. Component 1: Consolidating a common knowledge base
  2. Component 2: Building the foundation for multi-country cooperation
  3. Component 3: Institutional strengthening for Integrated River Basin Management (IRBM)
  4. Component 4: Demonstration of technologies and practices for IWRM and ecosystem management
  5. Component 5: Stakeholder Involvement, Gender Mainstreaming and Communication Strategies
11. The Project is implemented by UNDP and executed by the Global Water Partnership (GWP) through GWP-Mediterranean (GWP-Med) in cooperation with the United Nations Economic Commission for Europe (UNECE); GWP-Med is responsible for the realization of the Project. The Drin Core Group is the Steering Committee (SC) of the Project.
12. It is managed by a Project Coordination Unit (PCU), based in Tirana, Albania; staff is stationed also in Podgorica, Montenegro; Ohrid, The Former Yugoslav Republic of Macedonia; Pristina, Kosovo; and Athens, Greece. The duration of the two Projects is four years.

## Demonstration Activities under the GEF Drin Project

13. Within the context of the project -aimed at enabling transboundary cooperation among countries sharing a water body, and facilitate agreement on a program of joint management actions- Pilot Demonstrations are intended to provide multiple benefits to allow countries to (i) accrue direct experience on approaches, technologies, practices and organizational settings novel to the region and test their cost effectiveness and feasibility in the regional context, (ii) test cooperative arrangements, (iii) feed into the SAP formulation process.
14. The Development of Wastewaters management decision support tool is one of the six Demonstration activities of the GEF Drin Project.

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<sup>1</sup> [www.thegef.org](http://www.thegef.org)

# Wastewater management decision support tool

## Development of a Wastewater management decision support tool

15. Among the concrete actions agreed by the Parties to the Drin MoU to address problems identified as affecting sustainable development in the entire Drin Basin or in one or more of the Sub Basins is to *“Decrease nutrient pollution deriving from untreated or poorly treated wastewater discharges and unsustainable agricultural practices”* (Drin MoU, Article 3, (v)).
16. Addressing the issue of urban wastewater discharges as part of the Integrated Management of the Drin Basin and its sub-Basins, in a way that the specific requirements of particular uses are met and the Good Environmental Status (GES) of the system is obtained, while the treatment method and costs are optimal -with regard to the establishment and the operation of the wastewater treatment infrastructure- is an important goal. This is of particular importance for the Drin Basin taking into consideration the complexity of the Drin hydrological system, the fragility of its ecosystems and the restricted availability of financial resources in the Riparian countries.
17. Essential elements for the achievement of the aforementioned goal are: (i) the assessment/calculation of the optimum level of treatment of the effluents discharged in different water bodies; (ii) the selection of the optimum treatment method and infrastructure and; (iii) the possibility to intervene in emergency cases (failure of treatment plants, floods, etc.).
18. A decision support tool (DST) that would enable the above, would enable also the work at regional/Drin basin level, but also of national and local institutions in the area of wastewater treatment and environmental management thus, the achievement of the aims and objectives of the Drin MoU.
19. Wastewater treatment selection is a complex task. Over the last few decades, scientists and engineers have developed and applied models able to predict the quality or rather the concentration of given chemical or biological parameters versus particular inputs or conditions. Such models can be used to feed support decision tools related to wastewater management.
20. A **Modelling Tool (MT)** tailored to the conditions of the Drin Basin -being a complex natural system- that will serve as a **wastewater and environment management decision support tool (Drin WEMDST)** will be developed and tested. The Shkodra city (Albania) and the Shkoder/Skadar Lake and Buna/Bojana sub-basins will serve as the areas of reference for the development and testing of the tool.
21. The Drin WEMDST should be applicable to be used by the competent local and national institutions in Albania, The Former Yugoslav Republic of Macedonia, Montenegro and Kosovo (Drin Riparians) or for regional coordination mechanisms in the field of wastewater treatment and environmental management to address wastewater related problems.
22. The Drin WEMDST should be compliant with the following (the list is not exhaustive):
  - a. It should be developed taking into consideration the:
    - Existing monitoring networks and capabilities in each Drin Riparian.
    - Existing wastewater treatment infrastructure and methodologies in each Drin Riparian.
    - Institutional and legal frameworks regulating in each Drin Riparian the management of wastewater, storm water and overall water resources management.
    - Ecological values and major ecosystems in each basin and water body.
  - b. It should be applicable for use in human settlements and water bodies across the Drin Basin.

- c. It should be able to function and serve its aim as a decision support tool using the data generated through the existing monitoring networks and capabilities and in each Drin Riparian country.
  - d. Its outcomes should be of sufficient accuracy and precision for intended use.
  - e. Extraction of outputs and information (including systematized datasets) for use in a software (e.g. MS Excel)/model other than the Drin WEMDST should be possible;
  - f. Its interoperability with existing models used by the competent institutions in the Drin Riparians and third party tools should be secured to the maximum possible level;
  - g. It should be “user friendly” and easy to use also by scientists in the Drin Riparians with relatively limited experience in modelling.
  - h. The outputs of the Drin WEMDST to be suitable to be managed and presented through spatial visualisation software (GIS).
  - i. It should have an integrated spatial visualisation tool.
  - j. It should be publicly available and free of charge.
  - k. It should be upgradable and able to accommodate future needs.
23. All institutions and organizations in the Drin Riparians that will/may be using the Drin WEMDST start from different positions in terms of wastewater, water resources and basin management data collection and administration; these positions may have been driven by different political, historical and geographical backgrounds. Thus, it is expected that in order for the Drin WEMDST to meet the Characteristics and Requirements mentioned above, adequate information with regard to the monitoring and data collection and administration in the Drin Riparians should be made available prior to the development of the MT.
24. This information will become available by the PCU through the 1<sup>st</sup> phase of the technical assistance to the GEF Drin project for the development of the Information and Monitoring Exchange system that is expected to be ready within 2017.
- Information and data regarding wastewater in the Shkodra city that will be used for the development and testing of the Drin WEMDST will be collected directly by the Consultants that will be selected to develop and test the Drin WEMDST.
- Work related to wastewater management in the Drin Basin has been done by KfW and UNDP; this work should be taken into consideration by the consultants.
25. Available pollution, water resources and biodiversity data for the Shkoder/Skadar and Buna/Bojana basins will be provided by the PCU; related information will be collected for the development of the Transboundary Diagnostic Analysis within 2017/first half of 2018.

### Aim and Objective

26. The **aim** of the Pilot Project is to contribute to addressing wastewater management related issues in the Drin River.
27. The **objectives** of this activity are to:
- a. Develop a Drin WEMDST to be used by competent authorities in the Drin Basin, for the identification of the most environmentally appropriate and cost efficient solutions to address wastewater related problems in ecologically important areas.

- b. To test the Drin WEMDST for the case of Shkodra city and identify the most environmentally appropriate and cost efficient solutions in terms of wastewater treatment methodology and infrastructure to address wastewater related problems.

### Approach and Scope of work

28. The stages for the development of the Drin WEMDST should be:
  - a. Development of the Modelling Tool (MT).

The Shkodra city and the water bodies that receive the wastewater generated in the city (i.e. Shkoder/Skadar Lake and Buna/Bojana Basin) will be used as a “basis/reference” area.
  - b. Testing of the MT and preparation of the Drin WEMDST.

The MT will be tested using Shkodra city and the water bodies that receive the wastewater generated in the city as an application area. The testing period will result to necessary adjustments of the MT. Information from the Drin Basin will be used to appropriately adjust the MT and render it applicable to other sub-basins of the Drin Basin as a Drin WEMDST.

The Drin WEMDST will be used to propose the most environmentally appropriate and cost efficient solutions in terms of wastewater treatment methodology and infrastructure to address wastewater related problems, including emergencies.

29. The MT and the Drin WEMDST should be developed in a way to take into consideration and be able to define and predict the: main quality characteristics of the treated wastewaters with regard to the pollutants and contaminants of major concern and interest as a function of the operation of the treatment systems; the resulting prevailing environmental conditions of the receiving water body.
30. The MT and the Drin WEMDST should be able to be used for the identification of the most appropriate wastewater treatment system in Shkodra eventually in combination with management of storm waters.
  - a. The design of a wastewater treatment system should take into account the quantity, quality and temporal variations of urban wastewater and overall runoff, as well as the volume and characteristics of storm water collected in the sewer system (in case of combined systems). It should address the specific each time treatment needs with the best available and most cost-effective technologies. The evaluation and selection of wastewater treatment methodology and infrastructure will be based on alternative scenarios for two parameters; (i) at a first level scenarios will depend on the present and projected future loads of pollutants in influent wastewater and (ii) at a second level scenarios will depend on the rate of wastewater producers connected to the sewer system over those still using septic tanks, presently and in the future. The trends of the water quality of the discharged effluent of the treatment plant/system should be harmonized with the provisions of the Water Framework Directive and fulfil the criteria/objectives of GES.
  - b. The quality of the treated wastewater should ensure that the quality objectives of the receiving water bodies are met.
31. If technically feasible, the MT and the Drin WEMDST should be able to be used for addressing the problem of seasonal variation of discharge and water levels in the recipients as well as floods and assessment of their impact on sanitation.
32. The outputs of this assignment as well as the related reports will be distributed for comments to the Expert Working Groups on the Drin Core Group. The final outputs and reports incorporating

and addressing the comments provided will be considered by the DCG for adoption. The PCU will facilitate both processes.

33. The reports should be proofread and edited; an extensive non-technical summary will be provided in the project countries languages.

### Description of tasks:

#### Task 1. Preparation of an inception report

34. The consultants will prepare an inception report describing among others the timeline of activities, possible adjustments regarding the content of the tasks to respond to the methodology that will be used.
35. The inception report will be reviewed and approved by the Project Manager.

#### Outputs:

36. Inception report (in English).

#### Task 2. Fieldwork and collection of the necessary data

37. Collect needed data and information regarding the Drin Basin:
  - Information included in point 22.a.
38. Collect needed data and information for the reference area and sub-basins -i.e. Shkodra city and Skadar/Shkoder Lake and Buna/Bojana River- including (the list is not exhaustive):
  - Information included in point 22.a.
  - Eventual projects, development and spatial plans, or proposals for infrastructures that may affect the different components, e.g. storm water diversion canals etc.
  - River flows, meteorological data; statistics on extreme events; data regarding chemical (BOD, nutrients, pH etc.) and other parameters (biological, *E. coli*, etc.).
39. For this reason, use different means including but not necessarily restricted to the following:
  - A thorough investigation of literature and relevant reports from related projects;
  - In situ survey (e.g. making use of questionnaires and interviews) with competent authorities and scientists.
  - Means described in points 23-25.

#### Outputs:

40. Report of activities (in English) including a compilation of information and datasets identified.

#### Task 3: Develop the Modelling Tool



41. Develop the MT that will form the Drin WEMDST. The MT will be a combination of available models possibly including this already available to the countries e.g. of the Water Sewerage Company of the City of Shkodra.

**Outputs:**

42. A Modelling Tool that will form the basis of the Drin WEMDST.

**Task 4: Test and validate the MT - Modelling, assessments and recommendations for the Shkodra city**

43. Assess and validate the MT. Doing so, an assessment of the model predictions will be carried out per modelling unit (e.g. sewage treatment plant and receiving water body) supported by a sound statistical approach.
44. The consultant will use the MT to perform the following as means to test the MT and at the same time produce outputs that will be used by the national and local authorities for the management of wastewater in the Shkodra city.
  - a. Develop a model-based determination of the appropriate quality of treated effluents from Shkodra city in order to fulfil the quality objectives at the Skadar/Shkoder Lake and Buna/Bojana River and estuary, the coastal zone and the public health risk objectives from the spread of pathogens in flood events.
  - b. Determine the appropriate management scheme for wastewater and storm water in the city of Shkodra in order to ensure high standards for health safety for the population and the ecosystems in the receiving water bodies. The management scheme shall:
    - i. Include as sub-components an assessment of the needed conditions and interventions for the full coverage of the city by the sewer network and (depending on the data available) the interventions for the improvement/modernisation of the collection network to drastically reduce operational failures and other measures to reduce public health risks.
    - ii. Address technical issues: design of monitoring network; qualitative and quantitative parameters to be monitored; frequency of monitoring, etc.)
    - iii. Address administrative/operational issues; indicate appropriate fee collection scheme, marketing parameters, pricing, assessing the economic sustainability of operation, etc.
  - c. Assess and identify alternative options for the treatment of urban wastewaters, eventually in combination with industrial effluents. These alternatives may include more "traditional" wastewater treatment methods and infrastructure and more "innovative" management systems such as constructed wetlands and greater utilisation of natural ecosystems services. The latter may be combined with greater utilisation of possibilities offered by the specific natural characteristics of the area of application. The consultant should examine possibilities of utilising natural or semi-natural retention and detention systems for the appropriate management of floods.
  - d. Identify alternative flood scenarios and predict public health risks from the spread of water-borne pathogens in the city, the lake and downstream, as well as ways to prevent their spread.
45. Close cooperation with the Water Sewerage Company of the City of Shkodra should be established for the implementation of this task. The results of each phase will be discussed with the competent Authorities in order to facilitate formulation of appropriate policies and inform decisions to address the problems including eventual modifications in the regulatory, institutional and operational framework governing the management of wastewaters and runoff. The final results should be presented and discussed in a technical workshop with Authorities and

stakeholders.

46. A final draft of the results and particularly the recommendations deriving from them may be presented to a stakeholders' meeting to enhance the public acceptability and ownership of the proposed solutions.
47. The outcomes of the MT testing should be used for its refinement and finalization.

**Outputs:**

48. Report (in English and in Albanian) including the results and recommendations with regard to the management of wastewater in the city of Shkodra.
49. Report (in English) of the testing of the MT describing among others the adjustments to the MT as a result of its application in the city of Shkodra and the water bodies receiving the urban wastewater.
50. Technical stakeholder's consultation meeting in city of Shkodra.
51. Drin WEMDST in the Shkodra city and the Skadar/Shkoder Lake and Buna/Bojana River.

#### Task 5: Application and dissemination of the Drin WEMDST

52. Using the outcomes of the tasks described above the consultant will prepare the Drin WEMDST. The Drin WEMDST will:
  - a. Be provided to the Water Sewerage Company of the City of Shkodra upon its preparation. A training workshop will be offered to enable its use by the company;
  - b. Become available to the competent authorities of the project countries.
53. Prepare a simple users' guide.

**Outputs:**

54. Drin WEMDST
55. A separate report (in English) to elaborate on the methodological aspects and the replication potential of the pilot project focusing not only on the methodology followed but also on the lessons learned.
56. Drin WEMDST user guide (in English and in Albanian).

#### Qualification Requirements

57. **The Consultant (a company or a research insitute)** shall have extensive experience in developing models in the area of water/wastewater management, environment or sustainable development.
58. The Consultant should have:
  1. More than 10 years of experience in similar projects executed in developing countries and countries in transition with particular emphasis in the Balkans' Region.

2. More than 10 years of experience on the application and use of mathematical modelling to support the decision-making process.
3. A record of minimum 5 projects of comparable nature and degree of complexity.

59. A list of projects shall be submitted along with contact details for reference checking purposes (please indicate the e-mail addresses or fax numbers of contact persons).

60. The proposed team of experts should be able to respond to the requirements of the mandatory areas of expertise indicated in the table below (NOTE: there is no limitation on the number of experts per area of expertise). The consultant should clearly indicate the name of experts per area of expertise, and the actual number of man-days that each expert is allocated for each of the proposed areas of expertise. The inclusion of experts able to respond to all areas of expertise defined below is mandatory.

61. The team of experts should demonstrate ability to cooperate with local/national organizations and relevant institutions in data collection. Therefore, national and local expertise is encouraged. Specific experience in Drin River Basin countries will be considered as asset.

	<b>Team members and/or areas of expertise</b>	<b>Qualification requirements</b>	<b>Work-load (in expert-days)</b>
<b>1.</b>	Team Leader	<ul style="list-style-type: none"> <li>○ Minimum M.Sc. in relevant field (Water Resources Management, Wastewater Management and Design, Environmental science, Environmental Engineering, Civil / Hydraulic Engineering, Ecology, Economics or similar), PhD will be considered a strong asset</li> <li>○ Minimum 10 years of professional experience in similar assignments (development and management of complex environmental / water resources / wastewater / sustainable development projects)</li> <li>○ Experience as a team leader from at least 3 relevant international projects in SEE (wastewater / water resources / watershed / river basin projects or similar)</li> </ul>	
<b>2.</b>	Wastewater Management	<ul style="list-style-type: none"> <li>○ Minimum M.Sc. in relevant field (Wastewater Management, Environmental science, Environmental engineering, Civil / Hydraulic Engineering, Ecology or similar)</li> <li>○ Minimum 10 years of experience in projects related to wastewater management.</li> <li>○ Relevant experience from participation in at least 5 projects of comparable nature and degree of complexity preferably in an EU context</li> </ul>	
<b>3.</b>	Water Quality Management	<ul style="list-style-type: none"> <li>○ Minimum M.Sc. in relevant field (chemistry, biology, ecology, aquatic ecosystems, environmental science, environmental engineering or similar)</li> <li>○ Minimum 5 years of experience in development and implementation of water quality projects and programmes, ecological characterization of river basins or similar</li> </ul>	

		<ul style="list-style-type: none"> <li>○ Relevant experience from assignments that involve development and/or implementation of water quality programmes, analysis of water quality monitoring data or similar, based on EU WFD requirements</li> </ul>	
4.	Hydrology, Hydraulic Engineering and Flood Management	<ul style="list-style-type: none"> <li>○ Advanced university degree in civil/hydraulic engineering and/or modelling, hydrology, flood risk management;</li> <li>○ Number of projects / assignments that include civil engineering design, hydrological and/or hydraulic modeling, flood risk management planning projects, preparation of hydrological studies (minimum 3 required)</li> <li>○ Experience in working with the EU WFD</li> </ul>	
5.	Modelling (this domain could be covered by one of the experts above)	<ul style="list-style-type: none"> <li>○ University degree in engineering, computer science, geo-spatial sciences or similar</li> <li>○ At least 5 years of experience in hydrological, hydraulic modelling, GIS</li> <li>○ Relevant experience from at least 3 projects as a modelling expert</li> </ul>	

**NOTES:**

- There is no limitation on the number of experts per area of expertise, but the detailed evaluation / scoring of the team will be applied to the lead experts only (they must meet the minimum qualification requirements). Thus, please indicate the lead experts per areas of expertise.
- If the qualifications of certain experts correspond to the requirements of more than one area of expertise, that these experts can be proposed also for the respective areas
- **Failure to provide adequate expertise in all areas of expertise indicated in the table above is considered grounds for disqualification**
- Additional experts, as specified in Paras 62 and 63 above, covering a range of related expertise will be considered as asset.
- The number of planned man-days per expert/area of expertise need to be indicated in the consultant’s proposal, as well as for each of the experts.

**Terms and Conditions**

*Language*

62. The language of the required deliverables/outputs is indicated in the Main Outputs section above. All produced documents shall be subject to proofreading by qualified translators, while the quality of the final versions is subject to Drin Project approval.

*Legal requirements*

63. The content of the requested documents shall conform to the pertaining relevant legislation in the countries and the international best practices and models.

*Sources of data*

64. All necessary data shall be collected by the Consultant. The Drin Project team will support the Consultant and the experts in the data and info collection process by liaising with relevant national

and transboundary sources of information and reports. The Consultant shall also be responsible for identifying and collecting additional information necessary for carrying out the assignment.

#### *Review and quality assurance*

65. Review of the outputs and deliverables – like reports, modelling tools, user guides etc., may be carried out by an independent external expert or expert team upon Drin Project request.
66. Review of the deliverables and the modelling tools developed will be carried out by relevant Expert Working Groups of the Drin Core Group.
67. All relevant comments and suggestions made by the reviewer(s) will have to be integrated in the final versions of the deliverables and models.

#### *Duration of the assignment*

68. The maximum available time for development of the Plan is 18 months upon signing of contract.

#### *Methodology*

69. Interested bidders must develop and submit a timeline of actions and deliverables.
70. The technical proposal should provide information on the name of expert(s) per area of expertise and the total number of man-days for each expert allocated for each area of expertise.

#### *Reporting requirements*

71. The expert team will report to Drin Project. The Consultant shall submit brief quarter progress reports in English. In addition, other reports may be suggested by the Consultant depending on the proposed methodology and approach. Also, other reports highlighting certain important issues may be requested by Drin Project at various stages of work.

#### *Submission of data, reports and other material produced*

72. All primary data, reports, software, modelling tools and other documentation produced during this assignment shall be made available to Drin Project in electronic format on CDs/memory sticks. All data acquired and products developed in the course of the assignment will be in the ownership of Drin Project and cannot be used by the Consultant and its team without prior written permission.

#### *Public consultations / meetings*

73. The responsibility for organizing workshops and working meetings will be shared between the Consultant and Drin Project. The Consultant shall be responsible for: preparation of working material and agenda, ensuring participation of the key team members as required, preparation of minutes and etc. The Drin Project will be responsible for: distributing the invitations and ensuring adequate participation, selecting the workshop venue, and for covering various associated costs such as rental of venues, travel and accommodation of local stakeholders, printing, refreshment, or similar.

#### *Payment schedule*

74. The payment will be done in installments based on the milestones defined in the contract and in accordance to the consultant's proposed timeline and approach.

## Annex

Sewage from Shkodra city, which is located along the coast of Shkodra/Skadar Lake, is first collected into a pool and then pumped untreated into the Drin River at a short distance downstream, after the outlet of the lake, before the confluence with the tributary river Buna/Bojana. Despite this arrangement, the absence of wastewater treatment results not only in the pollution of the Drin River and the Buna/Bojana River downstream, but also, indirectly, to the Lake Shkodra/Skadar itself. Some households are not connected to the sewer system and still use septic tanks and pits, while there are also failures of the sewer system leading to spills. Both these problems are linked to a lack of a comprehensive waste management system and have as consequence the pollution of ground waters and subsequently of the Lake Shkodra/Skadar threatening the health of people and ecosystems. The discharged wastewater affects the Buna/Bojana River all the way down to its delta. Compared to the Shkodra/Skadar Lake the nutrient levels in the Buna/Bojana River are elevated and reflect mainly the discharges of urban wastewater of the city of Shkodra and, to a lesser extent, the agricultural inputs. Another related problem is linked to floods and extreme events. When the volume in the lake and the level of its surface rise as a consequence of heavy rainfall, abrupt increase of temperature leading to melt of snow-cover of mountains etc. and/or mismanagement or inability to control the dams upstream, floods occur in the city and eventually in the area of the untreated sewage collection pool, increasing the possibilities of acute health problems and extreme discomfort for the inhabitants, as well as damages in property, services etc. In recent years the lower Drin River basin has suffered major economic, social and environmental losses due to a series of major flood events, with the event of December 2010 being one of the most severe events ever recorded in the area, with thousands of houses surrounded by water. Based on IPCC predictions enhanced changes and variability of the climate are expected in the region, increasing the frequency of the aforementioned extreme events and related phenomena, calling for the elaboration of efficient climate adaptation measures to address this situation.

The poor management of the sewage and storm waters reflects, to some extent, inadequate regulations and implementation frameworks and governance which need to be improved in parallel with infrastructure in order to ensure the sustainability of any technical intervention and investment.