REPUBLIC OF ALBANIA

Ministry of Territory Adjustment and Tourism

INTEGRATED WATER AND ECOSYSTEMS MANAGEMENT PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT

SEPTEMBER, 2003

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I. INTRODUCTION

The Government of Albania has received a GEF/World Bank project preparation grant for the preparation of *Integrated Water and Ecosystem Management Project.* The project entails the design, operation, maintenance and administration of low cost wastewater treatment system aimed to reduce the sewage pollution load from the four cities of Durres, Saranda and Lezhe/Shengjin and protect and restore endangered coastal and marine habitats. The project will promote the use of *Constructed Treatment Wetlands (CTW)* for the treatment of wastewater flows in areas where existing pollution loads are threatening aquatic system with high biodiversity values. During the preparation phase. the *Ministry of Territory Adjustment and Tourism* has conducted: (i) Technical Assessment and (ii) Final Design study of the Constructed Treatment Wetlands for the coastal cities of Durres, Saranda and Lezhe/Shengjin. The studies conducted at the present time are at the Feasibility level, the Consultant is going to start the Final Design study expect to complete it within February 2004. The present Environmental Impact Assessment study was performed on the basis of the above-mentioned studies. It identifies positive and negative environmental impacts of alternative options; recommends the most acceptable option for each project site; suggests improvements and mitigation and monitoring measures.

Project justification and scope

Albania's water infrastructure is in urgent need of improvement, both in technical short term rehabilitation as in medium and long term technical and managerial improvements. Water quality could be improved significantly with a reliable supply of chemicals. Lack of maintenance and repair and lack of metering and operational control have resulted in excessive water losses. Aggevating this situation is the fact that wastewater treatment facilities do not exist in Albania and raw sewage is discharged untreated into sea and rivers.

Several causes for these conditions of Albania's water sector are:

- Lack of revenues: Tariffs below the true cost of water and lack of tariff collection enforcement in the last decade have significantly reduced the income of the water supply companies. Water and sanitation systems have received virtually no maintenance in the last ten years.

- Over consumption: Flat rates rather than metered consumption resulted in massive water waste and also the collapse of the irrigation system has contributed to a sharp increase in water demand in the last ten years. On top of this, a massive migration to urban centers, with illegal tapping and no incentive to reduce water consumption, augmented the water sectors problems.

- Inadequacy of the physical infrastructure: Due to the lack of appropriate materials/equipment and insufficient consideration of the economic aspects in the design, the existing systems are expensive to run and to maintain.

The Government of Albania (GoA) has embarked on a water sector strategy that involves a two-tier approach focusing on the short term on urgent repairs to the systems and on the medium term on a program to support sector reforms. Within this medium term program, the Municipal Water and Wastewater Project (MWWP) (IDAP075156) was formulated, aiming on improving the water and sanitation services in Albania, thus contributing to the economic development of the country in an environmental sound way.

The MWWP aims to achieve this objective by assisting the Government of Albania (GoA) in testing and developing the following important components of the water sector reform:

1. First time application of a management contract in Albania's water sector;
2. Piloting the GoA's adopted Rural Water Supply and Sanitation Strategy;
3. Integrate wastewater management into an overall ecosystem management to protect globally important biodiversity.

This EIA report refers to activities under the third component of the water sector reform. Integration of wastewater management into an overall ecosystem management to protect globally important biodiversity will be achieved by promoting the use of CTW's in areas where existing pollution loads are threatening critical aquatic ecosystems.

Degradation of the quality of the Adriatic Sea, caused mainly by pollution from land-based activities is a very serious problem. The coastal cities of Durres, Lezhe, Saranda and Shengjin do not have any wastewater treatment facilities at present, No conventional wastewater treatment is foreseen in the short- or medium term due to the problematic financial situation of the GoA in general and the water supply companies in particular. The proposed project aims to capture global benefits by reducing land-based pollution from the four cities and protect, restore and enlarge endangered coastal and marine habitats by introducing low cost ecologically-based wastewater treatment.

In brief, the project will:

- Reduce sewage pollution load generated by the four cities of Durres, Lezhe, Shengjin and Saranda;
- Develop and establish environmentally-beneficial low cost water treatment technologies using constructed treatment wetlands (CTW);
- Develop and establish management of protected areas regimes;
- Develop a strategy for dissemination and replication of project achievements.

Delay of the project implies that significant marine environments, coastal areas and lagoons would be seriously affected and it would be very difficult and costly to restore.

As such the baseline of the project implies:

- Continue discharge of raw untreated wastewater into sea and river;
- Further deterioration of the local environment also affecting globally important natural habitats;
- No conventional wastewater treatment is foreseen in the short term due to the problematic financial situation of the GoA in general and the water supply companies in particular.

The scope of this project includes the four coastal cities of Durres, Lezhe, Shengjin and Saranda with a total present population of 204,000 inhabitants.

II. BACKGROUND AND EIA OVERVIEW

II.1. GLOBAL SIGNIFICANCE OF THE PROJECT AREA

"The project aims at reducing the degradation of globally significance areas, which are presently threatened by pollution land-based pollution sources." The areas that will benefit from the project are:

- *Lezhe/Shengjin (Kune-Vaini lagoon)*: The area is included in the network of Protected Areas under the status of Nature Managed Reserve. It has been also identified as Important Bird Area (IBA) registering up to 17,000 wintering water birds. The area shelters numerous Globally Threatened Species such as angered species living in the proposed Managed Nature Reserve are: (i) the Globally Threatened *Phalacrocorax pygmaeus* (Pygmy cormorant); (ii) the Globally Threatened *Aythya nyroca* (Ferruginous duck), *Myotis myotis* (Mouse-ear bat); (iii) *Hyla arborea* (Tree frog); (iv) *Lutra lutra* (Eurasian river otter);
- *Durres (Rrushkull lagoon)*: The area has been identified as Important Bird Area (IBA) for over 10,000 wintering waterbirds;
- *Saranda Bay and Butrinti lake*: Butrint is a Ramsar site for Albania. Its inclusion in the list of Ramsar sites (wetlands of international importance) is based on its outstanding biodiversity values. 33 Globally Threatened species of animals do occur in the area. Among them is worth mentioning the presence of Caretta caretta (Leatherback), Emys orbicularis (European pond Terrapin), Haliaetus albicilla (White-tailed Eagle), Rhinolophus euryale (Mediterranean Horseshoe Bat), Myotis capaccinii (Long-fingered Bat), Myotis emarginatus (Geoffroy's Bat), Monachus monachus (Mediterranean Monk Seal) etc. The area is also identified as an Important Bird Area for Albania registering up to 14,000 wintering waterbirds. The southern part of the complex has been declared in 1992 a UNESCO World Heritage Site. In 1999 the World Heritage Site has been enlarged to incorporate an area of 2900 ha. This enlargement was complimented by the establishment of the Butrint National Park (Year 2000).

Furthermore, these areas, already affected by pollution problems, represent the territories for further residential settlement, agricultural activities and mainly potential touristy development. These are factors to be taken into account in the project analysis and alternatives set up and selections, mainly concerning the impact on the environment.

In particular, **Durres area** is progressively affected by a noticeable urban settlement, which is experienced by an uncontrolled expansion. Former use of the plain had a prevailing agricultural destination and a regular network of surface natural canals was built in order to allow surface run-off to drain into a central main channel. This channel finally discharges at sea by means of a hydrovore, to keep the plain dried during and after important rainfalls, due to the presence of a surface aquifer.

The central open channel is now the **final receptor of all sewage waters** of the Durres District, whose discharge at sea can provoke pollution effects and damages to the marine environment in the area of Porto Romano.

The plain is limited eastward by the Erzeni River, westward by the system of coastal hills and northward by the rather complex system of coastal wetlands and dunes of the Lalzi bay. All natural district is threatened by the direct and indirect impacts provoked on all environmental components by the advancing spreading of the uncontrolled urban settlement.

The western side of the plain is characterized by the older urban as well as industrial settlement, now completely idle, but land and surface aquifer contamination represent major problems not yet solved.

In the middle part of the plain embankments of an old fishing pond still remain, which represent a physical constraint to the chaotic expansion of the urban settlement.

Being not the settlement advances suitably planned , the required infrastructures in terms of roads, energy and water supply, sewage water collection, etc are completely lacking, which implies a strong impact on soil, surface and underlying waters and a threat to the natural resources of the marine as well as wetland ecosystems.

Saranda bay represents the most attractive coastal area of Albania , where eco-tourism potential is higher and strategies of sustainable development can be profitably implemented in the short and medium term, with an interesting return for the local economics.

Coastal Zone Integrated Management (CZIM) of Saranda District, extending to Butrinti Lake, Bistrica Spring and hydrographic catchments and existing wetlands, can be put forward and implemented only if sanitation problems and waste water treatment and protection of the natural and marine environment are accomplished.

As a consequence an action plan combining main sewage water trunk line (covered by PHARE Funds) with a wastewater treatment by naturalistic processes is highly envisaged, to preserve the marine environment from existing pollution effects.

Lagoon of Kune-Vaini is an important Protected Area, of great naturalistic value. City of **Lezhe and Shengjin**, the intensive agricultural activity developed in the alluvional area as well as the progressive population increase and future settlements, represent **potential threats** to the natural equilibrium and to the biodiversity preservation of the aquatic ecosystems.

Indeed, the sewage waters of Lezhe directly discharge into the surface waters of the Drini River, whose spreading at sea can affect the environmental conditions of all the coastal zone surrounding the river mouth, and consequently the lagoon. Direct effects of contamination of the lagoon waters can also occur by surface run-off of the agricultural fields and a hydrovore, installed to keep the fields dried after rainfall events, can increase the contaminant's flow. As a consequence the eutrophication process can arise sometime in the lagoon waters.

It is also necessary to mention the **naturalistic site of Kanalla Lake**, being a natural spring of karstic waters existing at the toe of the hills, within the lagoon. This a typical transitional water body, highly polluted for the direct discharge of sewage waters coming from the village of Shengjin.

II.2. LOCATION OF PROJECT AREAS

The project area total present population is of 204,000 inhabitants, with an evolution to the horizon year 2020 of 352,000 inhabitants.

Tab.II.1-Project area-population forecast

Sites	Project area Population	
	Year 2002	Year 2022
Durres	150,000	250,000
Lehze	18,000	30,000
Shengjin	6,000	12,000
Saranda	30,000	60,000
Total	**204,000**	**352,000**

Durres District covers a surface of *433 km²* and the average altitude is 2 m. Durres city has become the main gate connecting Albania to the world, due to its favourable geographical position, as well as to the large circulation of people, goods, means, cultures and opinions. The project area includes Durres city and the rural area in the northeast-and northwest of Durres. The rural area as a part of the former marshland of Durres includes Bisht Kamëz, Rrashbull, Arapaj, Shën Vlash, Shkallnur villages. Thanks to favourable geographical position and natural resources (the sea, the plains along the rivers Erzen and Ishmi, the surrounding hills from the north to the east, the mild Mediterranean climate etc.), the District of Durres is inhabited all over its surface establishing in such a way a large populated center. The settlement population rate has been subject to several factors like: social order, economic development, geographical and rural conditions, and migratory movements etc., which are in interaction and mutual dependence among them.

In the 1991, **Lezhe District** counted almost 68.200 inhabitants, meaning about 3,8 times as big of the population of the 1926. Lezhe town has had the superior increase of the population during the last century. In the 1938 it had only 750 inhabitants. In the residential centers that are subject of this project, has been noticed the following course of changes. The favorable geographical position on the seaside plain, almost equidistant to Tirana (capital city) and Shkoder (administrative center of North Albania), the presence of the fertile fields and of the sea, the suitable natural conditions and the potential prospect for development of the agriculture, tourism, commerce, building industry etc. have attracted the attention of many people wishing to reside in Lezhe District. Particularly interesting are the suburbs of Lezhe city, the coastline of Shengjin and the plain area. During the last decade the population of the project area is increased 2.7 times

Saranda district is situated on the southern edge of Albania. On the southwest it is bordered with Ionian Sea, on the southeast with Greece, on the north it shares border with Delvina and Permet districts, and on the west with Vlora district. The mountains and hills occupy the main territory, while the field of Vurgu (southern part of Delvina graben) is the main field relief. From the point of view of the international tourism, Saranda District and in particular the city area can take advantage from the vicinity and easy sea-connections with the Corfu Island. Tourism can be attracted by extending the offer from the typical summer sea-sun tourism, to a more de-seasonal eco-tourism, by involving the Butrinti lake, Bistrica springs and the archeological historical sites.

II.3. LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

The legal provisions regulating matters related to the management and structure of the territory are set out in the Constitution and laws of the Republic of Albania.

The Constitution of the Republic of Albania sets forth the general principles and obligation related to the environmental protection and conservation; maintenance of the ecological balance nature; and reasonable use of the country's natural resources.

Natural wetland

The overall responsibility for managing and monitoring the natural wetlands and coastal areas lies with the Ministry of Environment (MoE), according the new "*Protected Area Law*" (n°8906 dated 6/6/2002), and "*Protection of Marine Environment from Pollution*" (n°8905 dated 6/672002). The new "*Environment Law*" has been already approved by GoA Parliament and is under the approval by GoA President.

Wastewater disposal and treatment

The Government of Albania is undertaking an ambitious program of economic reforms, promoting a public-private partnership in key infrastructures, mainly in the water sector. The reform will lead to the establishment of a pro-private sector participation (PSP) regulatory and policy framework at the state and municipal level and the introduction of a PSP regime beneficial for the poor through the use of a Management Contract (MC). The project also aims at integrating wastewater management. Four major metropolitan areas, Durres, Saranda, Fier anf Lezhe, are involved in the reform process.

The international tender for the awarding of the Management Contract has been held on last **April 2002** *"Management Contract for the provision of water and wastewater services in Durres, Fier, Lezhe, and Saranda"*. The MC has been awarded on June 6, 2003, and the Firm has commenced the assignment on August 4, 2003. The management capability of the CTW is assured with:

- The training component to be delivered for engineers and management of the water supply companies;
- The MWWP includes the use of management contracts, handing over operation responsibility of the water company, to a private operator. Maintenance and operation of the CTW should be explicitly included in the contract with the private operator;
- An CTW Environmental Management Plan (EMP) will be prepared under responsibility of the MoE, including a comprehensive monitoring program for potential dangers to the ecosystem- A training program for engineers from the Ministry of Environment is foreseen in the GEF Project budget

Institutional Water Quality Monitoring

The monitoring of effluent quality and compliance with Albanian Standards are the responsibility of MoE. At present, no detailed legislation on specific standards for domestic sewage discharges into surface waters has been enacted yet in Albania, but a "*Wastewater Quality Law*" is under discussion on Parliament. Therefore only international regulations and limits for the typical wastewater concentrations to be attained can be taken into account for comparisons..

II.4. EIA OVERVIEW

II.4.1. SUMMARY OF THE STEPS UNDERTAKEN FOR ENVIRONMENTAL IMPACT ASSESSMENT

The project will finance the construction low cost ecologically based wastewater treatment technologies, with the major environmental objective to reduce the amount of nutrients flowing into

the Adriatic sea; making the project environmentally beneficial. The project will address global benefits by reducing pollution at the beach and protecting the marine ecosystem from destruction.

Apart from earth embankments planned to realize open channel to store the untreated wastewater and earth dykes planned to protect the CTW from the floods, no new physical structures of significant size will be built and no major adverse environmental impacts are expected.

Nonetheless, potential negative environmental impact are expected to be localized or able to be mitigated.

Given the nature of the CTW's work, the project has been classified as Environmental Category "B".

For category B projects covered by IDA funding, a separate Environmental Impact Assessment is required (EIA). Prior the CTW Final design preparation the EIA was carried out and handled by Ministry of Territory Adjustment and Tourism, and then submitted for approval by the MoE. A combination of quantitative and qualitative assessment techniques (ranging from desk-based analysis, to water and social survey) have been use. The EIA reflects the environmental guidelines and standards of IDAThe Environmental Management Plan (EMP) identifies a number of mitigation and monitoring activities which will address these potential impacts and therefore provides an adequate safeguard for environment. The EIA concluded that, provided mitigation measures described in the EMP are followed, the proposed activities are in compliance with the environmental requirements of both the Government of Albania and the World Bank with the respect to restoration developments of this nature.

The EIA describes existing environmental conditions at the four project sites (including climate, hydrology, soil and water quality, groundwater and biodiversity) and assesses the potential impacts on these conditions from implementation of the project, during the construction and operation phases.

Alternatives proposed by the Consultant: (i) No project, (ii) Alternative technologies, (iii) WWTP locations

(i)-No Project: The zero alternative OF NO PROJECT will increase the risks of public health degradation; decrease of high biodiversity values, and decline of local economy. The no-construction alternative was found to be nonviable from the health risk and environmental point of view.

ii)-Low cost Wastewater treatment technologies: A brief analysis was conducted of several technical alternative to realize the construction of a low cost ecologically based wastewater treatment system. The following "natural" treatment solution has been evaluated and compared: Free Water Surface type (FWS), Subsurface Flow type (SFS).

According the results of the environmental multicriteria analysis, including the results of the stakeholder consultation, the Free Water Surface type (FWS), has been selected for all the coastal cities included in the project.

(iii)-WWTP Locations: A multicriterial analysis was conducted of several alternatives to the proposed WWTP locations for the four project areas.

Two alternatives for WWTP's locations were assessed for Durres area, both located in the Durres former marshland:

- #1, Located in the former large fish ponds plant;

- #2, Located in the Porta Romàna area close to the sea shore of Lalzit bay, at 8 km from the new urbanization area of Durres.

The EIA supports the idea to locate the WWTP for the Durres area in the former fish ponds , as provided in Alternative 1. The selected land is State Property and not in use.

The main critical factor influencing the alternative identification for Lezhe and Shengjn areas were the lack of available land. In particular the implementation of the WWTP in Shengjin area appears very contradictory taking into consideration the lack of availability of suitable land.

For this reason the Shengjin wastewater will be treated in the WWTP of Lezhe.

Four alternatives for WWTP's locations were assessed for Lezhe/Shengjin area.

- #1, Located in "Ishulli I Sengjinit" near the Merxhani Lagoon. The area is free from civil settlements and moreover the agriculture activity is not exploited, due to the high salinity content of the soil;
- #2, Located in "Ishulli I Sengjinit" on the right left of the active channel of Drinit river, between the new Tirana/Lezhe road under construction and Drinit out-let in the sea;
- #3, Located in "Ishulli I Lezhes" downstream of the Lezhe town on the left of the active channel of Drinit river;
- #4, Located in "Ishulli I Sengjinit" near the Merxhani Lagoon. The area is free from civil settlements and moreover the agriculture activity is not exploited, due to the periodic flooding.

The EIA supports the idea to locate the Lezhe/Shengjin CTW , as is provided for in Alternative 4. The selected land is State Property and not in use.

Four main alternatives for Saranda CTW's locations have been identified:

- #1, Located on the right bank of Cuka Channel, between the river bed and Cuka town;
- #2, Located on the left bank of the Cuka Channel, between the river and the existing protection dike;
- #3, Located on the left bank of the Cuka beyond the existing river protection dike.;
- #4, Located on the left bank of the Cuka beyond the existing river protection dike, half way between Cuka Canal and Butrinti Lake.

The EIA support the idea to locate the CTW in the Saranda area, as provided in Alternative 4, taking into account the relevance of the health and environmental context (in the Ionian sea, between Corfu and Saranda cost, lives a small population of monk seal, an endangered species). The selected land is State Property and not in use.

The EIA indentified the following potential negative impacts of the project: (i) there is a health risk associated with the potential increase in mosquito population, (ii) there is a a social risk associated to odors emanating from wetlands when water begin to stagnate, (iii) inappropriate disposal of excavated materials, construction debris and small quantities of hazardous wastes; and (iv) impacts on biodiversity, habitats and rare species caused by contractors during the construction activities. Since the WWTP work will be done in properties owned by public o municipal

land, the project will not entail any resettlement and will cause no impacts to structures of cultural importance.

As part of the Technical Assessment process, public consultation were held during the preparation of the Technical Assessment Report and EIA with several stakeholders at central and local levels. Two separate consultations were held under the auspices of the three municipalities of Lezhe, Durres and Saranda. The consultations for each municipality were organized in two phases :

1. Single consultations with group of stakeholders (Local authorities, local NGOs, local communities) sharing common interest and concerns.
2. Broad consultation with representatives of stakeholders and top level decision-makers from local and central governement.

The main goal of the consultation process was to inform all the stakeholders on the results of the Technical Assessment report and to collect their suggestions in order to improve the project design. The Consultation Process final report is attached on Annex 4.

II.4.2. EMP MAIN FEATURES

The detailed *Environmental Management Plan (EMP)*, included as an annex in the Project Implementation Plan, includes monitoring and mitigation activities for the three sites (i.e. Durress, Lezhe and Saranda) at the different stages, during Final Design preparation and implementation. The EMP includes:

Mitigation activities to be included in the WWTP Final Design stage

(i)-the elaboration of a manual for sustainable WWTP management including control of the water regime in the artificial wetlands, and emergency procedure in the event of accidental pollution of the water body, and consideration of the breeding requirements of birds;

(ii)-removal of top soil before starting civil works, and substitute it with an impervious clay liners to avoid negative impact on the ground water;

iii)-elaboration of mosquito and odor control and management plan;

iv)-creation all around the WWTP sites a buffer zone wide not less than 40 m, with 30/20 m of bare strips and close to the WWTP fence a tree belts 5/10 m wide with autochthonous tree species plantation;

v)-elaboration of environmental management guidelines for the construction stage.

Mitigation activities to be included in the WWTP Implementation stage

(i)-During project implementation, procedures will be introduced to ensure that potential negative impacts as a result of the project are mitigated: the bidding and contract documents for construction will describe that the WWTP construction will be minimized though good construction practices to prevent, minimize or mitigate environmental damage. These requirements will be enforced by the Supervision of Works during construction. Also, to avoid extraction silt clay or clayey sand material for WWTP embankments (or sand and gravel for the concrete construction) from river beds, Contract Documents will require prior approval of the Engineer for extraction of any construction material. Contractor's requests for approval will identify the location of author-

ized silt clay or clayey sand borrow areas, or sand gravel quarries areas, and the quantities of material to be extracted;

(ii)-Environmental indicators, including quality effluents, will be monitored annually by the MoE in accordance with the Environmental Management Plan and the new Law on Environmental Protection under GoA approval.

III. ANALYSIS OF CURRENT SITUATION. FORECAST AND ASSESSMENT OF EXPECTED IMPACT OF THE PROJECT ON ENVIRONMENTAL COMPONENTS

III.1. INFRASTRUCTURE

III.1.1. EXISTING SANITATION INFRASTRUCTURES

The coastal cities of Durres, Lezhe, Saranda and Shengjin don't have any wastewater treatment facilities and existing raw sewage outfalls are located either directly on the seacoast, on the bank of coastal rivers or on drainage ditches that after a short distance discharge directly into globally significant. tidal marshlands and/or the sea. The effect of these discharges on the marine environmental and on bathing waters is described in the following chapt. III.3.

Durres city and rural areas sewage system

The Durress sewage system is a combined system, which collect surface storm water and wastewater. The wastewater are collected and discharged by gravity or by pumping stations in a surface drainage canals system that outfall to the sea by a hydrovore station at Porto Roma, about six kilometres north of Durres City. The waste water is discharged without any treatment or monitoring on the sea. The area of service of the Sewerage Enterprise is restricted to the municipal area of Duress City. The land drainage system and Porto Romano hydrovore station is maintained and operated by the Ministry of Agriculture. Many properties in the service area are not connected to the public sewage system and they either discharge directly to the surface drainage canals or septic tanks.

Lezhe city sewage system

The Lezhe sewage system is a combined system which collects surface storm water and waste water. The wastewater is collected and discharged by gravity and one pumping station, without any treatment or monitoring, in the Drint River. Many properties in the service area are not connected to the public sewage system and they either discharge directly to the Drinit or in local septic tanks. The waste water of Lezhe gravitate towards five outlets locates on left bank of Drinit River. The main part of the town area is served by a system of concrete collector which end at a pumping station from the waste water are delivered in the Drinit River. The north area of the town is served by a system of pipes flow by gravity by three outlet in Drinit. The waste water of the south zone of Lezhe flow by gravity in Drinit by the River Manati.

Shengjin city sewage system

As Lezhe sewage system also Shengjin has a combined system which collect surface storm water and waste water. The wastewater are collected and discharged without any treatment in the Kenalla Lake by a pumping station. The drainage system is composed by a main concrete collector following the alignment of the coastal road. The waste waters falls in a pumping station and then lifted by a ND 400 rising main to the Kenalla Lake. The sewerage system is equipped of storm water overflow into the sea. The overflow ND 600 mm is located on the lower part of the coastal road.

Saranda city sewage system

The Saranda sewage system is a unitary system which collect only the wastewater. The wastewater are collected and discharged without any treatment at sea. The Saranda sewage system is going to be rehabilitate under the EU Phare program-Water PMU "*Emergency Measures-Saranda Water Supply and Sanitation*", whose main items are: Rehabilitation of the main collector, Sewage system and pumping station; Sewer cleaning Program; Sewer and manholes rehabilitation.

The main Saranda collector begins in Koder and runs eastward, located in the promenade close to the sea shore. The collector terminates at the sewage pumping station which is located near the former Butrinti Hotel. The pumping station lifts the flow from collector through a rising main to an out-let to convey the sewage flow in the Cuka Channel, where it would then flow into the sea. At the present the collector discharges flows to the sea near to the small Saranda harbour.

III.1.2. WATER DEMAND AND WASTEWATER RETURN IN THE PROJECT AREAS

The wastewater production are based on the water demand. The demand for water is rising rapidly due to expanding residential and commerce development in the urban areas. Water consumption is presently constrained by intermittent supply. The evolution of the population and future wastewater production is made up to the horizon year 2022 (twenty years). The present per capita water use is assumed 80 litres per day. The water consumption will steadily increase with improved service and rising living standard, and it is assumed 150 litres per day on 2020 year.

Tab. III.1-Coastal cities wastewater production

Coastal cities	Reference Year	Estimate population	Wastewater production *(m^3/day)*	Average flow *(l/s)*	Peak flow *(l/s)*
Durres	2002	150,000	9,590	111	165
	2022	250,000	30,240	350	525
Lezhe	2002	18,000	1,150	13.3	19.95
	2022	30,000	3,460	41.6	62.5
Shengjin	2002	6,000	380	4.4	6.6
	2022	12,000	1,730	16.6	25.0
Saranda	2002	30,000	1,920	22.2	33.3
	2022	60,000	7,200	83.3	125.0

III.1.3. WASTEWATER TREATMENT PROPOSED FACILITIES

The project proposed sanitation facilities for the coastal cities of Durrres, Lezhe/Shengjin and Saranda, con be summarized as follow:

- Construction of a Low cost wastewater treatment system;
- Construction of the new sewage main collectors to deliver the wastewater from the existing cities out-let to the wastewater treatment plants.

Low cost water treatment systems relies on natural kinetics developing in the wetlands, reducing at the minimum the mechanical devices and energy supply. Among these technologies are included the Constructed Treatment Wetlands (CTW).

The natural wastewater treatment plant proposed by Consultant, is composed by pre-treatment unit, a primary treatment system interconnected with a constructed wetland.

The typical lay-out of the proposed natural wastewater treatment plant is composed by:

- Pre-treatment units: including bar rack units and an aerated grit chamber;
- Primary treatment system: Aerated Oxidation pond;
- Constructed Wetland according the Free Water Surface type (FWS);
- Sludge treatment and disposal system: sludge dry beds.

The FWS will be composed by 3 zones characterized by different vegetation:

- *zone 1:*fully vegetated with floating and emergent plants, with sedimentation and flocculation, as determined by transect measurements of dissolved oxygen and pollutant concentrations;
- *zone 2:*open-water surface with submerged growth plants. The natural aeration processes are supplemented by submerged macrophytes during daylight periods to elevate dissolved oxygen in order to oxidize carbonaceous compounds (BOD) to sufficiently low levels to facilitate the nitrification;
- *zone 3:fully vegetated with floating and emergent plants, with a final denitrification action.*

The WWTP will be equipped with sludge drying beds to the sludge dewatering. For the treatment of the dewatered sludge two options will be defined during the Final Desing stage: (i) disposal in controlled dumpsites (sludge earthening), and (ii) agricultural land sludge application.

III.1.3.1. Durres area

According the Consultant evaluation, in the area of Durres, the constructed wetlands system has to be considered as a preliminary intervention, mainly due to the expected increase of demographic development and population settlement (present population of 150,000 inhabit.), as well as the prevailing industrial sector of productive activities.
In the case of Durres the Consultant proposed a combined Conventional and Natural wastewater treatment system including:

- A high rate activated sludge process comprising of two aerated sludge tanks and two secondary settlement tanks where the simple dry weather flow is treated;
- In case of any storm water events a division unit separates all exceeding wastewater loads after the aerated grit chamber and is running via a bypass to the CTW (40.0 ha extension).

III.1.3.2. Lezhe/Shengjin areas

According the preliminary design carried-out the CTW surface areas required for Lezhe/Shengjin at the 20 years horizon are:

- Aerated Oxidation pond: 0.6 ha;
- FWS: 7.5 ha.

III.1.3.3. Saranda area

For Saranda city the CTW surface areas required for at the years 2022 (20 year horizon) are:

- Aerated Oxidation pond: 0.8 ha;
- FWS: 9.6 ha.

III.1.4. FORECAST OF EXPECTED IMPACT

The construction of the WWTP may increase the filtration of untreated water into the soil, respectively the level of underground water. Thus will be necessary the removal of top soil before starting civil works, and substitute it with an impervious clay liners to avoid negative impact on the ground water.

Another risk could be related to the of sludge disposal contamination

The construction work will result in large quantities of building and vegetation refuse. There will be large-scale excavation and filling activities related to the construction of temporary and permanent waste grounds and quarries will be searched for to provide soil necessary for the CTW embankments and protection dykes. The landfill sites will identified by the Consultant during the Final Design stage, based on a detailed Geological survey. During project implementation, procedures will be introduced to ensure that potential negative impacts as a result of the project are mitigated: the bidding and contract documents for construction will describe that the CTW construction will be minimized though good construction practices to prevent, minimize or mitigate environmental damage. These requirements will be enforced by the Supervision of Works during construction. Also, to avoid extraction silt clay or clayey sand material for CTW embankments (or sand and gravel for the concrete construction) from river beds, Contract Documents will require prior approval of the Engineer for extraction of any construction material.

III.2. CLIMATE

III.2.1. AIR TEMPERATURE

The Albanian coastal area, as far as the climate is concerned, is included in the areas of the subtropical belt climate. The vegetation period (> 10° C) varies from 330-340 days in Saranda (Ionian sea), up to 240-260 days in Velipoja (Adriatic). The quantity of the active temperatures > 10° C varies from 4400 up to 6000 hours. The coastal area has about 300 sunny days per year. The average amount of the global sunny radiation is 130 k.kal /CMA a year. The potential biological indicator in this area takes the value 3-4 times higher than the other parts of the country.

The annual average temperature in the Ionian coast is about 16-17°C while in the Adriatic is around 14,8-16,5 °C. Winter is relatively short, mild and very wet while summer is long, hot and very dry. The coldest month is January while the hottest month is July.

In the coastal area the temperature of the surface waters varies from 19.2° C in Saranda (Ionian) up to 17.7° C in Shengjini (Adriatic). The highest temperature of water during perennial period has been 29.8°C, while the lowest drops to 7.7° C. The Albanian coastal waters are generally about 2-3 °C warmer than the Italian coastal ones.

Average monthly temperatures for the project area sites are indicated in Tab.III.2 below.

Tab. III.2 - Average monthly temperature in project areas

Coastal cities	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Year*
Durres	6.4	7.5	10.0	13.8	17.6	21.7	24.0	24.0	21.2	16.4	12.2	8.4	16.0
Lezhe	6.6	8.0	10.9	14.4	18.0	21.7	24.5	24.6	21.5	17.3	12.9	8.8	15.5
Saranda	9.1	9.7	11.4	14.2	18.3	22.0	24.5	24.7	22.0	18.0	13.9	10.7	16.5

Source: Institute of Hydrometeorology, years 1951-1980-value in °C.

III.2.2. RAINFALL

Rainfall is an important climatic element, affecting the purity of the atmospheric air, the quantity and quality of waters. The specific geographical features, the transfer of air masses and their transformation is reflected in the type of rainfall, the quantity of rainfall and its distribution.

Albania is located at the boundary of two climatic regions: the Mediterranean zone, and Central Europe. In addition, the country combine a coastal plain in the West with fairly high mountains. The rain come mainly with south-west winds and falls according the obstacles encountered. This gives a variety of climates and rainfall patterns in the different regions of the country. The average annual rainfall is around 1484 mm; the seasonal patterns is very consistent, with July, sometimes August, as the driest month and November, sometimes December, as the wettest one.

Average monthly rainfall for the project area sistes are indicated in Tab.III.3 below.

Tab. III.3- Average monthly rainfall in Project areas

Coastal cities	*Jan*	*Feb*	*Mar*	*Abr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Year*
Durre	135	113	102	90	68	52	29	45	68	114	160	132	1222
Leghe	174.4	148.4	138.2	121.4	98.0	78.0	38.7	54.4	94.4	152.0	190.3	175.1	1463
Saranda	188.3	151.0	117.9	80.9	57.4	25.0	10.7	22.9	97.4	164.4	232.1	203.6	1158

Source: Institute of Hydrometeorology, years 1951-1980-value in mm

III.2.3. SOURCES OF ATMOSPHERIC POLLUTION AND THEIR POTENTIAL IMPACT ON THE PROJECT AREA.

Sources of air pollution in the project area are related with the urban/industrial areas of the Durres, Lezhe and Saranda cities. The other major pollution source are the *Durres hot spots*. The Durres hotspot sites are former industrial facilities where hazardous waste is causing

unacceptable human exposure requiring urgent risk reduction measures. One hotspot is the chemical waste storage located approximately 10 km north to the center of Durres City at the southeast foot of the Bishti Palles Cape. In this hotspot there are three storage buildings overloaded with chemicals like carbon disulfide, methanol, dimethyl amine, HCH residue etc. The second hotspot is the chromate plant, the chromate dumpsite and the lindane at the former Durres chemical plant located about 6.5 north to the center of the city of Durres and less then 1 km south of Porto Romano. The site is located on the Durres Plain, at the foot of Durres Hills. The chromate waste was dumped between the former chemical plant and the drainage channels in a layer approximately 1.5-2 m high. Two highly polluted areas represent the Industrial area of Durres located about 3 km east to the city center, and the Han-house located about 5 km northeast to the city center. While most of the former industrial establishments currently are not functioning the Hen-hose is normally working. No specific studies of the transport of pollutants by the atmosphere and rainfalls into the water have been made in Albania. Thus the amount of chemical pollution , falling out into the surface waters through atmospheric settling is unknown.

III.2.4. POSSIBLE PROJECT IMPLEMENTATION RESULTS

We believe the construction of CTW in the three project area will lead to a very insignificant microclimatic change, with a little reducing heat in summer and some increase of air humidity. In addition this insignificant chance will be manifest in a very very narrow area in the immediate vicinity of the CTW's.

During the construction period certain amounts of dust and waste gases from the machines will be generated. At the present stage of the study no exact estimation of the emissions can be made. However, these would not represent a serious risk for the local population, biodiversity and infrastructure.

III.3. SURFACE WATER AND GROUND WATER

III.3.1. THE ALBANIAN MARINE ECOSYSTEM

The Albanian coastal region contains two geographic entities: the Adriatic and the Ionian Sea coastal areas. The total length of coastline is about 429 km and the national waters confined to territorial waters of 12 miles width. The continental shelf lies entirely within the exclusive zone. The shelf is wider in the north (Adriatic sea), up to 25 miles across, and narrower in the south (Ionian sea), 2-3 miles width. Beyond 25 miles, sea depth exceeds 1000 m in the international channel.

There is no particular wind that prevails in the coastal plain. In winter, the most frequent one blows from the Southeast and in the summer season, the prevailing wind blows from the north-western direction.

There are three types of rather low currents in the Adriatic sea: continuous currents, tidal currents, and wind-driven currents. Strong winds persisting for a couple of days may create temporary currents running in the opposite direction with respect to steady and tidal currents.

The Adriatic coastal area (the northern part of the Albanian coast) is generally characterised by coastal lowlands (alluvial plains) intersected by rivers, and flanked by hills along its upland boundary. The coast is made of long sandy beaches, deltaic river mouths and lagoons. The coastal waters are shallow, receiving water from the rivers and several drainage canals. At sea, the water depth increases slowly, with first a sandy bottom with the associated biocenosis which becomes muddy with increasing depth.

On the sandy or muddy bottoms, the marine flora is scarce or occupies specific areas where currents or waves have less action.

The extensive sea grass beds of *Posidonia oceanica* are an important part of the Albanian marine ecosystem, often occupying a considerable part of the littoral zone. *Posidonia oceanica* and very well developed marine communities are found along Porto Romano bay and Shengjini bay.

The underwater rocky bottoms at Rodoni and Lagji Capes (Durres), and the eastern side of Vlora bay host patches of *Posidonia oceanica*.

III.3.1.1. Porto Romano and Rrushkull-Erzeni River outlet (Durres area)

The area of Porto Romano and Lalzi bay is a narrow, reclaimed part of the coastal plain. There are some natural habitats left along the coastline, such as a belt of pine trees, temporary marshes, roadbeds and salt marshes. In addition to the loss of large wetland parts by land reclamation, the quality of natural environment of that area continues to deteriorate due to the input of the polluted Erzeni river (contaminated mainly by sewage disposed upstream), direct discharge of untreated urban and industrial wastewater in the Porto Romano bay, excessive felling of trees for fuel, excessive erosion phenomenons, uncontrolled hunting, uncontrolled fishing and human disturbance.

The Lalzi bay with the Erzeni river mouth is an environmentally sensitive area. The coastline of the Rodoni-Bishti i Palles Capes, of which 35 % are cliffs exposed to mild erosion stretching along both capes. The remaining parts of this unit are alluvial beaches (actually, the Lalzi bay) of which 18 % is exposed to erosion and 47 % to deposition. Any intervention altering the quantity

of the material carried by the Erzeni river will affect the littoral, generating new erosion processes. The Porto Romano bay also is a section attacked by erosion.

The underwater rocky bottoms at Rodoni and Lagji Capes host patches of *Posidonia oceanica.*

III.3.1.2. Drini outlet (Lezhe-Shengjin area)

This unit has about 15 km of the coastline, from Shengjini harbour to the southern part of Vaini lagoon (including the Drini river), oriented in N-S direction. The shore are sandy and sediment is coming both from the Buna and Drini rivers transported by the longshore currents. The marine slope is gentle reaching the 20 m isobath at average of 2.0 km offshore. Kenalla, Kune and Vaini lagoons are separated from the shallow coastal waters by the narrow sandbars, low and mobile dunes, and the planted pine tree belt (*Pinus halepensis, Pinus pinea*).

Posidonia oceanica meadows and *Penaeus kerathurus* populations are reduced due to the polluted industrial and urban discharges into this area[1]. The breeding grounds of *Posidonia oceanica* have also deteriorated because of changes in the structure of the fishing fleet[2]. Fishing activities occur in the coastal waters including the trawlers from Shengjini and small local fishing boats. As in other places, the local population is collecting *Bivalves* along the shores.

The coastal wetlands of Drini river (Kenalla-Kune-Vaini lagoons) are a part of an environmentally sensitive area. Inland of the Shengjini beach lies the Kenalla lake surrounded by a dike with the open lake and a dried-up part with salinity tolerant vegetation. Through a pipeline, the urban sewage of Shengjini is directly drained into the lake. Further south lies the Kune lagoon extending up to Drini river mouth.

The coastal reach in the northern part of Shengjini has presented an coastal erosion phenomena. After that, until some 2.5 km south of Shengjini, the coast is relatively stable or slightly receding.

III.3.1.3. Saranda bay and Ksamili bay (Saranda area)

The coastal line is very refracted. It is divided in two main types from the morph graphic point of view: (i) high abrasive coast and (ii) low accumulating coast. The abrasive process is intensive and many falezas are created. The accumulation process is low and mainly developed in lowland areas. Sedimentation in Pavllo outlet is in the origin of sandy beach formation.

The coastline of Saranda bay to Ksamili bay can be divided into several sections: the area including the town of Saranda shows a recent development on the northern bluff near the entrance to the harbour; the area south of Saranda where the cliffs are steep and cut with caves and intermittent sandy beaches; the abandoned citrus plantations and deforested areas in the vicinity of Ksamili; the Ksamili islands, with small sandy beaches, Mediterranean maquis, and extensive *Posedonia oceanica* meadows covering the shallow areas of the bay of Ksamili. The whole area from Ksamili Islands to Stillo bay could be integrated in a protected and managed area with interconnected areas. In Ksamili bay and inlets, a marina and environmentally sound resort place could be settled.

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[1] Albania Coastal Zone Management Plan : Final Report - Phase One, 1995.
[2] Albanian Convention on Biological Diversity -1999.

Based on its biodiversity values Saranda bay to Ksamili has been included in the propopsed network of Protected Areas under the category of Protected landscape and Seascape Area.

III.3.1.4. Kune–Vain wetland and Kenalla Lake

The Kune–Vain wetland and Kenalla Lake or complex Kune–Vain lagoon represent one of the important coastal Albanian wetland. Area of Kune–Vaini wetland and Kenalla lake represents a wetland area of multiple ecological and economic values and uses, as provide fish and wildlife habitats, support complex food web, absorb water to reduce flooding and damage from storms, provide erosion control, improve the quality of water ed in particularly provide open space & aesthetic value.

The Drini River is the longest river of Albania, and the Kune-Vain lagoon complex has been built by the accumulation of the river sediments. This area is comprised in the network of Albanian Protected Areas, as described in the document "Biodiversity Strategy and Action Plan (BSAP)", approved by Government of Albania in the year 2000. The delta of Drini is recognized internationally as an Important Bird Area (IBA) and a Specially Protected Area (SPA) and represent the area of Kune-Western part of Kune lagoon, defined in the network of Albanian Protected areas as Scientific Reserve, according to the 1st category of IUCN. The site of delta of Drini is an important area for wintering water birds. In previous years the delta was the most important site for the nesting of herons (Ardeidae) and Cormorants including the Globally Threatened species of Pygmy Cormorant (*Phalacrocorax pygmeus*).

The other two parts of this lagoon complex, Kenalla–Eastern part of Merxhani lagoon and Drini River Outlet with Ceka (part of Vain wetlands) and Vaini wetlands are defined as Managed Nature Reserve, in according to the 4th category of IUCN.

III.3.1.5. Butrinti lake and related Wetland environment

Butrint is a wetland complex in the southern part of Albania, famous for its archaeological monuments, historical significance and natural richness. The core area is composed by a tectonic lagoon of 1600 ha, known as Lake Butrint, that is surrounded by forested hills and mountains and complimented by saltwater and freshwater marshlands. The main activities are fishing, mussel farming, stock raising, vineyards and cultural tourism, focused on the southern part of Lake Butrint (Greek, Roman, Byzantine, Venetian and Ottoman sites associated with *Buthrotum*), designated also as an UNESCO World Heritage Site in December 1999.

The area of Butrint is expanded from Cape Qefali to the Greek border. This area belongs to the District of Saranda and covers 35 km of coastline. The relief is not very important with an altitude of 363 m at about 4.5 km of the coast east to Butrinti lake.

Butrint is also included in the proposed network of Albanian Protected Areas under the category of Multiple Use Area. The zone is declared recently as Ramsar Site (2002) and it is recognized internationally as an Important Bird Area (IBA) and a Specially Protected Area (SPA). Butrint is an important area for wintering waterbirds.

III.3.2. WATER QUALITY AND POLLUTION LOADS

Degradation of the quality of trans-boundary water resources, caused mainly by pollution from land-based activities is an important problem. The coastal cities of Durres, Lezhe, Saranda and Shengjin do not have any wastewater treatment facilities. All the existing data from the recent years have shown certain trends toward decrease of the quality of water in the Adriatic sea.

III.3.3. WATER ANALYSIS AND DATA EVALUATION

Physical and chemical parameters. During the Technical assessment study carried-out by the Consultant, a water/wastewater and seawater quality examinations was performed, in order to confirm or adjust available water quality data.

The examination mainly concerned raw sewage and receptor water-bodies quality. The sea water quality have been investigated in terms of indices on water, sediments and biota.

The analysed sewage samples taken at project's sites wastewater facilities can be characterized **as strong-moderate** with typical domestic composition.

The analyses and assessment of existing studies, as well as the analyses performed during the study, conferm the degradation of the quality of water resources by pollution from land-based activities (nutrients, pathogens and oxygen demanding wastes), in the all coastal cities of Durres, Lezhe and Saranda.

In the Tab.III.4 a summary of analyses as analyses from the sampling performed, is given. Furthermore, for comparison, typical values for sewage in European Countries are shown.

The last column give the value which form the basis for calculation of CTW performed by Consultant.

Relevant World Bank general environmental guidelines for wastewater allowed limits for domestic sewage for discharge to surface water after treatment are summarized in Tab.III.5.

Tab.III.4-Water quality analysis

Parameter	Typical EC values for sewage			Overall values for sewages outfall (mg/l)				Assumed values (mg/l)	
	Strong	Moderate	Thin	Durres	Lezhe	Shengjin	Saranda	Durres	Other cites
BOD_5 (mg/l)	350	250	150	136	118	67	107	250	200
Total N (mg/l)	80	50	30	44	34	29	33	60	50
Total P (mg/l)	23	16	10	271	22	14	20	27	20
SS (mg/l)	450	300	190	335 -	346	102	217	400	400
COD (mg/l)	740	530	320	280	240	164	220	350	350
Wastewater quantity lcd	--	--	--					80%of 150 lcd	80%of 150 lcd

The main reason for the apparently *thin* sewage composition in term of BOD_5 are assumed to be related with a infiltration of water from the water table and consequent dilution of the wastewater. For this reason an higher value of BOD_5 ranging between 250-200 mg/l has been assumed in the calculations (see last column of Tab.III.4).

Analyses of toxic components, heavy metals etc., indicate very low values compared with guidelines for allowed limits. PH values are in range from 7.5 to 8.32 , which is normal.

Tab.III.5-World Bank general Environmental Guidelines-Domestic sewage limits

Polluant Parameter	Limit (mg/l)
Biochemical oxygen demand BOD_5 (mg/l)	50
Chemical oxygen demand COD (mg/l)	250
Phosphorous (mg/l)	2.0
Total suspended solids TSS (mg/l)	50
Oil and grease	10
Heavy metals, total	10
Ammonia	10
PH	6-9
Coliforms	< 400 MPN/100ml (MPN-Most Probable number)

III.3.4. POLLUTION EFFECTS

III.3.4.1. Rivers (Drint River and Cuka cannel)

The concentration of polluting substances changes as a result of hydrodynamic, physical and chemical, biological and biochemical processes taking place in the receiving river/natural wet-land. An important part is played by the oxidizing and restoring processes, absorption and de-sorption, and the formation of insoluble compounds. The transformation processes of organic compounds are an important factor influencing the state of water ecosystems. As a result of self-purification processes, organic substances undergo qualitative changes, which are mostly harm-less. Biochemical oxidation of organic substances takes place in two phases: carbon -dioxide and nitric. During the first phase, organic compounds of carbon dioxide are decomposed and during the second one processes of decomposition of organic nitrogen - ammonification and nitrifica-tion take place as a result of the functioning of heterotrophic bacteria. Nitrification is a process of biochemical ammonia ions being oxidized to nitrites and nitrates by autotrophic microorganisms. In the absence or presence of a minimum content of oxygen in the water, denitrification proc-esses may develop. Intermediate products are nitrites and nitrogen oxides, of which N_2O is mostly emitted in the air. Nitrates are usually reduced to molecular nitrogen.

The non-transparency of water has a considerable impact on the primary occurrence of denitrifi-cation processes.

The dynamics of nutrients depends on both the seasonal alterations and their content in the river waters. Nitrogen reduction in wetland zones can be assessed after the processing of a sufficient amount of information which will be collected from own monitoring data during operation in wetland zones.

Phosphorus is found in water areas mostly in the form of inorganic phosphorus compounds. Organically bound phosphorus occurs in dissolved state as phosphate in the organisms or sediments. Bacteria and plant organisms as a phosphorus source use dissolved inorganic phosphate compounds in the form of dissociated ions. Dissolved and organically bound phosphate is turned in orthophosphate during the process of phosphatization. In many instances the absorption of organic carbon compounds in the river ecosystems can be realized only in the presence of nitrogen and phosphorus.

The expected reduction of nutrient pollutants (nitrogen and phosphorus) in the waters of project area rivers (i.e. Drint river, Porto Romano surface drainage canals and Cuka cannel) resulting from the CTW construction in Lezhe, Durres and Saranda will be significant as stated on the following chapter III.3.4.3.

III.3.4.2. Marine area

Environment is an end user of water resources which poses therefore sometimes severe restrictions particularly on the emission of wastewater from other water use sectors. High BOD loads and suspended materials may influence biochemical and light conditions in the marine environment; industrial micro pollutants may be directly toxic for aquatic life and fish; and pollution from excess agrochemicals may have similar effects.

The marine ecosystem, though almost certainly damaged by uncontrolled wastewater emission of coastal urban concentrations, industry and polluted rivers, is still generally in a reasonable condition and its ecological and economic value may be considerable. Unfortunately, studies about the value and eventual degradation of the marine ecosystem are rare and an overall inventory has never been executed. The Biodiversity Action Plan has as a priority the mapping of the sea meadows with *Posidonia oceanica* and the study of animal groups and plants, because of lows scale of knowledge of a considerable part of these plants.

Little is known in Albania about marine environment along the Adriatic Coast and the effects of the considerable pollution of the last 30 years, both by discharge into the sea of polluted river water and by direct discharge of untreated urban and industrial wastewater. Except for smaller areas along the coast in the vicinity of cities and industrial concentrations, inspection shows in general visually clear and unaffected waters. However, systematic research on marine ecosystems and the effect of pollution has never been performed.

The problem of pollution in the marine environment becomes ever more serious. Adriatic Sea is easily exposed to pollution because of restricted water exchange and long shore lines. Areas with stagnant or partly stagnant conditions are especially sensitive to pollution due to slow water exchange. Organic wastes from communities and industries will cause an oxygen reduction process in the water. Oxygen is utilised for oxidation of the organic matter and nutrients bound in the matter will be released. This process will cause an increase of the primary plankton production in the area. This again will increase the oxygen utilisation. A secondary oxygen reduction process will begin, where the new organic matter is oxidised. This secondary oxygen reduction may require two to five times more oxygen than the primary process. This secondary process is not accounted for in the conventional BOD techniques.

The enrichment of natural waters by nutrients (eutrophication), primarily nitrogen in marine waters but also phosphorus, has been associated with **increased primary productivity and nui-**

sance algal growth in coastal zones and semi-enclosed and enclosed areas of seas. Increased loads of nutrients to coastal waters have caused increasing eutrophication and the major sources of nutrients to coastal waters are from sewage disposal. The primary production increases until the light penetration limits it. The consequences of eutrophication can be increased frequency of algal blooms (sometimes toxic), increased water turbidity, slime production, oxygen depletion in deep waters and mass fish and benthic fauna kills. Signs of such *eutrophication* can be observed in the Saranda bay, Shengjini and Kenalla.

The relatively low concentrations of dissolved oxygen in Saranda bay (approx. 7.63 mg/l), in Shengjini bay, Kenalla Lake (approx.8.46 mg/l) and Drinit river (9.70 mg/l), are to be related to pollution by organic matter. Also the results of the chemical analysis into the sea near the points of sewage discharge demonstrate the presence of nitrites. Particularly in Saranda bay, Shengjini bay and Porto Romano bay, it was observed[3] the development of some nitrofile algae populations (*Ulva rigida and Enteromorpha spp.)*, and this is an other demonstration of eutrophication in this waters. Ammonia can be converted to organic nitrogen by these resident algae *(Ulva, Enteromorpha). Ulva* blooms can become so luxuriant that the algal decay products are more unpleasent than the sewage itself.

Sewage pollution is directly responsible for the closure of many ***molluscan shellfish*** growing areas in Europe. Sellfish can accumulate and retain pathogenic organisms and toxic organic and inorganic substances present in the growing areas. During the last years mussel breeding was practically stopped, both for internal organisational reasons, but above all because of the block on exports imposed by the EC for sanitary reasons, in October 1994 for all living products of the fishery sector. The main requirement for the export of live mussels to the EU is the setting up of a shellfish monitoring system to guarantee the safety of bivalves harvested from water bodies. Currently Albania faces a ban due to a previous outbreak of cholera in live molluscs. This issue is now being addressed through the development of a monitoring system to certify the areas on the Albanian coastline and the marine waters that can harvest and export mussels. This is covered by EC/91/492 on placing live bivalves on the EU market.

Posidonia oceanica meadows populations are reduced due to the polluted industrial and urban discharges into this area, particularly in the Shengjini- Lezha and Saranda-Ksamili area, but also in the Porto Romano and Lalzi bay. This has been associated with an increase in water turbidity (Secchi disc. 1.25-1.50 m) reducing the amount of light exposure on the sea bed and this caused reduction in the ***Posidonia oceanica*** beds over the last decades (Kashta L., 1998). In sea areas with a low nutrient content a release of organic wastes may cause eutrophication of the surface water in the whole area. The increased biological production may be beneficial to the surface water by increasing the fish yield, but it can have serious effects on conditions in the deep water. Increased decaying organic matter there may lead to oxygen deficiency and can destroyed bottom fauna. It seems to be very difficult for nature to restore oxidising conditions when such a fertilisation cycle has started.

In Albania, the major types of endangered ecosystems and habitats are not only coastal (sand dunes, river deltas, alluvial forests, lagoons, and coastal lakes), but also marine ecosystems at medium and infralitoral level [1]. The ***Posidonia*** meadows represents an important ecosystem in the Adriatic Sea. The fundamental role played by the marine phanerogam meadows and in particular by Posidonia, can be summarised in the following points: stabilisation of the sea-bed through the development of an effective radical and stoloniferous apparatus; reduction of the intensity of movements of water with consequent maintenance of coastal balance, thanks to the

[3] Kashta L. and Mio A., 1992-Tirana University.
[1] Albania Coastal Zone Management Plan : Final Report - Phase One, 1995.

softening effect of the "matte" and the layer of vegetation; high production of oxygen and organic material by means of photosynthesis; direct and indirect source for numerous organisms and starting point for a complete food web; habitat of choice for numerous commercially important species, such as fish, cephalopods and crustaceans.

Information from all three project areas gives quite a clear picture of the organic load of the respective coastal zones. In all the project areas the urban centres discharge sewage directly into the sea (Saranda, Porto Romano-Durres and Shengjini bay) or into the wetlands (Kenalla) or into the river (Drini-Lezhe) at short distances from the sea and discharged sewage is not treated. The situation is particularly severe in Saranda, Shengjini and Kenalla. In the city of Saranda, urban and industrial waste is discharged directly in the central part of Saranda bay, and through the Cuka channel [(2)] into the sea. The waste plume spreads across the bay of Saranda, in a northern direction, polluting waters in front of Saranda.

These discharges of untreated domestic sewage can significantly add to the total loads of contaminants. Due to the breakdown of organic matter, such discharges can cause immediate **problems to marine life** from high oxygen demands in the water column and sediments and through toxic effects of ammonia. Of immediate concern to humans is the presence of large numbers of pathogens that can cause illness and disease. Also associated with the presence of pathogens is the potential contamination of seafood, particularly shellfish, which in Saranda bay and Butrinti lagoon (mussel *Mytilus galloprovincialis) and* in areas like Porto Romano, Lalzi and Shengjini (clams *Chamelea gallina, Ruditapes decussatus* etc) are commercially very important for Albanian fishery.

Pollutants may affect ***reproduction*** in many different ways. Teratological development of embryos may result in deformed or malfunctioning larvae which do not survive hatching. Reproduction may be influenced by behavioural changes of the adults during the mating season. Their behaviour, the production of eggs and sperm, the secretion of egg membranes, eggshells and production of egg nutrients, may be all affected by changes of hormone function and enzyme activity. Changes in the ecosystem may influence reproductive success when vitellogenesis is directly influenced by the availability of food. In the coastal area of Shengjini bay (particularly northern part-Rana e hedhun), in Porto Romano and Lalzi bay and near the Saranda and Ksamili bay there are very important areas for reproduction of some fish species, first of all for sea bass (Dicentrarchus labrax).

According the available data and observations, the pollution effects by uncontrolled and increased urban wastewater discharges into the marine environment can provide negative consequences both at the environmental level and to the institutional and economic ones.

III.3.4.3. Forecast expected impact on rivers and marine ecosystems

The implementation of the proposed treatment system will provide a noticeable reduction of the pollution loads into the receiving water bodies, which represents the major contribution to the protection and restoring actions in the endangered coastal zone and marine habitats.

At the global level, benefits will be obtained through the reduction of transboundary pollution into the Adriatic Sea which is currently endangering numerous species hosted in the coastal and marine environment. Based on the Technical Assessment of the nutrient trapping capacity of the proposed treatment system to be financed under this project, about 147 tons of Nitrogen and

[(2)] According EU Phare Program-"Emergency Measures-Saranda Water Supply and Sanitation"-see Annex 9

Phosphorous and 768 tons of BOD_5 could be reduced annually. Significant global biodiversity benefits are expected. Specifically the wastewater treatment system will have a positive impact on:

- Endangered marine ecosystems and habitats, in medium and infralittoral level (particularly Shengjini-Lezha area, Porto Romano bay and Saranda bay);
- Endangered coastal ecosystems: sand dunes, delta rivers (particularly Drini-Lezha), alluvial and wet forests, lagoons (Kune and Vaini) and coastal lakes (Kenalla);
- Protection of the Posidonia Oceanica meadows, particularly in the Shengjini- Lezha and Saranda-Ksamili area, but also in the Porto Romano and Lalzi bay.
- Protection from eutrophication in the Saranda bay, Shengjini area and Kenalla lake;

This in turn will have a positive impact in protecting beaches from erosion as well as providing hatchery and nutrients for endangered species. Development of some algae populations (Ulva and Enteromorpha), particularly in Saranda bay, Shengjini bay and Porto Romano bay;

III.4. WASTES

Household, building, industrial and hazardous wastes are generated on the territory of the considered areas:

- **Household waste** generated by cities human settlements, workers during the construction and development of the wetland zones, etc.

In the studied territory there is no organizez waste landfill. Unofficial dumping sites exist close to the city of Durress in land drainage area close to Porto Romano.

- **Construction waste**

The CTW construction envisages a large amount of digging and excavation work. This will result in large quantities of construction waste and vegetation residues waste. The landfills for this waste will be decided following the Final Design stage. During project implementation, procedures will be introducede to ensure that potential negative impacts as a result of the project are mitigated: the bidding and contract documents for construction will describe that the CTW construction will be minimized though good construction practices to prevent, minimize or mitigate environmental damage. These requirements will be enforced by the Supervision of Works during construction. Also, to avoid extraction silt clay or clayey sand material for CTW embankments (or sand and gravel for the concrete construction) from river beds, Contract Documents will require prior approval of the Engineer for extraction of any construction material. Contractor's requests for approval will identify the location of authorized silt clay or clayey sand borrow areas, or sand gravel quarries areas, and the quantities of material to be extracted;

- **Hazardous waste**

Small amount of hazardous waste will be generated in the course of construction work by building machines and transport vehicles.

  - Used lubricants and oil products-the change of oil will be done in a mechanical workshop and given to a licensed company for regeneration.

- Exhausted batteries will be sent to a licensed company for regeneration. The quantity of hazardous waste is minimal.

III.5. LANDS, SOILS AND HYDROGEOLOGY

III.5.1. LEZHA AND SHENGJIN AREAS

III.5.1.1. Geology

Lezha is situated in the northern corner of Lezha Plain, open at the west to the Adriatic Sea and surrounded by mountains at the north and at the east. This Plain constitutes the northernmost part of the big Tirana-Ishmi Depression. During the Quaternary period while this depression has undergone continuous sinking, the adjacent mountain areas are intensively raised. Particularly active this movement has been around the ancient Mati River delta area, which includes the Lezha Plain, also. Thick Quaternary, mainly alluvial deposits fill the Lezha Plain while high mountains consisting of Mesozoic and Paleogene formations border it to the north and to the east.

Quaternary deposits. It is believed that thick deposits filling the Lezha Plain known as undifferentiated are mostly alluvial deposits. In the upper part of the Quaternary deposits some marine and marsh deposits are developed.

Undifferentiated Quaternary Deposits - Q_4 are deposits of Mati River and less of Drini River. The deposits of Mati River consist of layers of more or less clean gravel, sandy gravel, sand and clay alternating in different sequences. The thickness of the Quaternary deposits all over the plain is more then 150 m, and reaching in maximum about 280 m, as can be seen in the geological cross-sections. Based on numerous existing wells, it appears that gravely deposits are widely distributed, at depth, in whole Lezha Plain.

Marsh deposits - Q_4kt, are developed mainly in the western, near Adriatic Sea area around the Kune-Vain lagoons, and less in central-eastern area of the Lezha Plain. They are represented of clays, clayey looms, clayey sands and fine sand. No special investigations are conducted on these deposits, but some preliminary data conform their maximal thickness to be about 3-4 m. At wide areas round the lagoons the marsh deposits at the surface are covered by a layer of salted soil thickness about 8-25 cm and maximal concentration up to 5 %.

Marine deposits - Q_4dt, are represented mainly of sand developed along the Adriatic Sea beach and are widely developed under the marsh deposits, also. As results by the wells record, maximal thickness of the sand deposits is about 25 m

Mesozoic and Paleogene Formations outcrop in the mountain area bordering Lezha Plain. They are represented of Jurassic and Cretaceous deposits represented mainly of limestone, and of Cretaceous - Paleogene deposits represented of rhythmic alternations of thin rock layers like shales, sandstone and limestone known with the local name Krasta Flysch.

III.5.1.2. Hydrogeology

On hydro geological point of view Lezha Plain represents the northern most sector of the big Tirana-Ishmi Artesian basin. In Figure 2 is shown the hydro geological Map of Lezha Plain and in Figure 3 are shown two hydro geological cross-sections.

The most permeable layers of the alluvial deposits of this plain, like gravel and sandy gravel, are saturated with fresh water and form a multi-layered artesian aquifer system. The cumulative thickness of the gravel layers, which form the most productive aquifer of the area, varies from about 50 to about 150 m for different sectors of Lezha Plain. There are four or five gravel aquifer

layers. The recharge of the aquifer system occur mainly by the infiltration of the surface water of Mati River in the southern part of the plain, and less by groundwater seepage from lateral outcrops of limestone rocks bordering the plain. Natural discharge of the aquifer system occurs toward the Adriatic Sea.

The gravely layers have in general distinctly high filtration properties; the transmissibility of the first gravely layer is usually varying from about 2000 m^2/day to more then 8000 m^2/day. According to the high transmissibility values of the aquifer, the specific capacities of the wells are high also. Most of the big diameter wells have specific capacity values from about 20 l/s/m to more then about 40 l/s/m and the maximal total capacity is about 150 l/s.

In the Hydrogeological Map (Fig. 2) are shown the most recent piezometric contours of Lezha Plain referred to the first and most important gravel aquifer layer. The groundwater in Lezha Palin is in confined conditions in practically over all the plain, with the only exception of the outlet areas of the Mati River. The original piezometric water level of the first gravely layer before any extraction (1962-1963) was around 4-5 m above ground level (g.l.). Today, after many years of continuous extraction for Lezha water supply system and uncontrolled free flowing of the about 80 wells, regional piezometric levels have stabilized around 1.5-2.5 m above g.l. showing a piezometric decline of 2.0-3.0 m.

As can be seen in cross-sections (Fig. 3), the gravely aquifer system is overlaid by a low permeable layer of clay, clayey sand and sand, about 30-40 m thick. This layer impede the hydraulic connection between the aquifer and the surface water and keep the pressure of the gravely aquifer's groundwater.

Many groundwater wells have been drilled in Lezha Plain, which mostly have result free flowing artesian wells. Some important big diameter wells are limited to the first aquifer layer only. Three big diameter wells located in Barbulloja well field (3.5-km south to Lezha) are used for Lezha city water supply. Ten big diameter wells have been drilled for irrigation of the Rila Plain, which occupies the central part of Lezha Plain. In the periphery of Merxhani and Vain lagoons some other free flowing wells have been drilled for "the local decrease of the salinity of the lagoons" as a measure to increase the fishing capacity of the lagoons.

Many chemical and bacteriological analyses have been performed, in the past, in a large number of wells. Summarizing the results of these analyses the following important considerations can be identified:

- In most of the Lezha Plain the groundwater quality is very good, it is in general low mineralised and low hard, excluding the north most sector of the plain (north to Lezha). The electrical conductivity values are varying usually about 250 to 500 μS/cm.
- The groundwater hardness in the central part of Lezha Plain is about 2-3 German degrees, which is distinctly lower then the hardness of recharge source water, that of Mati River with 10-12 German degrees. This is an indication of the intensive natural groundwater softening.

The total ground water resources of the Lezha Plain are very big; the calculated natural groundwater flow is about 2500 l/s. Present groundwater extractions from the existing wells, both pumped and free flowing, is about 800 l/s. The remaining quantity of the natural groundwater resources of about 1700 l/s is drained to the Adriatic Sea.

III.5.1.3. Topsoil description

The topsoil description is based on the field observation only and on scarce literature data. No special investigations (lithology logs and soil geotechnical analyses) were performed for the purpose. Soil surveys should be carried during the Final Design stage.The most wide spread types of topsoil of Lezha Plain are related to the genesis of the deposits as explained above in the paragraph of the geology. Some average representative data of main soil mechanical properties given below for every discussed soil types should be considered as a preliminary information. Their exact determination will be the object of future special filed and laboratory soil mechanical investigations.

- The topsoil types related to undifferentiated Quaternary deposits are more widespread. They are developed in most of the Lezha plain and even partially are developed also below the marsh deposits. They are represented mainly of clayey deposits like clay, silt clay and clayey sand. These deposits are characterized usually of a relatively low permeability, but have very different soil mechanic properties;

- The topsoil types related to Marsh deposits are developed around the existing lagoons. Their thickness is small, usually less then 1 m in the periphery of the lagoons and up to 4 m inside the lagoon areas. Litho logically the topsoil related to the lagoons is represented of fine-grained material like clay, clayey loom and clayey sand. The high salt content is a characteristic for these deposits, which has a negative influence on the geotechnical soil properties;

- The topsoil types related to the marine deposits are represented mainly of different size sands and are developed along the Adriatic Sea shoreline. In wide areas they are developed below the marsh deposits, also.

As a conclusion it is worth to mention two important issues related to the future Lezha/Shengjin wastewater treatment plant (CWT) and the groundwater:

The first issue concerns the depth of the first gravely aquifer from the ground surface. As described above in most of the Lazha Plain first gravely aquifer is tapped at depths from 25 m to more then 40 m. Such a thickness of the cover layer with it's already mentioned low permeability value is a good argument concerning the protection of the aquifer from the eventual surface pollution infiltration.

The second important issueto consider, is the soil water (or phreatic groundwater) level. On most of Lezha Plain the soil water level usually is at depths 1 to 2 m below ground surface, depending from the distance to the drainage channels widespread over all of the plain. A big pumping station located near the shoreline and pumping the water from the main drainage channel to the Sea maintains the low water level in the drainage channels. In case of non-proper function of the pumping station the water level in the drainage channel rises up and the water partially could inundate Lezha Plain.

III.5.2. DURRES

Durres is one of Albania's largest cities, located in the central part of the country's coastal zone. It has a current population of about 150,000.

A huge open drainage system has been constructed for the reclamation of the former marsh in the Durres Plain. The drainage system of the Durres Plain ends at a pumping station located at the northernmost edge of Durres Hills, in Porto Romano (see Figure 4). The pumping station dis-

charges the drained water into the Adriatic Sea. Should the pump station fail to operate, parts of the Durres plain would be flooded.

In Durres Plain there are two hotspots sites and two highly-polluted sites, which are shown in Fig. 4. The hotspot sites are former industrial facilities where hazardous waste is causing unacceptable human exposure requiring urgent risk reduction measures.

One hotspot is the chemical waste storage located approximately 10 km north to the centre of Durres City at the southeast foot of the Bishti Palles Cape (Figure 4). In this hotspot there are three storage buildings overloaded with chemicals like carbon disulfide, methanol, dimethyl amine, HCH residue etc.

The second hotspot is the chromate plant, the chromate dumpsite and the lindane at the former Durres chemical plant located about 6.5 north to the centre of the city of Durres and less then 1 km south of Porto Romano. The site is located on the Durres Plain, at the foot of Durres Hills (figure 4). The chromate waste was dumped between the former chemical plant and the drainage channels in a layer approximately 1.5-2 m high.

Two highly polluted areas represent the Industrial area of Durres located about 3 km east to the city centre, and the Han-house located about 5 km northeast to the city center. While most of the former industrial establishments currently are not functioning the Hen-hose is normally working.

III.5.2.1. Geology

Two geological structures, the Durres anticline and Spitalla syncline characterize the Durres area. The structures are separated by an active tectonic fault, making it the area with the highest seismological activity in Albania (see Figures 5, 6 and 7).

Durres anticline represents the hilly area from Durres at the south, to Porto Romano and Bishti Pales Cape at the north. Durres anticline is constructed of Neogene formations (Tortonian and Mesinian deposits) and of Pliocene deposits. Spitalla syncline is developed in the plain area of former Durres Marsh. The upper part of the syncline is filled up of Pliocene and Quaternary deposits.

Tortonian deposits - N_1^2t have only a small outcrop in Bishti Palles Cape and are represented of clay and sandstone.

Mesinian deposits - N_1^3 outcrop in the western part of Durres Hills, along the Adriatic Sea coast. They are represented of thick sandstone and conglomerate layers intercalated with clayey layers and gypsum.

Pliocene deposits are represented of two formations with the local names Helmesi and Rrogozhina. Helmesi Formation - N_2h, is represented mainly of clayey layers that outcrop in most of central part and of eastern slopes of Durres Hills. Rrogozhina Formation - N_2r is composed mainly of conglomerate and less of sandstone layers intercalated with clay layers. This formation outcrop only in the eastern hilly areas, in Rroshbulli Hills, but many hydro geological wells in the area of former Durres marsh area have tapped this formation below the Quaternary deposits. As can be seen in the cross-section (Figure 7), the uppermost conglomerate layer is tapped at the depth about 130 m, while the deepest one is taped at depth 240 m, below ground surface. The thickness of conglomerate layers vary from some meters up to 30-40 m. Clayey layers of varying thickness divide the conglomerate layers.

Quaternary deposits, are developed mainly in the plain area of Durres Plain, where they are placed above the Pliocene deposits of Rrogozhina Formation. These deposits are of different genesis; some of them are not differentiated, but marsh and marine deposits are developed, also.

Undifferentiated Quaternary Deposits - Q_4 mostly are fluvial deposits. They fill the eastern part of the plain area, while in the western part of plain (former Durres marsh) they are overlaid by marsh and marine deposits. The lower section of the Quaternary deposits is represented of intercalation of gravely and clayey layers. The upper section of the Quaternary deposits is represented of clayey loam, fine sand sandy clay deposits of fluvial and marsh origin. The total thickness of Quaternary deposits is about 100-130 m.

Marsh deposits - Q_4kt, are developed over all the surface of the former Durres Marsh area. Their maximal thickness in the centre of the former marsh is about 10-12 m, but on most of the remaining surface of this marsh it is less then 2.0 m. Litho logically this deposits are represented of clay and clayey loam.

Marine deposits - Q_4dt, are developed along the Porto Roman Beach and Lalzy Bay. They are represented of sandy deposits which maximal thickness is about 15-20 m.

III.5.2.2. Hydrogeology

Durres area in general, and Porto Romano - Bishti Pales Cape area particularly, have scarce water resource, both surface and groundwater resource. There is not any perennially flowing river in the studied area. The only surface water of the area is temporary flow of the drainage channels of Durres plain. As the elevation of this plain is low, its natural slope is not enough to create the flow to the Adriatic Sea. This caused the marshland before the construction of the drainage system the Durres plain. All the Durres Plain is drained by a deep central drainage channel located in the lower, middle part of this plain.

Considering the results of many drilled wells, the conglomerate layers of Rrogozhina Formation are identified as the most important aquifer layers of Durres area (Figure 7).

Most of the deep wells are artesian (free flowing), discharge about 0.5 to 2.0 l/s. The mean values of aquifer hydraulic properties and of wells are as follow: coefficient of permeability - 2.5 m/d, coefficient of transmissibility - 110 m^2/d, specific capacity of the wells - 0.6-0.8 l/s/m and the maximal capacity of the wells is about 10 l/s.

The water quality of Rrogozhina formation aquifer is not satisfactory. The water quality of most of artesian wells is in the limits of drinking water standards. The water is usually hard, the concentration of chloride and sodium are in the limit of acceptance and the concentration of iron usually is more then the limit of drinking water standard of 0.2 mg/l.

As can be seen in the cross-section (Figure 7), in the lower section of the Quaternary deposits of Durres plain there are encountered some gravely aquifer layers. As their water quality is poor the groundwater of Quaternary aquifer layers is not used for the water supply purposes.

Some thin delluvium deposits at hill slope contain small groundwater resources, they have a particular implication in the life of local population of new illegal houses constructed round the former Durres chemical factory. Innumerable dug wells were constructed for the exploitation of the small water resources of these deposits.

Due to the poor water quality the water resources of the Rrogozhina Formation aquifer are not used intensively. The local population is using only the free flowing wells for their water supply. Recently some attempts are made to use the Rrogozhina Formation groundwater for centralized water supply of the local population.

III.5.2.3. Topsoil description

As in the case of Lezha Plain the topsoil description of Durres area is based on the field observation only and on scarce literature data.

The most wide spread topsoil types of Durres Plain are the following:

- Marsh clayey loam's deposits;
- Marsh fine sand deposits;
- Marine sandy deposits.

Below are given some preliminary average data of the main mechanical properties for the different above mentioned soil type.

- Marsh clayey loam deposits are developed mostly in the central and in the southern part of the Durres Plain. Some important data about these deposits are collected by the geotechnical investigation wells drilled in the eastern periphery of Durres city. The registered maximal thickness of the marsh clayey loam deposits is about 12 m. The loamy deposits contain also sandy layers or lenses which thickness is usually not more then 2-3 m. These deposits are characterized of a very low permeability, low geotechnical properties;
- Marsh fine sand deposits are widely developed in the area of the former Durresi Marsh area. Usually they underlay the clayey loam deposits and their thickness usually is from about 2 to 8 m. They have high salt content and low geotechnical soil properties;
- The sandy marine deposits are developed along the Adriatic Sea shoreline and partially are developed below the marsh deposits. Their main soil mechanical properties are evaluated as below:

The relation of the future Durres CTW and the groundwater are favourable. The depth of the first gravely aquifer from the ground surface is more then 50 m and it is covered by very low permeable layers. At such conditions the aquifer layers are protected from the eventual surface pollution infiltration.

III.5.3. SARANDA

III.5.3.1. Geology

Saranda is the southernmost city of Albania and it is situated on mountain slope at the Ionian Sea. This low height mountain strip is prolonged from Saranda at the North to Ksamili coastal area at south. The width of this mountain strip varies from less of 1 km to 4 km, while it's highest peak is 232 m above sea level. East to Saranda Mountain strip is located Vurgu Plain bordering to the south the Butrinti Lagoon.

The climate of the area is typical Mediterranean, with dry and hot summers, and wet and mild winters. The mean annual temperature is 17.6°C. The average rainfall in Saranda Town meteorological station is 1509 mm/year, with an important precipitation period in winter (about 70%).

The main hydrological element of Saranda area is Bistrica River. Bistrica after joining the Kalasa River in the northern sector of Vurgu Plain, flows to the south and near Çuka village, about 3 km south to Saranda, through a man made channel, crosses the limestone mountain strip and discharges into the Ionian Sea. The mean annual discharge of Bistrica River is about 20 m3/s.

Geologically the Saranda mountain strip represents an anticline, which is mainly constructed of Cretaceous limestone formation. The Vurgu Plain and Butrinti Lagoon geologically represent a depression filled with the Paleogene, Neogene and Quaternary formations.

III.5.3.2. Hydrogeology

On the hydrogeological point of view, in Saranda area can be distinguished two main aquifers: limestone karst aquifer and gravelly porous aquifer.

The Saranda limestone mountain strip represents a karst aquifer, which due to the intensive fissuring and karstification has a distinctly high permeability. The intensive infiltrated precipitation in the limestone formations is short way discharged into the Ionian Sea without forming important springs.

Mainly Quaternary fluvial deposits, which maximal thickness is about 250 m) in the southern sector of the plain), fill up the Vurgu Plain. These deposits consist of alternated gravely and clayey layers. The transmissibility of the gravely layers is generally high to very high, particularly in the northern sector of the Vurgu Plain where it is about 8000 m^2/d. The yield of the wells varies from 10-20 l/s up to more then 100 l/s. Two wells total capacity 150 l/s located about 4-km northeast to Saranda, near Vrioni village, are used for the city water supply.

III.5.4. RISK FACTORS ON SOIL AND HYDROGEOLOGY

The following hydro-geological risk of water contamination on wastewater treatment system implementation have been identified:

- *Water body contamination from untreated water.* The CTW in Durres, Lezhe/Shengjin and Saranda are located in reclamation areas, with surface open drainage system and final pumping stations (hydrovore) discharges the drained water into the Adriatic sea. In case of non-proper function of the pumping stations the water level in the drainage channels rises up and the water could inundate the reclamation areas, where the WWTP's are located;
- *Aquifer contamination.* There is the risk of the aquifer pollution from untreated water surface infiltration.

The following Impact mitigation measures have to be included in the EMP:

- The WWTP's have to be protected against any flood events by a proper floods protection dykes;
- In order to avoid negative impact from the CTW on the ground water it is necessary to remove the top soil before starting civil works, and substitute it with an impervious clay liners. Monitoring of groundwater have to be included in the EMP.

III.6. FLORA AND FAUNA

III.6.1. DESCRIPTION OF HABITATS AND SPECIES

III.6.1.1. Kune-Vaini Natural Managed Reserve

Area of Kune–Vaini (including Kune, Merxhani, Kenalla, Vaini and Ceka) represents a wetland area of multiple ecological and economic values and uses, but faces several environmental and management problems.

For these reasons, Kune-Vain lagoon complex is included in the Biodiversity Strategy and Action Plan (BSAP) on the Representative Network of Protected Areas for Albania, with the identification of three zones, which reflect the naturalistic features of these areas and where specific management procedures can be set up.

However, the lack of a reliable and consistent management policy able to combine the recovery and conservation strategies of the existing natural resources with their exploitation in the frame of a sustainable development of all Lezhe district, is a major problem not conveniently tackled yet.

Ecological description of the Kune lagoon and Kenalla lake

The lagoon of Kune presents a very rich floristic and faunistic area. The vegetation is typical to coastal wetland areas. The main types of the vegetation are (i) aquatic, (ii) hydro-hygrophylic, (iii) halophyl (iv) psamophyl or sandy-dune vegetation *and* (v) forest vegetation.

- Aquatic vegetation is dominated by *Zoostera noltii* and *Ruppia cirrhosa. Z. noltii* is distributed more widely and gives tha main physionomy to the "Aquatic bed". *R. cirrhosa* is more developed in calm and shallow waters.
- Hydro-hygrophylic vegetation is dominated by plant comminities with the predominance of *Phragmites australis, Typha angustifolia and Scirpus maritimus.*
- Halophyl vegetation involves palnt communities addapted to high salt concentrations. Several communities with different dominance are identified : *Arthrocnemum*, *Juncus*, *Scirpus holoschoenus*, *Plantago crassifolia* etc
- Psamophyl or sandy-dune vegetation is usually located in the northern part of the complex and it is dominated by *Amophyla areanaria.*
- Forest vegatation covers nearly 10% of the total surface of the area. The more frequent communities are those typical riverine forests such as *Alnus glutinosa*, *Fraxinus angustifolia*, *Ulmus minor*, *Quercus robur*, *Populus alba* etc. Besides there are some other plant communites that cover small patches of the forest area including Mediterranean Pine species, scruby vegetation composed by *Tamarix* and *Salix* species.

In the different habitats (marine, estuarine, palustrine and riverine) are sheltered different vertebrates and non-vertebrates including mammals, birds, reptiles, amphibians, fish, mollusks and crustaceans.

The **diversity of the species** is higher compared with the other part of the ecosystem (Kune-Vain lagoon and Kenalla lake). The micro algae biomass level indicates high quantity of **phytoplankton** with a relatively great number of species). Some of the diatoms are determined Dinoflagellates are presented in few species .

The macrobenthos of this lagoon is characterized mainly by an intense growth of Annelids, Tubuliferae, Hydroids and *Carcinus aestuarii.*

The observation of fishery catches and hypoeutectic salinity gradient divide Kune lagoon in three main sub areas corresponding to **fish species** in these sub area (see Annex 10). The main fish specie are the eurohaline species: (*Sparus aurata*) gilthead seabream, *Dicentrarchus labrax*, Mugilidae spp., *Anguilla anguilla* etc.

The amphibian are represented mainly by *Rana lessonae, Hyla arborea, Rana dalmatina, Triturus cristatus, Triturus vulgaris, Rana balcanica* etc.

Different kinds of reptiles, usually threatened, can be mentioned, like Sea turtle *Caretta caretta* and Herman's tortoise *Testudo hermanni*, European Pond Terrapin *Emys orbicularis, Elaphe quatrolineata*, Viper *Viipera ammodytes* etc.

Also this area is rich of the **birds** as *Phalacrocorax carbo, Anas penelope, Fulica atra, Rallus aquaticus, Gallinula chloropus, Nycticorax nycticora, Ardeola ralloids* etc. Counts carried out during the last five years have stressed the ornithological importance of the area, especially on wintering waterbirds. Based on those figures, the area has been included in the list of Important Bird Areas for Albania.

Regarding the mammals the area registers as many as 40 species. The most common are *Pipistrellus pipistrellus, Mus musculus, Mustela nivalis, M. putorius, Vulpes vulpes* etc.

Ecological description of the Vain lagoon

The lagoon of Vain presents rich floristic and faunistic values. In the group of fauna are included: vertebrates (mammals, birds, reptiles, amphibian, fish) and non-vertebrates (mollusks, crustaceans).

The zooplankton was found on low quantity in general.

The lagoon of Vain has vegetation similar to the lagoon of Kune. More than half of the water surface is covered by flooded *Phragmites communis* beds with *Thypha latifolia*, the banks are composed of sedge communities, riparian woods of black alder galleries with *Alnus glutinopsa, Populus alba, Ulmus campestris, Fraxinus angustifolia, Salix alba* and *Quercus sp.* which are replaced over time by pine plantations. Maquis is composed mainly of: *Tamarix parviflora, Cornus mass, Juniperus macrocarpa, Rubus ulmifolium, Ruscus aculeatus;* the herbaceous vegetation of the marshland is characterized by *Cynadon dactylon, Dactylis glomerata, Agrostis sp., Phragmites communis, Juncus acutus, Salicornia fructicosa.*

The animal community is very much similar to Kune, the norhtern part of Drin delta

III.6.1.2. Rrushkulli-Erzeni River Outlet

The Rrushkulli-Erzeni River Outlet area is situated in Lalzi bay, the central part of the Adriatic coast of Albania, between Rodoni cape in the north and Bishti Palles cape in the south. It is boarded in the north and east by a hilly ridge (maximum height of 225 m), while in its south-east it continues with the drained fields of Qerreti and Durresi, formerly saltmarshes.

The catchments area of the Lalzi bay is estimated at about 250 km^2. Some parts of the area, close to the coast, are depressions reaching up to - 1.5 m.

They are kept dry by the actively pumping water through the pumping station near Hamalla village. The most of the area is occupied by the agricultural land, while the once well developed hygrophilic flood plain forest has almost disappeared; some small spots of it are still present only along the coastline north of Erzeni river mouth.

Sand dunes relatively well developed, halo-phyte and hygro–phyte vegetation, and a planted pine forest can be found in this area. Waterbird and waterfowl censuses of the last years have identified this area as an important IBA (over 10000 waterbirds and wetlands birds have been counted here). The Erzeni River Delta is important for migratory fish species breeding in freshwater. Posidonia meadows, *Posidonia oceanica*, and very well developed marine communities are found along the rocky littoral and Porto Romano Bay.

Besides different natural formations in this area, the results of the human's interference in the form of the embankment, the many draining canals and the artificial forests of the ones cultivated with pine alongside the coast and with poplars mainly along the flow of the Erzen river are present.

A small part of the area is protected : Rushkulli Nature Managed Reserve. Taking into account the complexity and ecological value of this area in the Biodiversity Strategy and action Plan (BSAP), approved by Government of Albania on the year 2000, the whole area is proposed for inclusion in the New Network of Contry's Protected Areas unde the category of Managed Nature Reserve.

Ecological description of the area

The area of Rrushkull-Erzeni River outlet is originated from the alluvial sediments of the Erzeni river, which meanders across the area.

The sub area Rrushkull–Hammalla lays in the Lalzi bay, from outlet (mouth) of Erzeni river in the South to the overflow of the Tarini stream in North and in the East in some cases, it lays for many kilometres, and it is limited from the agricultural land of the ex state agriculture farm Sukth (Hamallaj, Rrushkull, Jubë).

The terrestrial environment of this area presents these types of habitats: sand dunes, salt tolerant vegetation, flood plain and pine forests, and wetlands/marshlands. Sand dunes occupy a belt from 10 to 50 m in width along the entire coastline.

There are two main types of the dune vegetation: Plant community dominated by *Cakile maritima*, in the form of isolated spots, 4-5 m distant from each other, closer to the shoreline. Plant community dominated by *Elymus farctus*, on the well developed dunes, in which apart from the Dominant species, are present other species like; *Eryngium maritimum. Echinophora spinosa, Euphorbia paralias*, etc..

Salt tolerant vegetation is mainly present in the left hand side of the Erzeni river mouth. This type of vegetation is characterized by succulent plants like: *Arthrocnemum fruticosum, A. perenne, Salicornia europaea, Halimione portulacoides, Limonium vulgare, Inula crithmoides* etc.

The dominant species are *Pinus pinaster* and *P. halepensis*. This formation is generally not so dense and rather young.

The area contains also some rare and endangered plant species as: *Quercus robur, Fraxinus excelsior, Juniperus oxycedrus, Matthiola tricuspidata, Pancriatium maritimum, Quercus ilex, Adiantium capillus-veneris, Butomus umbellatus, Salix triandra.*

The coastal area presents the important fishing site for *Mugil sp., Liza sp., Dicentrachus labrax, Umbrina. cirrosa, Lichia amia, Sparus sp., Alosa phalax, Anguila anguila* and for crustaceans *Paeneus ceraturus* and for bivalves *Venus galina* and *Donax trunculus*.

The area is especially important for wintering waders and dabbling ducks. Among them is worth mentioning the presence of Golden Plover *Pluvialis squatarola*, European Curlew *Numenius arquata*, Little Stint *Calidris alpina*, Wigeon *Anas penelope*, Teal *Anas crecca* etc.

III.6.1.3. Butrinti lake and related Wetland environment

Butrinti lake and related costal area is one of the most important coastal wetland complexes of Albania. The main conservation value of Butrinti basin lies in the complex of habitats, which are

represented, and the degree to which these have remained undamaged by social development or habitat degradation. The basin supports species and communities of animal and plant that are globally rare or vulnerable. From the studies done results that Butrinti basin supports:

- 40 species of Mammals (57% of Albania), 15 of which are considered as Globally Threatened;
- 246 species of Birds (75% of Albania) with 13 Globally Threatened species;
- 35 species of Reptiles and Amphibians (69% of Albania) with 5 Globally Threatened species;
- 1500-2000 species of Insects (26% of Albania) with 2 species of Global Conservation Concern;
- 300 species of Fish (85 % of Albania);
- 800-900 species of Plants (26% of Albania) with 10 species of National Conservation Concern.

The phytoplankton population of the lagoon is abundant and mainly composed of diatoms *Cheatoceros sp., Cyclotella sp.* and Peridinates *Prorocentrum sp.* and *Peridinium sp.*. The accumulation of phanerogam *Zostera noltii* foliage is an indication of its extensive presence within the lagoon. Balanidae are very common among Crustacea and *Mytilus galloprovincialis* among Molluscs.

The birds seen in the area are: *Larus cachinnans, L. argentatus*, sparrows *Passer hispaniolensis, P. montanus* on the lake. While in marshland and the mudflats at the estuary are reported marsh harriers *Circus aeruginosus, Acrocephalus scirpaceus,* etc (see Annex 11).

Great concentrations of migratory birds occur in fall and winter, waders on the mudflats, saltern and in the estuary of the channel while Anatids assemble in large colonies on the lake during the coldest months. This area is also the richest of Albania for amphibians and reptiles. Otters have been recorded in the lagoon.

The vegetation of the area is rich and very diverse with 800-900 plant species. The different habitats identified include: woodland, Mediterranean maquis, dry pastures and freshwater and saltwater marshes.

Woodland. There is only a small area of dense woodland remaining at Butrint, located on the southern and eastern slopes of Sotires mountain and within the main archaeological site of *Buthrotum*. The woodland is characterised by a vertical structure composed of 3 vegetation levels were the main association is Elm *Ulmus minor – Ash Fraxinus angustifolia.* The dominant species are the Elm *Ulmus minor,* Ash *Fraxinus angustifolia,* Valonian Oak *Quercus robur* and White Poplar *Populus alba.* In specific cases, Laurel Tree *Laurus nobilis* and Holm *Quercus ilex* prevail over the other plants. The understorey varies from dense shrubby tree heath to an open herb.

Mile Mountain and the peninsula of Stillo are covered by sparse formations of Holm oak *Quercus ilex*, although the damages induced by successive burnings.

Mediterranean maquis. Mediterranean maquis is located mainly on the Ksamili peninsula (including the Ksamili islands) and in the hills to the southeast of Lake Butrint. It is dominated by the association of *Quercetea ilicis*. The most common species is *Quercus coccifera*, that covers 50 –60% of the total area. Other species present include *Q. ilex* (well preserved on Ksamili is-

lands), *Fraxinus ornus, Pistacia lentiscus, Phlomis fruticosa, Colutea arborescens, Phillyrea media* etc.

Dry pastures. Such areas occur mainly on the southern part of the complex, especially on the Vrina plain. The vegetation is adapted to high concentrations of salt, the continuous presence of water in winter, summer drought etc. The *Arthrocnemum* sp. followed by *Juncus* sp. and *Tamarix* sp. dominates the halophytic vegetation.

Freshwater marshes.Typical marsh vegetation is found in the northern part of Lake Butrint (northern reed beds) and in the western part of Lake Bufi. The dominant species are *Phragmites australis* followed by *Typha angustifolia*. Other species adapted to water are *Scirpus lacustris* and *S. maritimus*.

Saltmarshes.Saltmarshes occur as a narrow fringe along the south shore of lake butrint, at the mouth of vivari channel and river pavllo. the vegetation is dominated by glassworts with patches of tamarisk and sea aster.

The actual high species richness is explained by the high diversity of natural and artificial habitats such as seawaters, seashore, rocky islands, river, coastal wetlands, reed beds, forest, rocky areas and agriculture land. All those natural values make Butrinti an area of high ecotouristic possibilities and the development of ecotourism is the best way for a sustainable use of those resources. Despite its current natural (biological and landscape) richness, the area has been and still is seriously threatened by the drainage of large parts of its wetlands (1100 ha were already lost in the 1960s) and the continuous presence of overgrazing, logging illegal hunting and fishing, over development of aquaculture, uncontrolled tourism and human disturbance.

The Butrinti Lake area is defined on the Biodiversity Strategy and Action Plan (BSAP) on the Representative Network of Protected Areas for Albania with two zones. In according to the BSAP the proposed protected area **Çuka Channel – Ksamili Bay and Islands** would be managed mainly for landscape/seascape protection and recreation, the aim would be to maintain the natural conditions of the landscapes, to protect the biological diversity and to sustain the harmonious interaction of the men with this environment. This area includes terrestrial and marine areas, which are public or private property where varies activities, such agriculture, fishing and forestry are undertaken and also the next constructed wetland will respect this environment, being as integral part of this area. Regarding proposed protected area **Butrinti Lake** and its Surroundings would be managed mainly for the sustainable use of the natural resources of this area.

At last but not the least Butrint has been declared recenty a Ramsar Site for Albania. Its inclusion was based on several characteristics such as the high biodiveristy values, the very high number of Globally Threatened Species, the unique coexistance between natuyre and histroy etc.

General situation

In addition to the loss of large wetlands part by land reclamation in the past, the quality of environment of the three areas continues to deteriorate and the main problems consist:

- The lack of an integrated, sustainable management strategy based in multiple use and conservation of the natural resources of the area,
- illegal excessive cutting of trees for fuel or forest degradation,
- the input of the polluted river (contaminated mainly by sewage disposed upstream) especially for Erzeni,
- the uncontrolling (ill,gal) hunting, and illegal fishing (fishing with dynamite)

- very high levels of human disturbance.

III.6.2. CHARACTERISTICS OF THE SITUATION OF THREATENED SPECIES

The presence of endangered species in the project area has been considered as indicator of the richness of the ecosystems in terms of biodiversity and an objective criteria to evaluate the significance of an ecosystem at global level. UICN, the World Conservation Unit has prepared lists of the endangered species (with particular reference to the vertebrates), providing an opportune ranking, considering the rarity and the threats -Source Red Data Book IUCN, 1996).

Table III.6–List of the categories prepared by IUCN for the threatened species

Category and acronym	Notes
Extinct – EX	Not utilised in this work
Extinct in the wild – EW	Not utilised in this work
Critically Endangered – CR	A species is considered CR when the risk of extinction is very high in the immediate future
Endangered – EN	A species is considered CR when the risk of extinction is very high in the next future
Vulnerable – VU	A species is considered VU when the risk of extinction is high at medium term
Lower risk – LR	A species is considered LR when its conservation status presents some risk
Data deficient – DD	Not utilised in this work
Not evaluated – NE	Not utilised in this work

A project addressed to the improvement of water quality will provide a positive impact at global level in case of presence of an endangered species (categories CR, EN, VU) taking into account that water quality represents one of the key factors on the survival of the endangered species in the water habitats.

This evaluation process has been implemented utilising birds, reptiles and mammalians as indicator species, considering the lack of data availability for other vertebrates and their significance as indicators (key species). Appendix A provides the list of endangered species for each ecosystem, Appendix B the evaluation of each considered ecosystem.

Table III.7–List of endangered species observed in the project areas

Insects

1. *Cerambyx cerdo* – VU (vulnerable)
2. *Lycaena dispar* – LRnt (Lesser Risk nearly threatened)

Amphibians

1. *Triturus cristatus* – LRcd (Lesser Risk conservation dependent)
2. *Hyla arborea* - LRnt

Reptiles

1. *Caretta caretta* – EN (Endangered)
2. *Dermochelys coriacea* - EN
3. *Testudo marginata* – LRlc (Lesser Risk less concern)
4. *Testudo hermani* - LRnt
5. *Emys orbicularis* - LRnt
6. *Elaphe situla* – DD (Data Deficient)

Birds

1. *Phalacrocorax pygmeus* - LRnt
2. *Pelecanus crispus* – VU
3. *Aythya nyroca* - VU
4. *Oxyura leucocephala* - VU
5. *Haliaeetus albicilla* - VU
6. *Aquila clanga* - VU
7. *Falco naumanni* – VU
8. *Circus macrourus* - LRnt
8. *Gallinago media* - LRnt
9. *Numenius tenuirostris* – CR (Critically Endangered)

Mammals

1. *Rhinolophus blasii* – LRnt
2. *Rhinolophus euryale* – VU
3. *Rhinolophus ferrumequinum* – LRcd
4. *Miniopterus schreibersi* – LRnt
5. *Myotis capaccinii* - VU
6. *Myotis emarginatus* - VU
7. *Myotis myotis* – LRnt
8. *Sciurus vulgaris* - LRnt
9. *Glis glis* – LRnt
10. *Microtus (Pitymys) felteni* – LRnt
11. *Microtus thomasi* – LRnt
12. *Mus spicilegus (abbotti)* – LRnt
13. *Canis lupus* –VU
14. *Lutra lutra* - VU
14. *Monachus monachus* – CR
15. *Stenella coeruleoalba* – LRcd
16.

III.6.3. RISK FACTORS ON FLORA AND FAUNA

The constructed wetlands represent a new natural habitat for flora and fauna and therefore increase the biodiversity of the area, with a potential increasing of the protection for endangered species and animals. Also, they represent a buffer zone for the natural wetlands in their proximity.

The CTW construction phase have a potential negative impacts on biodiversity, habitats and rare species. It is possible for the construction work to affect certain rare species particularly by disturbance during the breeding period.

The Environmental Management Plan will include a comprehensive monitoring program for potential dangers to the ecosystem, and environmental management guidelines for contractors with good construction practices to prevent, minimize or mitigate environmental damage.

III.7. CULTURAL PROPERTY

No impact on any cultural property is expected in the sites selected for the project implementation.

The Environmental Management Plan and the Construction contract(s) will include appropriate instructions regarding cultural properties and their preservation measures. Before the construction government's attention have to be drawn specifically to that aspects and appropriate agencies, NGO's or university departments have to be consulted. During construction activities the Supervision of works will verify that these measures are being implemented.

III.8. HEALTH RISK

III.8.1. MOSQUITOES AND THEIR CONSEQUENCES

The mosquitoes from the *Anopheles* genus transmit the four types of plasmodia, which are the causative agents of human malaria. They are *Plasmodium vivax, P. malariae, P. ovale, and P. falciparum* and cause the tertian, the quartan, the atypical tertian, and the tropical malaria respectively. Eight types of malaria transmitting mosquitoes were registered in Albania.

The species composition of mosquitoes will not change following the construction of the CTW's. Mosquitoes (included which could be potential transmitters of malaria plasmodia) are encountered within the project area in great numbers even now.

Neither of the situations aforesaid does depend on the surface area of the recovered marshlands, nor will be facilitated by the activities related to the construction of the CTW. **The recovery of the CTWs will not increase the risk of malaria under any circumstances.**

A mosquito control methodology have to be identified by the Consultant during the Final Design stage and included in the EMP. The actions for mosquitoes control, should be coordinated with the Ministry of Health authorities.

The following **mitigation measures** have been included in the EMP and will be considered during the Final Design stage.

Depth of water. The mosquito larvae do not like deep water. As a general rule, larvae are rarely found in open water deeper than 30-40 cm. Than the CTW water level have to be > 50-60 cm;

Vegetation around Margin. Mosquitos larvae will use vegetaion growing out of or into water for shelter from predators. The ideal to minimise mosquito colonisation is to have bare margin all oround the CTW not less than 20/30 m;

Slope of Bank. In keeping with the aim of having as much deep water possible, the slope of the bank under the water margins sholud be steep, preferably grater than 30° or 3/1 (horzontal to vertical).

*Presence of Mosquito predators.*Mosquito larvae are good source of food for fish and a variety of insects such as dragonfly, damselfy and mayfly mymphs and water beetle adults and larvae;

Mosquito control agents. There are products for mosquito control which are environmentally sound. These products include: Bti, which is a fermentation product of the bacteria *Bacillus thuringiensis var israelensis; s-Methoprene. Bti, a growth regulator.*

The above actions for mosquitoes control (i.e. Introduction of mosquito predators, or use *Mosquito control agents)* , have should be coordinated with the Ministry of Health authorities.

III.8.2. ODOURS RISK

Odours emanating from wetlands are likely to occur when waters begin to stagnate.Two types of odour can be generated:

- Chemical odour from the formation of gases as a result of organic decomposition;
- Decomposition of certain *cyanobacteria.*

A constructed wetland that is well designed, operated and maintained should not pose a significant oudors risk; The *cyanobacteria* have a strong odour upon decomposition and this can be avoided by maintaining the wetland in operational condition.

A oudors control methodology have to be identified by the Consultant during the Final Design stage and included in the EMP.

The following **mitigation measures** have been included in the EMP and will be considered during the Final Design stage:

- Buffer zone all around the CTW plant of not less than 40 m wide;
- Sustain constant operational condition of the CTW to reduce the impact of *cyanobacteria* decomposition.

In order to ensure the proper operation of the facility and minimize odor risk the Operation & Maintenace outline of the CTWs are included in **Annex 6**. The above mentioned outline will further detailed during the final design stage.

III.8.3. HEALTH RISK FOR THE LIVESTOCK

The health risk for the livestock from the construction of the CTW's is practically zero.

III.8.4. HEALTH RISK FACTORS DURING THE BUILDING PROCESS

During the realization of the building projects:

- Atmospheric air and working environmental pollution with increased concentrations, dust and other building materials with a marked effect upon the upper respiratory system, the eyes, and the skin;
- Exhaust-pipe gases and end-products from the destruction of motor lubricating oils of the building machines;
- Additional noise loading;
- Risk of accidents and damages;
- Inappropriate stocking of building materials.

It is necessary to abide to the instructions for safety of work and to keep strictly the technological and labor discipline in order to avoid the risk for human health.

IV. ANALYSIS OF THE ALTERNATIVES WITH REGARD TO THEIR EFFECT ON THE ENVIRONMENT, ANALYSIS OF THE "NO PROJECT" ALTERNATIVE INCLUDED.

IV.1. ZERO ALTERNATIVE

The zero alternative of no project will increase the risks of public health degradation; decrease of high biodiversity values, and decline of local economy.

(i) Health risks

Up to now, Albania has no waste water treatment and all the waste waters usually are poured in channels and from there they go to rivers or directly to the sea. As described above, the waste waters of Lezh go through channels to river Drin and from there to the sea. In Durres the wastewaters go directly to the sea at the location of Porto Romano as well as in other points near to the tourist resorts. In Saranda the waste waters use to pour in the sea just in front of Saranda. A new project under progress aims to send the waters in Cuka channel, the channel that is also the outlet of River Bistrica.

All the three areas are intensively used by tourist activities and it is obvious that the nearby presence of waste waters might cause several health problems. Unfortunately there is no persistent monitoring of water quality in the three sites. Nevertheless, specialists believe that the waters have a very high microbial content.

(ii) Degradation of biodiversity values

Untreated wastewaters are rich in organic compounds that would increase the eutrophication of water levels. Eutrophication is the process by which waters gradually age and become more productive. Humans, through their various cultural activities, have greatly accelerated this process. Cultural or anthropogenic "**eutrophication**" is water pollution caused by excessive plant nutrients (primarily phosphorus, nitrogen, and carbon). Runoff from agricultural fields, field lots, urban lawns, and golf courses is one source of these nutrients. Untreated domestic sewage is another major source. Sewage is a particular source of phosphorus to waters when detergents contained large amounts of phosphates. The phosphates acted as water softeners to improve the cleaning action, but they also proved to be powerful stimulants to algal growth when they were washed or flushed into lakes. The excessive growth, or"blooms", of algae promoted by these phosphates changes the water quality. These algae cloud the water making it difficult for larger submerged aquatic vegetation (SAV) to get enough light. The SAV may dieback reducing available habitat of aquatic animals. When the algae themselves eventually die they decompose. During decomposition dissolved oxygen is removed from the water. Lowered oxygen levels make it difficult for other aquatic organisms to survive. Usually the algal blooms lead to oxygen depletion and resultant fish and other animals kills. Beaches and shorelines are in such cases fouled by masses of rotting, stinking blue green "algae" (Cyanophytes or Cyanobacteria).

(iii) Degradation of local economy

When eutrophication becomes a problem beaches and shorelines are in such cases fouled by masses of rotting, stinking blue green "algae" (Cyanophytes or Cyanobacteria). It is obvious that tourist, the basis of the local economy, will try to avoid such places

Furthermore there is no serious plans for the economic use of lands occupied by the proposed treatment system. The CTW lands wetlands cannot be used for sustainable agricultural practices due to the soil salinity. Only limited grazing is possible (extensive livestock breeding) and ex-

traction of reed and wood, which would not have a significant socio-economic effect for the local population. At present these areas are not being used for these purpose.

In conclusion, the zero alternative would cause restriction of any large investment in the areas (i.e. tourism, base infrastructure), with the related high indirect economic impacts. Such CTW project would lead to rejuvenation of the area, creation of new jobs, supporting of and initialisation of sustainable economic practices.

IV.2. CTW ALTERNATIVES TECHNOLOGIES

A analysis was conducted by the Consultant of several technical alternative to realize the construction of a low cost ecologically based wastewater treatment system. The following "natural" treatment solution has been evaluated and compared: Free Water Surface type (FWS), Subsurface Flow type (SFS), and VFS (Vegetated filter strips)

Tab.IV.1 summarizes the different types and characteristics of constructed vegetated natural pollution defence means, considered to achieve both the water treatment and biodiversity goals in the project locations.

Tab.IV.1-"Natural "wastewater treatment systems multicriteria analysis"

	Wetland-FWS type *(Free water surface)*	**Wetland-SFS type** *(Subsurface flow)*	**VFS** *(Vegetated filter strips)*
Application	Municipal sewage: Secondary and/or AWT	Municipal sewage: Secondary or AWT	Agricultural area: Nutrients and pesticide NPS pollution
Performances	TSS good, BOD good, FC very good, N fairly good, P limited	TSS very good, BOD good, FC very good, N good, P limited	Partial protection, reducing eutrophication risk
% removal	TSS 80% BOD 80% FC >95% N 65-70% P 50%	TSS 80-90% BOD 70-80% FC >95% N 70% P 50%	Not quantifiable, only for NPSP
Increment of Biodiversity	Strong contribution to habitat and biological diversity	Insignificant	Little significance, but riparian and shoreline protection
Need of Area	High	High	Fixed amount of surface
Specific area	2-3 m^2/Inhab.Eq	3-5 m^2/ Inhab.Eq.	-
Impacts	Mosquitoes and rodents, potential health risk	None	None
Cost	Medium	High (30-40% more than FWS)	Low

According the results of the multicriteria analysis, by comparing pollution abatement and habitat diversity effects against land surface occupation and potential impacts, the Free Water Surface type (FWS), has been selected for all the coastal cities included in the project. The FWS method has been selected for the following considerations:

- Less cost of construction and management than SFS;
- Require less area extension, and this aspect is fundamental for project coastal cities of Durres, Lezhe and Saranda, where the availability of undeveloped land is limited;

- More increasing of biodiversity than SFS (SFS not increase at all the biodiversity);
- Less problem of management due to the suspended solid concentration: the SFS type need of a continuous control due to the risk of blocked.

IV.3. CTW ALTERNATIVES LOCATIONS

The wastewater treatment plant (WWTP) alternatives location have been studied according the following considerations:

- adequacy of the site to accommodate present and future needs and absence of physical constraints;
- proximity to available sites for discharging treated wastewater and/or effluent re-use system;
- optimisation of pumping requirements;
- unused and public state owned lands for the proposed sites (according cadaster maps all the WWTP alternative have been located in Public State property) ;
- not proximity to town and people.

As stated in the previous chapters the coastal cities of Durres, Lezhe, Saranda and Shengjin do not have any wastewater treatment facilities. This causes a major public health risk and pollution of aquatic environment. The implementation of WWTP's has therefore high priority in all the above mentioned municipalities. The WWTP's description of the alternative locations for each coastal cities are fully described in the following Tab.IV.2.

Tab.IV.2-CTW's Alternative locations

Coastal cities	Alt. N°	Alternative description
Durres		Two main alternatives for CTW's locations have been identified both in the Durres former marshland:
	1	• Located in the former large fish ponds plant close to the new urbanization area;
	2	• Located in the Porta Romana area close to the sea shore of Lalzit bay, at 8 km from the new urbanization area of Durres
Lezhe		The main critical factor influencing the alternatives identification is the lack of available area for the CTW. Three main alternatives for CTW's locations have been identified:
	1	• Located in "Ishulli I Sengjinit" near the Merxhani Lagoon. The area is free from civil settlements and moreover the agriculture activity is not exploited, due to the high salinity content of the soil;
	2	• Located in Ishulli I Sengjinit on the right left of the active channel of Drinit river, between the new Tirana/Lezhe road under construction and Drinit out-let in the sea;
	3	• Located in "Ishulli I Lezhes" downstream of the Lehze town on the left of the active channel of Drinit river;
	4	• Located in "Ishulli I Sengjinit" near the Merxhani Lagoon. The area is free from civil settlements and moreover there is no agriculture activity.
Saranda		Three main alternatives for CTW's locations have been identified:
	1	• Located on the right bank of Cuka Channel, between the river bed and Cuka town;
	2	• Located on the left bank of the Cuka Channel, between the river and the existing protection dike;
	3	• Located on the left bank of the Cuka beyond the existing river protection dike.
	4	• Located on the left bank of the Cuka beyond the existing river protection dike closer to the Butrinti Lake border.

A multicriterial analysis was conducted of several alternative to the proposed WWTP locations for the three project areas, including the no-WWTP construction alternative. The no-construction alternative was found to be nonviable from the health risk and environmental point of view.

The multicriterial analysis was conducted taking into account the following issues: environmental impacts, project costs, local conditions, institutional, training and monitoring requirements, hydro geological and health risks.

In particular the **environmental impacts** have been considered in terms of:

- improvement/decrease of water quality;
- pollution of waterbed;
- soil contamination associated with the production of constructed wetland sludge's;
- lost of natural habitats, of endangered and migrant species.

The **project costs** include the capital costs (associated with the constructed wetland building) and the operating costs (associated with the constructed wetland management).

For the **Local conditions,** particular attention has been paid both to the availability of Public land where to realise the constructed wetlands and a preliminary opinion of the local stakeholders. For the availability Public State land property two conditions have been identified by the Consultant: (i) completed State Property, (ii) State Property rented by a private operator.
Subsequently, a Public Consultation Process, including workshops sessions, were held under the auspices of Municipality interested on the project. Institutional authorities local stakeholders, social groups, representatives, NGO's and other associations were included in the consultation process. The Public Consultation Process results are summarized in following chap.VIII.

Covering the **Institutional requirements**, we have examined the availability of local authorities to release the authorisation for the wetland works.

The **Training requirements** concern the needs of the Albanian personnel (managers and workers) to be trained in order to optimise the management of the constructed wetlands. The **Monitoring requirements** focus on the suitability to implement monitoring systems in order to evaluate continuously the performance of the constructed wetlands to improve the water quality.

Finally the consultant has evaluated the risks in terms of **human health** (associated with the presence of not treated wastewater close human settlements) and of **hydro-geological threats** associated with floods.

IV.4. PROJECT ALTERNATIVES SELECTION

The "*Environmental and Socio-Economic Quality Index (QI)*" for each proposed alternative location have been evaluated according the multi-criteria issues (see Annex 3). In order to optimise the allocation of resources particular attention should be paid to the very high value of the quality index (IQ) for Alternative 2 and 1 in *Durres*, which reflect the relevance of the project intervention in terms of public health and environment (see Annex 3 Tab.3.7). The Alternative 1 seems to be the more opportune to realize taking into consideration the fully land State ownership and lack of use. The Quality Index presents also very high values Alternative 3 and 4 in *Saranda*, taking into account the relevance of the health and environmental context (in the Ionian sea, between Corfu and Saranda cost, lives a small population of monk seal, an endangered spe-

cies): the Alternative 4 seems to be the more opportune to realize taking into consideration the fully land State ownership and lack of use. Alternatives 2 and 4 in *Lezhe/Shengjin* should be implemented, but the relevance of intervention in terms of public health and environment is not comparable with the Durres and Saranda projects. The Alternative 4 seems to be the more opportune to realise taking into consideration the fully land State ownership and lack of use.

Table IV.3 highlights the best alternatives for each intervention area and reports also the practicable/not practicable alternatives taking into account the *Environmental and Socio-Economic Quality Index (QI)"* values (see Annex 3 table 3.7).

Table IV.3–Selection of the best alternatives

Area	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 0
Durres	**To be selected**	Praticable	N/A		No practicable
Lezhe/Shengjin	Praticable	Praticable	No practicable	**To be selected**	No practicable
Saranda	No practicable	Practicable	Praticable	**To be selected**	No practicable

According the results of the EIA the followings alternative has been selected.

Durres: the EIA support the idea to locate the WWTP in the former fish ponds area, as provided in **Alternative 1**.

Lezhe/Shnegjin: the EIA support the idea to locate the WWTP, as is provided for in **Alternative 4**.

Saranda: The EIA support the idea to locate the WWTP in the Saranda area, as provided in **Alternative 4**.

IV.5. MEASURES FOR WWTP CONSTRUCTION

The engineering Final Design and the execution plants of the different construction works must be well considered in relation to the already existing engineering infrastructure-canals, dykes, pumping stations, roads, existing buildings, drained areas and their farming, as well as the interests of the local population and different organizations.

The Lezhe WWTP areas is interested by the Drint flood. The WWTP have to be protected by a protection, to avoid the plant embankment overtopping and Drint water contamination by untreated water.

Areas allotted for the WWTP construction need to be cleaned and purified from household and construction waste - sections polluted with pesticides, fertilizers, petroleum products, vegetation material, etc.

Cleaning of the canals remaining in operation during the new developments from precipitation and dead organic material.

It is also necessary that before launching of construction works and flooding, the humus layer of the vegetation areas be removed, and preserved for later farming needs.

V. MONITORING PROPOSAL

The Ministry of Environment (MoE) is a competent authority in the management and monitoring of the actions aimed at environment protection–legislation, strategies, policy, international projects and programs, monitoring and supervision, regulation of the activity in the private and state sector.

Regional Inspections of Environment gather information and perform supervisory functions in relation to the requirements of ecological legislation/laws for the different environment components.

A monitoring program is already included in the Project Budget. In **Annex 5** MoE Strengthening monitoring and enforcement capacity programme is attached.

An CTW Operation & Maintenance and Monitoring plan will be detailed by Consultant during the Final Design stage. The O&M plan will describes the procedures for operation and ongoing maintenance and monitoring actions to ensure the wetland and the associated facilities perform to an acceptable standard, and the design objectives are met. To ensure the satisfactory functioning and the sustainability of the wetland system some basic monitoring actions have to be included by the Consultant in the O&M and Monitoring plan. The principles of the CTW O&M and Monitoring plan are suggested in **Annex 6.**

V.1. AIR

Harmful emissions over the emission limit values are not expected for said area. It is important that after realization of the sites the possibility for monitoring concerning the air component be considered more precisely and profoundly, although no negative impact of the sites on this component is expected.

V.2. WATER

The wetlands will be flooded to a certain quota. This entails measuring and supervision of:

- quotas of the water level at certain locations within the wetlands;
- inflow quantity of water to the WWTP;
- outflow from the WWTP.

Measurement locations will be determined according to the alternative chosen.

Introduction of auto-monitoring in relation to the quality of the waters when entering and exiting the wetlands. A water analysis program connected to the biogenetic elements, and registering of the degree of reduction and catchments in the wetlands.

At a permanent inflow a short-term monitoring should be performed of the indices: water quantity, temperature, electric conductivity, pH, BPK_5, HPK, HB, total nitrogen, including ammonium, nitrate, and organic; total phosphorus, including soluble phosphates.

In rare case of pollution signals monitoring of the specific indices: metal ions, petroleum products, etc.

In case of still water, a monthly registering of the indices for organic pollution and biogenic elements and sulphides content (hydrogen sulphide).

Annual examination of the river bed alluvia/mantles.

Introduction of a hydro biological monitoring.

Use of the data from the national monitoring stations.

V.3. EFFLUENT WATER QUALITY

The monitoring of effluent quality and compliance with Albanian Standards are the responsibility of MoE. At present, no detailed legislation on specific standards for domestic sewage discharges into surface waters has been enacted yet in Albania, but a "Wastewater Quality Law" is under discussion on Parliament. Therefore only international regulations and limits for the typical wastewater concentrations to be attained, will be taken into account for comparisons. In the Tab. V.1 and V.2 a summary of international best practices (directives) related to urban domestic discharges in surface waters are shown. The adoption of international best practices sewage limits are recommended.

Tab.V.1- International Best Practices Environmental Guidelines-Domestic sewage limits (summary)

Pollutant Parameter	Limit (mg/l)
Biochemical oxygen demand BOD_5 (mg/l)	50
Chemical oxygen demand COD (mg/l)	250
Phosphorous (mg/l)	2.0
Total suspended solids TSS (mg/l)	50
Oil and grease	10
Heavy metals, total	10
Ammonia	10
PH	6-9
Coliforms	Less than 400 NPN/100ml (NPN-Most Probable number)

V.2-EC Requirements for urban discharges in surface waters (summary)

Pollutant Parameter	Limit (mg/l)	Sensitive waters
Biochemical oxygen demand BOD_5 (mg/l)	< 25	< 25
Total suspended solids TSS (mg/l)	<35	<35
Total Phosphorous (mg/l)	No general requirement	<2 mg/l for 10-10,000 pe <1 mg/l for >100,000 pe
Total N	No general requirement	<15 mg/l for 10-10,000 pe <10 mg/l for >100,000 pe

The compliance monitoring should characterise the quality of the effluent well enough to evaluate its likely impact on the receiving water. Situations will vary but compliance monitoring should at least determine seasonal variations in the concentration of: *BOD, suspended solids, dissolved oxygen, temperature, electrical conductivity, pH, total nitrogen, total phosphorus, and same indicator measure of pathogens(Ecoli), Flow, ammonium, filterable reactive phosphorus and nitrate* monitoring may also be required.

V.4. FLORA AND FAUNA

It is important to choose such species whose population status has been followed for the last 10-15 years at the least. Such species are:

- Aquatic Mollusks
- Birds–*Chlidonias hybridus*, *Tachybaptus ruficollis*, *Fulica atra*, *Ixobrichus minutus*, *Botaurus stellaris* and *Aythya nyroca.*
- Mammals–Lutra (Lutra lutra),
- Amphibians–Several species of Green Frogs
- medical leech, some species dragonfly, zooplankton;
- Plants–White Water Lily *Nymphaea alba* and Yellow Water Lily *Trapa natans,* Common reed *Phragmites communis.*

The species are selected in such a way as to cover the largest possible number of biotopes in the WWTP sites.

We suggest that monitoring should comprise of two phases: an initial stage of inventory, before beginning of activity for construction and monitoring of changes in the ichthyofauna state during activity performance.

Here monitoring is flexible and performed within short terms, and is closely connected with the activities carried out. In case of activity, which could cause fast changes in the environment, the impact of which is unknown, monitoring is carried out parallel to them, and the moment any negative impact is registered, they are terminated, and new alternatives must be looked for. In case of activity with negligible impact, monitoring is performed three times a month during the active season and once a month during winter.

V.5. MONITORING RESPONSIBILITIES

Monitoring Items	Ministry of Environment	Water Company
Air	MoA Regional Inspector	
Water (in/out-flow)	Included in the WWTP Operation & Maintenance Manual (**Annex 6**).	Included in the WWTP Operation & Maintenance Manual (**Annex 6**).
Effluent quality	Included in the WWTP Operation & Maintenance Manual (**Annex 6**).Carried out by the Water Company and reviewed by the Ministry of Environment	
Flora & Fauna	MoA Regional Inspector	

VI. CONCLUSIONS REGARDING THE ENVIRONMENTAL IMPACT ASSESSMENT

1. **Hydro-geological risk**. (i) water body contamination for potential flooding caused by lack of proper functioning of existing surface drainage system; (ii) risk of the aquifer pollution from untreated water surface infiltration, (iii) risk of sludge disposal contamination.

Impact mitigation measures: (i) the CTW have to be protected by a flood protection dyke; (ii) removal of top soil before starting civil works, and substitute it with an impervious clay liners to avoid negative impact on the ground water;(iii) procedures for sludge removal and disposal will be included in the Environmental Management Plan (EMP).

2. **Impacts of the construction phase on biodiversity, habitats and rare species**. It is possible for the construction work to affect certain rare species particularly by disturbance during the breeding period.

Impact mitigation measures: (i) An Environmental Management Plan (EMP), including monitoring program for potential dangers to the ecosystem, and environmental management guidelines for contractors with good construction practices to prevent, minimize or mitigate environmental damage is attached in Table VI.2

3. **Health risk–increased population of mosquitoes**. Although no significant increase in mosquitoes in the three areas is expected. There is a very low risk of malaria.

Impact mitigation measures: (i) Elaboration of a mosquito management plans for the three areas using a combination of biological and chemical control measures as described in chapter III 8.1; (ii)-creation all around the WWTP sites a buffer zone wide not less than 40 m, with 30/20 m of bare strips and close to the WWTP fence a tree belts 5/10 m wide with autochthonous tree species plantation. (iii) Sustain constant operational condition of the CTW according the O&M CTW plan and monitoring attached in Annex 6.

4. Social risk associated to odours emanating from wetlands when water begin to stagnate.

Impact mitigation measures: (i) Elaboration of a odours plans for the three areas using a proper water control measures to avoid the purification process as described in chapter III 8.2. (ii)-creation all around the WWTP sites a buffer zone wide not less than 40 m; (iii) Sustain constant operational condition of the CTW according the O&M CTW plan and monitoring attached in Annex 6.

5. Impact of the silt clay or clayey sand material extraction for CTW embankments or deposition of excavation spoils.

Impact mitigation measures: (i) An Environmental Management Plan (EMP) will be prepared prior to appraisal , including a comprehensive guidelines for contractors with good construction practices to prevent, minimize or mitigate environmental damage. These requirements will be enforced by the Supervision of Works during construction.

Table VI.1:Significant (or Potentially Significant) Issues for CTW construction

Issue	Location	Impact Description	Mitigation Measure
1. Hydro-geological risk	Durres, Lezhe, Saranda	It is possible the water body contamination from untreated water or from the WWTP sludge removal and disposal.	1
2. Impacts of the construction phase on biodiversity, habitats and rare species	Durres, Lezhe, Saranda	It is possible for the construction work to affect certain rare species particularly by disturbance during the breeding period.	2
3. Health risk	Durres, Lezhe, Saranda	No significant increase of the number of mosquitoes is expected after the WWTP construction. The risk of malaria is practically non-existent.	3
4. Risk of odours	Durres, Lezhe, Saranda	We consider the risk of negative impact of the odours emanating stagnate waters.	4
5. Impact of the deposition of excavation spoils	Durres, Lezhe, Saranda	In all cases there will be excess soil, organic matter, construction waste etc., requiring removal from the wetlands and disposal.	5

Table VI.2 Environnemental Management Plan

#	Mitigation Measure	Phase	Institutional Responsibility	Cost (USD)
1.1	Elaboration of a manual for sustainable management of the water regimes in the wetlands, such as procedures in the event of accidental pollution, flood, sharp changes in water levels, floods, consideration of the breeding requirements of birds, provision of optimal treatment capacity etc.	Operation	Management bodies of protected areas together with MoE.	130,000.00 $ To be included as in the ToR for the preparation of the protected areas management plans (i.e. Kune Vaini Management Plant).
1.2	Elaboration of a proper engineering Final Design to avoid the WWTP untreated water contamination including: flood protection dyke; removal of top soil before starting civil works, and substitute it with an impervious clay liners to avoid negative impact on the ground water	Detail design	Consultant companies in charge of detailed design and bidding documents of WWTP construction	----
1.3	Elaboration of a proper engineering Final Design of the WWTP sludge disposal, and elaboration of a proper sludge removal O&M plan to avoid water contamination.	Detail design	Consultant companies in charge of detailed design and bidding documents of WWTP construction	
1.4	Establishment of a comprehensive monitoring program for potential dangers to the wetland ecosystem, such as bioaccumulation, avian botulism and other avian diseases, vector problems, invasion of non-native plants and animals, debris accumulation.	Detail design	MoA, and Consultant companies responsible for detailed design and bidding documents of WWTP construction	100,000.00$ Included in MoE Strengthening monitoring and enforcement capacity programme
2.1	Elaboration of recommendation for biodiversity conservation during the construction phase	Detail design	MoA, and Consultant companies responsible for detailed design and bidding documents of CTW construction	Included MoE Strengthening monitoring and enforcement capacity programme **(Item 1.4)**.
3.1	Elaboration of a mosquito and odours management plan	Detail design	Environmental expert of the Consultant and MoE	--

#	Mitigation Measure	Phase	Institutional Responsibility	Cost (USD)
4.1	Elaboration of a odours management plan	Detail design	Environmental expert of the Consultant and MoE	--
5.1	Selection of suitable landfills for disposal of waste from the construction phase	Detail design	MoA, and Consultant companies in charge of detailed design and bidding documents of CTW construction	- -
5.2	Above recommendations to be included in construction contract provisions/clauses	Construction	Supervision of work and Contractor	--
6	Drawing up of a Technical design of the three cities main sewer to collect the wastewater to the CTW sites.	Detail design	Consulting companies	To be define

Table VI.3: Environnemental Management Plan

#	Monitoring Activities	Institutional Responsibility	Cost (USD)
1	Local Integrated Environmental Monitoring (LIEM), including water quality, sediment quality parameters and biological indicators with emphasis on fish monitoring; LIEM will comply with International, National and Regional Monitoring Programs.	Management bodies of protected areas together with MoE, consultant companies.	Included in component 1
2	Monitoring of ground water level (a part of local integrated monitoring)	Management bodies of protected areas, MoE, consultant companies	Included MoE Strengthening monitoring and enforcement capacity programme **(Item 1.4)**.
3	Mosquito population monitoring (a part of local integrated monitoring)	Management bodies of protected areas, MoE, consultant companies	Included in component 1
4	Biodiversity assessment program during construction phase	Management bodies of protected areas, MoE, consultant companies	Included in component 1

VII. EIA CONCLUSION

The in-depth analysis of possible environmental impacts allows for the conclusion that the proposed project complies with the environmental requirements of Albania and of the World Bank and the WWTP construction is entirely possible with minimal negative impacts on the local population and on the environment.

VIII. PUBLIC STAKEHOLDERS CONSULTATION

VIII.1. ORGANIZATION OF THE PUBLIC CONSULTATION PROCESS

A Public Consultation process was organized by the Government of Albania and the World Bank in order to arrive to a common understanding of the issues related with wastewater management and environmental conservation. The process has discussed the findings of the technical study developed under the GEF Project "*Integrated Water and Ecosystem Management*" by the selected Consultant. The project has planned to build Constructed Treatment Wetlands (CTWs) in the cities of Lezhe, Durres and Saranda in order to preserve the biological diversity of the surrounding natural habitats including coastal wetlands, rivers and sea waters.

The consultation process was organized in two phases. The first phase of this consultation process was attended by circa 120 persons while the second phase by 50 persons. Participants considered the public consultation process a very good experience and expressed the necessity to follow up with such of experience for other projects in Albania, especially for those regarding the environmental projects.

The main goals of this consultation process have been:

- Dissemination of information on the main findings of the Technical Assessment Report;
- Collection of reactions to improve the future project activities;
- Promotion of the dialog between public institutions;
- Promotion of the use of man made wetlands for wastewater treatment;
- Creation of the local consensus regarding the initiative.

The final report of the Public Stakeholder Consultation process are attached on **Annex 4.**

VIII.2. CONCLUSION

The conclusions of the public consultation process are based on a good and active participation of all the stakeholders. Their appreciation towards the public consultation process was expressed also in the interviews organized by the World Bank and the facilitator.

The respondents agreed with the consultation workshop in terms of fulfilling their expectations and achieving its announced objectives. They considered the public consultation process a very good experience for them and expressed the necessity to follow up with such an experience for all the other projects in Albania, especially for the environmental projects. Almost all the participants stressed the fact that the consultation process increased their knowledge on natural wastewater treatments.

The majority of the participants approved the technical findings of the GEF Project "Integrated Water and Ecosystem Management". The CTWs are widely accepted as feasible. All the participants agreed that CTWs are actually a good solution for the treatment of sewage waters running from the cities of Lezhe, Durres and Saranda.

The majority of the issues raised during the consultation process were considered as closed. i.e. participants were convinced that :

- *The proposed CTWs alternatives represent a good approach for the treatment of sewage waters;*
- *CTWs have no negative impact on tourist activities in the three cities and more particularly in Saranda–Butrint and Porto-Romano;*
- *CTWs represent no nuisance in terms of Mosquitoes and Bad Odours;*
- *CTWs represent no hydro-geological and flooding risks;*
- *CTWs do not harm the environment of the Protected Area of Kune-Vaini (Lezhe). In addition GEF is going to finance 0.7 million dollars for the conservation of this ecologically important area;*
- *CTWs longevity is sufficient enough to ensure the successful mid-term treatment of sewage waters;*
- *CTWs carrying capacity is sufficient enough for the successful treatment of the sewage waters of Durres and Saranda*
- *The question of financing additional accessories remains still open and needs the commitment of other donors (Euopean Bank for Investment, etc.).*

At the end of this consultation process it is evident that the main issues that need to be verified are :

- *the land availability (in the three cities) of the CTWs;*
- *the population of Lezhe project area.*

Based on this information the consultants should elaborate the final design in order to fit the following requirements:

- *The inclusion of Shengjin in the CTWs scheme;*
- *The coordination of CTWs project with other sewage projects in Lezha area (PHARE, IOM, etc);*
- *The selection of the most appropriate alternative for Durres (Porto-Romano or Shen Vlash);*
- *The displacement (100-200 m) of the selected alternative for Saranda.*

VIII.3. DESIGN IMPROVEMENT

Following the main consultation process findings the following items will be included in the Final Design stage:

- *Shengjin wastewater system will be connected with the Lezhe WWTP;*

- *The Lezhe population will be according the new data available;*
- *The Saranda WWTP have been displaced of 800 m, as included in the Alternative 4 selected;*
- *According cadaster maps and Certificate obtained all the WWTP alternative have been located in Public State property.*

Annex 1

LIST OF THE FAUNA IN THE PROJECT AREA

1.0 Phylum molluscs

1.1-Malacofauna (phylum molluscs) of brackish water – coastal lagoons

Emri i moluskut	Kune	Vain	Butrint
Hydrobia (Peringia) ulvae	+	+	
Cerithium vulgatum	+	+	+
Nassarius mutabilis		+	
Nassarius reticulatus			+
Cyclope neritea	+	+	+
Aplysia punctata	+		
Cerastoderma glaucum	+	+	+
Solen marginatus	+		+
Scrobicularia plana	+	+	+
Dosinia lupinus			
Tapes decussatus	+	+	

+ presence of specie

1.2-Malacofauna (phylum molluscs) of costal coast

Latin name	Kune	Vain	Sarandë
Patella caerulea			+
Monodonta turbinata			+
Gibbula ardens			+
Gibbula divaricata			+
Rissoa ventricosa		+	
Hydrobia ulvae	+	+	
Cerithium vulgatum	+	+	+
Cerithium rupestre			+
Turritella comunis	+		
Janthina janthina		+	
Ocinebrina edwardsii			+
Pisania striata			+
Nassarius mutabilis		+	
Nassarius reticulatus			+
Columbella rustica			+
Vexillum ebenus			+
Conus mediterraneus			+
Mytilus galloprovincialis			+
Lithophaga lithophaga			+
Cerastoderma glaucum	+	+	+
Mactra corallina	+	+	
Solen marginatus	+	+	
Ensis ensis	+		
Ensis minor	+		
Tellina planata	+	+	
Tellina pulchella	+	+	
Tellina exigua	+	+	
Donax trunculus	+	+	
Donax variegatus	+	+	
Pharus legumen			
Dossinia lupinus	+		
Venus verrucosa			+
Chamelea gallina	+	+	+

+ presence of specie

2.0 Classe amphibia

	Latin name	Kune	Vain	Sarande
1	*Salamandra salamandra*	-	-	+
2	*Triturus cristatus*	+	+	+
3	*Triturus vulgaris*	+	+	+
4	*Hyla arborea*	+	+	+
5	*Bufo bufo*	+	+	+
6	*Bufo viridis*	+	+	+
7	*Rana balcanica*	+	+	+
8	*Rana eperiotica*	-	-	+
9	*Rana lessonae*	+	+	
10	*Rana dalmatina*	+	+	+

+ presence of specie

3.0 Classe reptilia

	Latin name	Kune	Vain	Sarande
1	*Caretta caretta*	+	+	+
2	*Emys orbicularis*	+	+	+
3	*Mauremys caspita*	+	+	+
4	*Testudo hermani*	+	+	+
5	*Testudo marginata*	-	-	+
6	*Hemidactylus turcicus*	+	+	+
7	*Cyrtodactylus kotschyi*	+	+	-
8	*Pseudopus apodus*	+	+	+
9	*Anguis fragilis*	+	+	+
10	*Algyroides nigropunctatus*	+	+	+
11	*Lacerta trilimeala*	+	+	+
12	*Lacerta viridis*	+	+	+
13	*Podarcis muralis*	+	+	+
14	*Podarcis taurica*	+	+	+
15	*Ablepharus kitaibelii*	+	+	+
16	*Typhlops vermicularis*	-	-	+
17	*Eryx jaculus*	-	-	+
18	*Coluber caspius*	+	+	+
19	*Coluber gemonensis*	+	+	+
20	*Coluber najadum*	+	+	+
21	*Coronella austriaca*	-	-	+
22	*Elaphe longisima*	+	+	+
23	*Elaphe situla*	-	-	+
24	*Elaphe quatuorlineata*	+	+	+
25	*Malpolon monspessulanus*	+	+	+
26	*Natrix natrix*	+	+	+
27	*Natrix tesellata*	+	+	+
28	*Telescopus fallax*	+	+	+
29	*Vipera ammodytes*	+	+	+

+ presence of specie

4.0 Ornitofauna (classe aves) [(1)]

Latin name	Kune	Vain	Total
Tachybaptus ruficollis	1-2	3-5	4-7
Ixobrychus minutus	3-6	10-15	13-21
Egretta garzetta	5	-	5
Ardea cinerea	3	-	3
Anas platyrhynchos	-	1-2	1-2
Rallus aquaticus	4-8	12-18	16-26
Gallinula chloropus	5-10	10-20	15-30
Fulica atra	1-2	2-4	3-6
Tringa totanus	2-5	2-4	4-9
Actitis hypoleucos	1-2	-	1-2
Charadrius alexandrinus	2-4	1-2	3-6
Charadrius dubius	1-2	1-2	2-4
Total	**24-49**	**42-72**	**62-121**

(1) in the marshlands observed in 2001

5.0 Mamalofauna (classe mammalia)

5.1. Mammalofauna e Kune-Vainit

5.1.1-Mammalians in the non wetland area of Kune-Vaini

No.	Scientific Name	Abundance[1]	Status[2]	Year
1	*Erinaceus concolor*	4	1	2001
2	*Tapla caeca*	4	1	2001
3	*Crocidura suaveolensis*	3	1	2001
4	*Rhinolophus euryale*	4	1	2001
5	*Rhinolophus ferrumequinum*	3	1	2001
6	*Rhinolophus blasii*	3	1	2001
7	*Myotis myotis*	3	1	2001
8	*Miniopterus schreibersi*	3	1	2001
9	*Pipistrellus pipistrellus*	2	1	2001
10	*Pipistrelus kuhli*	2	1	2001
11	*Pipistrellus savi*	2	1	2001
12	*Lepus europaeus*	4	1	2001
13	*Apodemus sylvaticus*	3	1	2001
14	*Apodemus flavicollis*	4	1	2001
15	*Apodemus mystacinus*	4	1	2001
16	*Mus musculus*	2	1	2001
17	*Mus domesticus*	2	1	2001
18	*Rattus rattus*	2	1	2001
19	*Rattus norvegicus*	2	1	2001
20	*Vulpes vulpes*	4	1	2001
21	*Meles meles*	4	1	2001
22	*Mustela nivalis*	3	1	2001
23	*Mustela putorius*	4	1	2001

[1] Abundance: **1**- Abundant; **2**- normal; **3**- non - normal; **4**- rarely
[2] Status: **1**- Nesting; **2**- Wintering; **3**- Rezident; **4**- Tranzit; **5**- Aksidentale

5.1.2-Mammalians in the wetland area of Kune-Vaini

No.	Scientific Name	Abundance[3]	Status[4]	Year
1	*Rhinolophus euryale*	4	3	2001
2	*Rhinolophus ferrumequinum*	3	3	2001
3	*Rhinilophus blasii*	3	3	2001
4	*Miniopterus schreibersi*	4	3	2001
5	*Myotis myotis*	3	3	2001
6	*Pipistrellus pipistrellus*	2	3	2001
7	*Pipistrellus kuhli*	2	3	2001
8	*Pipistrellus savii*	2	3	2001
9	*Rattus rattus*	4	3	2001
10	*Rattus norvegicus*	3	3	2001
11	*Vulpes vulpes*	4	3	2001
12	*Mustela nivalis*	3	3	2001
13	*Lutra lutra*	4	1	2001
14	*Meles meles*	4	3	2001

5.1.3 Mammalians in the marine water of Kune-Vaini

No.	Scientific Name	Abundance	Status	Year
1	*Dlephinus delphi*	4	5	1994
2	*Tursiops truncatus*	4	5	2001
3	*Monachus monachus*	4	5	1982(?)

[3] Abundance: **1**- Abundant; **2**- normal; **3**- non - normal; **4**- rarely
[4] Status: **1**- Nesting; **2**- Wintering; **3**- Rezident; **4**- Tranzit; **5**- Aksidentale

5.2 Mammalofauna of Butrinti

5.2.1-Mammalians in the non wetland area of Butrinti

No.	Scientific Name	Abundance[5]	Status[6]	Date/Viti
1	*Erinaceus concolor*	4	1	2001
2	*Tapla caeca*	4	1	2001
3	*Crocidura suaveolensis*	3	1	2001
4	*Crocidura leucodon*	4	1	2001
5	*Rhinolophus euryale*	4	1	2001
6	*Rhinolophus ferrumequinum*	3	1	2001
7	*Rhinolophus blasii*	3	1	2001
8	*Myotis myotis*	3	1	2001
9	*Myotis blythi*	3	1	2001
10	*Miniopterus schreibersi*	3	1	2001
11	*Pipistrellus pipistrellus*	2	1	2001
12	*Pipistrelus kuhli*	2	1	2001
13	*Pipistrellus savi*	2	1	2001
14	*Tadarida tenniotis*	4	1	2001
15	*Lepus europaeus*	4	1	2001
16	*Microtus thomasi*	2	1	2001
17	*Microtus felteni*	3	1	2001
18	*Microtus epiroticus*	4	1	2001
19	*Apodemus sylvaticus*	3	1	2001
20	*Apodemus flavicollis*	4	1	2001
21	*Apodemus mystacinus*	4	1	2001
22	*Mus m. musculus*	2	1	2001
23	*Mus m. domesticus*	2	1	2001
24	*Mus abbotti spicilegus*	3	1	2001
25	*Rattus rattus*	2	1	2001
26	*Rattus norvegicus*	2	1	2001
27	*Canis lupus*	4	5	2000
28	*Canis aureus*	4	1	2001
29	*Vulpes vulpes*	4	1	2001
30	*Meles meles*	4	1	2001
31	*Mustela nivalis*	3	1	2001
32	*Martes foina*	4	1	2001
33	*Sus scrofa*	4	1	2001

[5] Abundance: **1**- Abundant; **2**- normal **3**- non normal; **4**- rarely
[6] Status: **1**- Nesting; **2**- wintering; **3**- Rezident; **4**- Tranzit; **5**- Aksidentale

5.2.2-Mammalians in the wetland area of Butrinti

No.	Scientific Name	Abundance	Status	Date/Viti
1	*Rhinolophus euryale*	4	3	2001
2	*Rhinolophus ferrumequinum*	3	3	2001
3	*Rhinilophus blasii*	3	3	2001
4	*Miniopterus schreibersi*	4	3	2001
5	*Myotis myotis*	3	3	2001
6	*Myotis blythi*	3	3	2001
7	*Pipistrellus pipistrellus*	2	3	2001
8	*Pipistrellus kuhli*	2	3	2001
9	*Pipistrellus savii*	2	3	2001
10	*Rattus rattus*	4	3	2001
11	*Rattus norvegicus*	3	3	2001
12	*Vulpes vulpes*	4	3	2001
13	*Canis aureus*	3	3	2001
14	*Mustela nivalis*	3	3	2001
15	*Lutra lutra*	4	1	2001
16	*Meles meles*	4	3	2001

5.2.3 Mammalians in the marine water

No.	Scientific Name	Abundance[7]	Status[8]	Date/Viti
1	*Dlephinus delphi*	4	5	1998
2	*Tursiops truncatus*	4	5	2001
3	*Monachus monachus*	4	5	2000

[7] Abundance: **1**- Abundant; **2**- normal **3**- non normal; **4**- rarely
[8] Status: **1**- Nesting; **2**- wintering; **3**- Rezident; **4**- Tranzit; **5**- Aksidentale

Annex 2

LIST OF ENDANGERED SPECIES OBSERVED IN THE PROJECT AREAS

Table 2.1 – Kune Vaini marshland – List of endangered species

English name	**Scientific name**	**Category of threat**
Mouse ear bat	*Myotis myotis*	VU
Otter	*Lutra lutra*	EN
Ferruginous duck	*Aythya nyroca*	VU
Pigmy cormorant	*Phalacrocorax pygmeus*	LR

Table 2.2 – Kanella lake – List of endangered species

English name	**Scientific name**	**Category of threat**
Otter	*Lutra lutra*	EN
Ferruginous duck	*Aythya nyroca*	VU
Pigmy cormorant	*Phalacrocorax pygmeus*	LR

Table 2.3 – Durres Porta Romana marine environment – List of endangered species

English name	Scientific name	Category of threat
Sea turale	*Caretta caretta*	EN

Table 2.4 – Durres-Rrushkull-Erzeni River Managed Natural Reserve with connecting corridor- List of endangered species

English name	Scientific name	Category of threat
Mouse ear bat	*Myotis myotis*	VU
Ferruginous duck	*Aythya nyroca*	VU
Pigmy cormorant	*Phalacrocorax pygmeus*	LR
Pallid harrier	*Circus macrourus*	LR

Table 2.5 – Durres-Rrushkull-Erzeni River Managed Natural Reserve without connecting corridor- List of endangered species

English name	**Scientific name**	**Category of threat**
Mouse ear bat	*Myotis myotis*	VU
Ferruginous duck	*Aythya nyroca*	VU
Pigmy cormorant	*Phalacrocorax pygmeus*	LR

Table 2.6 – Butrinti lake area – List of endangered species

English name	**Scientific name**	**Category of threat**
Mouse ear bat	*Myotis myotis*	VU
Otter	*Lutra lutra*	EN
	Aythya nyroca	VU
Pigmy cormorant	*Phalacrocorax pygmeus*	LR
Pallid harrier	*Circus macrourus*	LR

Table 2.7 – Saranda bay and Ksamili bay – List of endangered species

English name	Scientific name	Category of threat
Monk seal	**Monachus monachus**	CR
Sea turtle	*Caretta caretta*	EN

Table 2.8 – Kakome bay – List of endangered species

English name	Scientific name	Category of threat
Monk seal	*Monachus monachus*	CR
Sea turtle	*Caretta caretta*	EN

Annex 3

ENVIRONMENTAL AND SOCIO-ECONOMIC QUALITY INDEX FOR THE PROPOSED ALTERNATIVES (QI)

1.0 Methodology

The evaluation of the alternatives has been realised adopting a multi-criteria approach based on a qualitative assessment of the interactions between the proposed project alternatives and the environment (chemical/physical, natural and socio-economic aspects). A very simple abstract of the methodology utilised is reported below.

Firstly, the consultant has identified the typologies of aspects involved in the evaluation of alternatives and listed on Tab.3.1-6. Secondly, the chemical/physical, natural and socio-economic aspects and their interactions with project interventions have been considered in order to determine the impacts (and the risks of impact) of the alternatives.

Finally each impact has been described with qualitative indicators being (Tab.3.1): (i) positive/negative, (ii) reversible/irreversible, (iii) temporary/permanent and (iv) magnitude (low, strong and very strong).
These qualitative indicators have been defined as:

(i) **positive/negative**-the impacts associated with the improvement/deterioration of environmental or socio-economic conditions;
(ii) **reversible/irreversible**–the impacts where corrective actions should/should not be able to recover the conditions ex ante;..
(iii) **temporary/permanent**–the impacts whose duration is limited/endless.
(iv) **magnitudo**–the dimension of impact on terms of environmental or socio-economic conditions

The results have been reported in the paragraphs 3 and 4.

Tab. 3.1- Qualitative indicators for the multi-criteria analysis

Type of impact	*Categories*	*Simbol*
Impact	**Positive** **Negative**	+ -
Effects	**Irreversible** **Reversible**	**I** **R**
Duration	**Permanent** **Temporary**	**P** **T**
Magnitude	**Low** **Strong**	**L** **S**
	Very strong	**VS**

This analysis has been finalised using a quality index (QI), which accommodates the results of the alternative evaluation. These results, in a tentative ranking of project alternatives, enable a preliminary evaluation of project interventions according with this figures:
QI positive values (>+300) mean a strong feasibility of the alternative proposed without particular environmental or socio-economic constraints;
QI values (among <+300 and >0) provide a positive evaluation of the alternative proposed, but highlights the needs of specific environmental or/and socio-economic measures; the alternative should be realised but need of a cat. A evaluation of impact.
QI values <0 mean that the implementation of the alternative proposed presents strong environmental and/or socio-economic impacts and it is not practicable. Other alternative should be considered.
The project evaluation includes the alternative of no-construction identified as alternative 0 in compliance with the TORs.

Basically, a distinction was made between relevant and not relevant impacts, implying that each project intervention should be associated with impacts of category I (no relevant impacts = reversible, temporary and low magnitude impacts) or category IV (3 relevant impacts eg irreversible, permanent and strong magnitude impacts). In the first case the impact has been evaluated using a value of 25 points (+ or – according with the positivity or negativity of the impact), as compared to the second case where the value is of 100 point, as illustrated in table 3.2.

Table 3.2–Attribution of values to the different categories of impacts

Impacts			***Degree of relevance***	***Category of impact***	***Value***
Reversible Temporary Low (R T L)			0 relevant impact	Cat.I	25
Irreversible Temporary Low (I T L)	Reversible Permanent Low (R P L)	Reversible Temporary Strong (R T S)	n°1 relevant impacts	Cat.II	50
Irreversible Permanent Low (I P L)	Irreversible Temporary Strong (I T S)	Reversible Permanent Strong (R P S)	n°2 relevant impacts	Cat.III	75
Irreversible Permanent Strong (I P S)	Reversible Permanent Very Strong (R P VS)	Reversible Permanent Very Strong (R P VS)	n°3 relevant impacts	Cat. IV	100
Irreversible Permanente Very strong (I P VS)			n°3 relevant impacts + magnitude	Cat. V	125

2.0 Analysis of alternatives

2.1 Durres area

The project aim is to realise about 100 hectares of constructed wetlands in the Durres plain in order to treat the waste waters flowing from the city (150,000 inhabitants) to the sea (Porta Romana) through an open channel.

Alternative 1–The constructed wetlands will be located in a former fish farm close the new urbanisation area of Durres.

Alternative 2–The constructed wetlands will be realised in the neighbouring of a little brackish wetland close the sea (1 Km from the pumping station of Porta Romana and 8 Km from the new urbanisation area of Durres). The State Property is rented by a private operator

The project location as proposed in alternative 1 should enable to treat the urban wastewater close in neighbouring of Durres, reducing the human health risk associated the presence of untreated open sewage canal flowing from Durres to Porta Romana.
The selection of alternative 2 don't present the same advantages of alternative 1, but it is more realistic taking into account the urbanisation process in Durres (NE part). The location close Porta Romana will avoid to build new treatment plant in the next future. The future cover of the canal should be proposed as mitigation measure in terms of public health. Particular attention should be paid also in undertaking mitigation measures during the construction of the lagoon in order to avoid the potential environmental damage to the brackish wetland located in the neighbouring of the proposed intervention area of alternative 2.

Table 2.3 - Multi-criteria evaluation of Durres area of intervention

A. Water	**Alternative 1**	**Alternative 2**	**Alternative 0**
Water quality	+ R P VS	+ R P VS	- R P VS
B. Soil			
B.1 Waterbed	+ I P VS	+ I P VS	- I P VS
B.2 Sludges	- R P L	- R P L	None
C. Biodiversity			
C.1 Natural habitats	+ R P VS	+ R P VS	- R P VS
C.2 Endangered species	+ R P L	+ R P L	- R P L
C.3 Migration species	+ R P S	+ R P S	- R P S
E. Costs			
E.1 Capital costs	- I T L	- I T S	None
E.1 Operational costs	- I P L	- I P S	None
F. Local condition suitability			
F.1 Availability of land	- I P L	- I P VS	None
F.2 Stakeholder opinion	+ R P L	+ R P VS	- R P VS
G. Institutional requirements			
G.1 Local authority permit	+ I P L	+ I P L	None
H. Training			
H.1 Manager training	+ R T L	+ R T L	None
H.2 Worker training	+ R T L	+ R T L	None
I. Monitoring			
I.1 Chemical-physical and microbiological parameters	+ R P S	+ R P S	None
Risks	**Alternative 1**	**Alternative 2**	**Alternative 0**
Human health	+ R P VS	+ R P S	- R P VS
Hydro-geological	- R P L	- R P L	None

2.2 Lehze area

The project foresees the treatment of the waste water coming from Lezhe (18,000 inhabitants) to the river Drinit in a costructed wetlands (about 19 ha). Three alternatives have been proposed.

Alternative 1 - Located in "Ishulli I Sengjinit" near the Merxhani Lagoon. The area is free from civil settlements and moreover the agriculture activity is not exploited, due to the high salinity content of the soil. The State Property is rented by a private operator;

Alternative 2 - Located in "Ishulli I Sengjinit" between the Merxhani Lagoon and Drint river. The area is free from civil settlements and moreover the agriculture activity is not exploited. The State Property is rented by a private operator;

Alternative 3 – The constructed wetlands will be located in "Ishulli I Lezhes" downstream of the Lehze town on the left banks of the active channel of Drinit river.

Alternative 4 - Located in "Ishulli I Sengjinit" near the Merxhani Lagoon. The area is free from civil settlements and moreover the agriculture activity is not exploited. The State Property is free of any private operator.

The site selected in alternative 1 2 and 4 must be considered as a semi-natural habitat. The grassland presents the typical ecological communities of Mediterranean alophyle grassland.
In the evaluation of alternative 3 particular attention should be paid to the high hydro-geological risk in case of floods. The intervention is located in a flooding area of Drinit river.
Alternatives 1 and 4 are more practicable than alternatived 3 taking into consideration the lack of hydro-geological risks. Alternatives 1 and 4 need of mitigation measures considering the proximity with Merxhani lagoon in order to reduce noise pollution, to avoid exhausted oil spilling and related ground and water contamination, to minimise waste production. Particular attention should be also paid during the construction works to the reduction of the disturbance during the nesting season of birds. Further details in table 3.4.

Table 3.4 – Multicriteria evaluation of the alternative in Lezhe/Shengjin area

A Water	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 0**
Water quality	+ R P VS	+ R P VS	+ R P VS	+ R P VS	- R P VS
B. Soil					
B.1 Waterbed	+ I P VS	+ I P VS	+ I P VS	+ I P VS	- I P VS
B.2 Sludges	- R P L	- R P L	- R P L	- R P L	None
C. Biodiversity					
C.1 Natural habitats	- R P L	+ R P L	+ R P L	- R P L	- R P L
C.2 Endangered species	+ R P L	+ R P L	+ R P L	+ R P L	- R P L
C.3 Migrant species	+ R P L	+ R P L	+ R P L	+ R P L	- R P L
E.Costs					
E.1 Capital costs	- I T L	- I T L	- I T L	- I T L	None
E.1 Operational costs	- I P L	- I P L	- I P L	- I P L	None
F.Local condition suitability					
F.1 Availability of land	- I P VS	- I P VS	- I P L	- I P L	None
F.2 Stakeholder opinion	+ R PV S	+ R PV S	+ R P L	+ R PV S	- R P VS
G. Institutional requirements					
G.1 Local authority permit	+ I P L	+ I P L	+ I P L	+ I P L	None
H Training					
H.1 Manager training	+ R T L	+ R T L	+ R T L	+ R T L	None
H.2 Worker training	+ R T L	+ R T L	+ R T L	+ R T L	None

I. Monitoring					
I.1 Chemical-physical and microbiological parameters	+ R P S	+ R P S	+ R P S		None

Risks	**Alternatives 1**	**Alternative 2**	**Alternative 3**	**Alternatives 4**	**Alternative 0**
Human health	+ R P L	+ R P L	+ R P L	+ R P L	- R P L
Hydro-geological	- R P L	- R P L	- I P VS	- R P L	None

2.3 Shengjin Area

The realisation of the constructed wetlands in Shengijini area appears very contradictory taking into consideration the lack of availability of suitable land. The location of the constructed wetland in the marshland bordering the Kanella lake (alternatives 1) presents a very strong negative impact in terms of lost of natural habitats and of destruction of nesting habitat of an endangered species, Black winged stilt (*Himantopus himantopus*), which also should be considered as a flag species, witness of the richness in terms of biodiversity of the marshland. The consultant has proposed to connect the Shengjin wastewater to the Lezhe CTW.

2.4 Saranda area

The objective of the project is to treat the wastewater coming from the city of Saranda (30.000 inhabitants). Currently the untreated wastewater is pumped to the Cuka Channel close to the river outlet in Saranda bay.

Alternative 1- Realise a constructed wetland (20ha) on the right bank of Cuka Channel in order to treat the wastewater and to pump it in the outlet of Cuka Channel. The State Property is free of any private operator.

Alternative 2 - Constructed wetland, will be located on the left bank of the Cuka Channel, between the river and the embankment, at the proximity of the estuary of the river itself. The State Property is free of any private operator.

Alternative 3 - Constructed wetland, will be located on the left bank of the Cuka Channel beyond the river protection embankment and in the neighbouring of Butrinti lake. After the wastewater treatment system, the waste-residual-water will be discharged in Cuka Channel. The State Property is rented by a private operator

Alternative 4 - Constructed wetland, will be located on the left bank of the Cuka Channel beyond the river protection embankment and in the neighbouring of Butrinti lake. After the wastewater treatment system, the waste-residual-water will be discharged by gravity into the Butrinti lake, and then to the sea. The State Property is free of any private operator.

Alternative 1 will not be approved by the Cuka population, taking into account the proximity of the intervention with the town. A small wetland (a pond plus a reed habitat) is located close the proposed intervention area and construction works could produce negative environmental impacts. Alternative 2 is located in a potential flooding area and dikes need to be built in case of selection of the alternative. Alternative 3 and 4 are more practicable.

Table 2.6 - Multi-criterial evaluation of Saranda area intervention

A Water	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 0**
Water quality	+ R P S	+ R P S	+ R P S	- R P L	- R P S
B. Soil					
B.1 Waterbed	+ IPVS	+ IPVS	+ IPVS	+ IPVS	- IPVS
B.2 Sludges	- R P L	- R P L	- R P L	- R P L	None
C. Biodiversity					
C.1 Natural habitats	- R P L	+ R P S	+ R P VS	- R PV S	- R PV S
C.2 Endangered species	+ R P S	+ R P S	+ R P S	- R P L	- R P VS
C.3 Migrant species	None	None	+ R P S	- R P L	None
E.Costs					
E.1 Capital costs	- I T S	- I T S	- I T L	- I T L	None
E.1 Operational costs	- I P S	- I P S	- I P L	- I P L	None
F.Local condition suitability					
F.1 Availability of land	- I P VS	- I P VS	- I P VS	- I P L	None
F.2 Stakeholder opinion	- R P VS	-R P S	-R P S	+R P VS	- R P.VS
G. Institutional requirements					
G.1 Local authority permit	- I P L	+ I P L	+ I P L	+ I P L	None
H Training					
H.1 Manager training	+ R T L	+ R T L	+ R T L	+ R T L	None
H.2 Worker training	+ R T L	+ R T L	+ R T L	+ R T L	None
I. Monitoring					
I.1 Chemical-physical and microbiological parameters	+ R P S	+ R P S	+ R P S	+ R P S	None

Risks	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 0**
Human health	+ R P VS	+ R P VS	+ R P VS	+ R P VS	- R P VS
Flood	- RPS	- R P S	None	None	None

3.0 The selection of alternatives

The qualitative data contained in the Tables 3.3-6 have been opportunely elaborated according to the value stated in table 3.2 in order to calculate the environmental and socio-economic Quality Index (QI) for each proposed alternative. The results are presented in *Appendix A* and summarised in table 3.7. Roughly should be considered that all the alternatives which present a quality index value > 300 are opportune from environmental and socio-economic point of view. Contrarily the alternatives with environmental quality index values < 0 are not suitable (further consideration in para 2.0) .

Table 3.7–Environmental and socio-economic quality index for the proposed alternatives (QI)

Area	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 0
Durres	+500	+450	N/A	N/A	-650
Lezhe/Shengjin	+300	+275	+255	+350	-525
Saranda	-75	+250	+350	+450	-600

4.0 Discussions

Durres – Alternatives 1 and 2 present the same IQ values (QI = +500/+450), but these figures are associated with different evaluation of the aspects. The **Alternative 2** seems to be the more opportune to realise taking into consideration the stakeholders opinion. **Alternative 1** enables to save a considerable amount of money in terms of capital and operational costs.

Lezhe – Alternatives 1 and 4 present the highest IQ values (QI = +300/350). The **Alternative 4** seems to be the more opportune to realise taking into consideration the stakeholders opinion and the availability of the land without any private operator. Alternative 3 is not practicable taking into consideration the high hydro-geological risk.

Shengijni – .The realisation of the constructed wetland in Shengijni (Alternative 1) should be not considered taking into account the strong environmental constraints in terms of lost of biodiversity and the ecological fragility of Kanella lake. The city wastewater will be connected with the Lezhe CTW facilities.

Saranda – Alternative 4 (QI = +450) seems to be the most indicated because is not associated with socio-economic or ecological constraints. Alternative 3 (QI = +350) is practicable but is associated with higher capital costs as well as a non enthusiastic stakeholder adhesion. Alternative 1 (QI =-75) is not practicable taking into account the stakeholder negative opinion, the hydro-geological risk and other ecological issues.

Table 3.8 highlights the best alternatives for each intervention area and reports also the practicable/not practicable alternatives taking into account the QI values (see table 3.7).

Table 3.8 – Selection of the best alternatives

Area	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 0
Durres	to be selected	to be selected	N/A	N/A	No practicable
Lezhe/Shengjin	Practicable	Practicable	No practicable	to be selected	No practicable
Saranda	No practicable	Practicable	Practicable	to be selected	No practicable

In order to optimise the allocation of resources particular attention should be paid to the very high value of the quality index for the alternatives 1 and 2 in Durres, which reflect the relevance of the project intervention in terms of public health and environment. The Quality Index presents also very high values alternative 4 in Saranda, taking into account the relevance of the health and environmental context (in the Ionian sea, between Corfu and Saranda cost, lives a small population of monk seal, and of sea turtles two endangered species).

Alternatives 4 in Lezhe should be implemented, but the relevance of intervention in terms of public health and environment is not comparable with the Durres and Saranda projects.

Annex 3-*Appendix A*

3.1-Evaluation of CTW alternatives in Durres

A. Water	**Alternative 1**	**Alternative 2**	**Alternative 0**
Water quality	100	100	-100
B. Soil			
B.1 Waterbed	125	125	-125
B.2 Sludges	-50	-50	
C. Biodiversity			
C.1Natural habitats	100	100	-100
C.2 Endangered species	50	50	-50
C.3 Migration species	75	75	-75
E.Costs			
E.1 Capital costs	-50	-75	
E.1 Operational costs	-50	-75	
F.Local condition suitability			
F.1 Availability of land	-75	-125	
F.2 Stakeholder opinion	50	100	-100
G. Institutional requirements			
G.1 Local authority permit	75	75	
H Training			
H.1 Manager training	25	25	
H.2 Worker training	25	25	
I. Monitoring			
I.1 Chemical-physical and microbiological parameters	50	50	

Risks

Public health	75	75	-100
Hydro-geological	-25	-25	
QI Index	**500**	**450**	**-650**

Annex 3-*Appendix A*

3.2-Evaluation of CTW alternatives in Lezhe

A. Water	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 0**
Water quality	100	100	100	100	-100
B. Soil					
B.1 Waterbed	125	125	125	125	-125
B.2 Sludges	-50	-50	-50	-50	
C. Biodiversity					
C.1 Natural habitats	25	50	50	25	-50
C.2 Endangered species	50	50	50	50	-50
C.3 Migratory species	50	50	50	50	-50
E.Costs					
E.1 Capital costs	-50	-50	-50	-50	
E.1 Operational costs	-50	-50	-50	-50	
F.Local condition suitability					
F.1 Availability of land	-125	-125	-75	-75	
F.2 Stakeholder opinion	100	50	50	100	-100
G. Institutional requirements					
G.1 Local authority permit	75	75	75	75	
H Training					
H.1 Manager training	25	25	25	25	
H.2 Worker training	25	25	25	25	
I. Monitoring					
I.1 Chemical-physical and microbiological parameters	50	50	50	50	

Risks

Public health	50	50	50	50	-50
Hydro-geological	-50	-50	-125	-50	
QI Index	**300**	**275**	**255**	**350**	**-525**

Annex 3-*Appendix A*

3.4-Evaluation of CTW alternative in Saranda area

A. Water	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 0**
Water quality	75	75	75	-50	-75
B. Soil					
B.1 Waterbed	125	125	125	125	-125
B.2 Sludges	-50	-50	-50	-50	
C. Biodiversity					
C.1Natural habitats	-50	75	75	75	-75
C.2 Endangered species	75	75	75	75	-75
C.3 Migratory species	75	75	75	75	
E.Costs					
E.1 Capital costs	-75	-75	-50	-50	
E.1 Operational costs	-75	-75	-50	-50	
F.Local condition suitability					
F.1 Availability of land	-125	-125	-125	-75	
F.2 Stakeholder opinion	-125	-75	-75	+100	-100
G. Institutional requirements					
G.1 Local authority permit	-75	75	75	75	
H Training					
H.1 Manager training	25	25	25	25	
H.2 Worker training	25	25	25	25	
I. Monitoring					
I.1 Chemical-physical and microbiological parameters	50	50	50	50	

Risks

Public health	100	100	100	100	-100
Hydro-geological	-50	-50			
QI Index	**-75**	**+250**	**+350**	**+450**	**-550**

Annex 4

PUBLIC CONSULTATION PROCESS

ANNEX 4

PUBLIC CONSULTATION PROCESS ON

"INTEGRATED WATER AND ECOSYSTEM MANAGEMENT PROJECT"

GEF Component P075156

Prepared by Dr. Taulant Bino

(Facilitator of the Public Consultation Process)

Tirana, 5th of May 2003

EXECUTIVE SUMMARY

This report is the review of the Public Consultation process organized by the Government of Albania and the World Bank in order to arrive to a common understanding of the issues related with wastewater management and environmental conservation. The process has discussed the findings of the technical study developed under the GEF Project "Integrated Water and Ecosystem Management" by two consultant companies, SWS and TEI. The project has planned to build Constructed Treatment Wetlands (CTWs) in the cities of Lezhe, Durres and Saranda in order to preserve the biological diversity of the surrounding natural habitats including coastal wetlands, rivers and sea waters.

The consultation process was organized in two phases. The first phase of this consultation process was attended by circa 120 persons while the second phase by 50 persons. Participants considered the public consultation process a very good experience and expressed the necessity to follow up with such of experience for other projects in Albania, especially for those regarding the environmental projects.

Participants approved the technical findings of the GEF Project "Integrated Water and Ecosystem Management". The CTW were thus widely accepted as feasible. Participants were convinced that CTWs compose actually a good alternative for the treatment of sewage waters of Lezhe, Durres and Saranda.

Some of the issues raised by the participants need the follow up of the Project Implementation Unit of World Bank Water Project and the contribution of SWS and TEI consultants. Such issues are :

- Verification of landownership for the selected CTWs alternatives in the three cities;
- Inclusion of Shengjin sewage waters in the selected CTW alternative;
- Redesigning of CTWs for Lezhe and Shengjin taking into consideration the reel number of the inhabitants in Lezha and Shengjin;
- Integration of CTWs project for Lezhe with other actual sewage water projects for Lezhe area;
- The definition on the exact location of the CTW in Saranda

A clear response for those issues should be definitively included in the final design for the Construction and Management of Constructed Treatment Wetlands.

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Introduction

The Government of Albania and the World Bank have started and are now promoting a participatory approach through a process of Public Consultation in order to arrive to a common understanding of the issues related with wastewater management and environmental conservation.

This process is based and discusses the findings of a technical study developed from a Consultant company SWS & TEI (Italy) under a grant from the GEF entitled Albania GEF Integrated Water and Ecosystem Management. The grant and the project had the objective of introducing basic wastewater treatment in areas of global environmental importance and integrating the management of wastewater into the overall ecosystem management.

The project has planned to build Constructed Treatment Wetlands (CTW) in the cities of Lezhe, Durres dhe Saranda. As well as in other Albanian urban areas, the wastewater from the three cities mentioned above, are discharged, without any treatment, directly into rivers or drainage channels, that in turn transport the untreated sewage into tidal marshland or marine coastal zone. The absence of treatment causes a large pollution in marine waters and in the areas of special biological importance located in their vicinity. Such a pollution has considerably deteriorated the natural inland ecosystems and the biological productivity of the coastal areas. Pollution from untreated sewage water represents thus a serious threat to the biological diversity of the natural habitats of the coastal wetlands, rivers and sea waters, as well as a potential risk to public health.

In order to face this problem, the technical study proposes some alternatives for the location of the CTW. Based in a multicriteria approach the project has selected for each city one alternative as being the most appropriate for the CTW location.

The project findings were part of the public consultation process that had five objectives :

- to provide information to different stakeholders about the GEF project and its environmental and technical aspects;
- to listen to stakeholders' opinions, concerns and suggestions on the issues related to wastewater treatment;
- to promote the dialogue between public institutions (Central and local Government) and civil society (Local communities, NGOs and specialists in the field of environment) on the issue of environmental protection and ecosystem management;
- To promote the use of constructed wetlands for wastewater treatment;
- To build consensus among stakeholders on the CTW locations.

This report is the result of ten workshops (seven in the first phase and three in the second phase of the public consultation process) held in the three cities and in Tirana. It gives a general overview on the main issues raised during the consultation process, suggestions to improve the project and pays particular attention to issues that need further verification and elaboration.

Structure of the Report

The report is structured in three chapters. The first chapter describes the organization of the consultation process stressing the overall representativeness of all the stakeholders. The second chapter continues with the discussions held during the consultation process. It is built in three subchapters describing the consultation process on the CTWs in the three cities. Each subchapter is a self speaking document that could be separately used by stakeholders interested in only one of the cities.

The third chapter gives a general overview of the main results of the consultation process. The issues raised in this chapter deserve a very special attention by PIU, SWS and TEI consulting entreprises as well as the World Bank.

1. Organisation of the Public Consultation Process

The consultation process was attended by the representatives of the three municipalities, the World Bank, Water PIU and the Ministry of Environment. The consultation process was organized in two phases :

A. First Phase of the Consultation Process

The first phase was organized in seven single consultations with groups of stakeholders in local and central level (Tab. 1). The local stakeholders were represented by (i) Local Authorities; (ii) Local communities involved in the project; (iii) NGOs and environmental specialists of the local level *and* (iv) NGOs and environmental specialists of the central level (Tirana). That last meeting was justified by the high concentration of NGOs and environmental specialists in Tirana. The number of participants on the first phase consultation was about 120 persons.

Table 1. Information on the workshops held during the first phase

Date	City	Participants	Nr. Of participants
10th of January 2003	Saranda	Local authorities	33
13th of January 2003	Lezhe	Local authorities	17
14th of January 2003	Durres	Local authorities	18
28th of January 2003	Lezhe	Local Communities, NGOs and specialists of environment	25
29th of January 2003	Durres	Local Communities, NGOs and specialists of environment	17
31st of January 2003	Saranda	Local Communities, NGOs and specialists of environment	11
19th of February 2003	Tirana	NGOs and specialists of environment based in Tirana	17

The municipalities hosted six out of seven meetings held on both phases of the consultation process. In each municipality were held two separate meetings :

1. *With Local Authorities and Local Institutions*

   The participants represented Municipalities, Prefectures, Districts, Water Directorates, Urban Directorates, Primary Health Directorates, Regional Environmental Agencies and the Water PIU. Some of the meetings were attended by representatives from the World Bank and Ministry of Environment.

2. *With Local Communities and Local NGOs*

   The participants were representatives of local communities of Lezhe (Shengjin Commune), Durres and Saranda (Aliko Commune) as well as members of local NGOs, active in the field of development and nature conservation.

The last workshop of the first phase was held in Tirana, under the auspices of the Albanian Ministry of Environment. Participants were members of the community of environmental experts and environmental NGOs.

In each workshop the participants were introduced with the technical report of the project "Integrated Water and Ecosystem Management". This was made possible through the distribution of a package containing a detailed overview of the project and technical details on the CTW of each municipality. Each workshop was based on three presentations by the Facilitator and the consultant:

- Objectives and organisation of the public consultation process;
- The biological and socio-economical importance of the coastal area in the three municipalities *and*
- Detailed description of the GEF project accompanied by sufficient information on the main findings of the technical report.

At the end of each meeting the participants selected 2-3 spokespersons that were invited to participate in the second phase workshop.

The first phase was concluded with the compilation of a conflict assessment document entitled "Report of the First Phase of the Public Consultation Process on Integrated Water and Ecosystem Management Project".

Copies of the report (in English and Albanian) are available nearby the Water PIU and the World Bank. The main findings of this report are presented below (in 2.1.) in order to understand the framework of the discussions held during the second phase of the consultation process.

B. Second Phase

The second phase was organized in three broad consultations (Tab. 2) with elected representatives of the stakeholders and top-level decision-makers from local (Municipalities, Communes, Prefectures, Districts, selected spokespersons, Regional Environmental Agencies) and central Government (Ministry of Territorial Adjustment and Tourism, Ministry of Environment).

Table 2. Information on the workshops held during the first phase

Date	City	Nr. of participants
22nd of April 2003	Lezhe	19
25th of April 2003	Saranda	15
2nd of May 2003	Durres	18

The second phase of the consultation process was attended by 50 participants (A complete list of participants is presented in Annex 2.2.). The meetings were hosted by the respective Municipalities of Lezhe, Durres and Saranda.

A package containing (i) the first phase report, (ii) the detailed overview of the project and technical details on the CTW of each municipality; was distributed by mail to every participant.

The three workshops were based on three presentations by the Facilitator and the consultant:

- Objectives and organisation of the public consultation process;
- Technical details on the selected alternatives of CTWs;
- Detailed description of the main findings of the first phase of the consultation process.

The presentations were followed by free discussions on the issues identified during the first phase of the consultation process.

At the end of the discussion phase, the consultants and the facilitator drafted the main conclusions and asked for the consensus of all the participants.

2. The Main Findings of the Consultation Process

The issued raised during the first phase of the consultation process were classified in two groups:

(i) Closed issues

Issues on which (after the explanations) the majority of the participants agreed with the recommendations.

(ii) Open issues

Issues still pending that needed more discussion and decision-making during the second phase meetings.

As stressed above, the second phase meetings used the main findings of the first phase as a basis for discussion.

2.1. Public Consultation on CTWs of Lezhe/Shengjin

2.1.1. First Phase of Public Consultation on CTWs of Lezhe/Shengjin

(i) Closed Issues

1. Nuisance from Mosquitoes and Bad Odours

Participants and more specifically local communities were in general sceptic about the impact of CTWs in their quality of life. According to them, CTW will increase the number of mosquitoes and the emission of bad odours. Such factors, they believed, will deteriorate the quality of their life.

Such concerns were considered as resolvable by the consultants. They explained that that the CTW will not significantly increase the number of mosquitoes considering that the CTW will be built in an area already surrounded by numerous wetlands (serving as breeding sites for mosquitoes). The consultant stressed the fact that if management provisions (described in the technical report, executive summary and the "schede") are respected, it is not risk of increase of mosquitoes number. This last statement is valuable also for the risk of bad odours increase.

2. Hydro-geological and flooding risks of the selected alternative

Some of the participants (more specifically the local authorities) were concerned on the potential hydro-geological risks presented by the selected alternative. Those risks are more related with

pollution of ground waters from the wastewaters concentrated in the CTW. Participants asked if the consultant had undertaken hydro-geological studies in order to determine the best of alternatives.

It was clarified that the selected alternative is based on technical and hydro-geological study, which carefully considered the risks of pollution penetration from CWT to the underground layers. The construction of CWT includes a layer of 10-15cm of clay which serve as waterproof between the basin of CWT and the underground layers.

Another question was about the risk of flooding by the Drini River that would expand pollution from CWT into the surrounding areas and more specifically to the Protected Area of Kune-Vaini dikes. The selected alternative is the safest of all the three alternatives regarding the expected floods by the Drini River. Anyway, some measurements such as cleaning the bed of the Drini River on its down stream after of Lezha city might result extremely necessary. Another improvement is expected also by the recent rehabilitation of the drainage pumping station in the area (financed by the World Bank).

3. CTW longevity

The participants were very interested to know if the CTWs could be considered as a long-term solution in the treatment of sewage waters. They asked about the expected longevity of the CTWs and what will happen after its filling by the deposited sludge.

The consultants argued that sludge will be removed in a 5-year basis and it could be further used as organic fertilizer for agricultural production. The calculated size and the treatment capacity of the CTWs were based on the expected number of inhabitants in 20 years. Thus the CTW are foreseen for a 20 year period. After this period the CTWs may serve either as tertiary system of Conventional systems, or they could be expended in order to face the increase of the sewage flow.

4. The transport of sewage waters from Lezhe to the selected CTWs alternative

Local authorities asked on the technical solution for bringing the wastewaters from Lezhe to CWT proposed. According to them some other accessories (pipelines, pumping stations) are needed for the full implementation of CTW project.

The consultants informed that the GEF would not finance those activities and that financial support from other donors (European Bank for Investment, etc) has been envisaged for that purpose.

Taking into consideration that the real needs for completion of the project require a very big contribution from the donors, the audience expressed their concern regarding the donors

possibility to finance it. In this case, they suggested to GEF to reconsider its policy for financing not only the CTWs but also some other parts of the project such as pipeline, pumping station etc. That issue will be further discussed in the second phase meetings.

(ii) Open Issues

1. The inclusion of Shengjin sewage waters in the selected alternative

The Head of Shengjin Commune expressed its dislike for not including the Shengjin wastewater in the proposed CWT. According to him, such an inclusion will not drastically increase the demanded CTW budget since the commune is already working on the rehabilitation of sewage system that is bringing Shengjin wastewaters in Kenalla Lake.

The consultant (SWS) accepted it as a good proposal that should be considered for the inclusion in the final design.

2. Land availability for the CTWs

According to the participants and more specifically the local communities, the land proposed to be used by the CTWs is already distributed to local landowners. Obtaining this land would ask its prior purchase. The prices could be very high considering that the proposed alternatives are located nearby tourist areas.

The findings of the technical report, based in a very detailed socio-economic study and data provided by the Land Registration Office have resulted that the land is officially state property (Ministry of Agriculture). In this case it needs only to make a transfer of the property from Ministry of Agriculture to Lezha Local Government.

3. Treatment capacity of CTWs of Lezhe

Some participants were of the opinion that the number of inhabitants of the project area was underestimated by the project.

The consultants clarified that the data regarding the actual number of inhabitants and the rate of natural growth of the population were provided by the District Census Office, the institution responsible for statistics relating with population census.

4. The conservation of the Protected Area of Kune-Vaini

The participants and more specifically the local NGOs asked if the project had foreseen management actions towards the conservation of biological resources of Kune-Vaini Protected Area.

The consultants expressed their positive reply towards this comment. According to them the project recommends the creation of Kune-Vaini Management Area (KVMA). The objective of KVMA is the conservation and sustainable management of the Kune-Vaini wetland and Kenalla lake Protected Areas. The cost of this proposal is estimated in 1.100,000 US Dollars.

That issue of KVMA will be further discussed in the future meetings (WB, MoE, GDFP) although it was definitively not controversial during the consultations.

Nevertheless, the results of the discussion between the Albanian Government (MoE) and the World Bank should be subject of further consultation with local stakeholders. This consultation process will have the objective of (i) introducing people with the project on KVMA (ii) to listen to stakeholders' opinions, concerns and suggestions on the issues related with the project (iii) gain stakeholders support and (iii) increase the effeciency of the management measures foreseen by the project.

2.1.2. Second Phase of Public Consultation on CTWs of Lezhe/Shengjin

The second phase meeting supported the treatment of sewage waters of Lezhe through the CTWs. All the participants agreed that CTWs are a good solution for the treatment of sewage waters running from the city of Lezhe to the surrounding areas of ecological importance. Participants considered the selected alternative (1st Alternative - Located in "*Ishull Shengjin*" near the Merxhani Lagoon) as the most appropriate alternative.

But before going to the final design they suggested that the consultants should verify a few details related with.

1. Land availability of the CTWs

There was still no clear response on the landownership rights over the proposed territory of CTWs. In difference form the technical assessment report, some of the participants (District of

Lezhe) said that the land might by under private ownership. Obtaining this land would ask its prior purchase.

It is obvious that the status of ownership over the territory of the proposed CTW need further verification. Local authorities expressed their commitment to verify this issue but they needed first an official demand from the PIU of Water Project (Durres). For that reason the PIU has sent a letter on 23rd April 2003 to the local authorities in order to obtain the official information on the matter.

2. *The evaluation of the population of the project area*

According to the mayor of Lezhe the number of inhabitants of the project area is larger that the figures offered by the technical assessment report. The actual number of inhabitants is 28,000 instead of 18,000 reported by the consultants of SWS and TEI.

The mayor stressed the importance of this fact relating it with the treatment capacity of the proposed CTW. A different number of inhabitants would certainly bring to the re-evaluation of the expected number of inhabitants for 2020. If different from the technical assessment report, than the final design of CTW should change in order to cope with the higher number of inhabitants and the higher amounts of sewage waters.

Still official information is needed by the municipality of Lezhe. Such information is expected by the Municipality of Lezhe after the letter sent on 23rd April 2003 from the Water PIU on the subject.

3. *The coordination of CTW project with other sewage projects in Lezha area (PHARE, IOM, etc)*

According to the participants, the decision-making CTW is strictly related to two other sewage projects that are actually implemented or are going to be implemented in Lezhe area.

There is actually a project including some of the southern quarters of Lezhe that has planned to poor the sewage waters in Tale, a marshy area south of Lezhe.

It is thus imperative for the CTWs project to be coordinated with the other sewage projects. If coordination is missing than (i) the CTWs will not collect all the sewage waters of Lezhe but only a part of them; (ii) a certain amount of sewage waters will still continue to run untreated and will certainly harm the biodiversity and values of a natural marshy area.

In such a framework the coordination between the GEF project and the other sewage projects (PHARE, IOM) is desperately needed. Information on the mentioned projects will be offered by

the municipality of Lezhe. The Water PIU on 23rd April 2003 sent a letter asking the official information on the subject.

4. The inclusion of Shengjin in the CTW

All the participants expressed their firm opinion about the inclusion of Shengjin city in the CTW scheme. The arguments for its inclusion are :

- Shengjin will continue to poor its sewage waters in Kenalla, and will continue to damage the biodiversity values of Lezhe area
- Untreated sewage waters will harm the touristic values of the entire area of Lezhe, since Shengjin is one of the most important tourism assets for the whole region of Lezhe.

The inclusion of Shengjin in the CTWs scheme might bring some changes to the final design of the CTWs. The changes would need some information on:

- the number of inhabitants in Shengjin area (the figures offered by the technical assessment report are considered as not very correct by the head of Shengjin's Commune);
- The landownership status of the CTWs selected alternative (The new proposed CTWs should be larger than the first one, in order to include and to coupe with a higher amount of sewage waters).

As mentioned above Water PIU sent a letter on 23rd April 2003 for having the official information on the matter.

2.2. Public Consultation on CTWs of Durres

2.2.1. First Phase of Public Consultation on CTWs of Durres

(i) Closed Issues

1. CTWs or Conventional System

Some of the participants especially in the second meeting (with communities, NGOs, environmental specialists) asked for the construction of a conventional system instead of the CTW. According to them the CTW is not e very long-term solution for the city of Durres taking in account the high number of inhabitant and the recent tendencies for further demographic increase.

The consultants replied that for the moment being, the conventional system is not an option of GEF financing. Furthermore the conventional system is very expensive and actually it is difficult to find any donor that would finance it. Only for the city of Durres, the construction of a conventional system would ask 25 Million US Dollars and some other 3.75 million/year for ensuring its proper maintenance.

Actually the CWT is considered a good step for the improving the quality of the wastewater pouring in the sea (Lalzi bay). Taking into consideration the requirements of the water quality in the beach tourist area in Lalzi bay, in the future Durres needs a conventional system. The proposed CTW will be integrated as a tertiary system of wastewater treatment.

2. Nuisance from Mosquitoes and Bad Odours

Participants and more specifically local communities were in general sceptic about the performance of CTWs in terms of :

- Mosquitoes and
- Bad odours

Participants were in general sceptic about the impact of CTWs in their quality of life. According to them, CTW will increase the number of mosquitoes and the emission of bad odours. Such factors, they believed, will deteriorate the quality of their life.

Such concerns were considered as resolvable by the consultants. They explained that that the CTW will not significantly increase the number of mosquitoes considering that the CTW will be built in an area already surrounded by numerous wetlands (serving as breeding sites for mosquitoes). The consultant stressed the fact that if respected the management provisions (described in the technical report, executive summary and the "schede"), will not allow an increase of the number of present mosquitoes in the area. In the worst cases (high summer temperatures, accidents etc.) the system will be helped by chemical agents for reducing them.

Bad odours are also a resolvable problem. The CTW are located far away from urban areas. As for the mosquitoes the management provisions, potential bad odours will have no impact on the surroundings.

3. Hydro-geological risks of the selected alternative

According to the participants (more specifically the local authorities) the selected alternative might present some hydro-geological risks. Those risks are more related with pollution of ground waters from the wastewaters concentrated in the CTW. Participants asked if the consultant had undertaken hydro-geological studies in order to determine the best of alternatives.

It was clarified that the selected alternative is based on technical and hydro-geological study, which carefully considered the risks of interchanging of the pollution from CWT and the underground layers and vice versa. The construction of CWT includes a layer of 10-15cm of clay which serve as waterproof between the basin of CWT and the underground layers.

4. The transport of sewage waters from Durres to the selected CTW alternative

As in Lezha, taking into consideration that the real needs for completion of the project requires a very big contribution from the donors (more than 8 km pipeline, a second pumping station etc), the audience expressed their concern regarding the donors' possibility to finance it. In this case they suggested to GEF to reconsider its policy for financing even some other accessories (pipelines, pumping station, etc) of the project and not only CWT.

The consultants informed that the GEF would not finance those activities and that financial support from other donors (European Bank for Investment) has been envisaged for that purpose.

(ii) Open Issues

1. Landownership issues related with the selected alternative

According to some of the participants (representatives of the urbanism inspectorate - Prefecture of Durres), the second alternative (Porto-Romano) might have landownership problems because most parts of the land are already distributed to the private people. Obtaining it for the project purposes would ask its prior purchase.

That picture is different from the findings of the technical assessment report. This report, based in a very detailed socio-economic study, have resulted that the land is officially state property. Definitively this issue will be reconsidered again for clarification with the high level rapresentants in the second phase of the workshops.

2. Discussion on the location of the CTW

The participants had two proposals regarding the geographical location of the CTWs of Durres :

A. CTW located in the former fish farms (Shen Vlash) – First Alternative

The first meeting (local authorities) supported the first alternative i.e. the location of the CTW in the former fish farms (Shen Vlash) of Durres.

According to them, (1) in difference from Porto-Romano (Second Alternative), Shen-Vlash (First Alternative) is not an area of potential tourism development. As such, it is more feasible to

create the CTWs in Shen Vlash rather than in Porto-Romano, (2) The fish farms in Shen Vlash (First Alternative) have no landownership problems while Porto-Romano (Second Alternative) might have some, (3) The fish farms (first alternative) were large enough (210 ha.) to shelter the CTW

This proposal had nevertheless its weak points :

- According to most of the stakeholders, Porto-Romano may not be considered as tourism development area because recently the Albanian Government gave the permission to build a complex of oil tankers very closed to this area. The presence of oil tankers jeopardizes every possibility of tourism development.
- The First Alternative (fish farms in Shen Vlash), although cheaper than the second one (Porto-Romano), was not supported by some stakeholders because this area has potentials for the future urban development of Durres city. Thus the CTW would be relatively close to the urban area.

B. CTW located in Porto-Romano – Second Alternative.

Taking into account the considerations mentioned above as well as the presence of some illegal building in the area of Porto Romano, it was proposed to see the possibility to set up the CWT more inside (in the east direction) of the ex-swampy area. In the other hand this will avoid all the issues raised on tourist aspects, and the problems regarding the land ownership. This proposal was considered as very useful by the consultants and it needs to be evaluated in the second phase meetings.

2.2.2. Second Phase of Public Consultation on CTWs of Durres

The second phase meeting supported the treatment of sewage waters of Durres through the CTWs. All the participants agreed that CTWs are actually a good solution for the treatment of sewage waters running from the city of Durres to the surrounding areas of ecological importance. Participants considered the selected alternative (IInd Alternative - Located in Porto-Romano) as the most appropriate alternative.

But before going to the final design they suggested that the consultants should verify a few details related with.

1. Porto-Romano was selected as the most appropriate alternative for the CTWs

The majority of the participants agreed that the second alternative (Porto-Romano) was better than the first one (former fish farms of Shen Vlash). (i) Porto-Romano alternative had no problems with the future urban development of the city of Durres; (ii) Porto-Romano alternative was more supportive to the enhancement of biodiversity values of Durres area (iii) and obviously Porto-Romano is not a priority area for the development of coastal tourism.

The first alternative is less appropriate because : (i) it is an area of potential enlargement for new settlements of Durres; (ii) It is less supportive to the environment because it is far away from the existing areas of environmental importance and faces thus problems related with the fragmentation of natural habitats.

2. Landownership rights over the territory of Porto-Romano alternative

Participants were divided on the issue of landownership rights over the territory of the second alternative in Porto-Romano. Some of the participants believed that the land was under state ownership while the other group believed that the land has been already privatised. It is obvious that this issue needs further verification nearby the responsible authorities i.e. the Prefecture of Durres. The PIU of Durres has officially requested the needed information on 4th of May 2003.

3. Porto-Romano (Second Alternative) or Shen Vlash (First alternative)

Participants agreed that if the second alternative (Porto-Romano) is not feasible (due to landownership problems), than the first alternative (former fish farms in Shen Vlash) could be adopted for the CTWs. In difference from Porto-Romano alternative, Shen Vlash alternative apparently represents no landownership problems. According to the mayor of Durres, the majority of this land belongs to the municipality of Durres.

2.3. Public Consultation on CTWs of Saranda

2.3.1. First Phase of Public Consultation on CTWs of Saranda

(i) Closed Issues

1. Conventional systems instead of CTW

Some of the participants, especially in the first meeting (local authorities) asked for the construction of a conventional system instead of the CTW. According to them the CTW is not e

very long-term solution for the city of Saranda taking into account the high number of inhabitant and the recent tendencies for further demographic increase, and the relatively "low" efficiency of the CWT (about 70%) for the beach tourist area.

The consultants replied that for the moment being, the conventional system is not an option of GEF financing. Furthermore the conventional system is very expensive and actually it is difficult to find any donors to finance it. Only for the city of Saranda, the construction of a conventional system would ask some 6 Million US Dollars and some other 1.8 million/year for ensuring its proper maintenance. Actually the CWT is considered a good step for the improving the quality of the wastewater pouring in Saranda bay. Taking into consideration the requirements of the water quality in the beach tourist area in Saranda bay, in the future Saranda needs a conventional system. The proposed CTW will be integrated as a tertiary system of wastewater treatment.

Some other participants proposed to treat the wastewater by pouring them directly by a pipeline in the depth of the sea.

This alternative was not accepted because :

a. this is out of GEF policy financing;
b. Saranda waters are considered as transborder waters (Albania and Greece) and there is an evident risk of claiming by the Greek authorities.

2. Advantages/disadvantages of the CTW

Participants and more specifically local communities were in general sceptic about the performance of CTWs in terms of :

- Mosquitoes and
- Bad odours

Such concerns were considered as resolvable by the consultants. They explained that that the CTW will not significantly increase the number of mosquitoes considering that the CTW will be built in an area already surrounded by numerous wetlands (serving as breeding sites for mosquitoes). The consultant stressed the fact that if will be respected the management provisions (described in the technical report, executive summary and the "schede"), it is not expected an increase of the number of present mosquitoes in the area.

In the worst cases (high summer temperatures) the system will be helped by chemical agents for reducing them.

The same about the risk of increasing the bad odours.

3. CTWs' carrying capacity

According to one of the participants (local authorities) the number of inhabitants of the project area during summer season was underestimated by the project leading to miscalculation of the size and the treatment capacity of the CTW.

The consultants agreed with the question, but it is accepted that CTW will work overloaded during the summer season lowing from 70% into 50% their efficiency.

4. Hydro-geological risks of the selected alternative

The selected alternative might present some hydro-geological risks for pollution of the calcaire rocks in the area.

It was clarified that a lawyer of 10-15 cm is foreseen in the design serving as waterproof to the rocky underground.

1. Open Issues

1. CTWs location

The second meeting suggested that the CTW could have a potential impact on tourism. They proposed for CTW to be located "further east" of the proposed location. Such a removal would position the CTW far away from the coastal line (areas of potential tourism importance). Thus the CTW would have a smaller direct impact in the tourist areas and/or indirect impact (psychological effect over tourists) over economic activities related to tourism. That proposal was supported also by the representatives of the commune because the CTW would thus fall inside the territory of the former agricultural enterprise. This issue will be also discussed in the second phase of the workshops.

2. Landownership problems related with the selected alternative

According to some of the participants of the second meeting (local communities), the selected alternative (3rd option) might have landownership problems because it has been already distributed **in use** to 80-90 farmers. This issue will be clarified in the second phase of the public consultation with the high level of participants. It is believed that the state is the owner of the land (Ministry of Agriculture), which is distributed in use to the farmers for a certain period. The state has the right to take back this land in case of public purposes.

2.3.2. Second Phase of Public Consultation on CTWs of Saranda

The second phase meeting supported the treatment of sewage waters of Saranda through the CTWs. All the participants agreed that CTWs are actually a good solution for the treatment of sewage waters running from the city of Saranda to the surrounding areas of ecological importance. Participants considered the selected alternative (IIIrd Alternative - Located south of Cuka channel, beyond the existing river protection dike) as the most appropriate alternative.

There were nevertheless some discussions regarding the selected alternative in terms of :

1. The location of the selected alternative (south of Cuka channel, beyond the existing river protection dike)

The participants still want to displace the CTW in the eastern direction for about 100 or 200 meters. Their concern for the proposed alternative is that the CTW is situated very close Bradaneshi, a small group of houses very close to Saranda-Ksamili road. In the other hand, the participants argued that this would reduce the psychological effect of the CTW over tourists visiting Saranda area.

2. The landownership problems of the selected alternative.

Obviously there are not problems of the private ownership in the proposed area for developing the CTW. Based on the workshop discussions, the land is still under the state ownership represented by the Ministry of Agriculture. Nevertheless such information needs to be reconfirmed nearby the local authorities (Prefecture of Vlora Region, Directorate of Agriculture and Food, Registration Office and Cadastral Office). The Deputy Prefect of Vlora and Saranda, present in the workshop, promised to provide the official confirmation regarding the status of land ownership of the CTW area.

2. CONCLUSIONS

The conclusions of the public consultation process are based on a good and active participation of all the stakeholders. Their appreciation towards the public consultation process was expressed also in the interviews organized by the World Bank and the facilitator.

The respondents agreed with the consultation workshop in terms of fulfilling their expectations and achieving its announced objectives. They considered the public consultation process a very good experience for them and expressed the necessity to follow up with such an experience for all the other projects in Albania, especially for the environmental projects. Almost all the participants stressed the fact that the consultation process increased their knowledge on natural wastewater treatments.

The majority of the participants approved the technical findings of the GEF Project "Integrated Water and Ecosystem Management". The CTWs are widely accepted as feasible. All the participants agreed that CTWs are actually a good solution for the treatment of sewage waters running from the cities of Lezhe, Durres and Saranda.

The majority of the issues raised during the consultation process were considered as closed. i.e. participants were convinced that :

- *The proposed CTWs alternatives represent a good approach for the treatment of sewage waters;*
- *CTWs had no negative impact on tourist activities in the three cities and more particularly in Saranda–Butrint and Porto-Romano;*
- *CTWs represent no nuisance in terms of Mosquitoes and Bad Odours;*
- *CTWs represent no hydro-geological and flooding risks;*
- *CTWs do not harm the environment of the Protected Area of Kune-Vaini (Lezhe). In addition GEF is going to finance 1,1 million dollars for the conservation of this ecologically important area;*
- *CTWs longevity is sufficient enough to ensure the successful mid-term treatment of sewage waters;*
- *CTWs carrying capacity is sufficient enough for the successful treatment of the sewage waters of Durres and Saranda*

- *The question of financing additional accessories remains still open and needs the commitment of other donors (Euopean Bank for Investment, etc.).*

As explained above, there are still some issues that would need further verification and elaboration.

(i) Land availability of the CTWs

Since there is still no clear situation on the landownership rights over the proposed territory of CTWs. An official answer is expected by the Local Authorities after the letters sent from the Water PIU on this matter.

(ii) The inclusion of Shengjin in the CTWs scheme

All the participants expressed their firm opinion about the inclusion of Shengjin city in the CTW scheme. The potential inclusion of Shengjin in the CTWs scheme might need to resize the design of the CTWs for Lezha.

(iii) The re-evaluation of the population of Lezhe project area

Before going to the final design of CTWs, it is very crucial to verify the number of inhabitants for the project area of Lezhe. According to the mayor of Lezhe the number of inhabitants of the project area is larger that the figures offered by the technical assessment report. The actual number of inhabitants is 28,000 instead of 18,000 reported by the consultants of SWS and TEI.
Still, official information is needed from Lezhe municipality. PIU of Waters Project in Durres sent an official letter asking this kind of information.

(iv) The coordination of CTWs project with other sewage projects in Lezha area (PHARE, IOM, etc)

CTWs project in Lezhe needs coordination with the other sewage projects. If this coordination is missing than (i) the CTWs will not collect all the sewage waters of Lezhe but only a part of them; (ii) a certain amount of sewage waters will still continue to run untreated and will certainly harm the biodiversity and values of a natural marshy area.
Information on the mentioned projects will be offered by the municipality of Lezhe. Water PIU is waiting for the official information from Lezha Municipality on the matter.

(v) Porto-Romano (Second Alternative) or Shen Vlash (First alternative)

Participants agreed that Porto Romano alternative is more appropriate approach. In case that this alternative is not feasible (due to landownership problems), than the first alternative (former fish farms in Shen Vlash) could be adopted for the CTWs. In difference from Porto-Romano alternative, Shen Vlash alternative apparently represents no landownership problems. According to the mayor of Durres, the majority of this land belongs to the municipality of Durres.

(vi) The location of the selected alternative for Saranda

The participants still want to displace the CTW (south of Cuka channel, beyond the existing river protection dike) in the eastern direction for about 100 or 200 meters. The displacement will locate the CTWs far from Bradaneshi, a small group of legal houses very close to Saranda-Ksamili road, and it would reduce the psychological effect of the CTWs over tourists visiting Saranda area.

Besides the issues related with the construction of the CTWs in the three cities, there is still a need for further consultation on the implementation of the KVMA project

As mentioned in 2.1.1., the issue of KVMA is still subject of discussion between the WB, MoE, and GDFP. Nevertheless, the results of this discussion should be subject of further consultation with local stakeholders. This consultation process will have the objective of (i) introducing people with the project on KVMA (ii) listening the stakeholders' opinions, concerns and suggestions on the issues related with the project (iii) gaining stakeholders support and (iii) increasing the effeciency of the management measures foreseen by the project.

At the end of this consultation process it is evident that the main issues that need to be verified are :

- the land availability (in the three cities) of the CTWs;
- the population of Lezhe project area

Based on this information the consultants (SWS & TEI) should elaborate the final design in order to fit the following requirements:

- The inclusion of Shengjin in the CTWs scheme
- The coordination of CTWs project with other sewage projects in Lezha area (PHARE, IOM, etc)

- The selection of the most appropriate alternative for Durres (Porto-Romano or Shen Vlash)
- The displacement (100-200 m) of the selected alternative for Saranda

Annex 1. Evaluation of the Public Consultation Process

Objectives

This evaluation was conducted to gauge the opinion and experiences of the participants at the three first meetings of the first phase consultation process for the GEF Integrated Water and Ecosystem Management Project held in Saranda, Lezha, and Durres in Albania.

1. Methodology

The evaluation questionnaire included a total of 13 questions including open- and close- ended questions. The responses from the close-ended questions were measured on 1-5 scale.

Six quantitative questions were aimed at measuring the opinions of the respondents regarding the expectations, objectives, role of the facilitator, presentations, usefulness, and overall level of satisfaction.

One question was asked to measure participants' opinion about the usefulness of the information they gathered during the consultation workshop.

A cluster of five quantitative questions was aimed at assessing how balanced the consultation was. These questions included different aspects such as how much attention was paid to individual opinion and technical issues, timings of presentations and participation, and pace of the consultation.

2. MAIN FINDINGS

A total of eight 36 participants out of 44 responded to the evaluation questionnaire. Following are some of the main results of the quantitative questions.[1]

RESPONDENTS' CURRENT POSITIONS AND REASON FOR PARTICIPATION IN THE CONSULTATION

Most of the respondents (55.6%) said they either were representing government in the consultation workshop.

Majority of the respondents (41.7%) stated that they participated in the consultation to express their views on the subject while about one third (33.3%) of them said they wanted to learn more about the subject.

EXPECTATIONS AND OBJECTIVES

Data analysis shows that the respondents were very positive about the consultation workshop in terms of fulfilling their expectations and achieving its announced objectives.
The mean score for the questions on expectations was 4.00 on a 1-5 scale[2] while the score was 4.18 for fulfilling the announced objectives of the consultation.

FACILITATOR AND PRESENTATION

The high ratings for the questions on the facilitator (mean score of 4.48 on a 1-5 scale[3]) and the presentations (4.47) show that respondents had a very good opinion about the facilitator's role in managing the consultation and the presentations delivered during the consultation.

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[1] Results for all quantitative questions of the evaluation are presented later in this report.
[2] Questions on expectation and objectives were ranked on a 1-5 scale, 1 meaning "not at all" and 5 meaning "very much."

USEFULNESS AND SATISFACTION

Mean scores show that the respondents had a very positive experience in terms of overall usefulness and satisfaction with the consultation. The mean score for the question on usefulness was 4.65 on a 1-5[4] scale and 4.35 for overall level of satisfaction.

INFORMATION SHARING

The mean score (4.43 on a 1-5 scale[5]) on the question related to information sharing show that the respondents had a very positive view in terms of increasing their knowledge on natural wastewater treatment. Respondents were asked to rate their level of agreement with the statement that said: "My information on natural waste treatments increased as a result of this consultation."

HOW BALANCED THE CONSULTATION WAS

Data analysis shows that the respondents had a fairly positive opinion about the question of how balanced the consultation was. A set of five questions was asked to measure this issue. The questions included aspects such as how much attention was paid to individual opinion and technical issues, time for the presentations for consultants/facilitator, time for participation/intervention, and the pace of the consultation. All the five questions in this section ranked between 3 and 4 on a 1-5 scale[6]. The question on the time for the presentations of the consultants/facilitator ranked the highest (mean score of 3.42) whiles the questions on the time for participation/intervention ranked the lowest (mean score of 3.00).

2.7. Recommendations

Results of the evaluation show that there is a need to focus on better allocation of time for the participants to take part in the discussion during the consultation process. Compared to the other aspects of the consultation, it is apparent that more attention needs to be paid to individual opinion and technical issues.

2.8. Qualitative questions

From the analysis of the open-ended questions it appears that participants valued the consultation process especially for making available useful information about the project and its environmental aspects as well as offering a venue for expressing opinions and discuss about important issues. At the same time, they considered that the consultation process could be improved by providing more information on the technical aspects. Most of the respondents are rather optimistic about the impact of the consultation on future developments.

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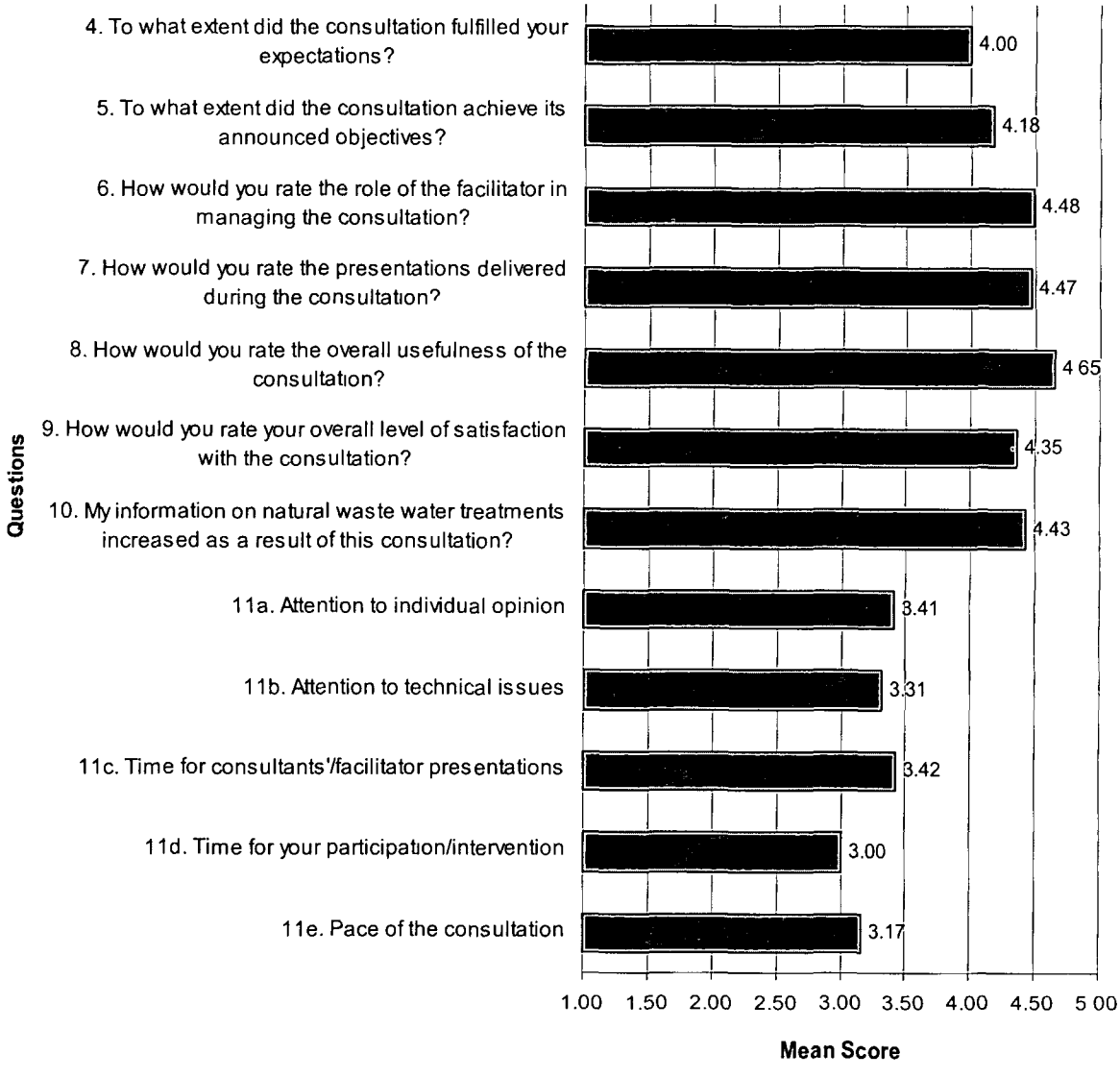
[3] Questions on facilitator and presentations were rated on a 1-5 scale, 1 meaning "very poor" and 5 meaning "very good."

[4] Questions on usefulness and satisfaction were rated on a 1-5 scale, 1 meaning "very low" and 5 meaning "very high."

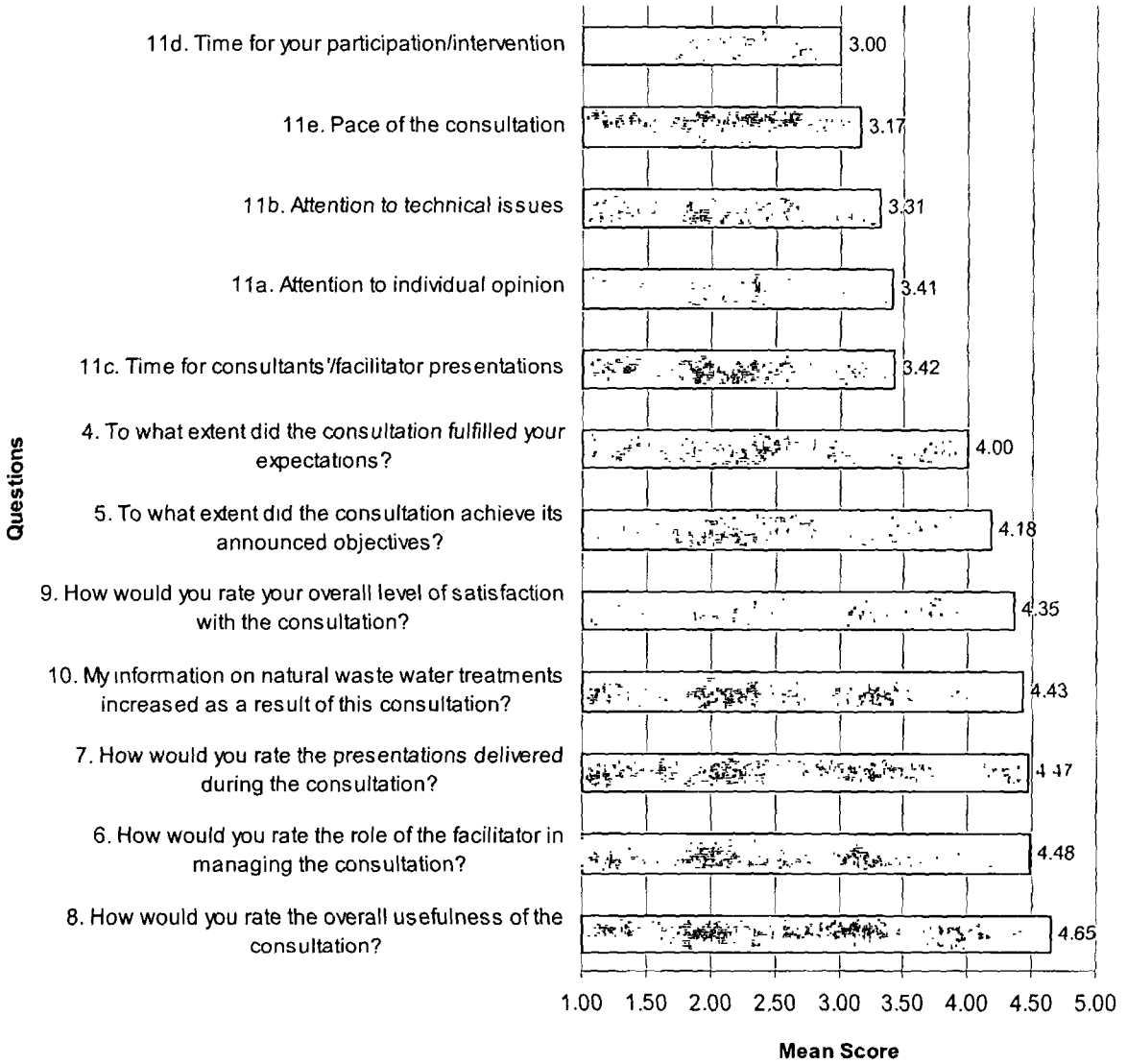
[5] Questions on information sharing were rated on a 1-5 scale, 1 meaning "strongly disagree" and 5 meaning "strongly agree."

[6] Questions were ranked on a 1-5 scale, 1 meaning "insufficient" and 5 meaning "excessive."

All Question Mean Scores



Sorted Mean Scores for All Question



Evaluation for Consultation Workshop
Results of All Questions

1. What was your main reason/interest for attending the consultation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	To share information	8	22.2	22.9	22.9
	To express my views on the subject	15	41 7	42.9	65.7
	To learn more about the subject	12	33.3	34.3	100.0
	Total	35	97.2	100.0	
Missing	System	1	2.8		
Total		36	100.0		

3. Who did you represent in the consultation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Government	20	55.6	62.5	62.5
	Civil society organization	3	8.3	9.4	71.9
	Other	9	25.0	28.1	100.0
	Total	32	88.9	100.0	
Missing	System	4	11.1		
Total		36	100.0		

Descriptive Statistics

	N	Mean	Std. Deviation
4. To what extent did the consultation fulfilled your expectations?	34	4 00	.95
5. To what extent did the consultation achieve its announced objectives?	33	4.18	.81
6. How would you rate the role of the facilitator in managing the consultation?	29	4.48	.78
7. How would you rate the presentations delivered during the consultation?	34	4.47	.71
8. How would you rate the overall usefulness of the consultation?	34	4.65	.60
9. How would you rate your overall level of satisfaction with the consultation?	34	4.35	.73
10. My information on natural waste water treatments increased as a result of this consultation?	35	4.43	.81
11a. Attention to individual opinion	32	3.41	.76
11b. Attention to technical issues	32	3.31	.59
11c. Time for consultants'/facilitator presentations	33	3.42	1.09
11d. Time for your participation/intervention	29	3.00	.93
11e. Pace of the consultation	12	3.17	.58

Annex 2. List of participants in the meetings held during the first phase of the consultation process.

A. PARTICIPANTS OF THE FIRST PHASE WORKSHOPS

LEZHE - 1ST WORKSHOP IN LEZHA - LOCAL AUTHORITIES (13/01/03)

1.	Linda Maçi	Office of juridical and foreign affairs
2.	Pashk Biba	Services Office
3.	Ndue Koleci	Head of the Shëngjin Commune
4.	Medi Gazi	Urban Sector
5.	Petrit Gjoni	Forestry Service
6.	Preng Vorfi	Forestry Police
7.	Zef Maçi	Water Supply and Sewage System
8.	Dolor Leka	Engineer (Water Supply and Sewage System)
9.	Jak Gjini	Head of Regional Environmental Agency
10.	Vath Gabili	Inspector of REA
11.	Gjok Jaku	Mayor of Lezhe
12.	Arben Bejtja	Deputy Mayor of Lezhe
13.	Arben Bakllamaja	World Bank
14.	Andreas Rohde	World Bank
15.	Claudio Purificato	World Bank
16.	Genci Gjeci	PIU Director, MTAT
17.	Claudio Serrini	SWS Consultant
18.	Ndricim Shani	PIU Consultant
19.	Daniele Calabrese	World Bank
20.	Taulant Bino	Facilitator of the Consultation Process

LEZHE - 2ND WORKSHOP - LOCAL COMMUNITIES (28/01/03)

1.	Vasil Martini	Ishull-Shengjin
2.	Kujtim Alia	Fisherman
3.	Prel Malaj	Fisherman
4.	Cesk Koldoda	Ishull-Shengjin
5.	Fran Prelaj	Ishull-Shengjin
6.	Fatmir Delishi	Chemistry specialist
7.	Yllson Zeneli	Economist, Director of Primary Health
8.	Pashk Dragusha	Agronomist
9.	Pjeter Kola	Veterinary
10.	Osman Elezi	Retired
11.	Ndue Lika	Retired
12.	Jak Gjini	Head of Regional Environmental Agency
13.	Ndue Koleci	Head of Shengjin Commune
14.	Zef Ymeraj	Head of "Ecological Club"
15.	Gjergj Elezi	Head of "Environment, Education and Health"
16.	Gege Ndoka	"Environment, Education and Health"
17.	Fatmir Dushkaj	Swiss Caritas in Lezhe
18.	Qazim Dushku	Psychologist (Education Directorate)
19.	Dila Frani	Biologist (Education Directorate)
20.	Gjin Ndoka	Geographer (Education Directorate)
21.	Faik Bejtja	Head of Cleaning Office
22.	Mark Simoni	Biologist (Lezhe Municipality)

23.	Zef Nikolla	Director of High School "Gjergj Fishta"
24.	Violeta Vurca	Economist, Caritas Switzerland
25.	Ndue Gila	Teacher (Biologist)

DURRES - 1ST WORKSHOP - LOCAL AUTHORITIES (14/01/03)

1.	Thanas Lati	Services Office
2.	Shefqet Hyka	Development Program Office
3.	Vasil Gjoni	Services Office
4.	Ekaterina Zoto	Health Office
5.	Astrit Hysaj	Secretary of the Municipality Council
6.	Ditika Ziu	Environmental Office
7.	Besnik Kertusha	Deputy Major (Municipality of Durres)
8.	Myslym Kaculi	Forestry Service
9.	Avdulla Hasani	Inspector of Forestry Service
10.	Muhamed Mema	Head of Consulting Sevice (Directorate of Agriculture and Food)
11.	Lefter Lulo	Fishery Inspector (DAF)
12.	Nadire Jani	Public Health Service
13.	Dhurata Qesja	Primary Health Service
14.	Eqerem Kapedani	Vice-Director of Fishery Research Institute
15.	Ilir Qesja	Head of Regional Environmental Agency
16.	Artin Demiri	Inspector of REA
17.	Zamir Dedej	Ministry of Environment
18.	Ndricim Shani	Consultant of PIU (Water Project)
19.	Genci Gjeci	Director of PIU - Water Project (MTAT)
20.	Claudio Serrini	WS Consultant
21.	Daniele Calabrese	World Bank
22.	Claudio Purificato	World Bank
23.	Taulant Bino	Facilitator

DURRES - 2ND WORKSHOP – LOCAL COMMUNITIES (29/01/03)

1.	Hajdar Kovaci	Architect
2.	Estref Haxhialushi	Botanist (Retired)
3.	Sali Bajo	Physician/Friend of Environment and Nature
4.	Andon Papingji	Dr. of Agricultural Sciences
5.	Koco Miho	Architect (Retired)
6.	Gani Buka	Chamber of Commerce – Durres
7.	Ekaterina Zoto	Citizen/Prefecture of Durres
8.	Selami Dakolli	Deputy Mayor (Municipality of Durres)
9.	Vasillaq Gega	Physician
10.	Edgar Frasheri	Architect
11.	Viktor Dhimgjini	Architect
12.	Bardhyl Balteza	Chemistry specialist
13.	Tasim Besho	Friends of Nature and Environment
14.	Zeqir Taga	Fishery Association
15.	Pellumb Berisha	Deputy
16.	Ndricim Shani	Consultant (PIU – Water Project (MTAT)
17.	Taulant Bino	Facilitator

SARANDE - 1ST WORKSHOP – LOCAL AUTHORITIES (10/01/03)

1. Timoleo Kajo	Deputy Mayor of Saranda
2. Dashmir Peci	Directorate of Agriculture and Food
3. Donika Birjani	Water Directorate
4. Entela Skendaj	Council of District – Vlora
5. Apostol Qiko	Geological Service – Vlora
6. Gjergji Mano	Office of Tourism Development
7. Robert Piro	Services Office – Saranda
8. Lea Gjicali	KRRT
9. Haxhi Musai	Head of Urban Development Sector
10. Shkelqim Hajno	"Ionian Profesional Journalist Association
11. Feruz Basha	Forestry Service
12. Baftjar Imeri	Head of Services Office – Saranda
13. Gjergji Mano	Head of Foreign Office - Saranda
14. Aleks Prifti	Primary Health Service
15. Frederik Deraj	Water Supply and Sewage System
16. Areti Papadhima	Regional Environmental Agency - Saranda
17. Luiza Zanaj	Regional Environmental Agency – Vlora
18. Zamir Dedej	Ministry of Environment
19. Shkelqim Hajno	Journalist
20. Artur Mazi	Engineer
21. Vladimir Gino	Consultant for the Sewage System Rehabilitation Project
22. M. Agaj	Supervisor
23. Arben Bakllamaja	World Bank
24. Xavier Chauvot de Beauchene	World Bank
25. Andreas Rohde	World Bank
26. Claudio Purificato	World Bank
27. Genci Gjeci	PIU Director, MTAT
28. Claudio Serrini	SWS Consultant
29. Ndricim Shani	PIU Consultant
30. Daniele Calabrese	World Bank
31. Taulant Bino	Facilitator of the Consultation Process

SARANDA- 2ND WORKSHOP - LOCAL COMMUNITIES (31/01/03)

1. Mitro Zhupa	Geologist
2. Qani Sejdini	Environmental Association of Saranda (Forestry Engineer)
3. Pushime Demko	"Environment and Tourism" Association
4. Aleks Naco	Aliko Commune
5. Pellumb Ademi	Cuka village
6. Areti Papadhima	Engineer
7. Agim Mato	Agimi Association, "Jimi Monako" Culture Center
8. Robert Lala	Agimi Association, "Jimi Monako" Culture Center
9. Gjergji Mano	Office of Tourism Development
10. Suzana Mehmeti	Office of Tourism Development
11. Shkelqim Hajno	"Ionian Profesional Journalist" Association
12. Mitro Zhupa	Geologist
13. Baftjar Imeri	Geologist
14. Taulant Bino	Facilitator

TIRANA - WORKSHOP WITH NGOS AND SPECIALISTS (18/02/03)

1. Besnik Baraj	Deputy Minister (Ministry of Environment)
2. Enkelejda Patozi	Value Add – Consultancy Company
3. Entela Cobani	Faculty of Construction Engineering
4. Anni Koci	GEF/Small Grants Programme
5. Arben Bakllamaja	World Bank
6. Perikli Qiriazi	Geography Department (Tirana University)
7. Lirim Selfo	PMU Ohrid Project (MoE)
8. Dhimiter Haxhimihali	Fac. of Nat. Sciences/Association of Industrial Ecology
9. Niko Pano	Association for the Preservation of Coastal Waters
10. Xhemal Mato	Masmedia and Environment
11. Arben Pustina	MedWetCoast Project
12. Mihallaq Qirjo	Regional Environmental Center
13. Violeta Zuna	MedWetCoast Project
14. Aleko Miho	PPNEA/ FNS
15. Sajmir Beqiraj	APAWA/Museum of Natural Sciences
16. Ferdinand Bego	ASPBM/Museum of Natural Sciences
17. Marieta Mima	ECAT-Tirana
18. Zamir Dedej	Director of Nature Conservation Department (MoE)
19. Ndricim Shani	Consultant – PIU (Water Project)
20. Taulant Bino	Facilitator

B. PARTICIPANTS OF THE SECOND PHASE WORKSHOPS

LEZHE - FINAL WORKSHOP (22/04/03)

1. Gjok Jaku	Mayor of Lezhe
2. Luigj Isufi	Head of Lezhe District
3. Ndue Koleci	Head of the Shëngjin Commune
4. Pjeter Kola	Lezhe Municipality
5. Edi Zhubi	Lezhe Municipality
6. Rita Lacaj	Lezhe Municipality
7. Martin Dedaj	Council of Lezhe District
8. Gezim Ndoj	Service Office (Prefecture of Lezhe)
9. Hasan Muca	Head of Coordination Office (Prefecture of Lezhe)
10. Zef Maçi	Water Supply and Sewage System
11. Jak Gjini	Head of Regional Environmental Agency
12. Tonin Ndreka	Forestry Service Directorate of Lezhe
13. Zef Ymeraj	Head of "Ecological Club"
14. Gjergj Elezi	Head of "Environment, Education and Health"
15. Mirela Kamberi	Pollution Directorate – Director, Ministry of Environment
16. Besnik Baraj	Deputy Minister of Environment
17. Genci Gjeci	PIU Director, MTAT
18. Ndricim Shani	PIU Consultant
19. Taulant Bino	Facilitator of the Consultation Process

DURRES – FINAL WORKSHOP (02/05/03)

1. Miri Hoti	Mayor of Durres
2. Besnik Kertusha	Deputy Major (Municipality of Durres)
3. Edmond Agolli	Municipality of Durres
4. Roland Xhelili	Prefecture of Durres
5. Vasil Gjoni	Services Office (Prefecture of Durres)
6. Liri Domi	Public Health Service
7. Dhurata Qesja	Primary Health Service
8. Edgar Frasheri	Architect
9. Ilir Qesja	Head of Regional Environmental Agency
10. Artin Demiri	Inspector of REA
11. Pellumb Berisha	Deputy
12. Bajram Mejdiaj	Ministry of Environment
13. Zamir Dedej	Ministry of Environment
14. Besnik Baraj	Deputy Minister (Ministry of Environment)
15. Arben Demeti	Deputy Minister (Ministry of Territorial Adjustment and Tourism)
16. Genci Gjeci	PIU Director, MTAT
17. Ndricim Shani	PIU Consultant
18. Taulant Bino	Facilitator of the Consultation Process

SARANDE – FINAL WORKSHOP (25/04/03)

1. Timoleo Kajo	Deputy Mayor of Saranda
2. Rajmonda Gjoni	Deputy Prefect of Saranda district
3. Kristo Kaishi	Head of Aliko Commune
4. Entela Skendaj	Council of District – Vlora

5. Baftjar Imeri	Head of Services Office – Saranda
6. Areti Papadhima	Regional Environmental Agency - Saranda
7. Luiza Zanaj	Regional Environmental Agency – Vlora
8. Vladimir Gjino	Consultant for the Sewage System Rehabilitation Project
9. Qani Sejdini	Forestry Service Directorate of Saranda
10. Apostol Qiko	Geological Service Vlore-Sarande
11. Zamir Dedej	Ministry of Environment
12. Pellumb Abeshi	Secretary General (Ministry of Environment)
13. Genci Gjeci	PIU Director, MTAT
14. Ndricim Shani	PIU Consultant
15. Taulant Bino	Facilitator of the Consultation Process

Annex 5

STRENGTHENING OF THE MANAGEMENT, MONITORING AND ENFORCEMENT CAPACITY IN WETLAND AND COASTAL AREAS

Strengthening of the management, monitoring and enforcement capacity in wetland and coastal areas

1.0 Project background

The project proposal refers to the polluted areas of Durres, Lezhe and Saranda, characterized by different morphological, hydrological and biological features. Wetland construction combined with primary and secondary stages of treatment plants have been envisaged as future solutions to reduce environmental pollution and preserve the biodiversity.

The implementation of the wetland construction project implies the existence and availability of water quality standards and of assessment procedures, to compare and to evaluate the correspondence of the intervention results with the expected rehabilitation objectives and biodiversity preservation.

This means to increase progressively **the enforcement capacity of controlling the environmental processes and of introducing EIA procedures.**
Suitable priority sites for intervention will be those where defense and protection of natural resources and biodiversity are emphasized and reduction of water pollution can produce more consistent direct and indirect benefits.

As a consequence, links between water quality standards, monitoring activities and impact assessment procedures have to be searched and analyzed, to implement the enforcement capacity.

2.0 Project objectives

This proposal concerns the consultancy and the assistance of the Ministry of Environment in enhancing the management of the wetlands and coastal areas, involved by intervention works implementation, under the GEF-component.

Proposal is to promote a **"Pilot Project"**, to enforce and harmonize, to European standards, some of the existing or under implementation environmental laws, issued by MoE.
The project components will concern:

- **Water quality monitoring and enforcement.** The monitoring of effluent quality and compliance with Albanian Standards are the responsibility of MoE. Application procedures will be studied and organized;
- An implementation and specification of the **"Environmental Impact Assessment"** during and after works in protected areas, where pollution control and natural resources protection are often associated with Sustainable Development Planning. The ***specific EIA during works*** for these Areas should represent a **Decisional Support System**, for the reliability estimate and efficiency verification of the Intervention Management Plan. An Information System based on GIS techniques will be foreseen;
- A specific **training course**, with the participation of technical staff of the MoE and of the local authorities of Durres, Lezhe and Saranda, where wetland construction is envisaged, will be carried out, with the scope of strengthening the management, monitoring and assessment capacity.

3.0 Project methodology and contents

The proposed methodology implies the development of a Detailed Monitoring Program shared in three stages, focused preliminarily on :

a) Provide water quality standards and law enforcement for water protection

At present, no detailed legislation on specific standards for domestic sewage discharges into surface waters has been enacted yet in Albania, but a "*Wastewater Quality Law*" is under discussion on Parliament. Therefore at the moment only international regulations and limits for the typical waste water concentrations to be attained, can be taken into account for comparisons.

Being water the basic element for the development of biological resources and biodiversity conservation of the Protected Area and wetlands, acceptable water quality condition and dynamical regimes have to be guaranteed
Availability and application of Water Quality Standards and limits at the waste waters discharge points, referred to water matrix, biota and sediments, will be specified for all water systems, by issuing an up-dated technical water standard reference scheme.

Criteria for monitoring program will be the following:

- water bodies will be divided in rivers, lakes, transitional water and wetlands, marine coastal zone, sensible area for cyprinids and salmonids life, drinkable waters natural resources;
- parameters to be measured will be those controlling the eutrophication process in the river, in the lagoon and in the coastal zone, so covering biochemical measures as well as biological parameters ;
- procedures for the classification of water bodies and biota will be identified;
- criteria to identify water quality objectives will be proposed;
- parameters as indicators of some specific pollution of anthropogenic origin will be taken into account;
- matrices to be investigated will be water, sediment and biota, for the computation of EBI ;
- locations for sampling will be representative of boundary conditions (river flow, lagoon entrance, loads discharge points, off-shore), of sensible areas in the lagoon and of the spreading phenomena from pollution sources;
- frequency of sampling will be carried out monthly for eutrophication parameters, four times a year for biological factors, twice a year for sediments.

Rules and procedures will be drown in cooperation between consultant and local experts.

b) identify a Monitoring program during the construction of the CTW

The EA carried-out identified potential negative impacts of the project during construction: e.g. inappropriate disposal of excavated materials, construction debris and small quantities of hazardous wastes; environmental damage caused by contractors during the construction activities.

During project implementation, procedures will be introduced to ensure that potential negative impacts as a result of the project are mitigated. Environmental indicators will be monitored and obligations, for implementation in accordance with the new Law on Environmental Protection under GoA approval and OP 4.01, will be detailed and included in the contracts with operators.

c) CTW Monitoring during Operational Phases

The monitoring of effluent quality and compliance with Albanian Standards are the responsibility of MoE.

To ensure the satisfactory functioning and the sustainability of the wetland system the following monitoring operation are suggested to MoE:

- **CTW water compliance Monitoring.** Compliance monitoring is largely determined by the relevant environmental legislation and conditions imposed by the approval authorities. Compliance monitoring should characterize the quality of the effluent well enough to evaluate its likely impact on the receiving water. Situations will vary but compliance monitoring should at least determine seasonal variations in the concentration of: *BOD, suspended solids, dissolved oxygen, temperature, electrical conductivity, pH, total nitrogen, total phosphorus, and same indicator measure of pathogens(Ecoli), Flow, ammonium, filterable reactive phosphorus and nitrate* monitoring may also be required.

- **CTW Performance Monitoring.** Performance monitoring is essentially a two-stage process. The first stage is to monitor all the necessary quantity variables to be able to construct a water balance model for the system. Preferably this requires a simultaneous continuous record of: *inflow, outflow, water level, rainfall and evaporation.* The second stage is to sample the range of flow conditions for water quality. The combination of these datasets allows the estimation of loads in and out of the wetland and an accurate determination of the mass of pollutants removed by the wetland.

- **Protection of receiving waters and surrounding environment**. Variables to monitor in addition to the compliance list include: *total oxidised nitrogen, ammonium, and filterable reactive phosphorus.* In addiction monitoring of **wetland fauna** can be useful in assessing the overall health of the wetland community. Typically, aquatic macro invertebrates can be used for this purpose. Pest species (eg. mosquitoes) in particular need to be regularly monitored. Other species, like birds, need to be regularly monitored also. Birds that either eat aquatic vegetation or use it for habitat and nesting can cause major damage to wetland vegetation.

d) Strengthening of the enforcement capacity.

At the end of the project development, a short **training course** will be organized and carried out with the cooperation of the MoE personnel and its participation. Representatives of local Authorities from Durres, Lezhe and Saranda will also be involved in the training, in order to enforce the local monitoring and management capacity and to increase awareness of the environmental problems.

The training course will last for a two-weeks period, involving at least 20 technicians with biological, hydrological, geological, environmental engineering background and competences. In agreement with MoE, the following environmental aspects will be analyzed:

- Water quality standards and EIA procedures;
- Monitoring criteria and techniques in coastal zones and transitional waters systems;
- Artificial wetlands construction and maintenance procedures;
- Efficiency control techniques and EIA application methods;
- Coastal dynamics, sediment balance and water circulation in lagoons and internal systems;
- GIS application to water systems.

The Training course will have a practical character, by identifying, with the participation of local representatives of Durres, Lezhe and Saranda, the monitoring program (parameters,

sampling frequency and location, analytical methods, data processing, IT resources, etc), according to the rules and procedures previously established and agreed by MoE. Organization, time schedule and resources will be identified even in agreement with case histories which will be analyzed during the training.

4.0 Timing and Organization

The overall timing for the accomplishment of the **Strengthening monitoring and enforcement capacity Project** will be of 6 months.

Team work organization will foreseen n°1 abroad expert with specific competences in water quality planning and natural resources management, with a participation of albanian scientists and experts.

5.0 Costs estimate

Total costs is 101.500 US $, shared in

Tab.5.1-Strengthenig component-Cost evaluation

Description	Unit price ($)	Q.ty	Total Amount ($)
Equipments			
CPU and accessories	3.500	3	10.500
Consultants Remuneration			
International Expert incl. allowance	18,000	2 m/month	36,000
Local Experts	4,000	6 m/month	24,000
Rembursables			
International fly	800	3	2,400
Local transportation	1,800	2 months	3,600
Training			
Organization and direction			3.000
Direct costs (renting, transports)			2.000
International Teachers (5 experts)	100/hour	80	8.000
Local allowances for teachers	120/day	20	2.400
Documentation preparation			5.600
International fly	800	5	4,000
Total cost			**101,500**

Annex 6

CTW'S OPERATION AND MAINTENANCE PLAN AND MONITORING OUTLINE

1.0 Operation and Maintenance Plan

The operation & maintenance (O&M) plan describes the procedures for operation and ongoing maintenance to ensure the wetland and the associated facilities perform to an acceptable standard, the design objectives are met and O&M costs are saved by early detection of problems.
To ensure the satisfactory functioning and the sustainability of the wetland system the following maintenance activities are suggested:

- Aquatic plants should be periodically monitored to ensure weed or nuisance species have not established and, if so, the physical removal of these species should be promptly carried out;
- Careful water level control should be maintained at all times;
- Some harvesting of wetland plants may be beneficial to maintain access for predators, to invigorate plant growth, remove excess biomass and remove some nutrients;
- Management or control of mosquitoes can include plant density control, fluctuating water levels, introducing native mosquito eating fish and maintaining a balanced eco-system;
- Clearance of any blockages of weirs, inlets and outlets.

Problems with operation and maintenance can occur when:

- natural disasters take place;
- wetland is plagued with weed problems;
- wetland is poorly designed and constructed;
- wetland is overloaded, hydraulically and organically;
- operator is not familiar with the system;
- build-up of solids and debris is not periodically removed;
- wetland plants are disturbed by birds.

The CTW's Operation and Maintenance activities and duty are shown in Tab 1.1

An operation and maintenance plan provides the framework for system management whereby the operator can make informed decision and take actions. To be effective the operator should have a knowledge of plant and weed species identification and basic wetland ecology. Should a problem be more complex then relevant expertise and advice should be sought.

Normally the CWT will not require the employment of additional specialist personnel but be managed and monitored by existing environmental, engineering and operations staff (i.e. Albanian Ministry of Environment or Ministry Public works) . Periodically, a review of the wetland performance and condition by a specialist in this field is recommended.

An example of a wetland O&M schedule is provided in Tab.1.2, including the expected frequency of O&M activities.

Table 1.1-Operation & Management Activities and Duties

Activity	Duty/Responsibility
Solids accumulation	Solids removed over 75 mm depth. Determined by regular inspections & depth measurement Do not damage margin vegetation during removal. Dispose solids in approved location.
Debris removal	Remove from inlet zone, macrophyte zone and ensure outlet weirs are clear. Dispose debris in approved location
Open water zones	Remove any emergent or floating vegetation within open water zones. Check and remove any sediment accumulation over 75 mm in depth Dispose sediment in approved location Do not damage margin vegetation
Weed Control **Assess plant diversity**	Identify invasive and noxious weeds and remove by physical means preferably Apply chemical eradication method using approved methods end chemicals Wetland level may be temporaly lowered to help identify nuisance weeds. Dispose weeds in an approved location. Cheek thet species are not tending to dominate. Remove plants indicating domination or developing as a monoculture. Dispose surplus plants in an approved location.
Harvesting needs	Floating plants should be drawn off if very dense Emergent plants can be cut or Control burned after lowering the water level. Burning should be restricted to early spring and be of low intensity Dispose of surplus plants in an approved location
Mosquito control	Regular inspections identify problems. Report complaints Regular changes in water level, native fish stocking, check on vegetation densities, avoid stagnant zones, and/or seek specialist
Replanting needs	Replace dead wetland plants with approved species Control water depth during replanting establishment period Check areas tending to channelise and short-circuit and replant accordingly. Ensure minimal disturbance to existing plants during replanting.
Water level control	Take particular care during plant establishment phase Make adjustments at the outlet weir structure. Assess wetland ability to cope with variations of inflow. Lower water levels prior to a forecasted wet event.
Erosion & scour damage	Undertake inspections following events, report and undertake remedial work to structures, earthforms and vegetated areas. Repair any bank erosion Minimise disturbance to vegetation

Table 1.2-Example Wetland Operation & Maintenance Schedule

OPERATIONS *w =weekly* *m =monthly* *e =after peak flow* *b =bi - annually*	**Operation and Maintenance Activity**	**Inlet Structure**	**Inlet Zone**	**Rock Work**	**Macrophyte Zone**	**Outlet Structure**	***Wetland embankments***
Solids accumulation	Remove & dispose accumulations over 75 mm in depth		*e,m*				
Debris	Remove & dispose		*e,m*	*e,m*	*e,m*	*e*	
Scour damage	Inspect, report & make repairs	*e,m*	*e,m*	*e,b*		*e,m*	*e,m*
Noxious plants	Remove & dispose		*m*		*m*		
Harvesting need	When densities indicate overgrowth Conditions, harvest & dispose				*m*		
Structure check	Undertake necessary repairs	*e,m*		*e,m*		*e,m*	*e,m*
Mosquito checks	Inspect and report if a problem		*m*		*w*		
Replanting need	As plant die, replace with selected species				*m*		
Water level adjustment	Undertake during plant establishment phase				*w*	*e,w*	

2.0 Monitoring

Environmental monitoring can be undertaken at various levels of detail to satisfy a number of purposes. Wetlands can be monitored for:

- compliance to licence conditions;
- performance assessment;
- operational control and maintenance.

The objectives for any monitoring program need to be clearly outlined. Purpose and objectives of the monitoring will tend to determine what variables are assessed and in what detail. Most monitoring programs need to be individually designed to focus on the specific requirements of the system, the level of detail required and how the results will be used. For example:

- monitoring for compliance may only characterise the quality of the effluent;
- monitoring for performance will require the determination of the quantity and quality of both the influent and effluent;
- monitoring for operational control and maintenance may focus on how treatment performance and wetland structure varies spatially within the system and over time.

Compliance Monitoring

Compliance monitoring is largely determined by the relevant environmental legislation and conditions imposed by the approval authorities. Compliance monitoring should characterise the quality of the effluent well enough to evaluate its likely impact on the receiving water. Situations will vary but compliance monitoring should at least determine seasonal variations in the concentration of: BOD, suspended solids, dissolved oxygen, temperature, electrical conductivity, pH, total nitrogen, total phosphorus, and same indicator measure of pathogens(Ecoli), Flow, ammonium, filterable reactive phosphorus and nitrate monitoring may also be required.

Performance Monitoring

Performance monitoring is essentially a two-stage process. The first stage is to monitor all the necessary quantity variables to be able to construct a water balance model for the system. Preferably this requires a simultaneous continuous record of: inflow, outflow, water level, rainfall and evaporation. The second stage is to sample the range of flow conditions for water quality. The combination of these datasets allows the estimation of loads in and out of the wetland and an accurate determination of the mass of pollutants removed by the wetland.

In terms of protection of receiving waters, it is usually the mass of pollutant input that is critical rather than the simple concentration. Variables to monitor in addition to the compliance list include: total oxidised nitrogen, ammonium, and filterable reactive phosphorus.

Operational Control and Maintenance

Operational control and maintenance monitoring is designed to provide information to help manage the performance of the system. To adequately manage a wetland treatment system requires some information on all wetland components: inflow, through flow, outflow, substrate and detritus, micro biota, flora, and fauna.

Tab.2.1-Operational Control and Maintenance Monitoring Components summarises the typical component of operational monitoring.

An important element of operational and maintenance monitoring is that it must be linked lo appropriate management responses so that remedial action is timely. Appropriate response times can vary considerably. For example microbial communities may start to respond to a change in organic loading within hours. Depending on conditions, mosquitoes can complete their entire life cycle in as little as 7 to 10 days. Consequently mosquito control procedures have to be initiated immediately after a risk is detected. Many aquatic plant species form large vegetative stands that may survive for many years. Consequently actions undertaken to manage aquatic plants (drying cycles or water level changes) may take an entire growing season to become evident. Operational

and maintenance monitoring forms an important link in the adaptive management feedback system for successful wetland operation.

Table 2.1-Operational Control and Maintenance Monitoring Components

Component	Monitoring Focus	Suggested Frequency	Typical/possible management response
Inflow, throughflow outflow	Monitoring these components can be based on performance monitoring. The main difference is the additional monitoring of throughflow within the wetland. These additional sites allow the spatial vadation and rate of treatment processes to be described.	Quantity=continuous/daily Quality = can be highly variable depending on the system (daily to weekly).	Vary influent load, change operational water depth, instigate a drying cycie.
Substrate and Detritus	Monitoring the composition of these components allows the build up of litter to be tracked, the effectiveness of drying cycles to be assessed and the accumulation of phosphorus and toxicants to be evaluated.	Quarterly to annually.	Vary organic load, change operational water depth, instigate a drying cycle, change toxicant pre-treatment.
Microbiota	Monitoring of wetland microbiota can be either direct or indirect. Direct methos include determining organic matter degradation rates by placing artificial substrates into the wetland or incubation of sediment cores to determine denitrification potential. Indirect methods include tracking changes in BOD as a measure of organic carbon degradation or tracking the conversion of organic nitrogen to ammonium and to nitrate.	Indirect measures can be incorporateci into performance monitoring Direct measures quarterly to annually.	Vary organic load, change operational water depth, instigate a drylng cycle.
Flora	Monitoring of wetland vegetation allows the composition, evenness and density of plant cover to be recorded. Variations in these parameters can influence performance. Standing litter load can also be assessed.	Roudne-quartely to annually. Inspections should also occur after major environmental events, eg. flood, strong winds, frosts.	Change operational water depth, instigate a drying cycle, harvest standing litter, instigate weed control, initiate spot replanting, modify edge zone management.
Fauna	Monitoring of wetland fauna can be useful in assessing the overall health of the wetland community. Typically, aquatic macroinvertebrates can be used for this purpose. Pest species (eg. mosquitoes) in particular need to be regulary monitored. Other species, like birds, need to be regulary monitored also. Birds that either eat aquatic vegetation or use it for habitat and nesting can cause major damage to wetland vegetation.	Health assessment=annually. Pest monitoring=weekly.	Vary organic load, change operational water depth, instigate a drying cycle, instigate pest (mosquito) contro] procedures, modify edge zone management, review terrestrial vegetation layout-re-plant to interrupt water bird approach paths to the wetland.

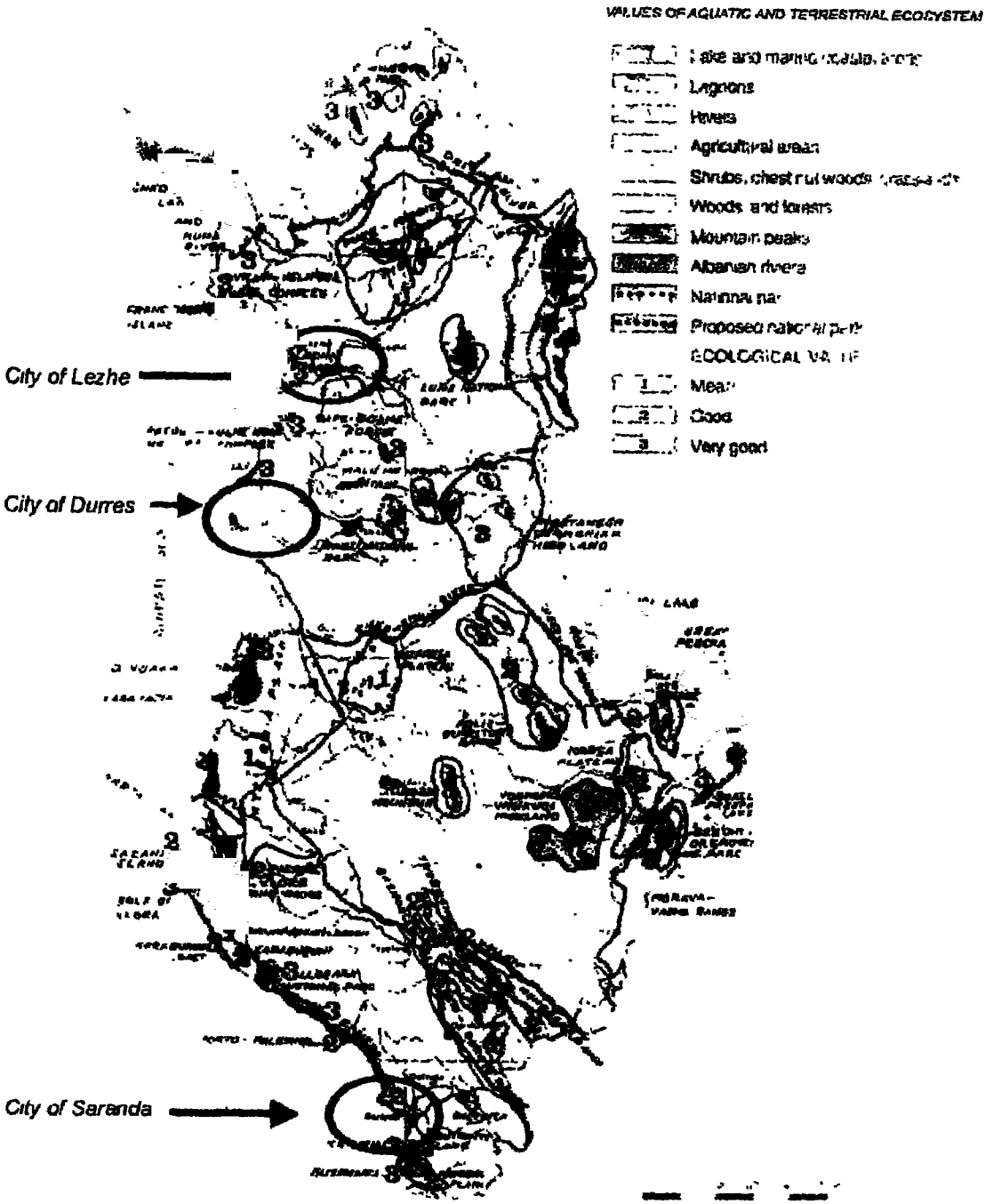


Fig. 1 PROJECT AREAS

GEOLOGICAL MAP OF LEZHA AREA

Scale 1: 100 000

Adopted from the Geological Map of Albania, Scale 1 200 000

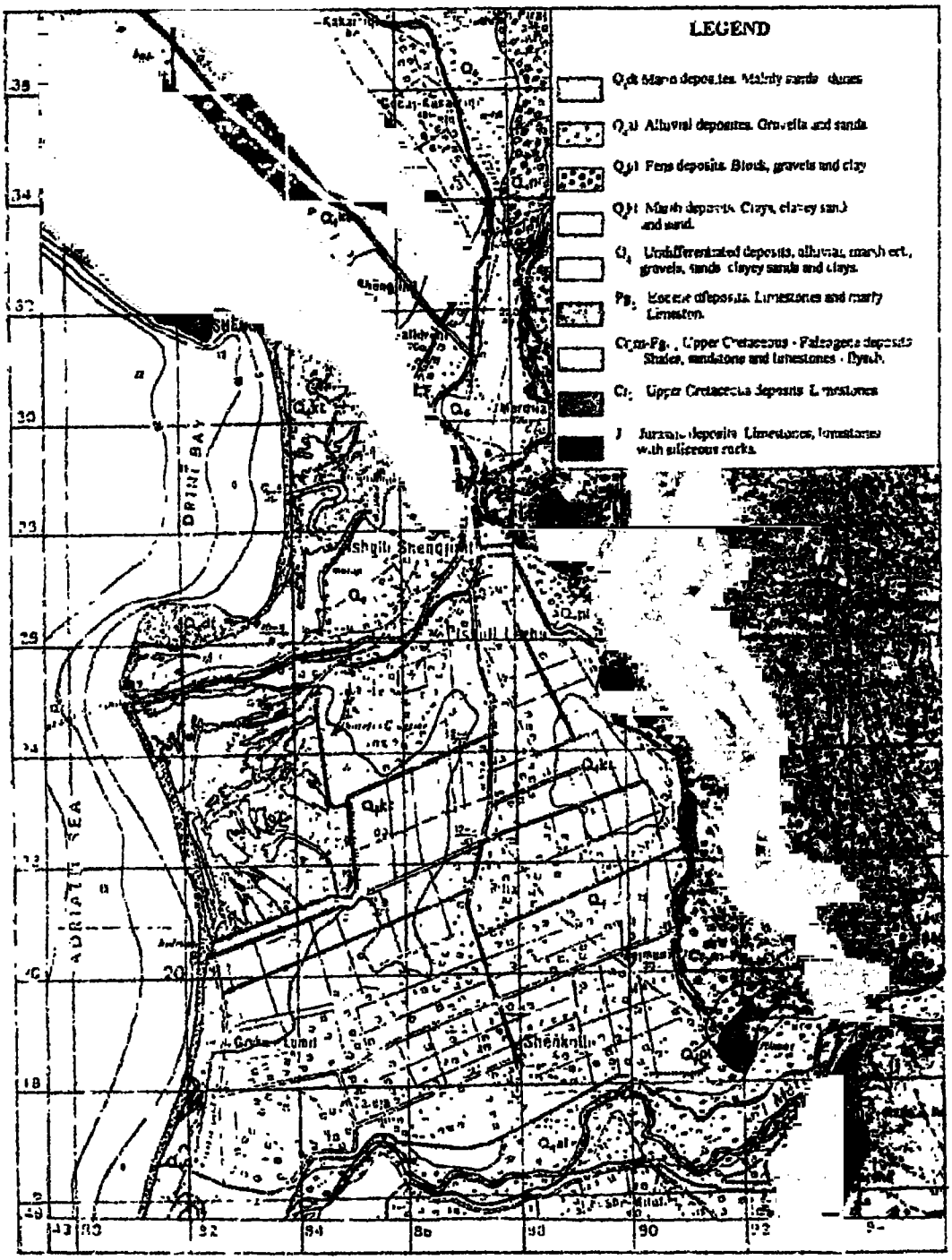
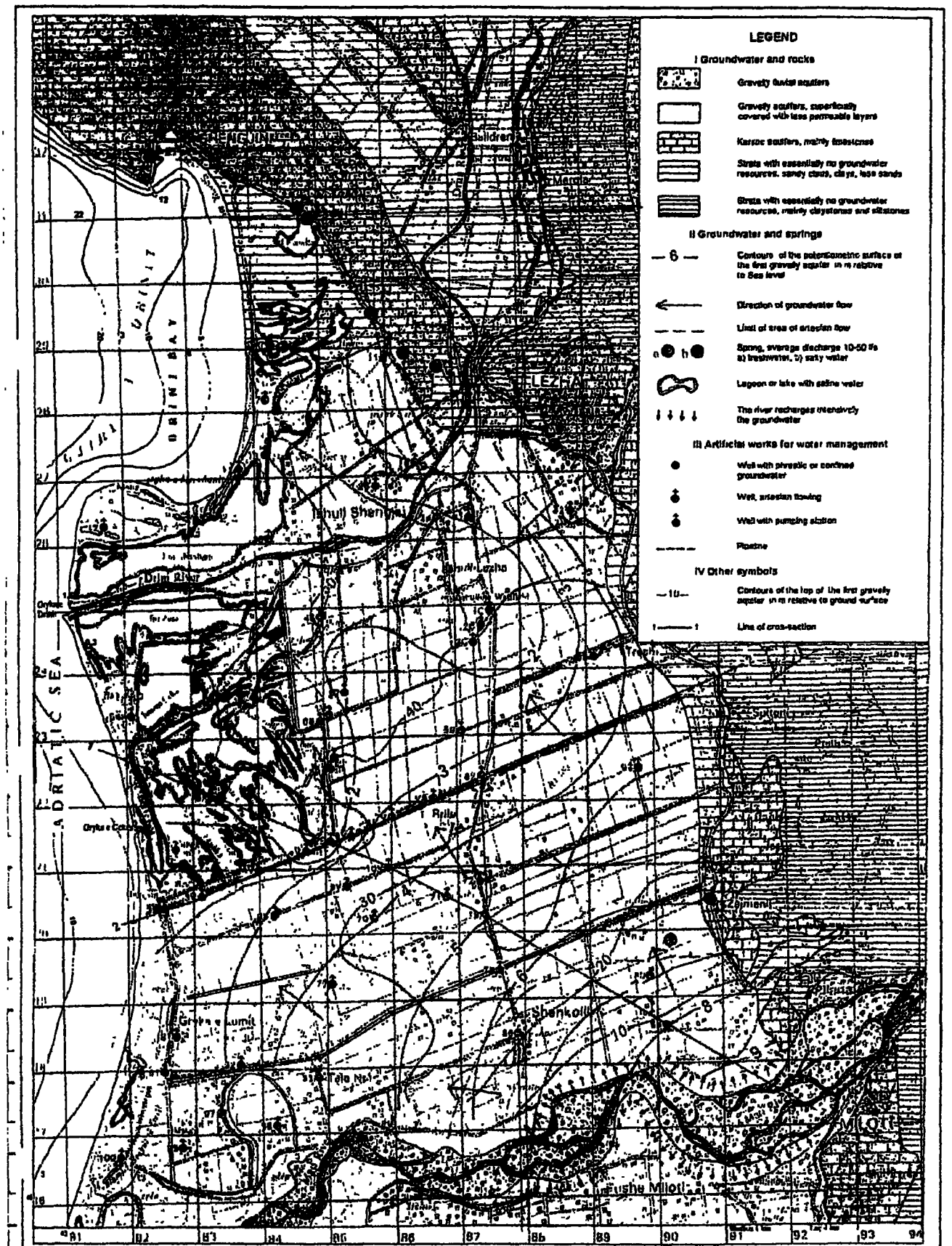


FIG. 2

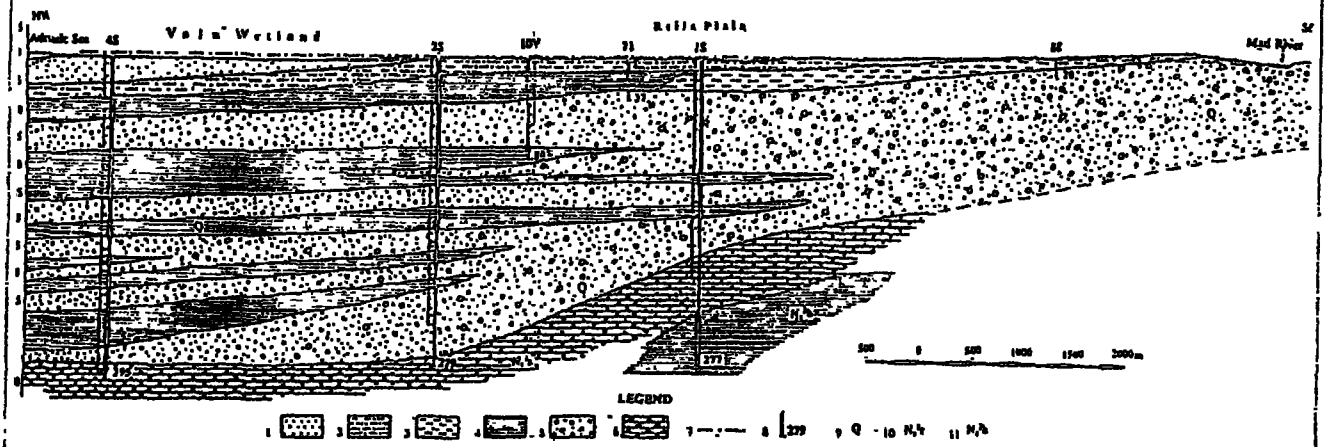
HYDROGEOLOGICAL MAP OF LEZHA PLAIN

Reduced from the Hydrogeological Map scale 1:50 000

FIG. 3

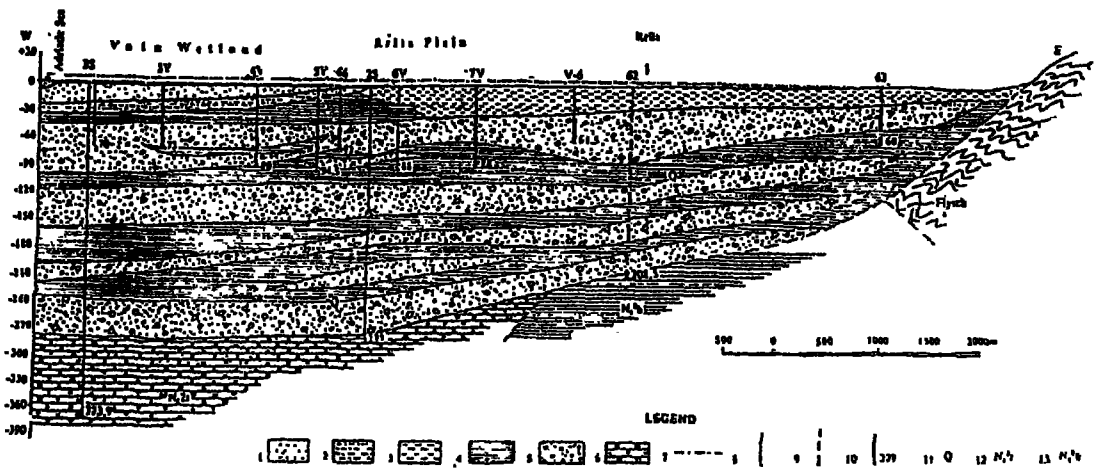


HYDROGEOLOGICAL CROSS - SECTION 1 - 1 IN LEZHA PLAIN



1. Sand 2. Clayey sand 3. Silty clay 4. Clay 5. Gravel 6. Conglomerate 7 Piezometric level
8. Well screen and well depth, m 9 Quaternary deposits 10. Upper Pliocene deposits 11 Lower Pliocene deposits

HYDROGEOLOGICAL CROSS - SECTION 2 - 2 IN LEZHA PLAIN



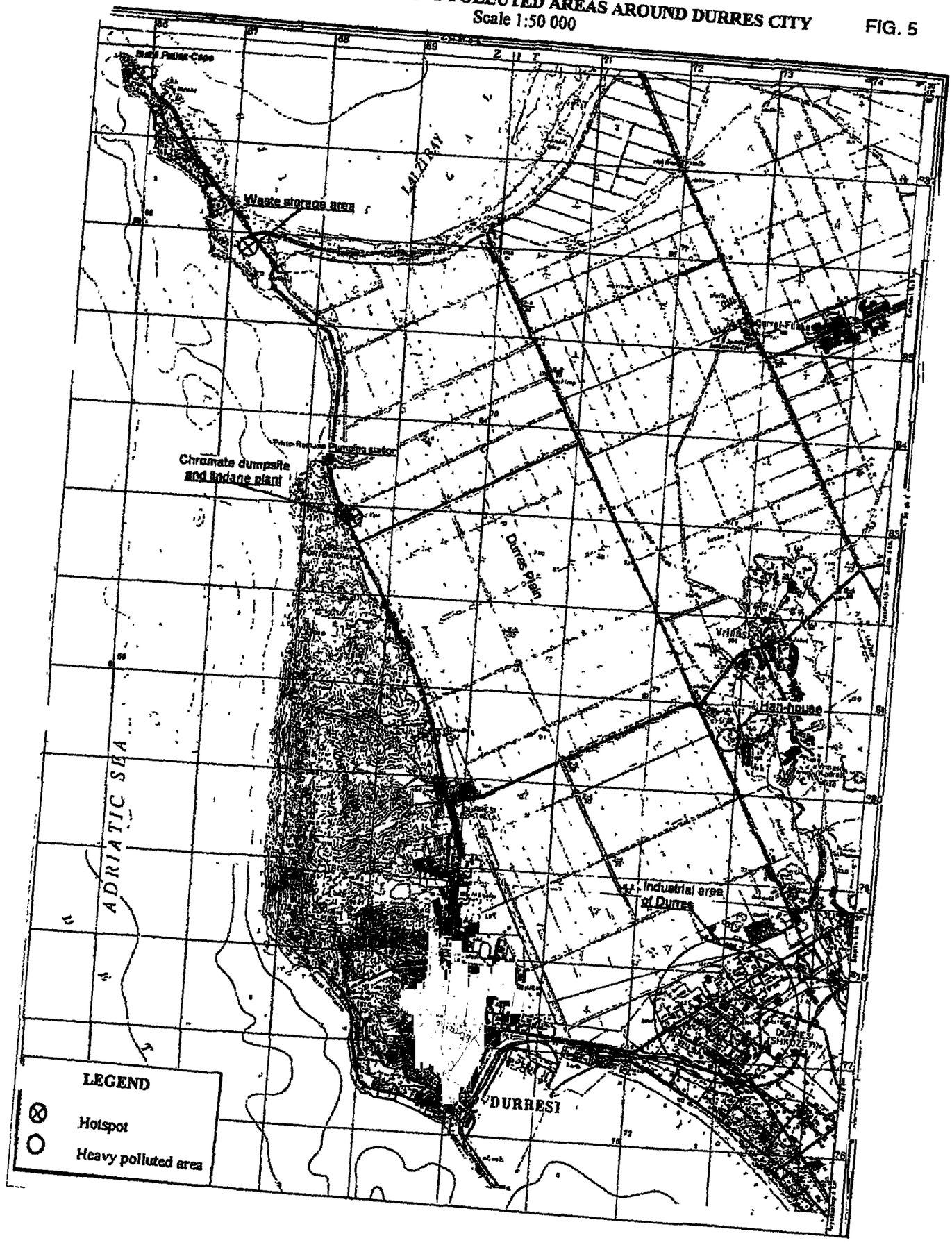
1. Sand 2. Clay to sand 3. Silty clay 4. Clay 5. Gravel 6 Conglomerate 7. Piezometric level
8. Well on the cross - section line 9. Well projected on the cross - section line 10 Well screen, and well depth, m. 11 Quaternary deposits 12. Upper Pliocene deposits 13. Lower Pliocene deposits

Compiled by Romeo Eftimi

FIG. 4

HOTSPOTS AND HEAVY POLLUTED AREAS AROUND DURRES CITY
Scale 1:50 000

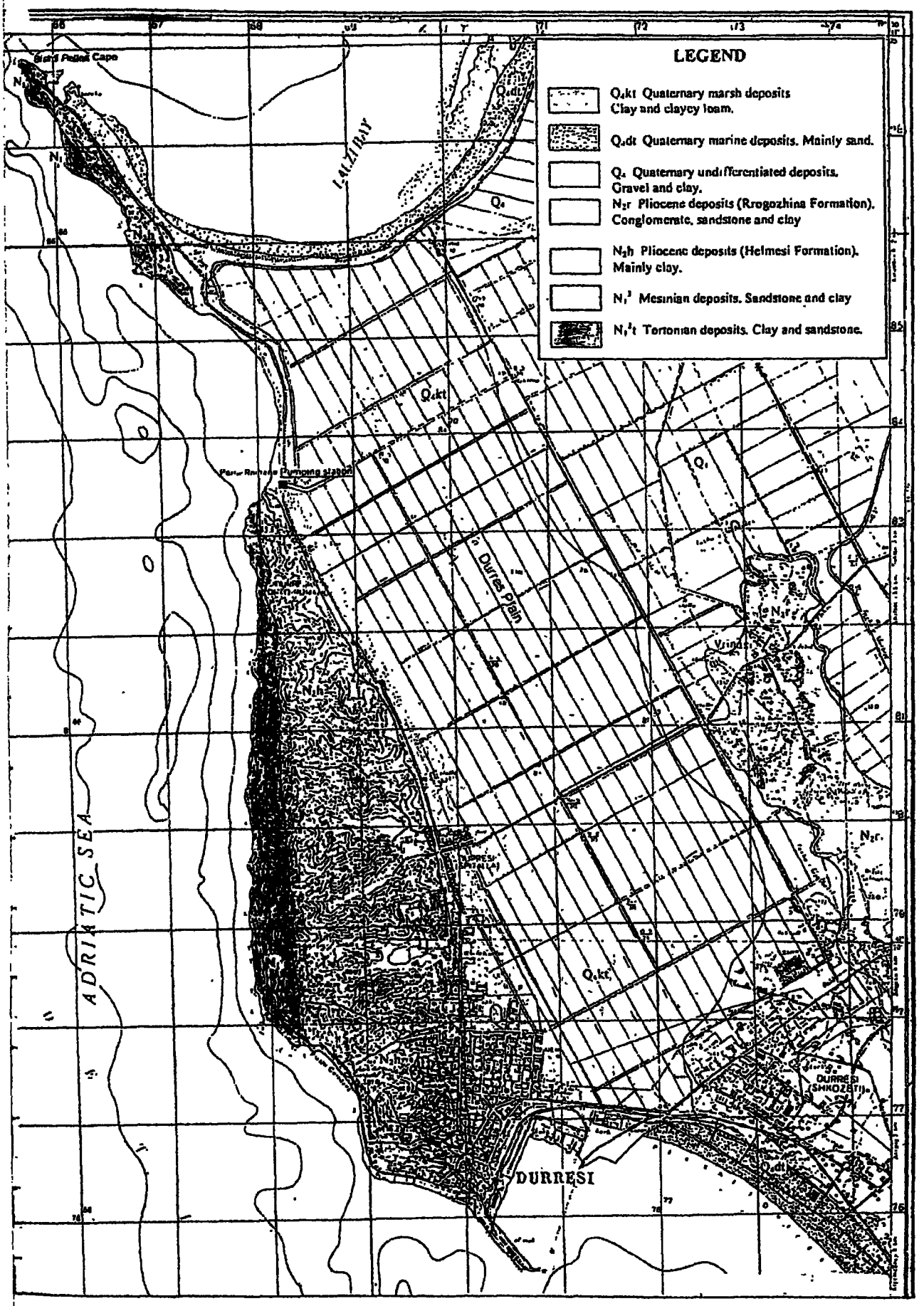
FIG. 5



GEOLOGICAL MAP OF DURRES AREA

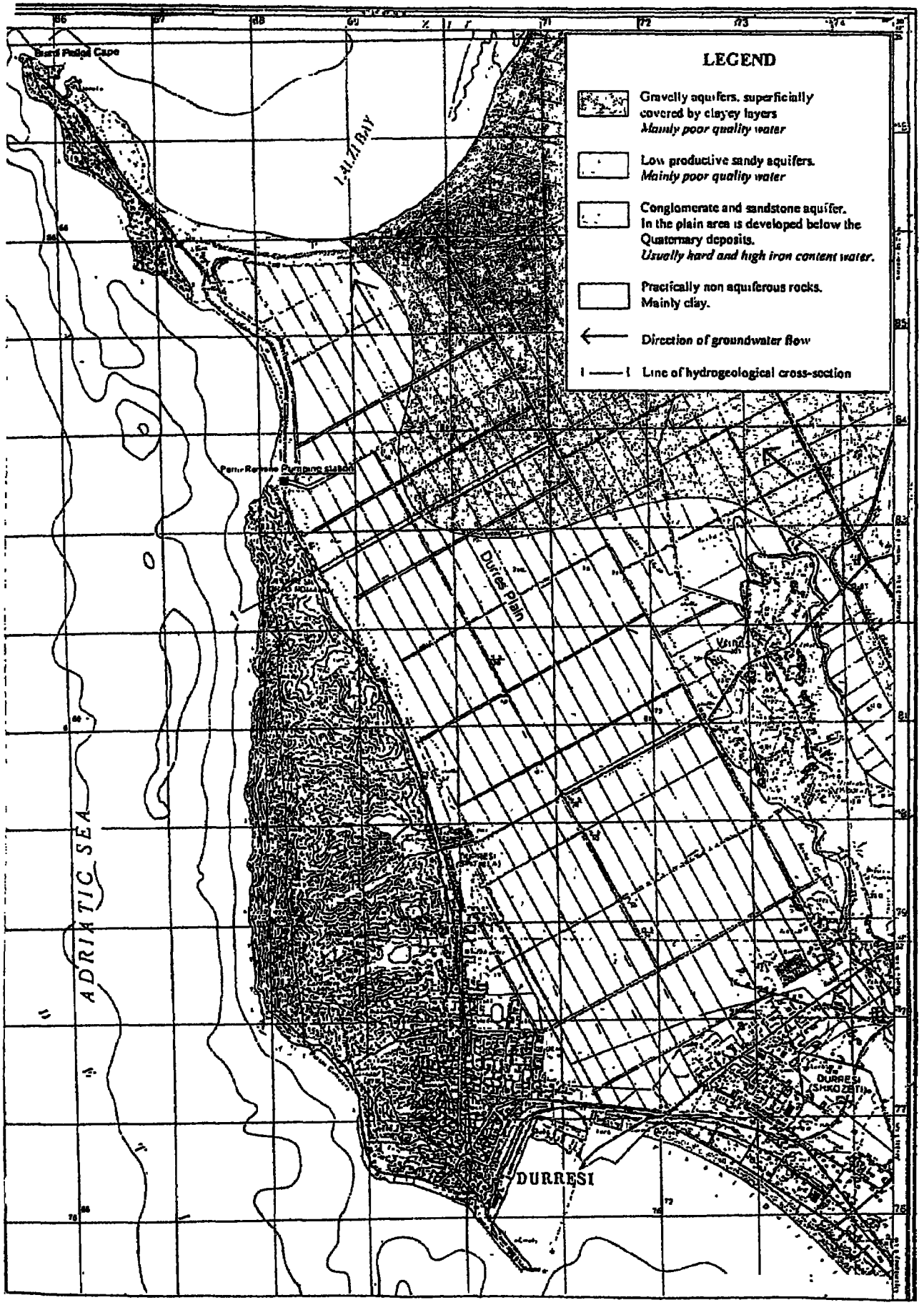
Elaborated from the Geological Map of Albania Scale 1:200 000

FIG. 6



HYDROGEOLOGICAL MAP OF DURRES AREA
Elaborated from the Hydrogeological Map of Albania Scale 1:200 000

FIG. 7



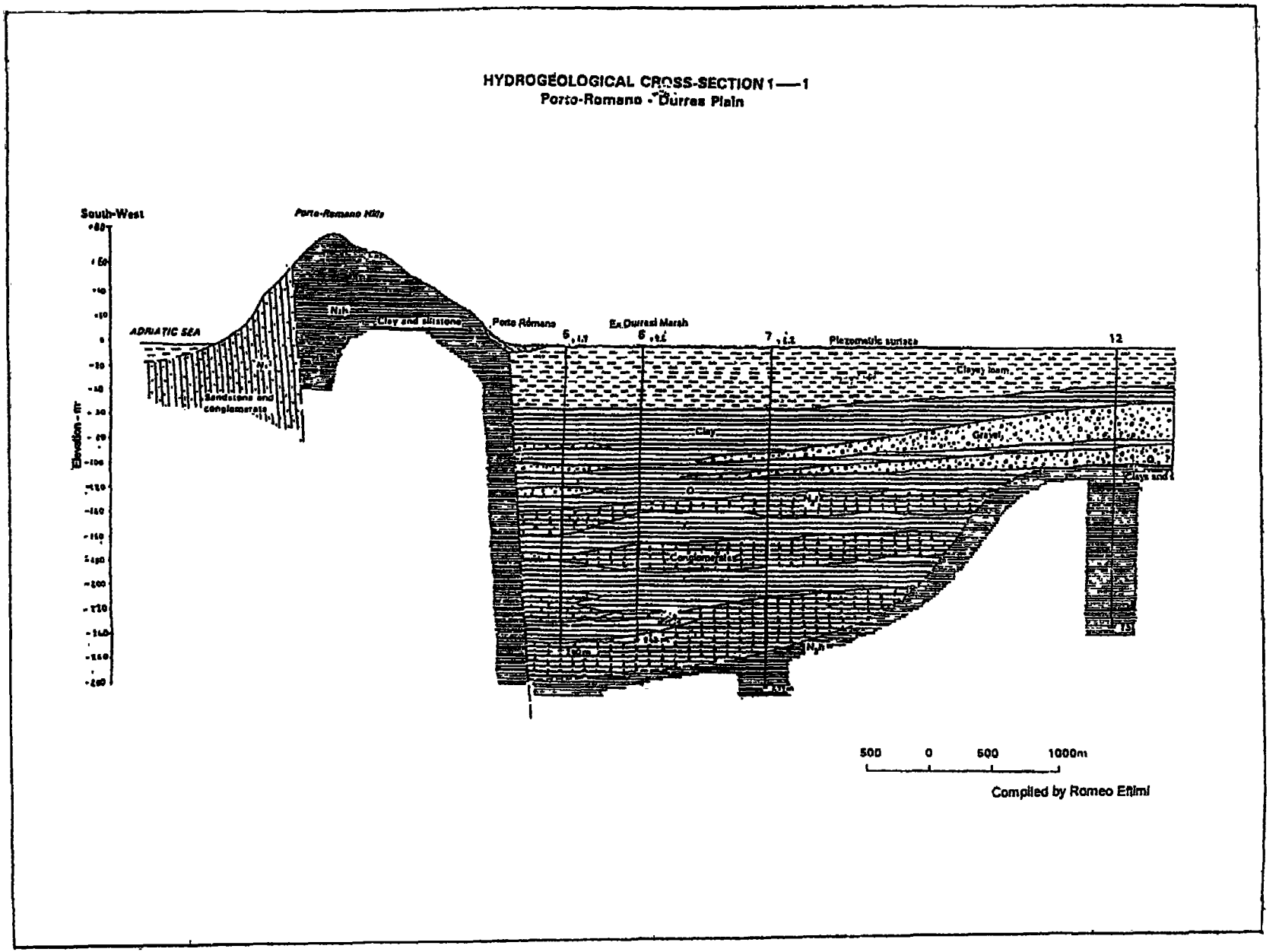
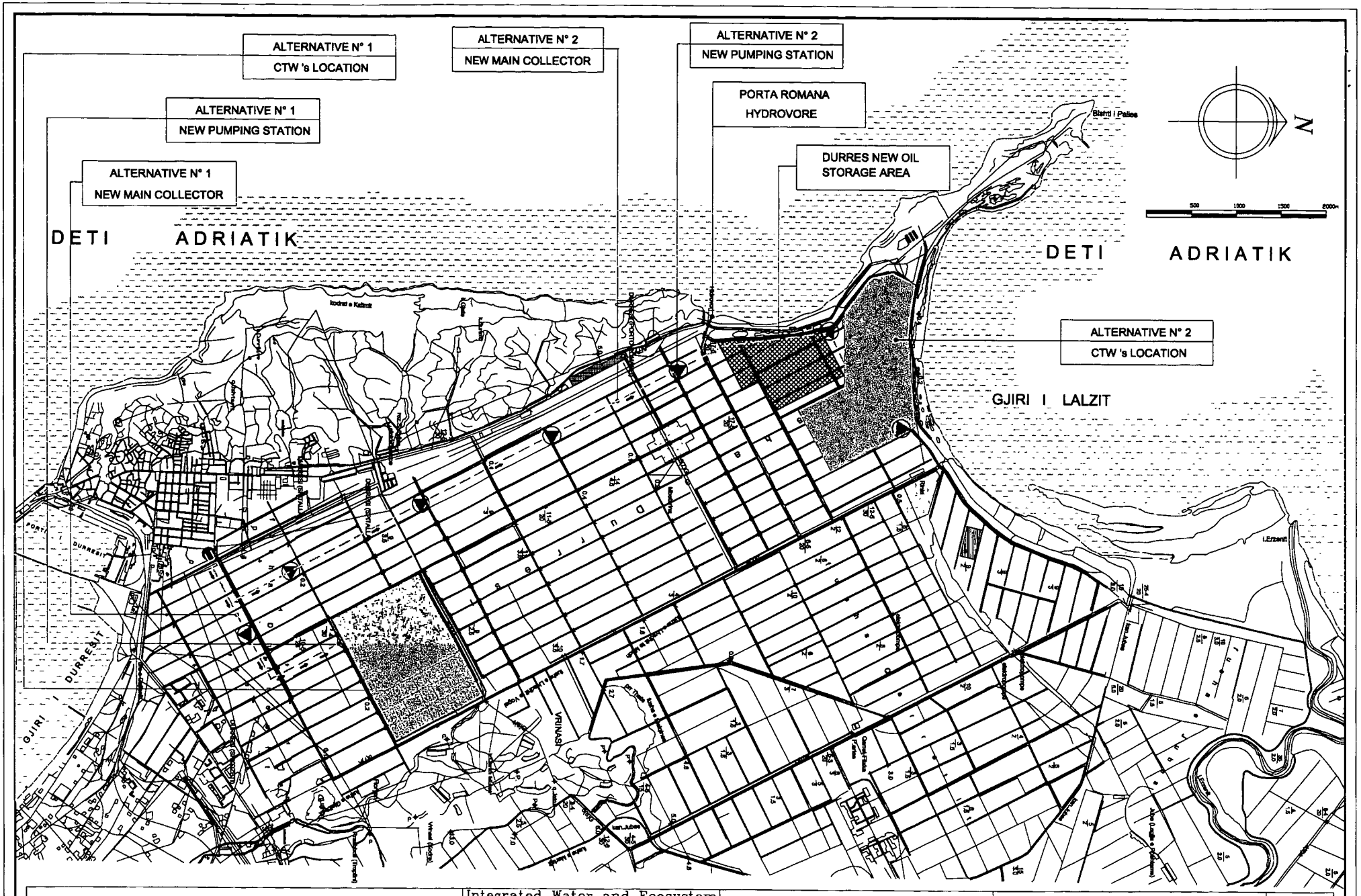
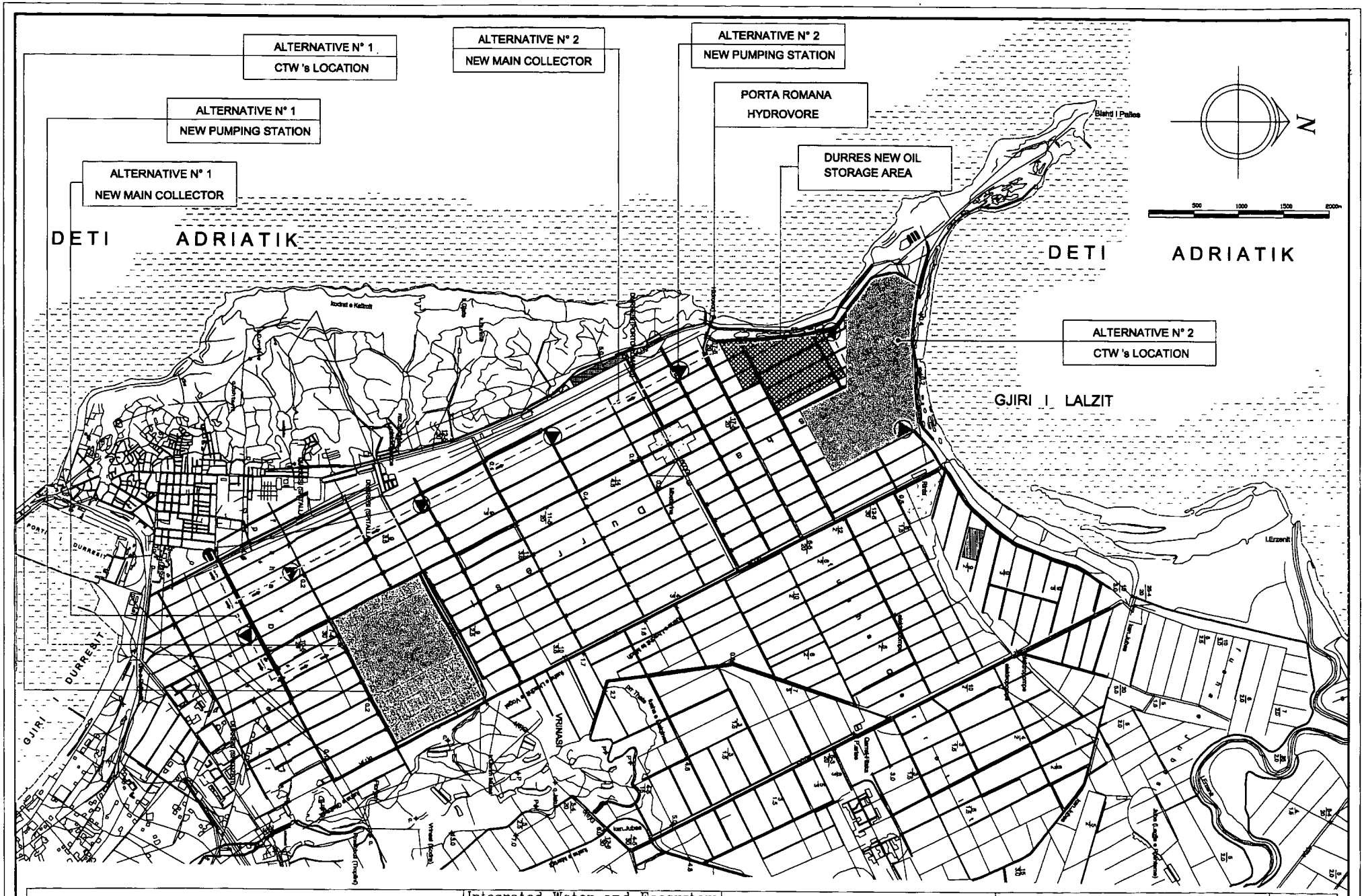

HYDROGEOLOGICAL CROSS-SECTION 1—1
Porto-Romano - Durres Plain
South-West
Porto-Romano Hills
ADRIATIC SEA
Sandstone and conglomerate
Clay and siltstone
Porto Romano
Ex.Durresi Marsh
Piezometric surface
Clayey loam
Clay
Gravel
Elevation - m
500 0 500 1000m
Compiled by Romeo Eftimi

FIG. 8



GOVERNMENT OF ALBANIA	Integrated Water and Ecosystem Management Project (GEF Component P075156)	Technical Assessment of Constructed Treatment Wetlands	DURRES AREA WETLAND ALTERNATIVE LOCATIONS	DWG. N° 09 A3



GOVERNMENT OF ALBANIA	Integrated Water and Ecosystem Management Project (GEF Component P075156)	Technical Assessment of Constructed Treatment Wetlands	DURRES AREA WETLAND ALTERNATIVE LOCATIONS	DWG. N° 09 A3