EIA REPORT

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1. Executive summary

The EIA for EbA interventions in Kune Vain Tale Protected Area, follows the EIA framework of Albania which is in compliance with EU Guidelines.

In the first chapter is represented a general introduction of the project in the frame of EbA. It is followed by the EIA methodology, based on principles of planning and organizing of the EIA.
The technical EIA starts with Legal framework where are described existing Albanian legislation related to Environmental Protection, EIA, Protected Areas, Land use, tourism, waters etc. In this chapter are included also international agreements and conventions, related national, regional and local strategies and plans etc.
The fifth chapter describes the project interventions. The interventions are grouped into two sub-projects:

- Reopening of the water exchange channel between Adriatic Sea and Ceka Lagoon and
- Planting of trees, bushes and grass,

as important interventions in the frame of Kune Vain resilience – Ecosystem Based adaptation. In this chapter is explained also, why the opening and reopening of artesian wells are excluded from project interventions. The main reason is reduction of water pression, by over exploitation of ground water basin, and water cannot catch the land surface by self discharge (artesian characteristics). All technical descriptions are fully referred to Technical Designs prepared by related consultants.

The sixth chapter, Environmental Baseline, describes natural assets and issues of the Kune Vain Tale Protected Area, and the socio-economic and cultural assets of the area and the region. At the description of natural characteristics, are mentioned also issues caused or incited from climate change, and predictions for expected changes in air temperature, rainfalls, sea level etc. Most of the data referred are those taken from previous studies, or field surveys of the consultant team, consultation with community and stakeholders, national and region/local expertise, because not available data from the monitoring institutions of the country. The socio-economical description is based almost in data on regional and local population and gender, economical status and demographical data, education, infrastructure, culture and heritage of the community.

In the chapter 7, is described the selection of the best option/alternative for each of the interventions; opening of the channel and plantations.
The selection of the best alternative considered both interventions:

- Selection of the best option for amelioration the water exchange between Adriatic Sea an Ceka Lagoon 7 multifunctional criteria are selected for the final evaluation of the preselected alternatives. The selection is based in the formula where; the total raking points came as a result of the summary of the ranking point for each criteria divided in

the number of the selected criteria. Three options are considered for selection of the best one, with related alternative.

The option 1, is considered the option with "Do Nothing" alternative. This alternative doesn't create any additional impact by construction and maintenance activities. It also doesn't require any budget for interventions, but, the negative impacts form the blocked tidal channel, causes actually reducing of fish, eutrophication, deterioration of water wildlife and avifauna, etc. That can be considered as cumulative impacts that damages biodiversity values as well as socio-economic stress by reducing of incomes from tourism and fishery. Also this option has not any indirect positive impact (ex. employment). The option "Do nothing has not any cost for construction or operation/maintenance.

The option 2, is considered the alternative of re-opening of the tidal channel, without a breakwater to control sedimentation of the channel and of the lagoon body. This option requires a frequent cleaning and reopening (any six months reflected in technical design report). In the alternative of this option, the impacts are not considered cumulative because is just a rehabilitation of the existing channel and works are not accompanied by important impacts like land term changes of habitat and landscape etc, The negative impacts seems to be caused in biodiversity and habitats during construction/maintenance. But, their effects are small and short term, nevertheless they are frequent (any six months for reopening cleaning operations). This alternative has a relatively moderate cost for re-opening of the existing tidal channel on around of 341 446 USD, and maintenance/operation cost during 10 years goes around 15 000 USD/year, which, with a total for 10 years including operation and maintenance, runs to about 150 000 USD. In total, the amount for the option 2, is 491 000 USD, with construction and maintenance.

The option 3, is considered the alternative of re-opening of tidal channel with breakwaters to control sedimentation in the channel and lagoon body. The channel has the same characteristic like in option 2. The breakwater, planned to be built in the southern part of the channel, is about 350m long, characterized by solid/strong material (rocks and gravel), with high resistance due to wave and sea streams. Another breakwater, shorter than the first, can be built in the northern part of the channel. This investment, is joined by cumulative impacts in soils (risk of high erosion in the northern part of the channel). Also fragmentation of shore habitats is expected by the breakwater in both phases, construction and operation. This option has a much higher cost for construction than the second option. But the cost of maintenance for third (3) option is very low. This option is characterized by high employment rate during construction, but low employment during maintenance/operation. The positive impacts expected by the breakwater efficiency, losses its values in compares with high and cumulative impacts, seem to be caused by erosion in the northern part of the channel (because the breakwater will catch all sediments coming from the Mati river and Tale channel, which are the most efficient sources for coastal morphological equilibrium, in the Vaini/Adriatic sea littoral). Such erosion, in a short term can destroy already the littoral, and connect in all north/south direction the sea and lagoon waters. In this case the Ceka lagoon will lose all its wetlands characteristics, and will not serve anymore as a natural fish nursery site, damaging not only the fishery and tourism/recreation, but also the ecological

equilibrium of the site, that will cause loosing of all specific biodiversity (overall avifauna) that are the main reasons for considering the site as Protected Area. For this option is not given any detailed cost in the project desing, but the EIA consultant, using comparative methodology, with a cost of 1m. breakwater=1000 USD, can calculate:
341 446 (cost for opening of the channel) + 350m breakwater x 1000USD/m = 691 000 USD.

A pondering methodology with relevant matrixes is used for evaluation of the best of three selected options. The positive and negative impacts are expressed in the related matrix, considering impacts in natural environment and socio-economical ones. By this evaluation the second option (option 2) is considered as the best. The efficiency of this option, requires a strong collaboration between Kune Vain Tale Protected Area Administrative Staff/Regional Directorate of Protected Area, National Agency of Protected Area and fisherman and/or other interested parties and stakeholder, for channel maintenance.

- Selection of the best option with alternatives on planting based on soil characteristics, plant adaptability, expected effects in respect with Ecosystem based Adaptation etc.

To rehabilitate the lost habitats, to avoid and face expected impacts from climate change etc., the project has planned to plant with trees a surface of 10 ha and with bushes and grace, a surface of 2 ha. Also, the selection of the best option for planting activities, has followed the same methodology like for the works for re-opening of the tidal channel. A preselection phase has join the planting activities. First are selected some alternatives and is done their evaluation by spatial point of view and soil/land characteristics, land use etc. As result of this pre-evaluation the technical designer for planting, has defined only some sites that can be planted, having the smaller impacts in the site biodiversity during planting and transport activities, the smaller impacts to the land use, avoiding so complains of the community, etc. After such evaluation the technical designer, declaimed that not more than 7 ha are technically valuable for planting of trees and 2 ha with planting with bushes and graces. During years, the natural phenomenon, incited also by not planned human activities, has result on change of the soil characteristics, increasing of the soil humidity, losing of natural organic matter of top soils etc. So, in some areas, the plant deteriorated species cannot be planted, and other alternative species are proposed. The methodology used from the technical designer for selection of the trees, is the "Ecological Comparative Methodology". After that, are evaluated different alternatives, considering soil characteristics, of the sites defined for plantation, plant characteristics for adaptivity, etc, having into the count plant resistance due to waters, salinity, their value for habitat rehabilitation etc. The evaluation methodology is based on pondering system, and then expressed in the shadow matrixes, considering several level of adaptability for each considered plant characteristics. 11 species are evaluated, and all of them has a high

adaptive capacity to severe site conditions and have ability to improve soil conditions and fertility which limits the forest vegetation growing. The reforestation of such soils along the coast might be affected negatively by some factors:

- sand movement from wind
- wind exposure
- shallow underground waters
- excessive heating of upper layers of sand and soils
- summer drought
- lack of soil's nutrients

Combination of all elements was integrated in the shadow matrix, where 11 species, are evaluated in 11 criteria, showing their potential values for each of site and soil characteristics, highlighting the species options for each of those conditions, and selecting of the best species. Six species are selected as most appropriate ones and proposed for planting.

The following chapter is focused on characterizing of impacts, grouped in two main sub-groups; positive and negative impacts. In this chapter are selected the significant negative impacts, cumulative impacts etc, which will be in the focus of the Management Plan. The impacts are assessed separately for each of inteventions; reopening of the channel and planting activities, in both construction/planting and maintenace phases. In this chapter are mentioned also the negative impacts that cannot be reduced. Three are considered the main negative impacts that cannot be reduced:

- Sedimentation of lagoon body by operation of the tidel channel (some consideration are given to reduce this impact by additional works in lagoon body)
- Planting of pine species have the risk that may control the natural development of forest vegetation floors
- Noises and disturbance will be generated during maintenance of the tidal channel

In the next chapter is described the Management Plan, where are included the Mitigation Measures program and Monitoring Program. In the Mitigation Measures program, are included all negative impacts selected in the previous chapter, proposed mitigation measures and their timeframe, responsibilities and related cost.
The monitoring Program includes not only the monitoring of works during interventions and operation/maintenance, but also monitoring of implementation of proposed mitigation measures. A strong collaboration of Regional and National Protected Areas authorities, Regional stakeholders and community is considered substantial for maintenance of the interventions efficiency.

The chapter 10, is a short chapter, Institutional Strengthening, where are proposed some measures that can ensure the efficiency of interventions in term and additional proposals which conditions present and future possible interventions success in the frame of Ecosystem Based

Adaptation. If not followed the suggestions given in this chapter, the efficiency of the investments in term may be in risk. Between other are considered future collaboration of Kune Vain Management staff and related Administrative regional and national authorities, with local takeholders like fishers, farmers etc, for tidal channel maintenance, avoid grazing in the planted sites etc.

2. Introduction

Kune Vain Lagoon System (KVLS), located within the Drini – Mati River Delta in the Lezha region of Albania, provides a wide range of valuable goods and services to nearby communities. A rapid increase in population size and widespread poverty in the area have led to an increase in pressure on the lagoon for ecosystem goods and services, and to unplanned alterations in the buffer zone surrounding the lagoon. The local community derive the majority of their income from fishing or agriculture, and therefore depend on functional, intact ecosystem in the lagoon system for their livelihoods. Unsustainable resources use within the KVLS is also causing a reduction in quality and quantity of water in the KVLS affecting lagoon productivity, increased coastal flooding and increased sand dune erosion.
In order to address this problem. Kune Vain Lagoon System is vulnerable to the effects of climate change and is expected to experience more intense and frequent floods and storm surges. Climate change has create additional problems all over the site.

Special Climate Change Fund and Eba

In order to address those problems, the Special Climate Change Fund (SCCF) project aims increase the
capacity of government and local communities living nearby the KVLS to adapt to climate change using an integrated suite of adaptation interventions, including EbA, which is considered more cost effective in long term versus hard infrastructure measures. Additionally, EbA is known to generate co-benefits to the economy and society and be more sustainable in long-term.
This will be achieved by three complementary components:

- Improving technical and institutional capacity of policy- and decision-makers in Albania to address climate change risks through the implementation of adaptation interventions, including ecosystem based adaptation (EbA);
- Demonstrating adaptation interventions within the KVLS;
- Improving awareness and knowledge of local communities and national stakeholders on effective
- EbA.

Scientific research has been used to develop an integrated suite of adaptation interventions including EbA that will:

- Improve the quantity and quality of water in the lagoon resulting in improved lagoon productivity;
- Reduce beach dune erosion thereby improving the resilience of local communities to coastal flooding.

EbA interventions will result in multiple benefits to the local communities, economy and environment including: i) reduced flooding; ii) improved biodiversity and iii) improved fisheries production. As such, this suite of interventions will improve the capacity of the ecosystem to

adapt to climate change and provide important goods and services to local communities. In so doing, adaptation interventions and EbA will improve the local communities' capacity to adapt to the negative effects of climate change.
Furthermore, the sustainability of the project will be ensured by:

i) strengthening the current Inter- Ministerial Working Group on Climate Change;
ii) developing an up-scaling strategy which includes training local and national decision-makers on how to identify and secure funding for EbA projects;
iii) training national government and local communities on EbA; and
iv) developing and implementing

The project will build on several on-going baseline projects, including the Water Resource and Irrigation Project, the ECOSEA project, and the UNEP Coastal EbA Program. It will be executed by the Ministry of Environment (MoE) of Albania, and implemented by the United Nations Environment Program (UNEP).

The EbA interventions will be implemented in three interlinked habitats within the KVLS that have been identified as the most vulnerable to climate change. These habitats includes the Ceka Lagoon, degraded beaches adjacent to the Ceka Lagoon and degraded forests within the KVLS.

Global Significance

Through appropriately designed, implemented and monitored EbA interventions, the SCCF financed project will also contribute to the conservation and sustainable use of biodiversity, including species of global significance. The KVLS was the first protected area in Albania and is classified as an IUCN Category IV protected area. This lagoon area lies within an internationally recognized Important Bird Area (IBA) that provides wintering grounds for over 70 species of water birds. The KVLS includes important nesting habitat for birds, in particular the globally threatened Dalmatian Pelican (*Pelecanus crispus*) and Pygmy Cormorant (*Phalacrocorax pygmeus*) and abundant fish species. This lagoon system includes over 270 plant species of which 18 are endangered. The project provides global environmental benefits by reducing the vulnerability of this ecologically important area, and the threatened species therein, to climate change.

3. EIA Methodology

The working methodology is based on preparing an EIA report in respect of TOR requirements and Albanian Standards as required by National Legislation. The Albanian Legislation, from 2006, is in compatibility with EU Directives related to EIA (please reffer to Legal and Rregulatory Framework, Chapter 4). This document is developed in close collaboration with the local and national expertise, local community and stakeholder wishes and demands, and project coordinator and director upon UNEP and MOE requirements. The main phases of the EIA were:

Screening – Has considered the nature, cumulativeness and positive and negative effects which can be generated by applying of demonstration of the project in term. Considering the importance of the Kune Vain Protected Area, its sensitive assets, site issues, and expected impacts seems to be caused by climate change and planned interventions, a detailed screening is done by the consultant, in the first stage of this phase. By an overall analyses, considering the conservation and protection aims of the project intervention, the environmental status of the sites where will be acted, results that respecting Albanian legislation, the EIA report, should be prepared on bases of the level of the Preliminary EIA study.

Scooping – was the first step to focus the EIA procces on realistic effects of project interventions, defining of main impacts, usefull and effective mitigation measures and monitoring program. Scoping is done for evaluation of activities due restriction of Proteted Area land use and zoning, natural rsource avaliability, considering conservation as a focus of the project development. The EIA process will be focused also on possible expected impacts of Climate Change in Protected Area habitats and biodiversity, and their direct and indirect effects to the local community and stakeholders. Preparation the initial documentation for the EIA has been done considering site assets on biodiversity and visual properties, those with economical values as tourism and fishery, changes during the time, effects of Climate Change events in such change etc.

The main base for scoping is evaluation of intervention actions. This stage is joined by reconsidering of planned activities and avoiding those that are not more appropriate for the scope of interventions, or generate cumulative impacts to the local community and stakeholders.

The main initial information is oriented to:

- Expected effects of the project implementation of the demonstrative of interventions as an instrument for Ecosystem Based Adaptation.
- Effects of each of the actions on site values (positive and negative) and needs for maintenance during future years.
- Effects of each of the activities considering construction and operation/maintenance effects,

By the scoping, it looks that the effects of gases (emissions/removals) by above mentioned activities are not significative.

An very important step of the EIA report is the Selection of the alternatives. The selection of the best alternative considered both interventions:

Selection of the best option for ameliorate the water exchange between Adriati Sea an Ceka Lagoon, and

Selection of the best option with alternatives on planting based on soil characteristics, plant adaptibility, expected effects in respect with Ecosystem based Adaptation etc.

Characterization of impacts and Preliminary EIA report. - Detailled characterization of the impacts, considering their magnitude, time extensions, spatial effects etc, are taken into acount

for both positive and negative impacts. A deep analyse is done to assess the positive and negative effects of the intervention is the site, considering not only activities but also long term effects having into account facing of Climate Change impacts.
To better clasify the main impacts the consultant has done a preliminary desk work to define the site richs and assets, their sensitivity, the value of such assets for local and national level, the status and wishes of the community and local stakeholders etc. A range of consultation was done with local and national researches with high experience on the site, fishery etc. More than 15 field trips of full consultant team, are done to verify the status of sites to be affected and assess the expected effects, and two experts are working full time in the Lezha region, supporting core team for collection of needed socio-economical information, information on stakeholder and community awareness, level, identification of household possible activities considering Ecosystem Based Adaptation etc. Such consultation has helped also to evaluate how sites and their assets that can be affected by any of interventions, how the community and stakeholder react for such interventions etc.

Project implementation activities are assessed in three phases, preliminary phase, reconstruction/construction and operation/maintenance phase for:

- Planned routine activities – activities occurring during normal operation conditions.
- Planned but not routine activities (activities that are planned to occur but not considered as normal operations, always been within operational design parameters.
- Unplanned events – accidents.

As the most important part of the impact characterization, the impacts classification has considered following items.

- Interact the biophysical environments, considering losses by Climate Change effects and react, considering Ecosystem Based Adaptation.
- Interact the existing human environments (health, socio-economical, gender, infrastructure and cultural conditions),
- Interact local and national development plans.
- Breaks on local, national, international and bilateral etc standards, considering the IV category of Protected Areas (Natural Managed Reserve) and the focus for protection of Kune Vain.

The main impacts are considered those on coastal morphology, fishery, biodiversity and habitats (Reduction of erosion, increasing of the specific habitats diversity, increasing of wildlife presence –all of them important tourism potentials), human sites, health and economy (improving of fishery), future reduction of first wave (the most destructive of sea storms) etc. Such impacts are classified on those that can be totally avoided, those that can be partially reduced and those that cannot be reduced (remains impacts) etc. The selection of cumulative and potential impacts, was very important to build the management plan with its mitigation measures and monitoring program.

The first Part of the management Plan includes a detailed program on mitigation measures, for each of the considered impacts of any intervention, classified upon receptors (indicators/targets) and project phase (construction, operation/maintenance). This subchapter give the responsible for mitigation measures, their costs, the period of implementation etc.

The second part of Management Plan, is focused on monitoring program, giving clearly the indicators to be monitored on the bases of following points:

- Monitoring program will be adressed for both phases; construcion/plantation and operation/maintenance
- What needs to be monitored at Kune Vain site and human surroundings sites?
- What sort of information is required?
- What are the existing sources of monitoring information for KV?
- Are there any gaps in the existing information, and how can they be filled?
- What should be done if adverse effects are found at KV?
- Who is responsible for the various monitoring activities, when should these be carried out, and what is the appropriate format for presenting the monitoring results?

The public information and consultation was organized in close collaboration with Baseline Survey consultant. Questionaires are used to inform and collect information regarding the project and community, stakeholders and decision makers wishes and awareness. A public hearing finalize the public consultation activity.

Frequent meeting with Project Coordinator, close collaboration with her and other project consultants, consultation with local and National decision makers for Environment and Protected Areas, has joined the EIA proccess in all of phases; filling of data gabs, exchanging thoughts regarding EIA finds etc, being compatible with Project Client and UNEP requirements and comments, as well as with obligations due to Albania Environmental legislation.

4. Legal and Regulatory framework

4.1 Institutional Framework for Environmental Protection

Environmental institutions in Albania have gone through a deep institutional reform process over the last two decades. As a result of several years of efforts of all stakeholders in the country and the contribution of the international community, in September 2001 was established the Ministry of Environment, which in 2005 transformed into the Ministry of Environment, Forestry and Water Administration (MoEFWA) in present, the Ministry of Environment.

Ministry of Environment is the primary authority responsible for environmental management and environmental policy at the national level in Albania. The MoE is responsible for addressing environmental issues including landscape protection, protected areas, ecosystem preservation

and restoration, and conservation of flora and fauna. It compiles and implements government policy on environmental protection, drafts legal and sub-legal acts for the purpose of sustainable environmental protection and management, coordinates the activities of the line institutions for environmental issues, organizes and coordinates the work for environmental monitoring, prepares international or bilateral documents for the protection of the environment, prepares the report "On the State of the Environment", reviews and issues environmental permits for various economic activities, promotes information, awareness and attracting the public in important environmental discussions, etc.

With respect to climate change, the MOE is tasked with inter alia:

- Developing national policies on climate change adaptation and mitigation
- Ensuring that the EU Environmental Acquis is adopted and implemented
- Coordinating the mainstreaming of climate change issues in relevant sectors with other line ministries
- Developing programmes and project proposals to implement national or international climate change legislation;
- Monitoring the implementation of environmental legislation.

In 2006, the MoE established the Agency of Environment and Forests. In 2011, this agency was then transformed into the National Environmental Agency (NEA). The main duty of the NEA is to monitor and develop new policies to protect and improve the environment. The NEA includes the Regional Environmental Agencies (REA). These REAs are executive territorial agencies of the MoE tasked with issuing environmental permits and environmental inspection and monitoring.

The National Protected Agency Agency, established in February 2015, with its regional structures (Protected Areas Administrations) is responsible for the administration and management of biodiversity and protected areas as well as for the implementation of the management plan. The Protected Area Administration plays a coordinating and informative function to ensure a better implementation of legal practices regarding the conservation of nature, biodiversity, protected areas and landscapes.

By DCM no. 6, dated 29.1.2014, the State Inspectorate for Environment, Forests and Water has been created, which has the mission to ensure compliance with legal requirements in the field of environmental, forestry and water protection. It is responsible for all the inspection functions in the relevant field in accordance with the responsibilities of the ministry responsible for environment, water and forests.

In 2014 was developed the National Coastal Agency (NCA). The main functions of the NCA include: protection and sustainable development of the coastal zone, implementation of policies and strategies for integrated management of the coastal zone, proposed changes and improvement of the legal framework for the ICZM, cooperation with projects and activities related to the protection and development of coastal areas and monitoring the implementation of these projects and activities.

At the local level, Municipalities are responsible for environmental protection, although they do not have specialized environmental units, except Municipalities. Based on the law on organization and functioning of local government no.8652 dated 31 July 2000, local authorities took responsibility for environmental protection, management of water resources, urban waste, transport infrastructure and green areas in early 2001.

The private sector contributing in environmental field is developed in last years. Many NGO-s or other private entities, today are dealing not only with public awareness etc., but also with scientific and technical research.
Stakeholders, both at the central and local level, have a role and responsibility for the conservation, good management and sustainable use of natural resources in the protected area.

4.2 Legislation

In this chapter are mentioned overall Regulatory framework related to the project in Term. In the Regulatory framework are considered the environmental legislation, legislation regarding EIA, PAs, other Laws related to the environment, waters, soils, urban planning etc.
Also this chapter considers some of the main national strategies and Plans, Conventions and agreements, as well as Local strategies and Management Plans

4.2.1 Basic Environmental legislation

The legal basis for the protection of nature derives from the Constitution of the Republic of Albania, 1998 approved by Law No. 8417, dated 21.10.1998. Article 59 of the Constitution emphasizes that "the State aims at a healthy and sustainable ecological environment for the present and future generations, and the rational utilization of natural resources on the basis of the principle of sustainable development", and aims to ensure:

a. A healthy and environmentally sustainable environment for present and future generations
b. Rational use of forests, waters, pastures and other natural resources on the basis of the principle of sustainable development

Nature conservation, within the PA system, is increasingly evaluated as an important instrument for preserving the highest biodiversity values in the country. The expansion and strengthening of the protected area network, the basis for establishing the country's Ecological Network, is considered as one of the most important objectives of the Albanian Government Programs and Action Plans.
The national environmental legislation is undergoing an intensive transposition phase through the inclusion of the EU Environmental Directives. The main principles of EU environmental laws are already found in Albanian legislation. This legislation is being drafted with the assistance of foreign experts, and reflects the requirements of the conventions in which Albania

is a party. Following are given some of the main laws related to protected area, environment, ownerships, biodiversity, water administration, etc.

"The Law on Environmental Protection", no. 10 431, dated 09.06.2011, which came in force in 2013**.**
This law regulates the relation between the man and the environment, protects the environmental elements and processes and guarantees the material conditions for the sustainable development by completing the necessary legal frame for the implementation of the constitutional right to have an ecologically sound environment. The law explains the environmental policies, protection of humus layer, water protection, criteria on the use of water resources, the Environmental Charges and Taxes etc. Legislation on environmental protection is progressively enriched by legal and sub-legal acts, which are generally approximating with the EU environmental directives and standards.

- Law no.8905, dated 06.06.2002 **"On protection of marine environment from pollution and damage"**
- Law no.9385, dated 05.04.2005 "**On forest and forestry service"** amended by the laws :
    - Law no. 9533, dated 15.5.2006
    - Law no. 9791, dated 23.07.2007
    - Law no.15, dated 2012
    - Law no.36, dated 2013
- Law no. 9533, dated 15.5.2006 **"On some amendments to Law no. 9385, dated 4.5.2005 "On Forests and Forest Service"**
- Law no. 38/2013 On some amendments to the Law no. 9693, dated 19.03.2007 **"On the pasture Fund"**
- Law .no 9587, dated 20.07.2006 "**On biodiversity protection"**
- Law no.8868, dated 04.02.2008 **For some changes of basic law of "protected areas", no. 8906, 06/06/2002**
- Law no.9867, dated 31.01.2008 **"On definition of rules and procedures for international trade of endangered species of wild fauna and flora"**
- Law no.10006, dated 23.10.2008 **"On wild fauna protection" amended by law no. 41/2013 , 2008 (2013 amendments)"**
- Law no. 10253, dated 11.03.2010 "**On hunting"**
- Law no.10234,dated 18.02.2010 "**On adhering of republic of albania in the protocol "on the integrated management of coastal areas in the mediterranean," of Barcelona convention "for the protection of the marine environment and coastal regions of the mediterranean"**

- Law no.10266, dated 15.04.2010 **"To protect the air from pollution"**
- Law no. 10463, dated 22.09.2011 **"For integrated waste management"**

A range of laws and bylaws, are produced in last years revising existing Legistation in relation with EU Directives

- Law no. 10448, dated 14.07.2011 **"On Environmental Permit"**
- Law no.64, dated 31.05.2012 "**On fisheries"**
- Law no.7,dated 30.01.2014 **"On the announcement of hunting moratorium in the republic of albania"**
- Law no.8641, dated 24.07.2014 "**For some changes of the law "on biodiversity protection", amended by law no. 68/2014"**
- Law no.5 ,dated on 04.02.2016 "**On the announcement of the moratorium on forests in the republic of albania"**

To ensure the implementation of these laws, a number of DCMs, regulations and orders have been approved to supplement the legal basis for the specific nature protection elements:

- DCM no.103, dated 31.03.2002 "Concerning environmental monitoring in the Republic of Albania "
- DCM no.847, dated 29.11.2007 "On the Environmental *Cross-Cutting Strategy*"
- DCM no.84, dated 27.01.2009 "On determining the criteria raising network inventory and monitoring of biodiversity"
- DCM no.546, dated 07.07.2010 "On approving the list of species of wild fauna, hunting object"
- DCM no. 553, dated 07.07.2010 "On the hunting season in the Republic of Albania"
- DCM no.700, dated 13.08.2010 "On approval of payment for exercising hunting"
- DCM no.866, dated 10.12.2014 "On approval of types lists of natural habitats, plants, animals and birds, of interest for European Union"
- DCM no.102, dated 04.02.2015 "On the establishment and the organization and functioning of the national agency of protected areas"
- DCM no.103, dated 04.02.2015 "On the establishment and the organization and functioning of the state inspectorate of environment and forest"
- DCM no.31, dated 20.01.2016 "On the approval of the strategic policy document for biodiversity protection"

- Order no.283, dated on 10.04.2013 "On approval of the list of coastal wetland areas, which serve as habitats for migratory birds"
- Order no.1280, dated on 20.11.2013 "On approval of the red list of wild fauna and flora"
- Instruction no.7, dated on 06.01.1998 "On ensuring the information on environment. the public rights on information"
- Regulation no.1, dated on 25.02.2013 "On internal functioning of the protected area management committee"

4.2.2 Legislation on Protected Areas

The Albanian legislation on protected areas is referred at IUCN Protected Areas Categorization. A number of laws, DCM, regulations or guidelines are available related to Protected area. As IV Protected area category, Kune Vain has such a wide and divers land use and human activities that is object of a large legal framework of Albanian Legislation. Most of them are referred to Environmental legislation, and part of them with laws that in direct manner effect on it. The Albanian Legislation is based in Albanian Constitution.

The management of protected areas is based on Law no. 8906, dated 06.06.2002 "On Protected Areas", as amended.
This law regulates the protection of six categories of protected areas, applied in the territory of the Republic of Albania. The categorization of areas, status and level of protection for each area is based on the criteria of World Center of Nature Conservation. The categories are listed as following:

I. Strictly natural reserve/scientific reservation/ (Category I);
II. National Park (Category II);
III. National Monument (Category III);
IV. Natural managed reservation/area of management of habitats and species (Category IV);
V. Protected Landscape (Category V);
VI. Protected area of managed resources/protected area with multi-purpose utilization (Category VI)

The object of this law is the declaration, preservation, administrations, management and usage of protected areas and their natural and biological resources; the facilitation of conditions for the development of environmental tourism, for the information and education of the general public and for economic profits, direct or indirect, by the local population, by the public and private sector.

The purpose of this law is to provide special protection of important components of natural reserves, of biodiversity and the natural, as a whole, through the establishment of protected areas. Protected areas are set to provide the preservation and regeneration of natural habitats, of species, of natural reserves and landscapes.
In the following is summarized the description of this IV category, of Albanian P.A.

1. The territories that represent biocenters or biocorridors with importance in Regional or Local level, or territories with plants, wildlife, ore or paleontological finds, especially protected, or arias used for scientific studies, educational or cultural reasons, declared Managed Nature Reserve.
2. In such protected areas is applied the third category of protection, and are prohibited the:
   - Changes on natural status of water reserves, sources, lakes and wetlands systems;
   - Chemicals disposal;
   - Moving and parking of cars outside public roads or approved parks,
   - Collection of plants, minerals, paleontological finds or rocks;
   - Building and functioning of objects for military reasons.
   - Fixing of boards, Tables, posters etc... include signs that are not giving data about objectives of Protected Area conservation.
   - Mountain climbing , skiing, camps, and fires outside defined places.

3. The other activities can be applied in such protected areas, only after been "Environmentally Permitted" by environmental authority.

The Law on "Protected Areas, No 8868, dated on 04/02/2008, for some changes of basic Law of "Protected Area", No 8906, 06/06/2002, is going to detail some of the terms and changes. This law clarifies more the criteria for planning and proclaiming buffer zones, orientation on zoning of P.A., etc. In the law is mentioned that to avoid destruction of such areas, the activities that can affect the specific habitats or species, should apply the conditions approved in their "Environmental Permit" given by the responsible Ministry of Environment.
Implementation of the law "On protected areas" as amended, is accompanied by various sub-legal acts approved by the Council of Ministers, which include:

- DCM no.266, dated 02.04.2003 "On administration of protected areas"
- DCM no. 267, dated 24.04.2003 "On the proposal and designation of protected areas and buffer zones"
- DCM No. 86, dated 11.02.2005 "On the establishment of management committees for protected areas";
- DCM no.432, dated 28.04.2010 "On expanding the boundaries of Kune - Vain – Tale, managed natural reserve "
- DCM no. 897, dated 21.12.2011 "On approving the rules for the proclamation of the special protected areas"
- DCM No. 897 dated 21.12.2011 "On the Approval of Rules for the Designation of Special Conservation Areas".
- DCM no. 177, dated 31.3.2005 "Allowed norms of liquid releases and the zoning criteria of receiving water environments" Law nr 8906; date 6.06.2002; "On protected areas"

- Regulation no.1, dated on 29/03/2005 "For application of the legislation on fishery and aquaculture"
- Regulation no.8. dated on 11.11.2009 "Concerning management measures for the sustainable exploitation of fishery resources in the sea"
- Order no.148, dated on 21.02.2013 "On approval of standardized structure of management plan for the protected area"

- The DCM, No 267, approved on 24/04/2003, **Concerning Procedures Regulating Proposal and Declaration of Protected and Buffer Zones**.

A new Law **"on Protected Area"**, is drafted on 2016 and is expected to be approved and come in force in 2017. The main objective of this law is declaration, protection, administration, management and sustainable use pf Protected Areas and their natural and biological based on the principle of sustainable development. The law aims to garanty the specific protection of Protected Area, by:

- Approval of new sites as Protected Areas, with specific importance natural, economical and/or social assets, as part of the natural and cultural environmental herritage
- Development and conservation of Protected Areas, as National Assets, with specific importance for natural equilibrium and biodiversity as an obligation for present and future generations.
- Improve of conditions for applying of Environmental Tourism.
- Information and education/awareness of the public for the status and importance of Protected Areas.

4.2.3 Other Related Legislation

Law No. 68/2014 amending and supplementing Law No. 9587 of 2006 "**On Biodiversity Protection"** ensure full compliance with the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, as amended. The objectives of this law are achieved by regulating the sustainable use of the environment through the integration of biodiversity into strategies, plans and programmes across all levels of decision-making in the country. Based on this law, several action plans for endangered species protection have been implemented.

The law No 7908. dated in 5.4.1995, on "Fishing and Aquatic Life" is the other important law, which between others aims to ensure a rational and responsible exploitation of the biological water resources and the development of aquaculture, ensure the protection of aquatic biological resources, to develop a sustainable fishing activity etc.

Law No. 9385 on Forest and Forestry Service (2005). The goal of this Law is to establish equal rules on the relationships, rights, obligations and responsibilities of the State institutions, local government, Non-governmental Organizations and private business owners for the protection, administration, management and usage of the National Forestry Fund, forestry land and their biological and natural resources.

- Law no.7665, dated 21.01/1993 "**On development of tourism priority zones"**
- Law no.8652, dated 31.07.2000 "**For the organization and functioning of local government"**
- Law no.9970, dated 24.07.2008 "**On gender equality in society"**

  - DCM no.88, dated 01.03.1993 " On designation of tourism priority protected areas"
  - DCM No. 994, dated 02 July 2008, "On the seeking of public opinion in the environmental decision making"

4.2.4 Legislation on Environment impact assessment

Law No.10440 on the Environment Impact Assessment (2011) is fully approximated with Council Directive 85/337 / CEE of 27 June 1985 "On the assessment of the effects of public and private projects on the environment", as amended. This law aims at ensuring a high level of environment protection by preventing, minimizing, and compensating the environmental harms to be caused by projects not yet implemented, and enabling an open decision making process during the identification and the evaluation of the negative environmental impacts. It lays out the framework for the requirements, responsibilities, rules and procedures for the evaluation of the negative environmental impacts. The two annexes of this law descipt the types of activities that are classified in Preliminary EIA and Profound EIA.
Other legal and sublegal acts included on Environmental Impact Assessment legislation:

- Law no.11, dated 19/02/2015 **On the accession of the republic of Albania in the multilateral agreement among eastern europe countries for the implementation of the convention "on environmental impact assessment in a transboundary context"**
- Law No.91 / 2013, dated 28.02.2013 **"On the Strategic Environmental Assessment"**
  - DCM no.13, dated 04.01.2014 "On approval of the rules, responsibilities and deadlines for conducting the procedure of environmental impact assessment"
  - DCM no.620,dated 07.07.2015 "On the approval of the rules, responsibilities, and detailed procedures for stategic environmental assessment in a transboundary context"

- DCM no.686, dated 29.07.2015 "On the approval of rules, responsibilities and timelines regarding the environmental impact assessment procedure"
- DCM no. 219, dated 11.03.2015 "Rules and procedures for consultation with public and stakeholders, and public hearing during the strategic environmental assessment process"

4.2.5 Legislation on territorial planning

Law No. 10119 on Territory Planning (2009). This Law aims at ensuring the sustainable development of the territory through the rational use of land and natural resources, assessing the actual and future potential of the territory development on a local and national level by balancing natural resources with economic demand and public and private interests.

Other laws and by-laws related to territorial planning are:

- Law no.7693, dated 06.04.1998 **"On city planning"**
- Law no.8405, dated 17.9.1998 **"On Urban planning"**
- Law no.9482, dated 03.04.2006 "**Legalizing, urbanizing and integration of illegal construction"**
- Law no. 107, dated 10/07/2014 **"On territorial planning and development"**

- DCM no.774, dated on 14.11.2007 "On the approval of the Cross-Sectoral *Strategy* for *Rural Development in Albania "*
- DCM no.881dated14.12.2016 "On the approval of the National Territorial General Plan "
- DCM no.671 dated 29.07.2015 "For the approval of the Territorial Planning Regulation "

4.2.6 Legislation on land administration and protection

- Law no.7501, dated 19.07.1991 "**Concerning the land"**
- Law no.7715, dated 02.06.1993 **Concerning some changes and additions to law no. 7501 "on the land 7715"**
- Law no.7855, dated 29.07.1994 "**Concerning some changes and additions to law no. 7501 "on the land "**
- Law no.8752, dated 26.03.2001 "**On the creation and operation of land protection and administration structures"**
- Law no.9244, dated 17.06.2004 "**On protection of agricultural land"**
- Law no.9817, dated 22.10.2007 "On agriculture and rural development"
- Law no. 131/2014 "On Amendments and Additions to Law no. 9244, dated 17.6.2004, **"On the Protection of Agricultural Land"** as amended.

4.2.7 Legislation on water resources

- Law no.8102, dated 28.03.1996 "**On water supply and sanitation sector regulation"**
- Law no.111, dated 15.12.2012 "**For Integrated management of " Water resources "**
  - DCM no. 246 of 30.4.2014 "On the Determination of Environmental Quality Standards for Surface Waters"

4.3 International Environmental Agreements and Conventions

The international policy results with assignment of different agreements and conventions related to protected areas as outlined below:

- Bern Convention for the Protection of flora,wild fauna and nature environment of Europe, signed in 1995 and ratified by the GoA in 1999.
- CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora, ratified by the GoA in 2003.
- Convention on Protection of Marine Environment and Coastal Area of Mediterranean Sea
- Convention on Protection and use of water streams and international lakes
- Convention of Biological Diversity (CBD) Rio de Janeiro, signed in 1996 and ratified by the GoA in 2004.
- Convention for Protection of Flora and Fauna
- RAMSAR Convention on Wetlands of International Importance Especially as Waterfowl Habitat , to which Albania is party since 1996.
- Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus,1998)
- United Nations Convention to Combat Desertification (UNCCD) was ratified in 1999.
- Convention on the protection of the Mediterranean Sea from pollution, and the Protocol onSpecially Protected Areas, was ratified in 1990.
- Convention on the Conservation of Migratory Species of Wild Animals (CMS or the Bonn Convention) ratified by the GoA in 2002.
- ESPOO Convention (Finland) "On Environmental Impact Assessment in a Transboundary Context."
- United Nations Framework Convention on Climate Change (UNFCCC) ratified by the GoA in 2005.
- Kyoto protocol to the United Nations Framework Convention on climate change 1998 ratified by Albanian government 2004
- Paris Agreement, United Nations 2015, ratified by Albanian government through law no. 75/2016 dated 14.07.2016,

- *Protocol* on *Strategic Environmental Assessment ratified by Albanian government at the end of 2004*
- The European Landscape Convention, Florence, 2000

4.4 Strategies and Plans

4.4.1 Strategies

The National Cross-cutting Environment Strategy (2007) is the basic document that sets out the state policy in the field of environmental protection. This Strategy identifies priorities for environmental management in Albania. These priorities include: i) increasing the coverage of Protected Areas; ii) improving and implementing current environmental management plans; iii) completing the legal frameworks for nature conservation; and iv) the elimination of illegal logging and hunting through better enforcement of legal frameworks.

This cross-cutting strategy for sustainable development includes:

- **The National Energy Strategy**, approved by DCM no. 424, dated 26.6.2003 The revised National Strategy for Energy (expected for adoption in 2016) provides windows of opportunity to stronger mainstreaming climate change adaptation into energy policy with its high vulnerabilities to climate change- – besides the strong relevance of the energy policy for mitigation.
- **Cross-cutting Strategy on Rural and Agricultural Development**, approved by DCM no. 709, dated 29.10.2014
- **Business and Investment Development Strategy**, 2014-2020 approved by DCM no. 795, dated 11.7.2007
- **Sectoral Transport Strategy,** approved by DCM no. 1214, dated 3.9.2008
- **Tourism Sectorial Strategy**, approved by DCM no. 844, dated 6.11.2008
- **Inter-Sectoral Rural Development Strategy,** (2007-2013), approved by DCM no. 924, dated 14.11.2007
- **Regional Development Cross-cutting Strategy,** approved by DCM no. 773, dated 14.11.2007

National Strategy for Development and Integration 2014-2020, presents the vision for the social and economic development of Albania over the period 2014 to 2020 and explains the plans for achieving this vision through government policies and actions, aiming to bring Albania to the point of European Accession.

National Integrated Water Resources Management (IWRM) Strategy will improve the capacity of water resource managers to address climate- related stress factors in the management of water resources. It will also help develop adaptive capacity in managers in relation to food and energy

security and protection against floods. Overall, the water sector should focus more on River Basin Management Plans (RBMP) that include the whole river watersheds (currently now there are lunched two RBMP of Drin-Buna and Semani river), and to further mainstream climate considerations in all water related plans and projects. The new IWRM Strategy will provide adequate guidance into this direction.

Health and climate change adaptation strategy, provides strategic approaches for mainstreaming climate change adaptation into health policies.

4.4.2 Assessments and Guides

The Integrated Inter-sectorial Plan for the Coast aims to ensure the sustainable use and management of coastal areas – particularly those areas that have been identified as the most vulnerable in Albania.

The General National Plan is an initiative by the GoA to guide the sustainable use of natural resources in Albania. The purpose of the GNP is to create a management platform – that includes the necessary legal frameworks – for sustainable urban, economic, social and environmental development.

The National Biodiversity Strategy and Action Plan (NBSAP) (2000) represents the main guiding document on biodiversity in Albania. This plan defines the country's goals, objectives and measures of biodiversity conservation management for 2000-2015.

4.4.3 Management and Action Plans

The Coastal Zone Management Plan (CZMP). The goals of the CZMP include: i) preserving ecological integrity of the coastal areas by establishing ecological sustainable limits for resource use; ii) restoring or rehabilitating degraded resources; iii) ensuring that natural resources are equitable between generations; iv) encouraging complementary rather than competitive activities; and v) providing a mechanism for capacity building and planning.

National Action Plan for Renewable Energy Resources in Albania 2015-2020. The main intention of the new EU Directive for renewable energy (Directive 2009/28) is the determination of mandatory objectives for the use of energy for renewable resources. The Directive stipulates a general objective of 20% for EU and individual objectives for the Member States based on their current renewable energy level and their economic development level.

The National Civil Emergency Plan clarifies the roles and responsibilities of all public and private stakeholders. This aims to channel the flow of relevant information, to strengthen decision making, and through coordination, to reinforce the capacity to respond through all phases of the disaster cycle. Development of such capacity is also relevant for climate change induced disaster.

The NEAP (National Environmental Action Plan) is the basic document that presents the governmental policy in the area of environmental protection. National Environmental Strategy aimed at improving sectoral integration, providing an up to date analysis of the environment of

Albania and proposals for future policy and to guide integration of Albania's environmental policies to meet EU obligations. The Strategy for the Development of the Forestry and Pastures Sector in Albania (2003) aims at ensuring of the management and sustainable development of forestry and pasture resources in accordance with the aimed/intended governmental policies, aiming at the same time at the conservation and function of the public benefits of forests in accordance with the interests of the different layers of the society and for a steady multifunctional management, as well.

Water Supply and Sanitation Strategy Sector in Albania (2004) searches for a new mode of water and sanitation sector organization in the dawn of a fragile market economy and of legal and institutional adjustments. It analyses the decentralization process as well as management practices on the ground. Most of the attention is given to the achievements accomplishments and obstacles on the way of the reform, causes and consequences of the problems and ways of enhancing the sector efficiency and sustainability.

In last years the country strategies, plans and assessments are better oriented on Climate Change.

Albania's First National Communication on Climate Change is the first assessment of the Albania's present situation with regard to climate change. At the same time, it served as the basis for future action, research, improvement, offering opportunities for policy refinement and development.

Albania's Second National Communication on Climate Change aimed to support capacity building in the field of climate change.

Albania's Third National Communication on Climate Change aims to inform parties, decision makers and the Albanian public on the current trends of the climate change and its consequences, provide an inventory of GHG emissions and flows and describe the ability of Albania to contribute to mitigation and adaptation. Third communication is focused more in Coastal Area and In Adaptation of Ecosystems related to effects of climate change

4.4.4 Local/regional development strategies and management Plans

The local development plans in Lezha Region, are based almost in sustainable development, in respect with local capabilities and assets and environmental principles.

The Regional Plan on Forest and Grasslands Administration in the Lezha Region, promotes the preservation and rehabilitation of forest and grassland ecosystem. In addition, it aims to increase the number of the protected areas in the region.

Sustainable Development Strategic Plan for Lezha Community 2013 – 2030, the plan provides an integrated approach to sustainable development of the community, and serves to guide strategic development of the municipality in line with regional, national and European strategies and in cooperation and partnership with public and private actors. It aims to correct the factors that have had so far a negative impact on economic, social and environmental development and to maximize local values, advantages and potentials.

Environmental Management Plan for Kun Vain Marshland, 2007-2010, formalized by DCM 432, dated 28.04.2010. This Plan, between other includes actions for conservation, sustainable use and information/education of the public. An other important output, is the zonning of the Protected Area, and categorizing of land use and permited and not permited activities upon zonning etc. By this Management Plan and related DCM mentioned above, from the Protected Area is excluded the marshland of Kenalla and is included the Tale Coast and Lagoon.

Regional Environmental Action Plan Drini river delta, Shkodra - Lezhe (2006), The overall goal of this REAP process was to address unplanned development of cities, accompanied by uncontrolled interventions into the existing infrastructure, which has had a negative impact on the environment and public health and gives orientation on the develop ent of environmental voices activities.

5 Project Description

5.1 Rationales

From years Kune Vain Tale Protected Area, is suffering from several issues created by human unplanned activities/un sustainable use and Climate Change effects. Between problems can be mentioned:

- Increase of the erosion intensity in coats/littorals, and riparian forests and floods on inland agricultural areas. By it are reduced seriously tourism assets (reduction of beaches), damaged the important habitats for important flora and fauna, with visual and economical values, directly loss of agricultural production etc.
- Reduce the lagoon depth by intensive sedimentation coming from eroded site and overflows, block of communication channels between sea and lagoons etc. This phenomenon decreased directly the lagoon capability for fish, and indirectly made the lagoons very prone to eutrofication, by reduction of vertical and horizontal water circulation capabilities. This phenomenon has caused reduction of fishes, reducing the tourism users number and negatively impact the community mentality on values of the protected area.
- Threatening of lagoon existence by destroying littorals and creation of one body lagoon/sea waters. Inciting the youth of the community to migrate out of the site, because of the losing of hopes on lagoon conservation and its use as economic resource.
- The overflows are inciting the distribution of contamination in clean sites, by transporting the pollution by water running in overflows. Reduce site environmental quality and tourism potentials.

The unsustainable use and alteration of the KVLS is being compounded and will be further exacerbated by the effects of climate change, in several ways. Recent climate change models predict an increase in air (1.8°C by 2050) and sea surface temperature, which will lead to increased evaporation. In addition, global climate models also predict a reduction in precipitation, which will also result in an increase in salinity in the lagoon with detrimental effects on the fisheries. Models predict an accelerating rate of sea-level rise (up to 61 centimeters by 2100) resulting in increased erosion and the consequent loss of habitat within the KVLS. Finally, the KVLS is expected to experience more intense and frequent floods and storm surges. These extreme events will lead to the erosion of beaches and riparian forests and the alteration of flow patterns within the KVLS, which in turn reduces physical barriers to extreme coastal flooding events and limits the capacity of the lagoon to buffer the surrounding communities from these events.
Overall, climate change effects are reducing the capacity of this system to provide ecosystem goods and services to local communities.
The Kune Vain Resilience Project, between other aims to implement some adaptation interventions within The Kune Vain Tale Protected Area, focused on the Vaini site that consists on improving of the natural habitats and controlling the erosion in the coasts. A range of studies on years, and specific studies on project in terms has helped to identify and screen the most effective activities for the adaptation measures.
Adaptation interventions will include:

- Opening a new tidal inlet channel between the Ceka Lagoon and the Adriatic Sea;
- Opening/reopening of 12 artesian wells, to ameliorate the balance on salt and not salted water, and to offer drinking water for wildlife.
- Reforestation of some sites of the Ceka, which are deteriorated during years, to stabilize the sandy dunes and restore the damaged natural habitats, selecting native plants resilient to Climate Change. Such restored habitats will serve in the future as a buffer against the storms and floods coming from the seaside.
- Stabilizing the upper level of the sand dunes, to control erosion caused by normal tide and wave activities, wind (eolik) erosion, by planting of native water and salt resistant graces.

The implementation of adaptation interventions will result in increased ecological functioning and climate-resilience, which will reduce the vulnerability of the KVLS and the communities surrounding it to the negative effects of climate change.
During the scoping process, opening of artesian wells was not considered any more appropriate, so, this process is excluded from the planned interventions (please refer to the subchapter 5.6).

5.2 Rehabilitation of natural habitats and coastal protection

The interventions for rehabilitation of natural habitats and coastal protection are classified in three main interventions:

1. Planting of new trees to restore loosed habitats by Climate change effects like salinization, erosion (loose of soils), planting of appropriate native grasses in semi marginal areas(sandy littorals)
2. Opening of new channel at Ceka/Adriatic Sea, to improve lagoon-sea water exchange, improving the quality lagoon water habitats, increasing fishes and avifouna presence in the site, by combating eutrofication.
3. Re-opening/opening of artesian wells, to give the wildlife the chance for drinking water availability, and increase the biodiversity presence in the site

Following is the summarized description of the planned interventions. This chapter, with some exceptions regarding Protected Area zoning, is fully referred to the detailed designs made by:

- Star Engineering JV Nord-Comat – Dezign of the reopening of the tide channel
- NCETSD & Diava Consulting – Planting activities

5.3 Summary of the project for opening of Ceka-Sea tidal channel

5.3.1 General description of sea lagoon water exchange

Ceka Lagoon suffers from limited water circulation and restricted water exchange with the sea. It is connected to the sea through a meandering 3,000m-long channel (Matkeqe Channel) inland of North Tale Beach. The position of the channel mouth deviates depending on prevailing wave and water stream conditions. Two artificial cuts have been made through the beach in the past, mainly by fishermen initiatives, to improve water exchange, but they have been naturally filled with alongshore trans- ported sediment in short time. Tale Pumping Station, built in 1962/62, located to the south of Ceka Lagoon pumps untreated runoff (containing pollutants) into the connecting channel which ultimately reaches the lagoon. Because of the poor connectivity through the inlet, some of this runoff enters the lagoon. This water over freshens, reduces salinity and pollutes the lagoon and puts it at high risk of eutrophication. To this moment, on the ground interventions in this protected area have supported mainly the maintenance of the tidal inlet, fencing of the protected area, forestation of degraded sites, as well as provision of technical assistance to the Kune-Vain administration staff. State budget has supported the opening works for a new tidal inlet between the Adriatic Sea and Ceka Lagoon, but lack of a feasibility study and environmental impact assessment reports combined with lack of maintenance works, had adversely affected the sustainability of the investments. These interventions failed to take into account the impacts of climate change, especially the total flooding of the area and the major heat wave that have seriously damaged the Ceka lagoon ecosystem. Therefore, this project proposal takes into account sea level rise, the increased frequency of extreme climatic events such as sea storms, etc., and aims at improving the adaptation of this zone to such climate change effects.

5.3.2 Aim and Objectives

Thus, this project aims at addressing the problem of water circulation /communication between the Adriatic Sea and Ceka Lagoon, by opening a new channel in the narrow area between the Adriatic sea and Ceka, Lagoon and filling of the old inlet that comes from the Tale pumping station which will stop the flow from the pumping station to enter into the lagoon.

Objectives are related to this intervention as an Ecosystem Based Adaptation measure due to Climate Change Effects. Knowing negative effects of atmospheric and hydrological phenomenon on erosion/sedimentation process and closing of the existing channel, avoiding water exchange in the channel and by it, reducing natural fish production and tourism potential (as very important economical assets of the site), has also negatively impact the biodiversity of the waterfowls and other wildlife, that use the lagoon and its biological diversity as feeding, nesting or standing site. Expected effects of this intervention can be listed as following:

- Reduction of Ceka Lagoon eutrofication risk,
- Increase fish species and population numbers by improvement of fish habitats
- Improve lagoon water quality by avoiding discharge from Tale pumping station
- Improve water habitats as close as possible to natural conditions
- Improve standard life level of the community by increasing of natural assets quality

5.3.3 Expected results

Continual water exchange between the Ceka Lagoon and the Adriatic sea successfully established;
Water quantity and quality in Ceka Lagoon restored;
Natural habitat and biodiversity of the Ceka Lagoon improved;
Quality of water exchange between Ceka and Zaje Lagoons improved;
Fishing conditions in the lagoon improved;
Lagoon functionality maintained through improved management of sediment accumulation in the tidal exchange channels;
Co-operation between fisherman and the nature conservation administration within the project area enhanced;

5.4 Description of the territory of intervention for reopening of water exchange channel and protection status of the site

The site selected for the sea-lagoon channel is defined by a detailed spatial and hydraulic/hydro-technic evaluation. A range of consultation with fisherman and KV Administrative body was part of th selection of the site. Several alternatives are considered for comparison and selection of the best one. The channel site was chosen to be on the track of the old one, for some reasons, stated below:

- Minimal impact on the environment, because of very poor presence of vegetation in surrounding sites
- Small impacts by transport (It represents the shortest possible distance from automobilist roads)
- Use of the existing channel, i.e. not changes on environment and not additional fragmentation of the habitats
- Less construction works

As it can be noted by the photo, the site selected is a sandy area, marginal, site characterized by arid and semi-arid conditions. Not specific or important vegetation is appeared there. The site is situated in the littoral between Ceka and Sea, comprised by a sandy belt.

According to the Kune Vain Management Plan and its related DCM, the area where will be re-opened the channel is part of the Traditional Use Zone- Holding activities. The protection sub-zone includes the Ceka lagoon waters and its Eastern and Southern coasts, and bordered by embankments of buffer areas of Ishull Lezha and Barbulloja in the East, Tale embankment in South and Drini Mouth in the North. In the above mentioned site are permitted interventions for opening and maintenance of water exchange channels.

Photo 1. The existing channel that will be reopened

The maintenance of habitats by intensive management is part of actions in such areas to maintain the habitats in a holding close natural status. Traditional development on fishery, tourism and recreation, sport fishing, cultivation specific of indigenous species and educational actions based on traditional development are focused also in such territories.
Between others extensive structured fishing in the lagoon body, rehabilitation of existing dams and building of new dams, establishment of hibernation pools etc can be developed in such areas

Prohibited activities

- Introducing of alien species
- Grazing in lagoon coasts
- Collection of mollusks, crustaceans/decapods without an preliminary EIA and its approval by REA/NEA and MOE
- Discharging of waste waters in the lagoon bodies or channels without any treatment
- Discharging in lagoon of other contaminants like, chemicals, organic material and throw solid wastes and remains like rubbish, industrial remains, batteries etc.
- Changes on lagoon topography without approval of a hydraulic and EIA study.
- Changes on lagoon water sources, opening of new access with other water bodies, without a detailed Hydraulic study, sedimentation study and related EIA.
- Permanent fishing in water tongues.
- Fishing in wrong seasons, with wrong nets or techniques (electricity, poisoning etc.)

Photo 2. Areal view of the future construction site

5.4.1 Infrastructure needed

The reopening of the new channel has its requirement on available infrastructure, but those are quite modest and appropriate. No needs for energy source is required, except using of one electric generator that will help works with pumps for temporary draining of some working place. The gases to be generated by generator are quite un-considerable. The works will be done during the sunny day. The Transport will be realized from the existing Road from Tale Pumping Station to the channel in term.

5.4.2 Working Plan

The main work activities are planned as follow:

- Construction of the working campus, about 200m^2, in the South east of the channel in a sandy desert habitat.
- Leveling of existing road.
- Opening of the channel
- Using of temporary dams as water barrier during construction.
- Leveling of channel slopes.

The design of the area is given in the related annex.
The dredged material will be disposed directly to the truck and then transported at the disposal place.
The works for the opening of the channel will continue bout 3 weeks. For the maintenance, are planned once cleaning per 6 months, for all the period that the channel function will be considered useful.

5.4.3 The accessibility

The access of the site will be by using of existing road from Tale Pumping Station to the site. The existing damaged road will be restored, but not paved, avoiding permanent soil compression.

5.4.4 Remains and wastes from working activities

The dredged material will be disposed in the place that will be decided from the Lezha Municipality. In case that the dredged send will be of appropriate quality, the material can be

used for coastal filling in eroded area. This activity should be approved by the KV Administrative staff.

5.4.5 Employment

About 7 people will be employed directly during construction. 1 excavator operator, three workers/operators, 3 drivers of the transport trucks. In case that the dredged sand will be used for coastal filling, working animals and boats may be used to pas thought the littoral and lagoon waters, over the channels, etc.

5.4.6 Intervention cost

Two option of interventions with related alternatives, have been evaluated prior the selection of the best alternatives. The first option is opening of the channel without the breakwater and the second one, opening of the channel with breakwater to control canal and lagoon sedimentation. The best alternatives, proposed to be implemented is the alternative without the breakwater, which construction cost is 341 446 USD, and maintenance/operation cost during 10 years goes around 15 000 USD/year, which, with a total for 10 years including construction, operation and maintenance, runs to about 150 000 USD. In total, the amount for the selected option 1 is 491 000 USD.

5.5 Reopening/Opening of Artesian wells

In past decades (before 1990), in Kune Vain, there were 11 operating artesian open wells with a surface pressure that resulted 50-70cm high, and they were distributed into different points of an area numbering 10 square kilometers. These sources have provided sweet water to the living poultry within the lagoon. Meanwhile, during the last 20-years a decrease of the water pressure has been noticed, up to a point that it cannot reach the earth surface anymore in a natural way, as it did before the '90s.

There are several causes for the decreasing water pressure of the artesian wells, and they are listed below:

1. The diminution of the furnishing water from the aquifer
2. The damages or the jams caused along the axis of the wells
3. The overuse of ground water for irrigation etc

Investigating further, a decrement of the furnishing water from the aquifer would seem acceptable during droughts. Normally, once that this type of weather was left behind, the water should have sprouted again on the earth surface, which did not actually happen.

Next, after further controls were performed unto undamaged and free wells, it was clear that, even within these sound sources the water level was 50cm below earth surface.

Moreover, the surrounding area was examined while seeking information regarding eventual interventions, possibly created in the recent years, and it resulted that in order to provide water

for the local populations, two source-creating perforations were performed close to the lagoon's area.
A direct consequence of these interventions for water providing purposes is the decrement of -1.10m in the underground water pressure. It is understandable that the situation for the existing artesian wells is not going to improve, because there is a steadily increasing demand for water; on the contrary it will worsen until a new equilibrium of the underground waters is established. Exploitation of such waters for biodiversity purposes can negatively impact the community demand for water sources.
Being aware of this situation, the consulting engineer team concludes that it is impossible to have operating artesian wells within the lagoon, for the water cannot reach the earth surface and therefore it should not considered a exploitable resource.

5.6 Planting of specific sites with trees, bushes and grass.

5.6.1 Project Aim, tasks and Objective

The reforestation of these plots with forest species aims to; improve the physical and chemical land proprieties, establish a green forest habitat, improving wildlife presence and prevailing winds and waters in storm events Improve visual potential of the site for tourism and recreation.

Project tasks

The project task is to create some artificial forest with appropriate and native species, stands inside the Kune-Vain area through reforestation using seedlings of various species like:

Plot 8c & 21 a - Alepo pine (*Pinus halepensis* Mill.) + Stone pine species (*Pinus pinea* L.).

Plot 21a & 21c - Stone pine (*Pinus pinea* L.); Ash (*Fraxinus ornus* L.)- native specie & English oak (*Quercus pedunculata* Ehrh.) – native specie,

Plot 27a - Aleppo pine (*Pinus halepensis* Mill.) & English oak (*Quercus pedunculata* Ehrh.) – native specie

Planting of Tamarix sp. (bush) and Ammophila arenaria (grass), both native species in the site and very abundant in coastal wetlands.

The main task of the project is to prepare the respective reforestation projects in compliance with site conditions of each plot including the necessary interventions and works for planting, seedling replacement and seedling maintenance for a successful establishment of forest stands.

Project objective

The project objective is the installation of forest vegetation and grasslands through reforestation in certain plots inside the Kune-Vain lagoon. During filed survey are identified several plots which are situated not only close to the sea shore but also situated inside the studied area. The proposed plots for reforestation are: 8c, 21(a/b/c) and 27a.

5.6.2. Species description

Ability of species proposed for improvement of habitats and protection as Ecosystem Adaption Measure to face the projected climate change in the study area

Looking into the future, climate change and the uncertainty of the environment following this change will be the most important challenge to reforestation success. Potential impacts of the predicted climate change on the afforestation areas will be:

-water stress response
-sunlight tolerance
-soil conservation
-forest fire response
-pests and disease risk

For a successful reforestation 3 main factors are taken into consideration:
1-Species selection;
2-Planting stock density;
3- Seedling quality and planting practices

Refering to the technical design from NCETSD & Diava Consulting the selection of the species considering above mentioned requirements are based on:

- The appropriate species selection is crucial for the success of the reforestation and adaptation to predicted climate change.

- Planting stock density and species mixture in the project area are important for the success of the reforestation. The consultant proposed these planting densities taking into account: (i)-reforestation purpose and (ii) winds prevailing in the area with speed range from 2.5 to 3.1 m/s.

According the NCETSD & Diava Consulting design, the proposal of such planting designs will support seedling growth due to the available space and nutrients and the seedling competition would be limited. In the light of the climate change the coast areas are prone to extreme events and strong winds. Therefore establishment of such artificial forest stands with these planting designs will serve to protect better crops planted in agriculture lands and seedlings will be less affected by strong winds. For more details, please refer to the Design prepared by NCETSD & Diava Consulting.

5.6.3 Land use of selected plots for reforestation regarding Protected Area Zoning

All selected plots for reforestation are part of the forest economy "***Shëngjin-Tale*",** and of Protected Area are managed by the Directorate of Proteced Areas in Lezha Region. According Zonning of Kune Vain Protected Area, some of the plots are part of the Core Zone, within cathegories of 1/a (Plot 8/c), 1/b, 1/c and others in recreational zone. The table below shows tha land use of the zone defined by Kune Vain Tale Management Plan (2010-2020).

Management Zone	**Land use characteristics**
1. Core Zone protective integrated management zone sub-zoned in: 1/a)Strict Protected Zone 1/b.)Low human Presence/Protective intervention 1/c.) Controlled recreational area/ Low human presence	1/a)Not management and land use only for scientific or educational purposes 1/b)Low intervention for conservation purposes / small human interference 1/c) Recreational area with low sea sun visitors. Very fey infrastructure for control, safety and hygiene purposes.
2- Traditional Use zone – holding activities 2/a)Traditional development area 2/b Sustainable development area	2/a) Traditional development on fishery, tourism and recreation, sport fishing, cultivation specific of indigenous species 2/b) Focused on the development of tourism, other management actions that intensively maintain the habitats in a holding semi natural status
3.)Buffer Zones – Sustainable use zone	Protective belt to the Protected Area, traditional and sustainable

	management/intensive human presence

Table 1. Zoning and sub-zoning categories considered in Zoning of Kune Vain Marshland and Tale Coast.

In those sites is noted the presence of typical grass vegetation for sandy soils as well as reed (*Juncus maritima*) and scrub vegetation in some parts of the selected plots. Referring the map below, the plots selected for forest planting are situated in following management zones of the Kune Vain Tale Protected Area:

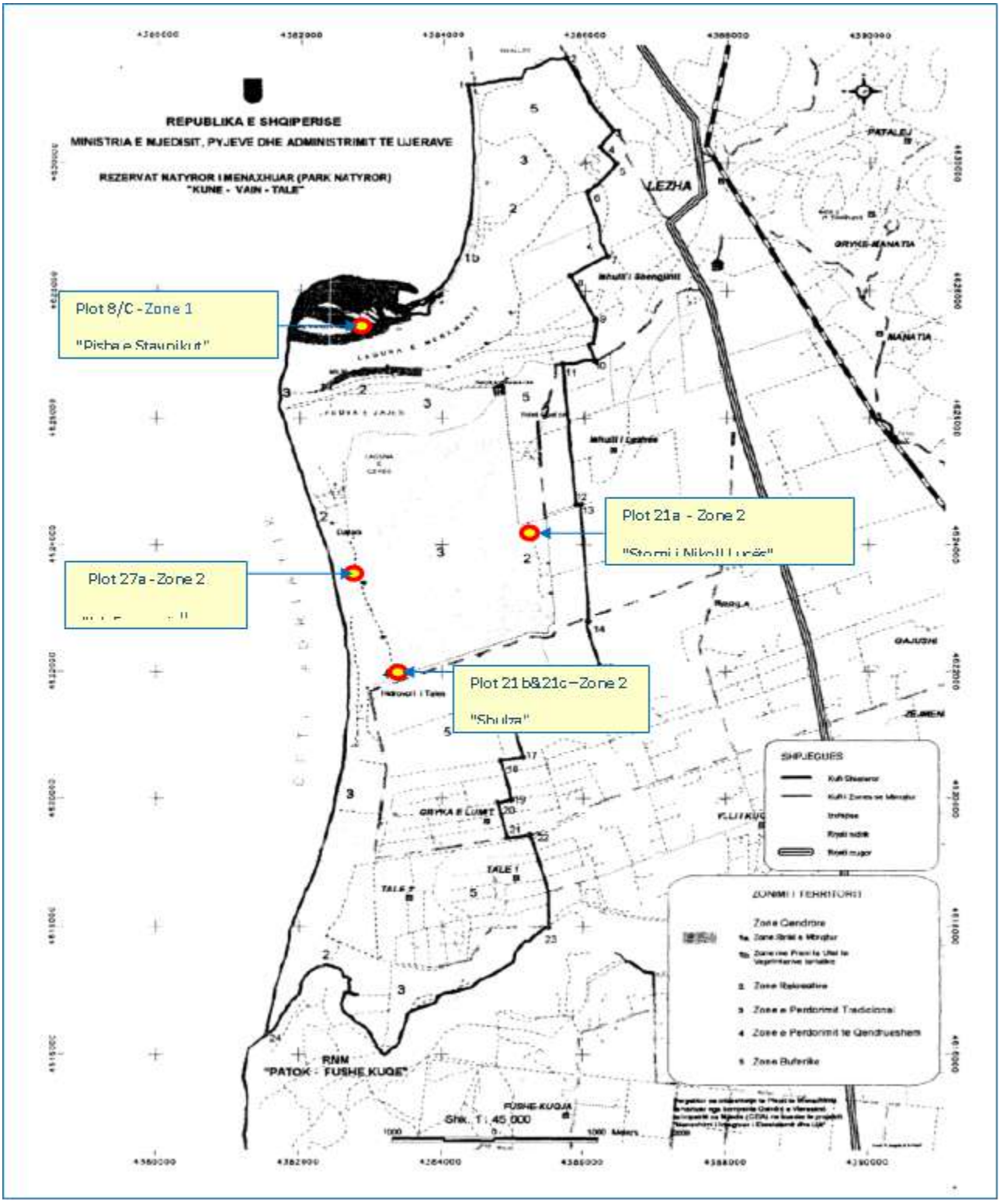
Plot 8/c, "Pisha e Stavnikut" – Zone 1

Plot 27/a, "Ish Fazaneria – Zone 2

Plot 21/a, 21 b and 21c ", "Shulza" and "Stomi I Nikoll Luces" – Zone 2

The plot 8/a, is not managed by humans. The other plots are used only for recreation or traditional development.

For planting of Tamaix sp. and Ammophila arenaria, are selected the site in North/East of Merxhani Lagoon, West of the Merxhani Lagoon, prior the channel between the littoral and Kune Island, first half of the southern part of the Drini Valley, and separate parts in the Tale channel, in the South of Vaini Lagoon.


REPUBLIKA E SHQIPERISE
MINISTRIA E MJEDISIT, PYJEVE DHE ADMINISTRIMIT TE UJERAVE
REZERVAT NATYROR I MENAXHUAR (PARK NATYROR)
"KUNE - VAIN - TALE"
Plot 8/C - Zone 1
"Pisha e Staunikut"
Plot 21a - Zone 2
Plot 27a - Zone 2
Plot 21 b&21c – Zone 2
"Shulza"
LEZHA
PATALEJ
GRYKE-MANATIA
MANATIA
GJUDIN
SHENJUESIT
RNM
"PATOK - FUSHE KUQE"
Shk. 1 : 45 000

Map 1, territories of selected plots for reforestation, related to the protection status (zonning) of Kune Vain Tale Protected Area. Elaborated in the map attached to DCM 432, 2010, for aproval of the Kune Vain Tale Management Plan.

Photo 3. View of the area to be afforested in the plot 8c

Photo 1. View of the area to be afforested in the plot 21a

Photo 5. View of the area to be afforested in the plots 21b&21c

Photo View of the area to be afforested in the plot 27a

Photo View of the site to be planted with Ammophila arenaria (coastal grass) and Tamarix sp. (water and salt resistant shrub.

5.6.4 Administration, distance from settlements and the accessibility

The Kune Vain Tale Protected Area, is under the Administration of Lezha Regional Directorate of Protected Area (RDPA). RDPA, is under the administration of National Agency of Protected Area, which operate under the Albanian Ministry of Environment.

The proposed plot 8c is situated in Kune Island, in the the western part of the village Stomi i Madh in a distance of 2.3 km.The overall area according to the management plan is 22.62 hectare (ha) and the area which will be reforested is **3.1 ha**.

The next area considered useful for reforestation is part of the forest parcel 21a and is located in a distance of 1.5 km from Barbulloje village. The forest parcel area based on the Forest Management Plan is 1.86 ha while the area proposed for reforestation inside of this forest parcel is **0.5 ha**.

Another object proposed for reforestation is part of the forest parcel **21 b** and **21 c** and is situated in a distance of 198 m far from the building of Tale Water Pumping Station in the

eastern part of this building. According to the Forest Management Plan the overall forest parcel area is 34.64 ha while the plot area proposed for reforestation is **3 ha**.
The last plot considered appropriate for reforestation is part of the forest parcel **27a** which is located in the southern of the Drini estuary in a distance of 2.47 km far of it. This area is used in the past for pheasant breeding and the area proposed for reforestation is **0.4 ha**. Presently some families are living in the "Ish fazaneri".
All proposed plots for reforestation are accessible and linked with existing roads making easier the implementation of the reforestation activities.

5.6.5 Location and bordering of proposed plots for reforestation

Based on the field survey, the consultant for reforestation has identified the borders and geographic location of each proposed plot for reforestation. The information of each plot with local name, their position and border are given below:

Plot no.8c
Local name: "Pishat e Stavnikut " , Kune Island
Location: 41°45'41.13" N & 19°35'0.26" E
Proposed plot borders:
- North: water body of Kune lagoon
- South: water body of Kune lagoon
- South: forest with mediterranean pines
- West: Adriatik sea

Plot no. 21a
Local name: "Stomi i Nikoll Lucës"
Location: 41°43'59.62" N & 19°36'44.59" E
Proposed plot borders:
- North: land plot 19b
- South: land plot 22b
- East: land plot 21c
- West: land plot 20b

Plot no. 21b & 21c
Local name: "Shulza"
Location: 41°42'43.12" N; 19°35'23.77" E

Proposed plot borders:

- North: plot 19a
- South: plot 22
- East: water body (lagunë)
- West: plot 22a

Plot no. 27a

Local name: "Ish Fazaneria"

Location: 41°43'43.68" N; 19°34'59.85" E,

Proposed plot borders:

North: plot 29b
South: plot 26
East: plot 28
West: plot 17d

5.6.6 Physical description of the site (terrain configuration, orientation, altitude, hydrology)

All proposed plots for reforestation are situated in a flat terrain with elevation range from 0.5 to 3 m above sea level (m a.s.l.) and with no influence of inclination. Based on our field survey we noted that existing vegetation is part of the Mediterranean salt meadows (Juncetalia maritimi) 1410**,** subspecies 15.51 of the European System of Vegetation Classification. The information for each forest parcel and proposed plot is summarized in the following table:

Nr	Forest parcel	Local name	Terrain pattern	Elevation (m a.s.l)	Site inclination (degree)	European Vegetation classification	Existing vegetation
1	8 c	"Pishat e Stavnikut"	flat	1	0	Mediterranean salt meadows (Juncetalia maritimi) 1410	tamarix,graminacea veg.
2	21a	"Stomi i Nikoll Lucës"	flat	3	0	Mediterranean salt meadows (Juncetalia maritimi) 1410	Juncus maritima

3	21 b & 21 c	"Shulza"	flat	1	0	Mediterranean salt meadows (Juncetalia maritimi) 1410	*Arthrocnemum fruticosum, Salicornia europaea, Limonium vulgare, Inula crithmoides,Phragmites australis, Scirpus maritimus, Tamarix dalmatica, Vitex agnus-castus, Tamarix hampeana*
4	27a	"ish Fazaneria"	flat	0.5	0	Mediterranean salt meadows (Juncetalia maritimi) 1410	White poplar (*P.alba* L.) and stone pine (*P.pinea* L.).

Table 1. Site characteristics of the proposed plots for reforestation. Ref technical design from NCETSD & Diava Consulting

a) Soil characteristics

Based on the field survey and information provided from the Forest Management Plan is noted that soil at all plots are part of the Azonal Group according to Albanian Soil System of Classification. These are new soils with no differentiation or division in soil horizons. These are alluvial soils, and sandy subtype (**Gleic Arenosol**). *Gleic Arenos*ol are sandy undeveloped soils. These soils are introduced in the form of sandy deposits and are extended across the whole field area of the coast. They have a wavy surface and with gradient in the sea direction. In these deposits the land formation is negligible due to the young age of parental material and lack of vegetation. These are lands of undifferentiated profile in grey color, with uniform distribution of particles in their profile, salty underground waters and close to the land surface, while on the surface they are dry and washed from soils.

b) Mineralogical composition

The mechanic and mineralogical composition of these soils is homogeneous due to the uniformity of the parent material composition. Maritime deposits basically consist of quartz.

c) Physical characteristics

These soils mainly consist of moderate and fine sand fraction (92-98%), while fine fractions (silt and clay) are found in rare quantities. The latter in sand deposits reach 3-5%. The lands have a limited water capacity, high permeability, low capillary action and high sensitivity to erosion.

d) Chemical characteristics

Undeveloped sandy soils have poor chemical qualities. They are washed on the surface and with basic reaction. They have a limited absorption capacity (1-5 mech./100 gr of soil), contain 3-10% of $CaCO_3$, low humus level (0.1-0.4%), as well as a low nitrogen content (0.02%), P assimilability (0.4-0.8) and K interchangeable (2-3 mg/100 gr of soil) one.

5.6.7 Species Selection for reforestation

Methods applied for species selection

During the process of species selection the consultant team have taken into consideration three elements: a) purpose of planting, b) site conditions and c) biological traits of species.
The method used by for species selection is the "method of comparative ecology". This method is applied for species selection when no experiment is established and is based on the comparison and agreement between species requirements and site conditions. Therefore for each species proposed for planting we have found and studied their requirements to site conditions.

The NCETSD & Diava Technical design, after their investigation, mentioned that most of the species proposed for planting are native and well adopted to site conditions. All species have a high adaptive capacity to severe site conditions and have ability to improve soil conditions and fertility which limits the forest vegetation growing. For more detail, please refer to the selection of the best alternatives (species selection).

5.6.8 Reforestation works

a) Planting density and their respective schemes in the study area

Due to the terrain characteristics, seedling planting is going to be through holes. The consultant have proposed different planting densities and formula taking into account the specie's requirements and the purpose of the project. Seedling planting will be performed to resemble the natural forests, making the second line to start in the middle of the first line distances. The combination of species may be realized within the line or between the lines and planting will begin from east to west to provide optimal light conditions.

Nr	Forest parcel	Local name	Planting area	Planting Density	Planting formula
1	8c	Pisha e Stavnikut	3.1	2 x 2 m	0.5 P.halepensis + 0.5 P.pinea
2	21a	Stomi Nikoll Lucës	0.5	2 x 2 m	0.5 P.halepensis + 0.5 P.pinea
3	21 b & 21c	Shulza	3	2 x 2.5 m	0.2 P.pinea + 0.4 F. ornus + 0.4 Q.pendinculata
4	27a	ish Fazaneria	0.4	2 x 2 m	0.6 Q.pendinculata + 0.4 P.halepensis

Table 5. Planting density and formula for each plot. Ref. technical design from NCETSD & Diava Consulting

b) Preparation of the area for planting

The area preparation for planting is a prerequisite for the successful implementation of planting works and for rapid adaptation of the planted seedlings. In order to prevent soil erosion, damage of upper soil layers and loss of nutritional elements, the existing ground vegetation must not be totally removed and no heavy machinery should be used to avoid soil compression. We recommend the removal of harmful plants such as blackthorns or briers and we suggest the use of manual tools during the preparatory works in order to keep safe the soil texture and nutritional elements. Controlled burning of ground vegetation may be applied to small areas but adequate care should be demonstrated. The planting orientation should follow the eastern-western direction, in order to optimize light conditions for the seedlings.

c) Planting of seedlings

We recommend the seedling planting within the period from February to March or November to December 2017, when they are under a period of dominancy and soil humidity is optimal. If planting takes place earlier, for instance in January, then seedlings will take more time to develop their root system. The better roots are formed, the longer seedlings will survive to drought conditions during summer months. We propose planting of seedlings older than 2 years prepared in pots or plastic bags in the nursery. It's important that all seedlings must meet all the required technical and biological standards.

Nr	Species	Age(yr)	Seedling standards		Planting period
			root collar diameter (mm)	height(cm)	
1	*P.helepensis*	> 2 yr	4-5	30-40	Spring or autumn
2	*P.pinea*	> 2 yr	4-6	30-40	Spring or autumn
3	*Q.pendinculata*	1 yr	6-8	30-41	Autumn
4	*F.ornus*	> 2 yr	6-8	80-90	Spring or autumn

Table 2. Seedling standards for planting. *Ref. technical design from NCETSD & Diava Consulting*

The longer seedlings are, better they compete with weeds and the existing vegetation. Planting is recommended to take place early and we suggest to avoid planting at noon. Holes may be excavated by means of spades or motor drills, which ensure hole excavation according to the required dimensions and without the need to cause strain to the workers.

Picketing of the holes will follow the eastern-western direction, starting from the terminal section of the plot. Planting density is different (see table 5) taking into account site characteristics and species traits. Planting in the second line will start in the middle of the distance of seedlings of the first line. This irregular planting scheme will establish a plantation that is similar to the natural forest stands. After picketing, work will continue with hole excavation. The holes dimensions will be : depth-40 cm; width 40 cm and length of 40 cm. The soil mass obtained from hole excavation will be placed separately respecting the soil layers. Thus soil from upper layer will be used at the bottom of the hole during filling process. Then hole filling will continue with other soil layers which will be compressed well at the seedling root. Given that the soils are

poor in nutrients, an amount of chemical fertilizer (diammonium phosphate) will be used in a quantity of 100 grams per seedling, in order to meet their demands for chemical and organic substances. After completing the hole filling then seedling watering will take place. A short stake should be used in planting, in order to ensure solid support until the wood stem becomes hard and unbowed.

d) Demands for seedlings

Respecting the planting density The designer has estimated the quantity of seedlings for each plot proposed for reforestation.

Nr	Forest parcel	Planting area	Planting Density	Planting formula	Seedling number per 1 ha
1	8c	3.1	2 x 2 m	0.5 P.halepensis + 0.5 P.pinea	2500
2	21a	0.5	2 x 2 m	0.5 P.halepensis + 0.5 P.pinea	2500
3	21 b & 21c	3	2 x 2.5 m	0.2 P.pinea + 0.4 F. ornus + 0.4 Q.pendinculata	2000
4	27a	0.4	2 x 2 m	0.6 Q.pendinculata + 0.4 P.halepensis	2500

Table 6. Planting density and scheme proposed for each plot. Ref. technical design from NCETSD & Diava Consulting

Based on the planting density and species participation according to the planting scheme we have assessed the respective number of seedling per each plot and species.

Nr	Forest parcel	Planting area	Total seedling number	Seedlings according to species			
				P.halepensis	*P.pinea*	*Q.pendinculata*	*F.ornus*
1	8c	3.1	7750	3875	3875	0	0
3	21a	0.5	1250	625	625	0	0
4	21 b & 21c	3	6000	0	1200	2400	2400
5	27a	0.4	1000	400	0	600	0
	Total		**16,000**	**4,900**	**5,700**	**3000**	**2400**

Table 7. Estimation of seedling number per each plot. Ref. technical design from NCETSD & Diava Consulting

e) Seedling conditions

While transporting and putting the seedlings into the area, proper care should be basically shown for:

- non-exposure of seedlings to high temperatures, wind or when there are contaminants.
- sapling roots should not be exposed and they must be carefully carried during planting process
- planting at the required depth and proper compression, in order to ensure full contact with the earth and safe adaptation to it.

When planting seedlings within the area following requirements should be respected:

- seedlings in pans or bags should be kept far from the sunlight
- seedlings should be spaced from each other, in order to ensure air circulation
- seedlings should not be planted during frosty periods
- seedlings should be possibly planted within a period of two weeks

f) Maintenance services after reforestation

In order to favor the optimal development of seedlings and ensure a high percentage in their sprouting, maintenance services needs to be carried out in the first two years after planting. These maintenance works comprise 2 hoeing works and 2 irrigations in the first and the second year after planting as well as the use of chemical or organic fertilizers. Hoeing will take place around the seedling, with a radius of 0.5 meters and a depth of 10-15 cm. The hoeing period will be from April to June and from August to September. It is recommended that hoeing should take place 2-3 days after rainfall, in order to retain in the hole the largest possible amount of water.

g) Successful planting of seedlings

Taking into account the site conditions and the possibility of seedlings damage due to various factors, the planting consultant foreseen a threshold value over 80% for successful planting planted seedlings. If the seedling occupation is below this threshold (80%), then replacement of dried seedling will take place.

h) Monitoring for the survive of seedlings

Monitoring of the seedling rate survive will be conducted in autumn, after the seedlings have completed a full growing season. Monitoring will take place by measuring the number of seedlings in the sample plots within the reforested areas.

i) Replacement of dead seedlings

Dead seedlings will be replaced during the next planting season. This will be done based on the data derived from the field verification of seedlings survive in the next autumn. The quantity of seedlings to be replaced is the same as the number of those dried due to various reasons. The cost for re-planting has to be covered by the contracted entity.

j) Protection measures

The reforested plot must be protected from grazing for a period of 2-3 years and in case of the appearance of pests or diseases, they should be treated. First we suggest the reforest plot fencing in order to prevent the entry of animals inside the area. Also, the area should be encircled by a plastic tape and be supplied with an indicative board showing that it's a reforested area. Also the consultant, propose the assignment of a maintenance worker to safeguard the area and carry out the maintenance works.

k) Employment

The total number of working days for the successful complete of reforestation is 2241 days. The designer foreseen the employment of 42 seasonal workers for 1 month period during reforestation and 30 workers for seedling replacement works during 2 years. Besides that we suggest the employment of 5 workers for 2 years engaged in the maintenance works and safeguarding of the forested plots.

Nr	Forest parcel	Total working days	Working days		Labour force	
			Reforestation	Maintenance works	Reforestation	Maintenance works
1	27a	87	30.5	56.5	1	1
2	21b&21c	585.4	240	345.4	11	8
3	21a	135.5	48	87.5	2	2
5	8c	858	316	542	14	13
6	Along roads	575	305	269.9	14	6
		2240.9	**939.5**	**1301.4**	**42**	**30**

Table 8. Working days and labour force during the reforestation. Ref. technical design from NCETSD & Diava Consulting

l) Safety measures at work and living conditions of workers

The company should have a policy of "Health and Safety at Work" to be regularly documented, implemented and updated. The company to deal with the project implementation should meet the standards related to the workers' living conditions, in compliance with the rules provided for by the International Labor Organization (ILO) and the domestic legal framework. Accordingly, the company should:

- ✓ Provide regular contracts and pay health and social services for the workers.
- ✓ Sign employment contracts with all employees; these contracts should be individual and documented.
- ✓ The company should not allow the workers to perform compulsory labour, as defined by ILO Convention.
- ✓ It should not allow the children's employment, in compliance with the requirements of ILO Minimum Age Convention .
- ✓ The company should observe the eight working hours per day and in case of overtime job, it should pay the workers in accordance with the applicable rules.
- ✓ The workers should have special clothing when accessing the facilities they will work, such as yellow vests or jackets and with phosphorescent strips, plastic protective head-caps, plastic protective glasses, work uniform suits for all workers, thick soled shoes etc.

Additionally, the project implementing company (or the entrepreneur) should apply the **Rules of Health and Safety** at the workplace. These rules are as follows:

a. The company should have a special first aid facility near the workplace.
b. The company should have proper vehicles for the safe transport of workers.
c. There should be a plan of measures in place for the timely evacuation of workers to an adequately supplied medical unit, in case of serious accidents.
d. The company should have a health insurance scheme for the workers to be affected by accidents at the workplace.
e. If the workers stay in camps for a long period of time, the work implementing company will have to take measures to provide necessary accommodation and food conditions. These conditions should be compliant with at least those stipulated in ILO Code of Practice for Safety and Health in the Forestry Work.

f. The company should appoint an individual to have the overall responsibility for the implementation of "Rules of Health and Safety at Work". Also, there should be conducted a preliminary training of workers, who will deal with all working processes, on the rules of health and safety at work.
g. The workers should be properly trained for the specific jobs they will perform.

6 Environmental Baseline

General

The Kune Vain Marshland is a complicated wetland that is situated in both sides of Drini of Lezha River, in the cost of Adriatic Sea. This site is comprised not only by inland habitats and its surrounding marches and lagoons but also, from lower part of the body of Drini River of Lezha and its delta. From Administrative point of view the site is part of Lezha district, and very close to Shengjini Town and Harbor in the North, villages of Shengjini Island, Lezha Island, Tale, Barbulloje etc. The site was very rich on wildlife and fish, and this justify this area as the first Albanian Game Reserve, used for hunting and recreation by Albanian elites and foreigners from years 1920 (oral testimonies), declaimed as Hunting Area, on year 1940, and declaimed as Hunting Reserve later, when the site were under the administration of Forest Service. The area had been close to strictly protected in the period of Centralized economy.

In all times the lagoon water bodies was some of the most important fishing source not only for the district, but also in National Level. In the years 1990, political changes were accompanied with social stresses and uncontrolled activities, that results on severe damages on habitats and wildlife, forest destruction and land occupation, uncontrolled and un-planned development of fishing, hunting, not effective recreational and tourism activity etc. Also in the last years, the peripheral area is suffering from massive informal urban development and activities such as mass tourism, illegal fishing and hunting etc.

Lacking of funds and missing of a right and effective management policy has conditioned the unexpected physical changes in the site. The study of the Management Plan of Kune Vain Marshland was found out in 2010, and formalized by related DCM in 2010 (please refer to Regulatory Framework chapter). The PA is declare as a Nature Managed Reserve (IUCN IV cathegory) In the MP and related DCM, from the the Protected Area is excluded the Kenalla Lagoon, and included the Tale coast and lagoon.

6.1 Natural Environments

6.1.1 Climate

The protected area of Kune-Vain along the Drini and Mati River Deltas, is situated in the Mediterranean Plain Zone, has a typical Mediterranean climate, with favorable geographical position on the seaside plain and generally low and flat relief. Its geographical position, isolated in the East and opened to the West and South, conditions the influence of air masses that comes from the sea which result in a mild climate. Nevertheless, in the January of 1989 and January 2016, the water of lagoons in some parts has been freeze. The climate is characterized by 4 seasons, with a mild and wet winter, hot summer and wet springtime and autumn. The solar radiation over the DMRD area registers averagely 1490 kWh /m^2 during a year the maximum value of solar radiation 213.9 kwh/m^2 is recorded in July, while the minimum one of 49.8 kwh/m^2 in December.

Air temperature

This zone is characterized by high values of air temperature. Nevertheless changes on extrem temperatures, the annual mean temperature is about 15°C. The warmer months of the year are July/August with the mean temperature 23.6°C, while the coldest is January with mean temperature 6.2°C. The mean maximum temperature values varies from 11.0°C in January up to 29.4°C in August, while the mean minimal temperature varies from 2.8°C in January up to 18.2°C (July).

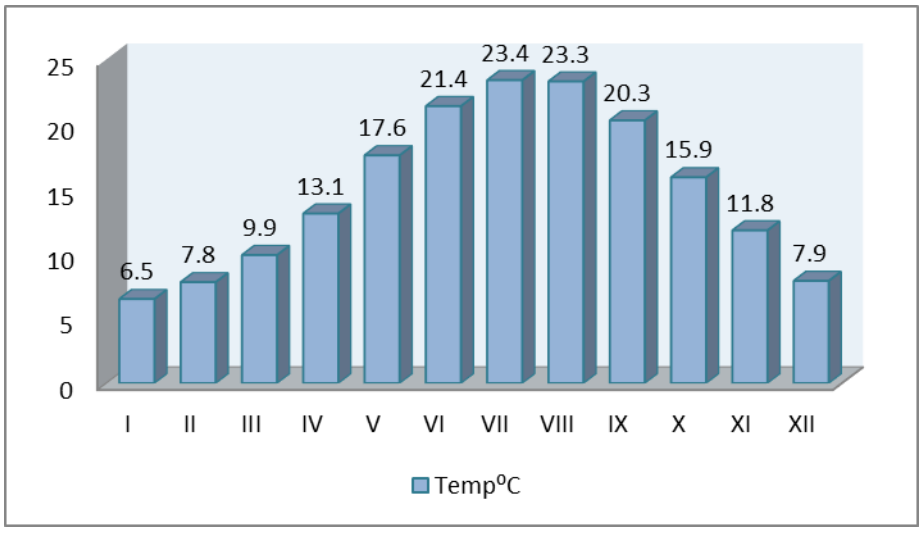


Figure: Average annual temperatures, Lezha station (Source: Strategic Environmental Assessment, Lezha Municipality)

Maximum Temperature. Considering maximum air temperatures recorded, the highest recorded has been 40.4°C coupled with an overall increase in the frequency of days with temperatures above 35°C.

According Albanian "Third Communication for Climate Change", up to 1985, hot days with temperature ≥35°C have not been a yearly phenomenon. During the period 1985 - 2000, this phenomenon is became more frequent. A slight increasing trend in the frequency of days with maximum temperature ≥35°C is observed, up to 2000. Considering the period 1961-2010, this

has resulted in an increase in the recording of heat wave days with only two cases prior to 2001 to 26 days in 2003 recorded at Lezha. In the last decade there has been up to a 4 times increase in the number of heat wave days recorded. Heat waves are cases when minimally in the six consecutive days the air temperature is 5°C higher than the long-term average temperature of the corresponding days. Up to the year 2001, except two cases (years 1961and 1968), practically was not reported any heat wave. After the year 2002, this phenomenon starts to be present. The maximum days 26 with heat wave is registered in the year 2003.

Minimum temperature .The number of days with minimum temperature ≤-5°C is very low. It varies from 0.3 days/year in the second decades up to 0.8days/year in the first decade and 0.7 days/years in the years (2001-2008) showing no significant trend. Two anomalies can be considered for the evaluation of the minimum temperatures. The maximum number of cases (5 days) with temperature ≤-5°C is registered in the year 1985 and 2016.

Precipitation

The precipitation regime is also closely linked with cyclonic and anticyclones activity, the site morphology etc. The summer is dry, and winter, spring and autumn are wet. The total precipitation registered over the study area reaches up to 1360 mm/year. This area is under the strong influence of Adriatic Sea. The wettest month is November (average 187.6 mm), followed by December and January with 157.3 mm and 154.5mm respectively. The driest month is July with 35.8 mm, follows by August 58.3 mm. About 66 % of the total precipitation is recorded during the cold months (October-March).

The precipitation variability for the period 1951-2008 is described below analyzing the trend of anomalies. The analysis reveals the existence of two distinguished periods:

- First period (1951-1980): wet, mostly dominated by the positive precipitation anomalies (precipitation over the average value). The wettest year in this period is 1962, with precipitation around 40% over the average value (1961-90).
- Second period (1981-2008): the driest one. During this period except five years, the anomalies of annual precipitation are negative (below the normal value). The driest year of the period is the year 2003, when the amount of precipitation is 45.3% below the normal value.

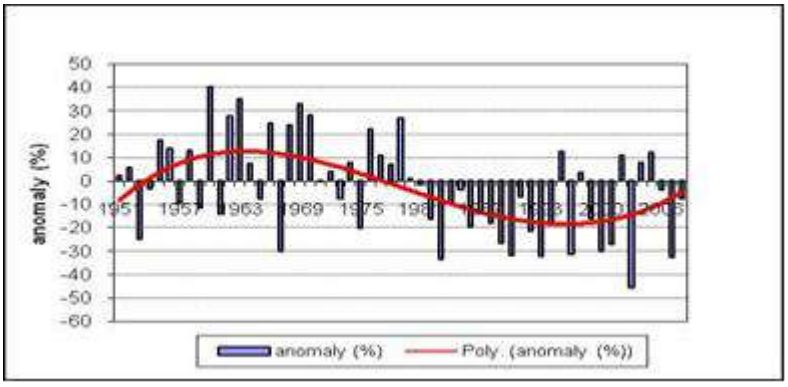


Figure: The annual anomaly and the trend of precipitation

In the last years, this zone is characterized by heavy rainfall, which sometimes, have caused flooding, especially during the spring 2010-2013s/.

The most important parameter related to rainfall intensity is the maximum amount of max precipitation during 24 hours. It might distinguish especially to years, 1970, 2002, 2010 when the value of 24h maximum of precipitation has reached up to 220mm. The long term course of daily maximum of precipitation is given in the table below.

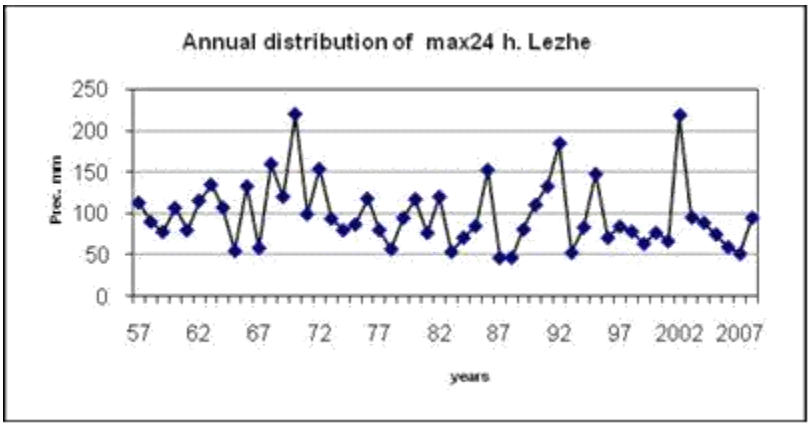


Figure: Long term distribution of 24h of max precipitation

Drought

The *Standard Precipitation Index (SPI)* is another important drought indicator closely related to precipitation. The SPI values for the three months period (SPI 3) calculated for Lezha station, shows that period 1981-1990 has registered the maximum cases with drought, followed by the period 2001-2008. The cases with drought have the light increase tendency.

Period	1951-1961	1961-1970	1971-1980	1981-1990	1991-2000	2001-2008
Drought	18	7	11	23	19	20

cases						

Table: Number of cases with drought

Snowfall is a very rare phenomenon in the coastal parts: the snowfall may last only for a short time and does not create a layer.

The wind speed over the study area displays a clear annual course that is related also with cyclonic circulation. The occurrence of cyclonic circulation during the winter period is higher than in warm period. The *annual mean speed* for the zone, represented from meteorological station in Lezha, is 3.7 m/sec. The high values of wind speed are registered during the cold period of the year, the *maximum value of mean speed* is 5.4m/sec recorded in January, and the *minimum one is* recorded during the warm period (2.7m /sec).

6.1.2 Climate change expected impacts

Climate change will be one of the greatest threats to human lives and livelihoods in the area. Climate change will significantly aggravate existing hazards such as flooding from cyclones and storm surges. Other climate-induced risks, including sea level rise, salinity intrusion, drought, and temperature and rainfall variations, are becoming serious threats to food, water, energy, and health security for human kind. Ecosystems will be highly vulnerable to projected rates and magnitudes of climate change and the services lost through the disappearance or fragmentation of ecosystems will be costly or impossible to replace. Changes in climate will affect biodiversity at all levels: genes, species, habitats, and ecosystems.

Changes on Annual Rainfall

Referring to the year 1990 graphs of annual precipitation, it is quite obvious a decrease trend in precipitation by the years 2030, 2050, 2080 and 2100. The annual precipitation is likely to decrease up to -8.1% (from -5.5 to -11%) by 2050; -12.9% (from -8.4 to -21%) by 2080 and -15.5% (from -9.0 to - 26.1%) by 2100. As result of the reduction in annual total precipitation the study area could experience a general decrease in runoff. A similar analysis, as in the case of annual temperature, is performed: A1BAIM may be considered as the average scenario, A2ASF as the best or the wettest (minimum precipitation decrease) and A1F1MI as the worst or the driest scenario (maximum precipitation decrease).

The likely changes in annual precipitation pattern related to 1990 for the three scenarios are presented in table below.

Years	2030	2050	2080	2100
A1BAIM (aver)	**-3,9**	**-8,1**	**-12,9**	**-15,5**
A2ASF	**-2,6**	**-5,5**	**-8,4**	**-9,0**

(min)				
A1FIMI (max)	**-5,4**	**-11,0**	**-21,0**	**-26,1**

Table: Projections of annual precipitation changes (%) related to 1990

All scenarios project a likely decrease in annual precipitation related to 1990 for all time horizons. Generalizing the outputs of different scenarios, the annual precipitation is likely to decrease up to -8.5% by 2050; and up to -18.1% by 2100.

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

Table. Scenarios on changes in precipitations till 2100

Decrease in precipitation can have important effects on the physical, ecological and biological characteristics of lagoons through the alteration of freshwater inputs and associated changes in salinity and dissolved oxygen concentrations.
Other indirect effects include altered flowering times, greater susceptibility to pests and greater allocation of photosynthetic products to root growth to increase the probability of securing rare water resources.
Lower precipitation would reduce freshwater inputs and potentially result in higher salinity. An increase in evapotranspiration rates due to decrease in precipitation, coupled with temperature increases and lengthened growing season, will reduce late summer soil moisture and rivers flow levels. Precipitation alters the water directly available to crops, including drought-stress, the supply of forage for animals, animal production conditions, irrigation water supplies, aquaculture production conditions, and river flows supporting barge transport.
Although there is likely to be a decreasing trend in annual precipitation, a high variability is expected. The cases of intensive rain (precipitation higher than the threshold) can be expected to

intensify. A further consequence of the predicted changes in precipitation is related to the occurrence of the 24hr maximum precipitation over the threshold that is considered as a hazardous event that might cause economic damages.
The 24hmax precipitation over the threshold is considered as a hazardous event that might cause many economic damages. Referring to the table below it may be expected the value 239mm once of the 100 years return period, 215mm once of the 50 years return period and 182mm once of 20 years return period, which are clasificate as a catastrophic precipitation. The value 182mm, which is expected to have once of the 20 years returned period, clasificates as dangerouse precipitation.

Return period (Year)						
T	2	5	10	20	50	100
Mm	93±7	132±11	158±14	182±17	215±21	239±25

Table: The expected 24hours precipitation for the different periods

An increase of days with hazardous rainfalls will increase flood risk in the area. In general this zone is characterized by intense precipitation events, which sometimes have caused flooding. Climate change will increase the frequency of intense precipitation events and thereby alter ecosystems of the area. The demand for water could increase, especially in summer.
The expected increase in the intensity of precipitation events is expected to produce increased in short-term freshwater inputs, decreasing salinity and dissolved oxygen concentrations in lagoons. Other effects of increased inputs of freshwater include the increased delivery of sediment and nutrients to lagoons.
An increase in intense precipitation events will change the pattern of freshwater runoff in the coastal plain watersheds of the DMRD, include increased flood risk.

Changes in timing wet season

Considering each of the seasons can be mentioned:
Winter precipitation (December/January/February). Precipitation total during winter, related to 1990, is likely to decrease up to -8.0 % (from -4.3 to -12.4 %) by 2050; 11.9 % (from -5.7 to -23.7 %) by 2080 and 13.7 % (from - 4.7 to -29.4 %) by 2100. Lower amounts of precipitation falling as snow and earlier snowmelt may bring drought conditions. Episodes of high relative humidity, frost, and hail can also affect yield, and the quality of corn and other grains and fruits and vegetables.
Spring precipitation (March/April/May). The total precipitation during spring, related to 1990, is likely to decrease up to -6.9 % (from -5.9 to -8.1 %) by 2050; -12.3 % (from -9.0 to - 17.7 %) by 2080 and -15.0% (from -10.1 to -22.2 %) by 2100. Results suggest that the sensitivity to water deficit is somewhat higher in spring, and this difference is thought to be the result of 'conditioning' of winter wheat which enables it to adjust its growth better in relation to water deficit. Crop yields are most likely to suffer if dry periods occur during critical developmental

stages such as reproduction. The timing, intensity, and duration of drought spells determine the magnitude of the effect of drought, but for many agricultural crops, water availability in spring is critical.

Summer precipitation (June/July/August). The highest decrease in average precipitation is likely to occur during summer, respectively up to -24.6 % (from -16.5 to -33.9 %) by 2050; -45.7 % (from -36.0 to -58.8 %) by 2080 and -54.8 % (from -44.2 to -71.8 %) by 2100. Considering the fact that summer is the season with less precipitation, the scenarios forecast a dangerous situation for agriculture; a combination of heat and drought stresses simultaneously, the one contributing to the other. These conditions are often accompanied by high solar irradiance and high winds.

Autumn precipitation (September/October/November). In contrary to the trend of the total annual precipitation and the precipitation during winter, spring, and summer where a decrease in precipitation in forecasted, the scenarios show that during autumn the precipitation changes are likely to have slight positive values up to 2040 while after that the likely trend is negative.

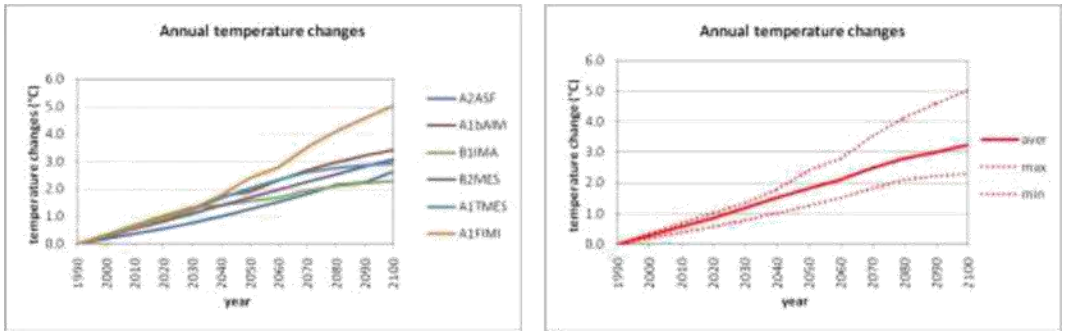


Figure Graphic of annual temperature changes

Changes in seasonal patterns of precipitation and runoff may alter hydrologic and chemical characteristics of coastal lagoons and rivers in DMRD area, affecting species composition and ecosystem productivity.

Expected changes in temperature:

The study area is projected to be drying over during the summer. This is ascribed to a combination of the increased temperature and potential evaporation that is not balanced by the increases of precipitation. Frost days and cold waves are very likely to become fewer.

Mean annual temperature changes

Increase of temperature has started after the year 1999 where the deviation has been negative -0.6°C. After that a slowly increase has began until the year 2008 where is reached the value+1.5°C.

All the scenarios reveal a likely increase in seasonal and annual temperatures related to 1990 for all time horizons. The likely changes in annual temperatures related to 1990 for these scenarios are presented in the figure below . The area is likely to become warmer. The annual temperature

is likely to increase up to 1.8°C (1.3-2.4°C) by 2050; 2.8°C (2.1-4.1°C) by 2080 and 3.2°C (2.3-5.0°C) by 2100.

Summer projections seem to be extremely problematic. Such situation is likely to result in increases to the frequency or intensity of extreme weather events (heat waves). The number of days with temperatures in excess of 35°C will become more frequent and is expected to increase by about 10 days by 2100 compared to present.

The occurrence of high temperature as well as their duration for a relatively long period, accompanies with negative effect (harmful) in many scopes of life activity. Thus it can be mentioned the damages in agriculture yield, damages in the growth of natural flora, increase of water demands, in the quality of human life, etc.

Many species are sensitive to temperatures just a few degrees higher than those they usually experience in nature. A rise in temperature as small as 1^0 C could have important and rapid effects on mortality of some organisms and on their distributions.

Increases more in daily minimum than maximum temperatures are likely to occur over nearly all land areas. Frost days and cold waves are very likely to become fewer. The expected changes in surface air temperature will derive changes in air humidity. Their combination is likely to influence the increases in the heat index (which is a measure of the combined effects of temperature and moisture).

Water temperatures in lagoons will increase. Warm water holds less oxygen than cold water. Higher temperatures will also reduce dissolved oxygen saturation levels and increase the risk of oxygen depletion. Warmer lagoons waters coupled with eutrophication can also increase the intensity, duration, and extent of harmful algal blooms that damage habitat and shellfish nurseries and that can be toxic to marine species and humans. River and stream habitats or water bodies will be affected by rising temperatures, and changes in flow patterns.

Temperature affects plants, animals, pests, and water supplies. For example, temperature alterations directly affect crop growth rates, livestock performance and appetite, pest incidence, and water supplies in soil and reservoirs.

Maximum temperatures ≥ 35°C

More frequent and severe droughts with greater fire risk are expected. More hot days and heat waves are very likely over the study area. These increases are projected to be largest mainly in areas where soil moisture decreases occur.

Warmer average and extreme temperatures will enhance the demand for freshwater and water for irrigation purposes, especially for soils with low water-storage capacities. If precipitation decline, the project area would face substantially increased risks of summer water shortages. As the direct consequence of increase in temperature is the increase in air humidity. Taking into account the projections for summer temperature, the number of cooling degree days may reach about 550, 670, 840 and 930 by the years 2050, 2080 and 2010 respectively.

	Period	Period	Years			
	1961-1990	2001-2008	2030	2050	2080	2010
Nr. of days Tmax >35°C (average)	17	8.4	4-5	6-7	8-9	10-11
Nr.of days with heat wave (decade)	19	74	60	80	95	120
Cooling degree days	360		550	670	840	930

Table. The expected number of days with Tmax >35°C, number of days with heat wave and the cooling degree days.

Warming and population growth would increase annual heat-related deaths in those aged over 65 and contribute to the spread of vector-borne, water-borne and food-borne diseases. Warmer average and extreme temperatures will enhance the demand for freshwater and water for irrigation purposes, especially for soils with low water-storage capacities. If precipitation decline, the project area would face substantially increased risks of summer water shortages.

Minimum Temperatures < -5°C

Referring to the current climate data, the number of days with minimum temperatures less than -5°C recorded during the period 1951-2008 in Lezha zone is very low, less than one day/year. Based on correlation between the number of days with the minimum temperature <-5 °C and the average winter temperature for the period 1961-2008, is calculated (interpolated) the expected number of days with minimum temperature <-5°C for the years 2030, 2050, 2080, 2100 (Table).

	Period	Period	Years			
	1961-1990	2001-2008	2030	2050	2080	2010
Nr. of days Tmin <-5°C (average)	0.5	0.7	0	0	0	0
Nr.of days with cold wave (decade)	48	11	10	7	5	
Heating degree days	1450		1810	1390	1350	1335

Table. The expected number of days with Tmin < -5°C, number of days with cold wave and the heating degree days.

The cold days, actually very low in number, might be a very rare phenomenon and less cold waves are very likely over the study area. About 10 days with cold wave by 2030, 7 days by 2050 and 5 days for the 2080 may be expected. Low temperatures are extremely limiting to plant

growth and distribution. The occurrence and the duration of negative temperatures, for a relatively long period, may cause damages in agriculture yield, in the growth of natural flora, in health problems especially to the people with heart deceases etc.

Change in frequency of drought episodes

A decreasing trend in annual precipitation can be expected to increase incidents of drought (SP13 - the cases of moderate, severe and extremely dry) to approximately 18 cases by 2030 and 20, 22 and 24 cases by 2050, 2080 and 2100 respectively.
Higher incidences of drought intensity will increase incidences of forest fires. Modest drought increases may limit many plant species and plant communities. Increasing invasive species are expected to affect composition of habitats and plant communities. Increased drought stress may also lead to increased frequency of and magnitude of pest and disease outbreaks. An increase in defoliation by pests may then lead to an increase in the likelihood of forest fires by increasing the volume of dead tree matter, which acts as fuel for fire.
An increase in drought intensity or frequency would also increase the incidence of coastal hypersalinity, resulting in the decline of valuable habitats.

Change in frequency of flooding events

The main factor that leads to flooding impacts remains the heavy precipitation, and there is an evidence of increasing frequency of high rainfall events. The DMRD area is flooded not only from the rivers but by sea water waves too. Depending on the direction and the severity of the wind, the coastal zone is often inundated. During a flooding event, waters may occupy the floodplain in a matter of hours, as in the case of flash floods, or for several weeks, as sometimes occurs during the winter period when the period of rainfall is longer or during spring floods caused by snowmelt. Flash flooding is characterized by the occurrence of the peak of the flood within 6 hours of the onset of rainfall. Also, sea level rise could increase the risk of flooding in three ways:

- There would be a higher base (level) upon which storm surges would build; if sea level rises one meter, an area flooded with 50 cm of water every 20 years would now be flooded with 150 cm every 20 years.
- Beaches and sand dunes currently protect many areas from direct wave attack; by removing these protective barriers, erosion from sea level rise would leave some areas along sea coasts more vulnerable.
- Wetlands and marshes slow the inland penetration of floodwater by increasing the friction at the estuaries by blocking waves. Losses of wetlands would thus increase coastal flooding.

The Adriatic Sea has experienced an average sea level increase of about 15 cm in the last century, indicating a backward movement of shoreline for each cm of average sea level rise.

Using satellite imagery, it was also noticed that the Albanian Adriatic coastline had an extension of 535 km2 in 1985 and in 2011 the extension reached 557 km^2 . Projected sea level rise are shown in table below.

	Forecasted Sea level rise (cm)			
Years	2030	2050	2080	2100
Aver	7.6	14.6	28	37.8
Max	13.6	26.4	52.4	72.6
Min	4.2	7.2	11.8	15.2

Table: Projection of changes in annual sea level (cm).

Model projections indicate that open coasts and estuaries will experience rising sea levels over the next century. In total, until 2050, approximately 1082.45 km^2 (32% of the coastal area or 3.76% of the country's surface) will suffer direct consequences from flooding. Most of agriculture and industrial areas will be lost due to sea level rise. Most of the coastal habitats such as sand dunes, fresh and brackish water wetlands, marshes and lagoons, will be lost or further deteriorated. The Adriatic coastline will shift towards the continent, and coastal erosion will be intensified.(*Source: Third National Communication of Albania to the UNFCCC, Ministry of Environment, UNDP,March,2016)*

Rivers has been very frequent during the last 20 years, occurring mainly in autumn and winter but also in spring. The most damaged areas have been Ishull-Lezha, Tale 1, Patok and Shëllinzë settlements, which are situated in the coastal zone and along the river deltas. The floods have damaged many houses and other built structures, agricultural products and livestock, road infrastructure etc.
The Lezha District has been flooded numerous times over the past 50 years. The most endangered area is an area of about 800 ha, situated at about 1m above sea level, located near the Kune - Vain Lagoon System.
Some of the main causes of flooding in the last 15 years are listed in the following table:

The biggest floods in the last 15 years		
Month/Year	The flooded surface (ha)	The reason for the flood
November, 1992	840	Break of the embankment of the Mat and Drin river

August, 1995	700	Non-functioning of hydropower on Shëngjin Island
September, 1996	800	Dense rain precipitation
October, 1996	700	Dense rain precipitation and n on-functioning of hydropower
February, 1998	500	Breaking the high water channel
December, 2000	300	Breaking the Sea Embankment on the Island
February, 2002	400	Breaking of sea embankment
September, 2002	800	Breaking of Drini river embankment
January, 2007	1200	Dense rain precipitation, Lezhe
December, 2009 – January, 2010	8600	Catastrophic flood. Sea tide (1.2-1.4m, 0.8 above normal) causes 1m flood in Shengjin, Ishull Shengjin village. 140mm rains have been recorded within 3 hours.
January, 2012	950	Very dense rain precipitation in Lezha
January, 2013	700	Very dense rain precipitation in Lezha
September, 2013	850	Very dense rain precipitation in Lezha and Shengjin
January, 2014	650	Dense rain precipitation in Lezha
October, 2016	850	Dense rain precipitation in Lezha district , flooding of agricultural land in Barbulloje and Blinisht

Table The biggest floods in the last 15 Years (Source : Source: Strategic Environmental Assessment, Lezha Municipality). Refer to the project "Identification and implementation of Adaption Response Measures in Drini-Mati River Deltas" is provide a projection of the impact (1000 people flooded) to 2100.

6.1.3 Geology

From Geological viewpoint the Kune Vain Marshland is situated in the western part of the Lezha Plain. Quaternary deposits (Q_4) underlay all Lezha Plain, and it's believed that such deposits

have an alluvial origin. In the upper part of such deposits are developed some deposits of marine and marsh origin.

Marsh deposits (Q_4 kt) in Kune Vain area are represented by clays, clayey sands and fine sands, and their total thickness is about 1m. The thickness of soils riches with organic matter is only 0.1 to 0.2m. This fact shows a relatively yang age of the lagoons.

Marine deposits (Q_4 d t) are represented mainly of sand and developed as a strip 100-300m in the Adriatic coast. Such sand deposits are developed under the marsh deposits with a thickness of 20-25m.

Pliocene formations (N_1^2) are situated in the depth of 150-250m below surface and are represented mainly from conglomerates and clays.

Cretaceous-Paleogene formations (CR_2 m-Pg) are represented of different rhythmic alterations of thin rock layers like shales, sandstone and limestone.

Mesozoic formations are represented of Jurasik (J) and of Upper Cretaceous (Cr_2) deposits. They are mainly limestone and limestone with siliceous rocks. The Renci Mountain has such an age formation and represents the anticline of this formation that is bordered with Kenalla Lagoon.

6.1.4 Geomorphology, Land form and coastal Dynamics

6.1.4.1 Geomorphology

The main geomorphology of the site is represented by a land forms that are characteristics for new littorals and new age lagoons. The main form is pseudo-dunes. The morphology of the area is represented generally by a flat relief, where appears the small up-rises of pseudo-dunes and depressions (represented mostly by lagoons or other low lands, where the altitude generally is lower than the sea level). The morphology of the area is conditioned by geological and soil characteristics, hydrology, sediment movements, vegetation, wind activity etc., that in years are creating the geo-morphology of the area.
The sediments came by sea from channels or by over-passing are changing gradually the deepness and the form of Lagoons bottom. To the other side, sedimentation and erosion, combined in different periods, have conditioned changes on the coast line, where fine sediments are moving very easily, and so, not allowing creation of new dunes, or establishment of existing pseudo-dunes. Also, destruction of natural vegetation, mostly the ***Tamarix*** sp., trees or other shrubs and grass species, has impacted the soil formation and incited the erosion development.
Parts of the sediments eroded are disposing in the coast line, some others are going in the lagoons and a good part is running away by back activity of waves. From morphological point of view, disposing of sedimentation in the lagoon bottoms is not a "loose", but thinking on the role that lagoons (include their morphology) plays in the community life as well as it importance for biodiversity, the changes on their bathymetry are very vital for the future of the site.

6.1.4.2 Territorial characteristics

The coastal line is appeared very active, also because very intensive human intervention. The depressions, in the first phase were part of the sea, and gradually are isolated by littoral arrows, to the moment that are surrounded quite completely by them. The higher point of the Marshland, is not more than 2m .

- **Lagoon forms**

One of the most important part of the site geo-morphology are lagoon forms. Each of the lagoons has its own form quite different from the others, conditioned by elements that defines land formation, and surface and bottom relief.

***Lagoon of Kune* .** The Lagoon of Kune (Merxhani Lagoon), as a part of lagoon complex Kune-Vain, is situated on the north side of Drini River. Its boundaries are in the north the city of Shengjin, in the east the Village of Shengjini Island, in the south the Drini River and in the west the Adriatic Sea. The area of this lagoon is 300 ha, with an average depth 0.75 m and a maximum depth 1.3 m .The water exchange mouth (access – sea channel) is 560 m long and 14-20 m wide and max 3 m deep and this lagoon have a relatively stable water exchange. The lagoon of Kune presents rich floristic and faunistic values. Kune/Merxhani lagoon, Kular– Eastern part of Merxhani lagoon (Size 1100 ha) and other small marshes represent the wetland habitats with one of the most valuable and sensitive components of the entire ecological complex of the delta of Drini. This Lagoon in the present changes its waters with Adriatic sea only by Kune/Merxhani channel, with a width of 22 m. Nowadays the water exchange by this channel is reduced seriously by creation of new morphological arrows in the East part of the island.

The other lagoon or big channel, known as Vija e Kularit, is situated in the North of the Kune/Merxhani lagoon, has not direct connection with the sea. The artificial channel opened (Shkoqi Channel) in the north of it, has been blocked by deposits of sand in its entrance from the side of the sea.

Photo. Lagoon of Kune/Merxhani and Drini River in the south

Lagoon of Vain *(Ceka and Zajet Lagoons etc)*, The Lagoon of Vain is situated in the south of Drini River and is one of the lagoon of Kune-Vain lagoon complex. Its boundaries are in the north the Drini River, in the east the villages of "Lezha and "Shengjini Island", as well as Rrile one, in the south by Tale channel and in the west from the Adriatic Sea. The surface of the lagoon is 850 ha. The water access – sea channel is 1800 m long, about 30 m wide and max deep 1 m. This lagoon has not a stable water exchange with sea because of the closing of the mouth of the access – sea channel from sand deposition. This lagoon has a low communication with the sea. The Matkeqe channel, was blocked and served just to discharge the Tale pumping Station waters into the lagoon body. The discharges into the lagoon has brought a lot of nutrients because pollution from waste waters collected by Tale channel. Such waters has create problems with eutrofication, almost in Zajet and Ceka lagoons. Nowaday this channel is already closed, by natural sedimentation. The lagoon of Vaini has a total surface of about 9 km^2, an average depth of 0.7 m and a maximum depth of 4.5 m, and has in its composition the lagoon of Ceka with 4.9 km^2 and that of Zaje of 2.4 km^2 and other smaller lagoons and marshes. Small channels, sometime pipes, permits water exchange between Zajet and Ceka lagoons.

Fig . Vaini Lagoons –Zajet and Ceka

Drini Mouth is the last part of Drini of Lezha River/channel, which is discharged between Kune and Vaini lagoons. In its last part, 2km long from the mouth, this river is running in virtual direction East-West, without meanders, having a uniform valley in form of "U", and a mouth in classic form of a funnel. The rapiers are separating the river waters from lagoons in its North and South. In atmospheric events this river overflows and discharges directly at the Vain side. At the eastern part of this river, not more than 300m far from the mouth, an artificial channel is linking the river waters with Zaje Lagoon.

The Drini mouth has changes its position several times during the last centuries, but only 3 of them are considered important. This displacement of mouth have happened within a wide location of about 7 km long, and have covered a wide area of the littoral, with an alternative direction North-South and South-North. Historically, the Drini River was a major supplier of sediment to the coastal zone, but now, major diversions and construction of dams along its course in the interior have reduced this supply significantly. Very little sediment now enters the coastal zone from the Drini River; this is the main reason for the overall sediment starvation and erosion of the Kune-Vaini sub cell. Sediment depletion to the north of the river has been recently exacerbated by the construction of the breakwater at its mouth . In years is observed (map analyses) an intensive erosion and sea advancement at the Drini mouth. During a period of 50 years, the sea has advanced inland in this area in a distance of around 400m. The process of accumulation is observed in the West of the mouth, when a ground small hill is crated by interaction of river waters and sea waters and their elements. Also an accumulation process was observed at the littoral in its North (first 100-200 m.), before the breakwater in the mouth was built.

The Drini River body, at its last km, has created a flat bottom with a very low steepness, and rich on vegetation, that doesn't allow the free discharge of the waters at the sea. Because of this, in cases of atmospheric events, overflow happened in the surrounding areas of Drini River. This phenomenon, in most of the cases has impacted agricultural areas and residential (farm/houses) ones.

Map . River Mouth and Drini Vain Channel

For such reasons, Albanian government took following protective measures:

- Building of breakwater to control the sediments coming from the sea to river delta and body. Presently is built only the breakwater in the south of the mouth.
- Collection of more waters in the Drini River, by cleaning its bed from vegetation, and ensure a satisfy flow from the river to the sea by providing the river bottom steepness.
- Dredging the part when Drini river meet sea waters on the delta, to avoid creation of the barriers formed by sediments depots,

The formation of lagoons and marches, from pedologic viewpoint are linked with tectonic activity as well as Drini River energy and sediment movements, include here their transport from streams and waves. At the last part of Drini and along its stream are deposited alevrolitic clay and sand clay. The field massif consists mainly in new deposits of deltaic, sand molasses and deltaic sand of Pliocene and Quaternary.

6.1.5 Major soil and substrate types

Following are shortly described the main type of soils and substrate types that characterize Kune Vain area.

- Alluvial soils (Eutrix fluvisols) with domination of clays and sub clays are disposed in both sides of Drini River, because of its overflowing and flooding in atmospheric events. Such soils are poor and have alkaline reaction.

- Sand sols (Arenosols) are found mainly in the coast and sometime in the depth of the massif. Those soils are created in the natural flat coastal belt with undulated relief and several depressions. They are created as consequence of the selective transport made by sea waters and river over homogenous deposits. Such soils are prone to wind and water activity. In some places when destruction of dunes has happened, pseudo dunes are covered by pines (*Pinus Maritima*). Three groups can be distinguished in this on this type of soil:

a- Sandi primitive sols (Hapus Arenosols), that forms a belt of 10-70m wide commonly free of vegetation. In some points, in Kune or Merxhani littoral they have some vegetation dominated by Pines and Oak. On the last 20 years, this belt is prone of intensive erosion. In dependence of their sedimentation they can be considered as modified class without salts, medium salted waters and salted waters. They are very poor sols.

b- Sand soils less developed (Hydromorph Arenosols) are found in the low lands. In the major part during the year they are under the water. They are characterized from the sand deposits covered in surface with a layer of soil or sub-sand. In some places forms thin layer of compacted clay. In 30-75% of cases they are covered from three different plant associations, while the remaining part is covered by water. The plant association are: shrubs (*Paliurus aculeatus, Rubus fructicosa, Alnus glutinosa, Querqus pendiculatic, Quercus cocifera, Tamarix parviflora*) with average growing; Herbs, represented by *Cynodon dactylon, Medicago marina, Euphorbia porales, Ergnium sp*., and Hygrophite vegetation with *Spartium junceum, Juncus effuse, Statice gemilini, Salsola sp*., and in rare cases *Typhia latifolia* and *Salicornea herbacea*. This soil has a depth of 2-20cm and is inserted with clay by the vital roots of plants. Than there is a very deep layer of sand totally soaked.

c- Sand sols of dunes (Luvik Arenosols) are represented by some rise and bunk formed from the movements of sand in vegetation conditions. The characteristic vegetation are xerophytes plants like *Euphorbia paralis, Agropyrum junceum, Salsola kali*, *Erianthis ravenae*, that cover no more than 20% of the surface. They are associated and replaced by bush vegetation and forest trees like *Pinus halepensis, Cistus villosum, Vitex agnus, Paliurus aculeatus* and *Rubus fruticosa*. A major part is associated with salt and water resistant plants. They are not salted, and the fertility of such soils is higher than Sandi primitive sols.

- ❖ Salted Sols (Sollonchak), are sand with higher salinization in the upper part. The salinization of such soils happened by infiltration in of the sea waters into the lagoon and by salted freatic waters close to surface and is associated with hydromorphism.

- Glay Hydromorphis, typical for marshes, are generally salt and are appeared in three layer not differentiated from each other.

a- The first layer - Being new lagoons the torf process is limited. It is observed the formation from hygrophyte plants like *Typha latifolia, Sparseum junceum, Juncus efuca*. These sols are distinguished from the content of organic residues in the surface and general are deep sols.
b- Second layer - Clay process which is dominant is represented from the reduced links in the absence of the oxygen and air.
c- Third layer – Clay phenomenon is represented in the deep profile and in the surface is well distinguished a layer very compacted and traversed by plant roots.

- Eutrix (Cambisols) are deep sols with excessive humidity and clay in the deep layer. They
  are sols formed by the process of land transformation from hydromorphic ones to farm lands.

In Kune Vain Marshland the most important environmental elements and basic habitats are the waters. The surface waters are much related to the sea waters as well as to the Drini River and ground-waters. So categorizing of waters and analyzing of their characteristics is very important on the following steps of the site management.

6.1.6 Groundwater-Hydro geologic description

The main hydro-geological features of the area are those of Lezha Plain to which is directly linked the Kune Vain Marshland and Mountain Area where karstik limestone aquifers.
In Lezha Plain, are developed gravely aquifers with gravel and sandy gravel, saturated with freshwater that all together formed a multilayer artesian aquifer system, which in present has loosed its characteristics because of overexploitation. The recharge into aquifer system seems to occur mainly by the infiltration from surface running waters (also from Mati River), mostly in the South and Western part, and by infiltration from lateral outcrops of limestone rock of Renci

to the North and North-Eastern Part. Natural discharge occurs toward the Adriatic Sea. Between the gravely aquifers and Kune Vain Lagoon there is not any hydraulic connection.
Many built/artificial wells are contributing on groundwater extraction. Such wells have been "free flowing", without pumping extraction. The initial free flowing discharge of the single wells varied from 10-20 l/s to 50-60 l/s. Some of them are used for drinking water and much other for irrigation purposes. In the years 1973-1975, several wells are built in the border of the lagoons to decrease the salinity in lagoon waters. 4 (four) of them are opened in Kune/Merxhani Lagoon with a total discharges of 100l/s, and 5 of them in Vaini Lagoon system with a total discharge of 200l/s. Nowadays most of such wells are not more functioning. By analyses made frequently in different times for groundwater quality, results that their quality is considered as very good and appropriate for drinking (three wells are used for many year as drinking water resource for Lezha city). Such waters have lower mineralization and hardness than the recharging water sources of Mati river.
Groundwater extraction in Lezha Plain from existing wells including also 80 uncontrolled free flowing wells, in 1997 is calculating at a total amount of 800l/s. Nowadays, can be mentioned that in respect of new developments made on the area, this amount can rich about 1000 l/s. Having into account that groundwater reserves of the area are calculated to 2500 l/s, the remained amount, 1500 l/s is discharged into the Adriatic sea. (Ref. to "Conservation and Wise Use of Wetlands in the Mediterranean Basin. Focus on Kune Vain Lagoon", Eftimi R. Hydro-geological and Geological Study", MedWet, ECAT Tirana, 1998).

6.1.7 Marine, surface brackish and freshwaters

- **Sea waters – Adriatic Sea.**

Adriatic sea is a shallow sea situated between Pirenej peninsula and Balkan ones. The mean of annual Adriatic sea water temperature in the coast is 17.7°C. Its level regime is depended from tide and wind phenomenon. The average daily oscillations in tide period vary from 30 to 50 cm. The maximum quota observed is 2.34m. a.sl. and the minimal quota is -0.59m. The salinity is $36^0/_{00}$ to $39^0/_{00}$. Sea currents have an average speed of 0.3m/s, with a direction of SE/NW. In the Drini Bay, the wave sizes are reduced in compares with those of surrounding areas, because of diminution of the depth and complicated coast morphology. The highest waves observed the last 100 years in this bay are 3.80m high, 59 m. long with a period of 7.5 s. The Kune Vain Marshland is situated in the coast of Adriatic Sea. The interaction between sea waters/sediments and river waters/sediments is created on the last geological period the Lagoon system of Kune Vain. (Kune Vain Tale Management Plan, 2010)

- ***Regime of sea level***

Characteristic for Drini Bay is that the strong winds with a direction from the sea to the land very often compress the mass of waters in the shallow area of coast, thus raising the maximum level of the water (measuring point at port of Shëngjini) 1 m above the sea level.

- **Wave Regime** ***(the data are ensured by Hydro-meteorological station of Shengjini)***

The wave regime of sea waves is, as it is known, a product of wind regime and the configuration of sea space. Thus, the most important indicators of the coming wave in the high seas, its height and period for a given direction, depend on the wind speed, the time of its action and the length of effective run.

The roses of geographic and effective run of the wave for the high seas, defined on the basis of the configuration of Drini Bay and limitations of spaces of Adriatic and Ionian Seas are given in the Table below.

Direction / Run (km)	WNW	W	WSW	SW	SSW
Geographic	537	296	202	167	225
Effective	339	348	221	286	523

Table . Data on Waves

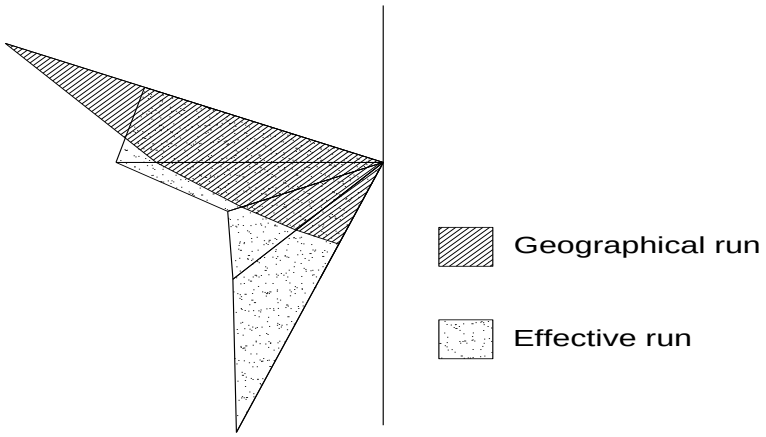


Figure . Run rose. Drini Bay

By means of the analytical model "SMB" it has been calculated the height and length of the wave in high seas as well as the time of wind action for generation of this wave, for some real values of effective run in Drini Bay and winds of speed higher than 15 m/s.

In Drini Bay, as a result of strong winds, heavy waves are generated in high seas. These waves, being displaced from high seas to the coast, adapt themselves to the bathymetric form of the sea floor, thus subjecting to the hydraulic phenomenon of refraction with respective transformations of height and direction of spreading of their front.

Effective run (km)	200	300	400	500
Wave height (m)	3.32	3.8	4.14	4.42
Wave length (m)	83	95	104	111
Speed of wave front (m/s)	11.4	12.2	12.7	13.1
Time of wind action (hours)	12.4	17.3	21.8	26.1

Table . Hydrographic data on waves

- ***Currents of waves in the area near the coast***

In the area between rivers Mat and Drini, as well as along the coast from Kune Island to the Shëngjin beach, especially for high levels of the sea, the waves with a front parallel to the coast hit the boundary dune and draw part of sediments to the sea. This sediment, later is displaced by the currents parallel to some parts of the coast and lagoon channels.

The heavy waves of high seas with direction of coming from the southern quadrant, after being subject to refraction in accord with the configuration of bathymetry of Shëngjin Bay, as well as their refraction in the area near the coast, create currents parallel to the coast with a direction from the south to the north and a speed higher than 1 m/s. These currents are capable to displace considerable volumes of sediments from the most exposed areas (eroding those) to those more protected (sedimentation).

❖ **River Waters – Drini River**

Drini of Lezha is the smaller branch of the Lowest Drini River, that is discharged in Adriatic Sea.
The value of hydraulic parameters of Drini River calculated in 2 main periods have shown a very important change on river hydraulic parameters, as are shown in the following table:

Period	Catchments basin surface	The mean altitude of the basin	Length	Water Discharge	Average value of suspended matter
Till 1854	11 756 km^2	971m	295 km	352m^3 /s	13.8 x 10^6 t
After 1963	455 km^2	192m	48 km	18.1 m^3/s	1.05 x 10^6 t

Table . Principal Hydrological parameters of Drini River and its metamorphoses (Source: Conservation and wide Use of Wetlands in the Mediterranean Basin. Hydrological Regime of Kune Lagoon. Tirane,1998)

❖ Lagoon Waters

The main and most important part of Kune Vain Marshland are lagoons and marshes. Vain Lagoon communicates with the Sea waters by its channel about 1,5-2 km long, depth 0.5 to 2m and width 20-150m. The average level of evaporation in Vaini is 763 mm/year. The salinity of the Lagoon is 9-15 $^0/_{00}$ in the western part, close to the sea, 8-12 at the Central part and 4-5 $^0/_{00}$ at the Eastern side. The water temperatures in the Western part vary from 24°C in winter to 25-29 °C in summer. The pH values measured until 1998 varies from 7.65 to 8.76.

The principal components of Vaini Lagoon are Ceka Lagoon, and in it Eastern part are Fundi i Lymit, Shulza, Gjoli i Buajve. Zajet Lagoon is another Vaini part that has a surface of 2.4 km^2, linked by pipes with Ceka Lagoon. Close to the Drini River this lagoon has a salinity of 9 $^0/_{00}$, growing up gradually in the east direction to 23$^0/_{00}$. In spite than been separated by a littoral cordon the Ceka and Zaje lagoons communicate by two pipes. Also Drini River of Lezha discharges its water in Ceka lagoon in plot periods as well as in Zajet by Lagoon channel. This phenomenon, together with problems of communication with sea waters, justifies the lower salinity of waters of Vaini in compares with Merxhani Lagoon. (ref to : *Conservation and wide Use of Wetlands in the Mediterranean Basin. Focused in Kune Vain Lagoon, Hydrological regime, Pano N. Tirane,1998*)

Merxhani lagoon communicate with sea waters by the south channel, that separates the littoral from the island of Kune, and discharges/charges from 5-10 m ^{3}/s. Evaporation layer of this lagoon is 850 mm/year. Two or more times per year, in wave events, the sea water, overpass the narrow littoral of Merxhani and is mixed with lagoon waters. The salinity of the waters in the western part is 25-36 $^0/_{00}$ and in the Eastern side 5-7-13 $^0/_{00}$. The water temperatures of this lagoon varies from 4-5 °C in winter to 25 -29 °C in summer. The pH values in winter vary from 7.57 to 8.25.

Kenalle lagoon, is another lagoon, that communicate with Merxhani ones and is situated in the North of the Protected Area. Its surface is 0,205 km^2 , has a length 750m and width of 500m. This is the deepest lagoon of the wetland system. The mean depth of it is 4.2m and the maximum of 13.5m. Around the area is a marshland with a surface of 2.24 km^2.

The size parameters of main lagoons such as Vaini and Merxhani are shown in the following Table

Lagoons	Aquatic Surface	Maximum Length	Maximum Width	Average depth	Maximum depth
Vaini	8.95 km^2	4.4 km	2.95 km	0.9m	4.5 m
Merxhani	2.5 km^2	5.8 km	0.95 km	1 m	5 m

Table . The hydraulic parameter of Vain and Merxhani Lagoons (Source: Conservation and wide Use of Wetlands in the Mediterranean Basin. Tirane,1998)

In the lagoon are identified many springs mostly in North/East shores. Kenalla Lagoon, communicate with channels in its Western side with Merxhani Lagoon, and its provided with freshwater from Renci Mountain. 840 mm/year evaporates from Kenalla Lagoon. The water temperatures vary from 10-12 °C in winter to 23-25°C in summer. The pH values measured in winter vary from 7.30-8.30. (ref to : *Conservation and wide Use of Wetlands in the Mediterranean Basin. Focused in Kune Vain Lagoon, Hydrological regime, Pano N. Tirane,1998*).

- **Physic-chemical parameters of waters**

In the summer months, Kune and Vain wetlands do not have so much sobering water, and the level of water is somewhat reduced due to evaporation from higher temperatures. In the autumn months in these areas the weather is windy and the water is very turbid. The water level is quite increased and in some areas it covers the road platform and the cafeteria nearby. The environment is not very suitable for plankton development. This reflected from the results obtained from the measurements.

Ph Value - **The pH** of a water system is important because it is directly related to biological productivity. In the aquatic ecosystem of Kune-Vain, is noticed that pH fluctuates around an average value of 7.2-7.6, which indicates that pH is generally neutral. The most suitable interval for aquatic fauna is 7 - 8.5 . On the other hand, there are seasonal fluctuations. In the spring months there is a tendency somehow acid, where the lower value is pH 6.3, while during the summer months, corresponding to the peak of the tourist season, pH It has done basic and in some cases reaches value 9 .

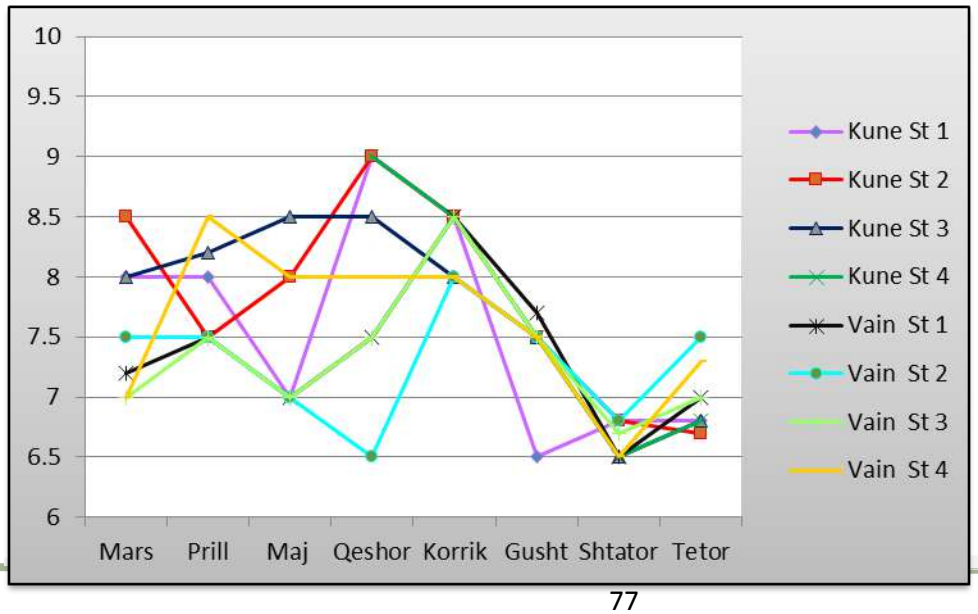


Figure . Seasonal variation of pH in Kune and Vain stations for year 2011

The Dissolved Oxygen - In Kune lagoon, year 2010, is noted that the values of dissolved oxygen in water fluctuate within optimal values from 4.83 mg / l to 15.29 mg / l. In year 2011, there is generally a decrease in dissolved oxygen content in water, which indicates deterioration of water quality compared with a year ago. For 2011, the values of dissolved oxygen in Kune/Merxhani lagoon ranges from 2.91 mg / l in (August) to 8.44 mg / l in October.
In Vain lagoon , in 2010 dissolved oxygen values ranges from 2.3 mg / l at to 8.8 mg / l. For 2011 the value of dissolved oxygen ranges from 1.5 mg / l to 9.19 mg / l . The greater fluctuations of values in different stations are observed in the months June and October 2011.

Biological oxygen demand - In Kune lagoon , Biological Oxygen demand on average is represented by seasonal variation. In hot months (July and August) is observed higher values compared to the other months. Respectively, the highest value observed in July , 2011 was 4.10 mg/l .
Vain lagoon also noted seasonal variation of averages for Biological Oxygen Demand, with the highest values in July and August, and in October too. The highest value observed was 7.35 mg/l ,in 2011.

Sea water quality

The contamination of aquatic ecosystems is a threat to the ecosystem itself and for the health of all living things, including humans. The pollution of water, mainly by emissions from urban wastewater, as a result of agricultural activity (cultivation of land near rivers, drainage of agricultural land) that makes possible the emergence of the phenomenon of eutrophication in these water bodies. The level of pollution in surface water on the Drin River in Kune and Vain, was made through investigation of seasonal variations, based on microbiological indicators. These parameters include: *Total Coliform (TC), Fecal Coliform (FC), Fecal Streptococci (FS)* in the surface water . The samples are taken during 4 seasons of 2012-2013. Ref *(Source: International Journal of Science and Research (IJSR))*

The samples of water and sediments for microbiological analysis are collected at fifteen monitoring points:

- 5 sampling points in the Drini River along its length, from the bridge Zogaj - Balldre up in the Industrial area
- Kune-Vain lagoons, 4 points sampling on each lagoon
- 2 sampling points belong to the estuary of the Drin River in the Adriatic Sea

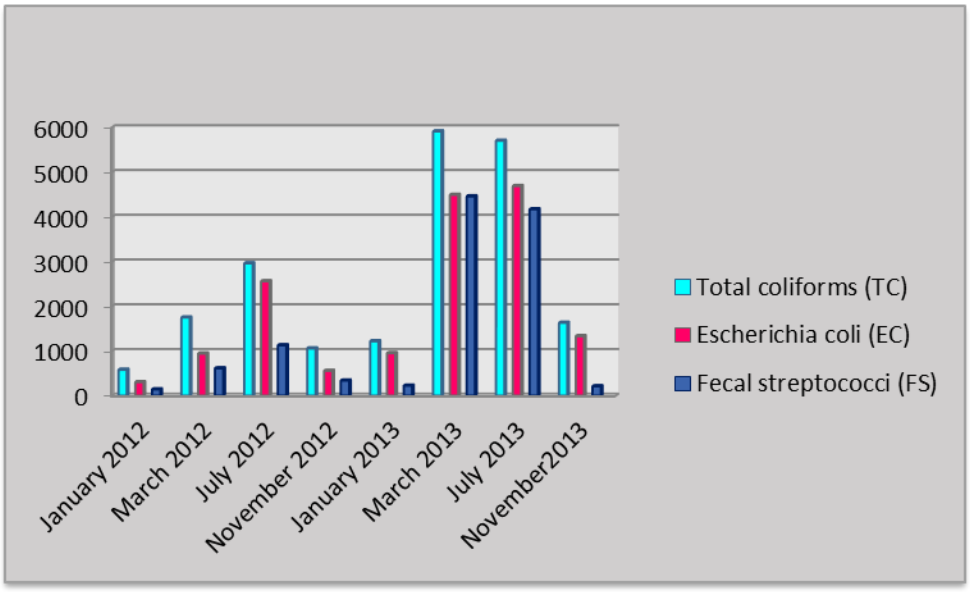


Figure. Seasonal variation of microbial indicators in water, during years 2012-2013. (Source: International Journal of Science and Research (IJSR))

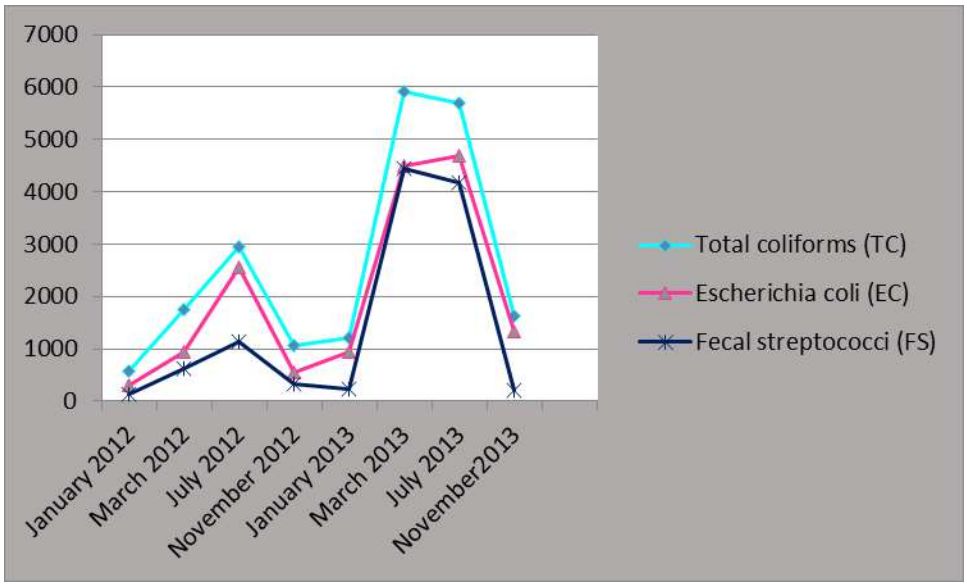


Figure. Seasonal variation of microbial indicators in water, during years 2012-2013. (Source: International Journal of Science and Research (IJSR))

By analytical assessment, for the parameters of Coliform bacteria, in relation to the environmental quality of water, it is observed that 3.3% of the samples belong to the class I (environmental quality very good); 40% of the samples belong to the class II (good

environmental quality); 19.2% of water samples belong to the class III (average environmental quality); 16.7% of water samples belong to the class IV (bad environmental quality); 20.8% of water samples belong to the class V (very bad environmental quality). The highest percentage of water samples class II and III, are monitoring points taken in the waters of the Kune Vain Lagoons; water samples taken at the station points in the Drini River belong to class V. Referring to the USEPA regulatory level (1986), in relation to the values of microbial indicators *E. Coli* (as a representative of Fecal coliform) and *Enteroccocc*i (as a representatives of Fecal streptococci) for the indicator was observed that E. coli is conform with recommended norms, in 70% of the samples, and 30% are not in conformity with it (25% of the stations in the sampling on the Drini River and 5% belong to samples taken at the estuary of the Drini River). Water samples taken at sampling stations in two lagoons are all conform to the values determined by this regulation (235 CFU/100 ml for a single sample). For indicator *Enteroccocci* (with representatives Fecal streptococci), was observed that water samples analyzed in this study are conform in 72% of the samples, and 28% are not conform with it (25% of water samples taken in the Drini River, and 3% belong to samples taken at the estuary of the Drini River).

The highest values of three microbiological indicators are found in the sampling points in the Drini River, followed by the water samples taken at the estuary of the Drini River. The lower Values averages of Total coliform, Fecal coliform and fecal streptococci in water are found in autumn and winter, while the highest average values are found in the spring and summer.

6.1.8 Ecological and Biological values

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

Ecological features, focused mostly at biological ones, are the most important part why this area is specific and has international, national and local importance.

Ecosystems (habitats), vegetation and ecological processes

The total surface of the protected area is 4401.31 ha, including on it also coastal sea waters to the 5 m izobate (about 500m far from the coast), because this water strip is considered closely linked with development of Marshland, littorals and river delta, and declaimed buffer zone. The territory is characterized by a diversity of habitats, as shown in the table below.

Protected Area Territory								
The P.A. territories	Forests (in ha)	Shrubs (in ha)	Surface Waters (in ha)	Beaches and dunes.	Agricultural lands. (in ha)	Inhabited Areas (in ha)	Marginal lands	Total Surface (in ha)

				(in ha)				
Kune and Drini River	44.28	116.59	413.06 lagoon and other surface waters + 0.45 ha Drini River Total = 413.51	46.54	1.3 ha	5.9 + 1 ha roads Total = 6.9	39.2	668.32
Vaini	25.04	492.32	730.25	19.32	3.5 abandoned land (overflowed)	4.2		1274.63
Tale Coast		386.99	12.81 channels and lagoon	56.09	47.77	Included at agricultural land		503.66
Total	**69.32**	**995.9**	**1156.57**	**121.95**	**52.57**	**10.1**		**2446.61**
Buffer Zones								
Kennlla/East of Merxhani								179.79
Ishull Shengjin village								254.52
Ishull Lezhe Village					312.77	65.42		378.19
Barbulloja Village								95.28
Tale					865.73	151.03 intensive human presence 30.16 low human presence Total = 181.19		1046.92
***Total of Buffer zones**								**1954.7**
Total P.A. Surface and inland buffer zones								**4 401.31 ha**

Tab. Habitat surfaces of Kune Vain and Tale Coast Protected Area. (Kune Vaon Management Plan, CEIA 2010).

*) In the buffer zones is not calculated the coastal buffer zone that includes the 500m. trip of the sea waters from coastal line to the sea direction.

The table below give a better understanding of the spatial situation of Kune Vain Marshland Habitats, including Kenalla lagoon. This Table is referred to MedWet Wetland Habitat Description System.

Habitat type	Surface in Ha	Surface in %
Marine	843.57	28
Estuarine	1 928	64
Palustrine	218	7
Riverine	30	1
Total	3020 ha	100

Table . Surface of main habitats in Kune Vain Marshland (Source: Conservation and wide Use of Wetlands in the Mediterranean Basin. Habitat Description of Kune Vain Lagoon System. Vila R, Tirane,1998)

By this Table it is clearly shown that the most important habitat, also by surface point of view is Estuarine habitat that count 1920 ha or 64% of the total surface.
Following are given two Tables with sub-habitats counted in Estuarine and Palustrine habitats.

Estuarine Habitats	Corresponding Surface in Ha	Corresponding surface in % in the Total area of Marshland
Estuarine-Emergent-Persistent	880.13	30
Estuarine-Water surface-Sand	684.49	22
Estuarine-Water surface-Mud	86.19	3
Estuarine-Shrubs-Deciduous	21.92	1
Estuarine-Forests-Deciduous	0.36	0.5
Estuarine-Aquatic Bed-Rooted Vascular	255.67	8.5

Table . Sub-habitat surfaces of Estuarine Habitats Source: Conservation and wide Use of Wetlands in the Mediterranean Basin. Habitat Description of Kune Vain Lagoon System. Vila R, Tirane,1998)

As it is shown in the Estuarine Habitats are included 6 sub-habitats. The estuarine-emergent persistent compose 30% of the total area and Estuarine - open waters – sand 22.5%.

At the following Table are given also Palustrine sub-habitats and their corresponding surfaces.

Palustrine Habitats	Corresponding Surface in Ha
Palustrine-Aquatic bed – Algal	10.47
Palustrine-Emergent-Persistent	103.16
Palustrine-Forested-deciduous	74.57
Palustrine-Shrubs/Scrubs-Deciduous	29.56

Table . Sub-habitat surfaces of Estuarine Habitats (Source: Conservation and wide Use of Wetlands in the Mediterranean Basin, Habitat Description of Kune Vain Lagoon System. Vila R, Tirane,1998)

In such Tables helps to create a better image in the surface of wetland system, where is included not only P.A. territory but also the Kenalla lagoon and surroundings, and the coatal sea waters.

6.1.9 Flora

The lagoon of Kune represents a very rich floristic area. The vegetation is typical to coastal wetland areas. Here the tall trees are estimated to represent 277 species involved in 67 families and 202 genders. The higher number of species in Kune Vain is that of *Graminaceae* family represented by 35 species. The second are *Composiates* families with 24 species, followed by *Leguminosae* family with 20 species, *Gyperaceaes* with 16 species, and *Chenopodiacea* with 16 species.

The main vegetation types of Kune Vain Marshland (A. Mullaj) are as following:

- Water vegetation
- Hydro-hygrofil vegetation
- Halophyl vegetation
- Psamophyl vegetation or sandy-dune vegetacion
- Forest vegetation
- Shrub vegetation

Following is given a short description of each vegetation type, upon the inception report and referred to Conservation and Wise Use of Wetlands in Mediterranean Basin, Focus on the Kune Vain Lagoon, Lezhe, Albania.

6.1.9.1 Lower plants

Aquatic vegetation

Aquatic vegetation is dominated by *Zosterra noltii* and *Ruppia cirrhosa*. Z. noltii is distributed more widely and gives the main physiognomy to the "Aquatic bed". *R. cirrhosa* is more developed in calm and shallow waters. The first covert about 40% of the surfaces of aquatic bed, and is situated mostly in mudded bottom of the lagoons. Often, both species create a monolithic plant community. Together with accompanied algae they create some biocenosses that can be considered as one of the most important oxygen sources for the lagoon waters.

Fluctuating algae populations of *Ulva rigida* (a variety of green seaweed) settle on soft, muddy substrata while the gut weed (*Enteromorpha sp*.) lives on harder (sandy) substrata. The sea grass beds have few species, but reach enormous quantities of biomass and in these communities live a large number of planktonic and benthonic animals. These plant communities cover important surfaces in the bottoms of the Merxhani, Ceka and Patoku Lagoons. Such beds play an important role in influencing the shape and stability of the shoreline, regulating dissolved oxygen and filtering suspended matter. They can enhance the biodiversity of a lagoon by providing a physical refuge from predation and also serve as nursery and feeding habitats for a variety of organisms.

Another group, but not so important is the monophytic plant community of *Lemna minor*, that is present in small stagnant freshwater ponds, with typical green color.

The communities represented by different *Patomogeton genera*, less developed than two firsts, covers the peripheral inland shores of the lagoons, with low salinity.

Hydro-hygrophylic vegetation

This type of vegetation covers a relatively big part of the Kune Vain Marshland. Hydro-hygrophylic vegetation is dominated by plant comminities with the predominance of *Phragmites australis, Typha angustifolia* and *Scirpus maritimus.* More than half of the water surface in Vaini Lagoon is covered by often accompanied by Typha latifolia and T. angustifolia.

- Plant community of *Phragmites australis*, spread mostly in the shore of lagoons (mostly in Ceka Lagoon). They are very resistant to different environmental conditions. In Ceka lagoon (with brackish waters), noticed a reduction of surfaces covered by communities of the margins of this lagoon dominated by common reed thicket (Phragmites australis), due to the increased salinity.

- Plant communities with *Typha angustifolia*, with lower presence in the marshland that the first one, form a belt along river, channels or other running waters.
- Plant communities with *Scirpus sp*. that formed mainly from *Scirpus maritimus and Scirpus lacustries*. The first ones, are spread in the depressions behind sand dunes.

Increase of salinity or a better communication sea - lagoon in Kune Lagoons (Ceka ,Merxhani, Vijë Kulari lagoons), has caused the disappearance of the communities of the margins of these lagoons dominated by common reed thicket (Phragmites australis). Currently, the environments around these lagoons are totally dominated by halophytic vegetation.

Halophyl vegetation

Halophyl vegetation involves plant communities adapted to high salt concentrations. Several communities with different dominance are identified : *Arthrocnemum, Juncus, Scirpus holoschoenus, Plantago crassifolia* etc

- Communities with predominant species of *Arthrocnemum genera*, living in the very salted meadow. They are covered by waters during the most time of the year. The predominant species are *Arthrocnemum fruticosum, A. perenne, A. glaucum, Salicornea europaea etc*. Generally they are accompanied with *Limonium vulgare, Inula crithmoides, saltmarsh-grass (Puccinellia festuciformis)* etc. They have a poor floristic compound.

- Communities with predominant species of *Juncus genera*, are represented by *Juncus acutus and Juncus maritimus*, that often forms a continuous belt and sometime are altered with other communities of *Arthrocnemum sp*.A good part of the year they remain under the waters. The communities of *Juncus acutus* are very resistant to the salted water.

Communities with predomination of *Scirpus holoschoenus, Saccarum ravennae, Plantago crassifolia* and *Schoenus nigricans* species, covers a small part of the surfaces between or behind sand dunes, between communities mentioned before. The sandy dune vegetation, *psamophyl*, creates a belt of 10m, sometime 30-40m and are not more than 1-2m high. The effect of the waves and salt waters delay such community to be developed very close to the waters. The first pioneer species behind the coast are *Cakile maritime, Xanthium stumarium, Salsola kali, Inula crithmoides* that becomes more frequent to inland direction. The most visible role plays the *Cyperus capitatus, Euphorbia palasis, Elymus farctus* etc. and rarely *Amophila arenaria* (extended mostly in Kune islet).

The physiognomy of vegetation is imparted by the species like *Eryngium maritimum, Euphorbia paralias, Echinophora spinosa, Cyperus capitatus Echinophora spinosa, Elymus farctus, Sporobolus pungens,* that pertain to a more evolved phase of psammophytic vegetation and from the beaches to the embryonic dunes. This type of vegetation represents a stable "potential" of the

sandy banks from Shengjini to Rodoni Cape. Sandy dunes in the Kune Islet is dominated by Euphorbia paralias.

6.1.9.2 Higher plants

The forest Vegetation

Forest vegatation covers nearly 10% of the total surface of the area and are concentrated mostly at Kune island and woodland site in the western of Zajet. The more frequent communities are those typical riverine forests such as *Alnus glutinosa, Fraxinus angustifolia, Ulmus minor, Quercus robur, Populus alba, Ligustrum vulgare* etc. Riparian forest dominated by *Quercus robur* that 50 years ago was widely distributed is rarely seen nowadays in Kune-Vaini. The area of riparian forests (typical for the region) is declining. So, Quercus robur that 10-15 years ago was widely distributed is rarely seen nowadays in Kune-Vaini. Other species such as *Alnus glutinosa, Fraxinus angustifolia, Quercus ilex* and *Populus alba* can be found fragmentally. 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. The communities with predominant species of *Alnus glutinosa* and *Fraxinus angustifolia* is one of the most important community. These forests are most distributed on recent alluvial deposits of the Kune Vain . Also *Ulmus minor, Qurcus robur, Populus alba* etc, are developed in the same area. The shrub floor is dense and the most dominant species are *Rubus ulmifolius, Crataegus monogyna, Rosa sempervirens, Tamarix dalmatica* etc. Herbaceous floor is also very rich, mostly in *Lythrum salicaria, asparagus acutifolius, Agrostis stolonifera* etc. As it can be viewed, the species of forest vegetation are quite similar with other Mediterranean marshalnds.

- Plant communities with predominance of Mediterranean pines as *Pinus maritima, Pinus halepensis and Pinus pinea* are developed over all lagoons, almost at Merxhani littoral and Kune Island, but mostly in Vaini site and Drini River coasts. Such plants are introduced by man, and planted time past time from beginning of the year 1970, in a surface of 60ha. This community is also damaged in the last years, and only in the Merxhani littoral, can be noted some saved groups.
- Plant community with *Populus alba*, has remained only at small surfaces, and has the same habitat with *Alnus glutinosa and Fraxinus angustifolia*. This plant community is hardly damaged in Kune Vain area.

The shrub vegetation

Between the most important plant communities of shrub vegetation can be mentioned those with predomination of *Tamarix sp*. Lagoon coasts as well as sea coast are popularized from such communities. *Tamarix dalmatica and T. hampeana* are the most commune sp. of such communities(In Kune islet they are localized on the external margin of the salt-marshes. They can rich to 4-5 m high. This community consists in two plant floor, where besides are developed *Vitex agnus-castus, Rubus ulmifolius* etc. An important distribution in this community has also

Juncus acutos, Arthrocnemum glaucum etc. This communities has e very strong resistance to the salinity.
The plant communities with predominance of *Salix* species are developed in the narrow belt of Drini River, and in their shrub floor are distinguished *Salix alba and Salix elaeagnos* etc.

6.1.9.3 Endangered and threatened plant species

Based on the Albanian Red List (2005) some of the endangered and threatened plant species of the Drini Mati River Deltas area, including Kune Vain are described in the table below.

Latin name	Common name Threatened	Status by IUCN	Type of habitat
Pancratium maritimum	Zambak deti	EN A1b	Sandy dunes
Juniperus oxycedrus subsp. Macrocarpa	Dëllinjë e kuqe kokërmadhe	VU A1b	Sandy dunes
Quercus ilex	Ilqe, hilqe, lëqeshtë, ylnjë	EN A1b	Riparian forests
Quercus robur	Rrënjë, rrojzë, rrajë	VU A1b	Riparian forests
Desmazeria marina	Desmazerë bregdetare	VU A1b	Sandy dunes
Ammophila arenaria	Amofilë e ranishteve	EN A1b	Sandy dunes
Hypericum perforatum	Lulebasani, balç, lulegjaku	EN A1b	Riparian and Mediterranean, coniferous forest
Stachys maritima	Sarushë bregdetare	VU A1b	Sandy dunes
Origanum vulgare	Rigon, çaj i egër, çaj bjeshke	EN A1b	Riparian and Mediterranean coniferous forests
Matthiola tricuspidata	Pllatkë trithimthore	EN A1b	Sandy dunes
Lotus cytisoides	Thuepulë vjexhësngjashme	EN A1b	Sandy dunes
Colchicum autumnale	Xhërokull vjeshtor, luleshlline,	EN A1b	Riparian and Mediterranean

	lulepreshi		coniferous forests
Posidonia oceanica	Posidone oqeanike, leshterik	VU A2d	Seabed of Drini Bay

Table .Endangered and threatened plant species of the DMRD area(including Kune Vain) and their status by IUCN. Source: Kune Vain Tale Management Plan, 2010

6.1.10 Fauna

The diversity of fauna is conditioned not only by physical proprieties of the area, but also from high diversity of the flora. Kune Vain constitutes a real natural treasure in biodiversity rich in quite attractive landscapes. The following data of the fauna is referred to "*Kune Vain Tale Management Plan, 2010"*

Mollusks

Degradation of water quality has condition a poor abundance of mollusks in Kune Vain marshland. In sea waters are observed 24 types of mollusks.

Lagoon	Total Moluscs	Gastropods	Bivalvors
Kune	40	16	24
Vain	30	13	17

Table . Distribution of Mollusks types in Kune and Vain sites. Source Kune Vain Tale Management Plan, 2010"

Malacofauna of Kune Vain is dominated by the following brackish wate - coastal lagoons species: *Hydrobia (Peringia) ulvae , Cerithium vulgatum ,Nassarius mutabilis, Cyclope neritea, Aplysia punctata, Cerastoderma glaucum, Solen marginatus, Scrobicularia plana, Tapes decussatus* The threatened species of mollusks are 21, the higher, compares with other Albanian wetlands.

Insects

Entomo-fauna of Kune Vain is dominated by coastal species, combined with lagoon and forest ones. There are 117 types of insects, 11 of them are threatened. 13 insects are sea ones. There are not dangerous insects in the site, except *Thaumetopoea pityocampa* and *Hypantria cunea* that

should be under the control, to avoid their negative impacts in vegetation and by it in all chain of biodiversity.

Fish

The fishes in Kune Vain Protected Area have a high diversity. 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 : Shallow waters of Lagoons, sea waters and running (Drini River) waters. The main fish specie are the eurohaline species: (*Sparus aurata*), *Dicentrarchus labrax*, *Mugilidae spp.*, *Anguilla anguilla* etc. The most important one from economical viewpoint are those of lagoons and sea, but very important are also river fishes. 26 species of fish are counted in Kune Vain Marshland. 12 of them are met in Drini River and 14 fish species are counted in lagoon waters. Of these endangered fish that need to be protected are: Garrik (*Licha amia*), Greater amberjack (*Seriola dumerili*), sea bass (*Decentrarchus labrax*), river lamprey (*Lampetra fluvicatilis*), (*Argyrosomus regius)*, (*Lebistes reticulatus*).

Amphibians and reptiles

In Kune Vain Marshland are meet 10 species of amphibians and 29 species of reptiles. 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 *Emys orbicularis*, *Elaphe quatrolineata, Viipera ammodytes* etc. In the Kune Island and Merxhani site, are living most of threatened species for both reptiles and amphibians (14 species). Sometime, *Caretta caretta* is trapped in fishing nets on the sea. Only one exemplar of *Dermochelus coriacea* is caught in August 2002, close to Kune Island, three m deep in the sea waters. . As a result of disturbances and deterioration of parts of its nutritional habitat caused by climate variability of the area, the number of individuals of Testudo hermani is found to be 50% less than it used to be 10 years ago in Kune-Vaini. Populations of amphibians (Rana sp. div) and reptiles (Natrix natrix, Mauremys caspica, Emys arbieularis) are decreasing or extinct (Source: REC additional report).

Birds

The birds are the most important part of conservation efforts in national, local and International point of view. The most studied groups are birds. From monitoring of wintering and nesting birds in Kune Vain results as following:

Nr. of species of wintering water Birds	Nr. of individuals wintering water birds	Nr. of nesting water birds.
32	2,318	12

Table . Monitoring data for wintering and nesting birds in Kune Vain. (Source: Kune Vain Tale Management Plan, 2010)

Because of intensive flooding in salt marshes Kune-Vain, vegetation is directly affected by more frequent and longer submersion. The majority of salt marsh birds nest on the ground and have shown to be vulnerable to disturbances caused by flooding. Many species feed on intertidal mudflats, where water levels affect the availability of food. The number of nesting bird species is low compared to the previous years and the potential estimated capacity: in 2005 only 11 species with 44-98 nesting pairs have been found in Kune-Vaini Lagoon. Species of nesting birds (such as, Egretta gazetta, Ardeola ralloides, Nucticorax nycticorax, etc.) are not visiting/using the Kune Vain lagoons any more.(*Identification and implementation of Adaprions response measure in the Drini-Mati River Delta*). The southern part of the delta, Vaini, is one of the only 2 wintering sites for bittern, Botaurus stellaris, in Albania.

Species	1951-53	1960-64	1966	1981	1984	1991	1993	1995	1996	2009
P. carbo	400-500	150-200	80-100	-	15-20	-	0	-	0	0
P. pygmeus	600-750	150-200	120-150	-	-	-	0	0	0	0
A. cinerea	200-250	225-300	100-150	50-60	22	33	21	0	14	0
E. garzetta	400-500	450-600	200-250	60-70	40	353	0-20	0	26	0
E. alba	-	-	-	-	-	-	-	-	0-1	-
A. ralloides	200-250	150-200	150-200	20-25	20	35	0-5	0	0-3	0
N. nycticorax	0	75-100	15-75	15-20	-	35	0	0	0	0
P. leucorodia	100-125	75-100	-	-	-	-	0	0	0-5	0
P. falcinellus	100-125	225-300	-	-	-	-	0	-	0	0
Total	2000-	1500-	665-	145-	97-	456	21-46	0	40-49	0

	2500	2000	925	175	102					

Table . Assessment of the couples of nesting birds at the colony of Kune. Source: Kune Vain Tale Management Plan (2010)

The no. of wintering birds has been reduced seriously from 1995 to 2002. In the 2006, is observed a better situation. The Kune Island is less populated from birds in the present in compares with years 1960-1980. The most populated space by birds in the present is Ceka Lagoon.

Years	*1995*	*1996*	*1997*	*2001*	*2002*
No. of individuals	*17,250*	*9,723*	*10,795*	*3,370*	*2,318*

Table . Number of individuals (birds) in different years in Kune Vain Marshland Source: Kune Vain Tale Management Plan (2010)

Respecting Albanian "Red List", the birds with an "Insufficiently known" status in the site are 12, with "Threatened" status are 3 species, 11 species has the "Rare" status, 9 species has "Vulnerable" status, with "Endangered" status is only 1 specie (*Ardea purpurea). Branta ruficollis and Anser fabalis*, has already "Extinct" status.

Ecological Status	Ectinct (Ex)	Endangered (E)	Vulnerable (V)	Rare (R)	Threatened (T)	Insufciently known (K)
Nr. Of Species	2	1	9	11	3	12

Table . Number of species upon "Red List" list categories, in Kune Vain Protected Area, Source: Kune Vain Tale Management Plan (2010)

Mammals

Referring data of Albanian Natural Sciences Museum (year 2002) 11 of mammal species are considered as bio-indicator in the Kune Vain Marshland. 7 of such species of mammals are endangered, and comprise about 63.6% of total bio-indicators of the site. Between species in risk can be counted such species like *Lutra Lutra,*Vulnerable, identified in the Merxhani channel, *Delphinus Delphi*, Vulnerable, identified on Shengjini Bay, *Meles Meles* , Endangered, *Torfius truncatus*, Rare, identified in Drini Mouth. (*Source:Conservation and Wise Use of Wetlands in Mediterranean Basin, Focus on the Kune Vain Lagoon, Lezhe, Albania, F. Bego, T. Bino, G.Joti, MedWet 2, ECAT, Tirana, 1998*)

Negative impact, caused by climate variability is observed in other species. Animals that feed on seeds and fruits are decreasing their populations. Less numbers of Lepus europeas are seen in the area, which use to be very populated.

Plankton and benthos community

The main bulk of phytoplankton population was constituted by less than 25 species. The diatoms were the dominant group from qualitative viewpoint. *Pennatea* diatoms were more common in this group. The zooplankton was found in low quantity and its dependant of the discharges of sea waters in lagoons. Copropodaea was the principal group that dominates the others. The algae are associated with *planerograms* community. From benthic viewpoint, it can be mentioned that underwater meadows are formed mainly by *Ruppia cirrhosa* and *Zostera noltii*. *Chaetomorpha linium* is present in the biger part of lagoon surfaces, and usually accompanied with *Ruppia cirrhosa*. In the margin part of the lagoons is found *Enteromorpha* sp. Both of them are nitrogen loving macro-algae so it can considered as indicators of development of eutrophication process. The presence of rooted *phanerograms* explain low levels of oxygen and high percentage of organic matter. In the periphery of the lagoons are found *Chaetomorpha linum, Cladophora sp., Cladostephus verticillatus, Ulva* etc., all of those associated with *phanerogams*. The sampling and analyzing process for plankton community is made on the 1997-1998, in the framework of MedWet 2 .

- **Status of the plankton in Kune side.**

In Merxhani, the diversity of plankton community is higher. The quantity of the chlorophyll measures is 8.39 mg/dm^2 . Some of the diatoms meet are *Amphora sp., Chaetoceros sp., Cocconeis scutellum, Coscinodiscus sp, Grammatophora sp*., etc. Such diatoms have sea water preference that shows that the characteristic of this lagoon are close to the sea in compares with Kenalla one. Only few *Dinoflagellates* are found in the site represented from *Protoperidinium sp. and Scripsiella sp.* etc. In Kenalla Lagoon the filament colonies of blue-green algae were present with genus *Oscillatoria*, that is typical for closed water systems. This indicator shows also from the higher level of nutrients and organic matter at this Lagoon.

- **Status of the plankton in Vaini side**

In Vaini area the status were quite different. The fresh water coming from the river has create other conditions and here are developed other populations of plankton, less related to the sea water. The chlorophyll in the place close to discharge channel of Drini River were 4.41 mg/l. The number of the genus was low but with large quantity, that shows a low diversity and a high/moderate level of trophic. Between diatoms can be mentioned *Ampiphrora sp., Cylindrateca closterum, Nitzschia sp., Pleurosigma sp., Thalassiosira mediterranea* etc.

- **Trophic state of Kune Vain Lagoon using phytoplankton as bioindicator**

Concentration of chlorophyll is an adequate parameter for assessing the trophic state of lagoon ecosystems. Trophic state of Delta Drini lagoons of Albania (ecosystem Kune–Vain) was evaluated during monitoring over the year 2011, from June to October (Evaluation of the Trophic Level of Kune and Vain Lagoons in Albania, Using Phytoplankton as a Bioindicator.
Assessment of the trophic status in Kune lagoon, monitored by 2002-2003, shows that the lagoon is characterized by a trophic state, as an annual average, oligotrophic. In the following monitoring (2006, 2007, 2009, 2010 and 2011), Kune lagoon results on average, as Mesotrophic. So overall, Kune is characterized by a tophic state as oligotrophic and moreover mesotrophic, even, in some cases with tendency to eutrophic.The higher value of chlorophyll **a** concluded was : 22.9 mg/m3. So we have a growing trend in trophic state .It is observed the presence of chlorophyll **a** and **c** pigments. These facts suggest the presence of the group of red algae such as: *Rhodophyta, Cryptophyta, Dinophyta*, etc

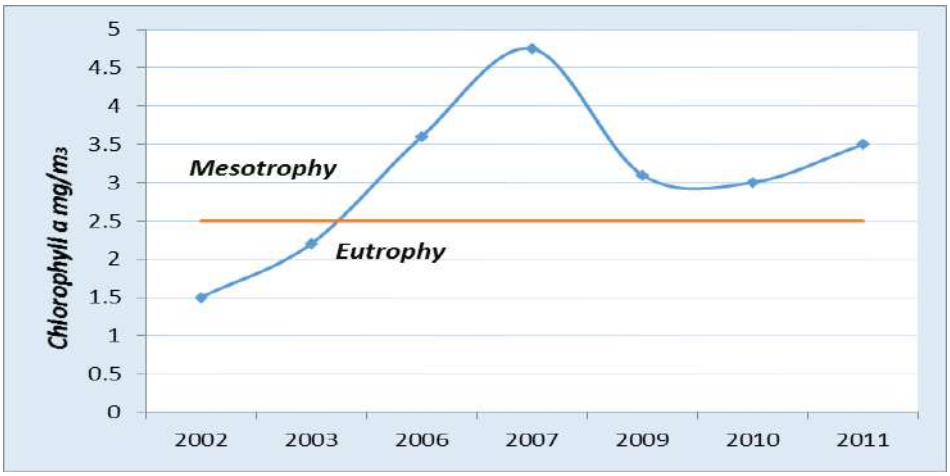


Figure . Annual averages of trophic status in Kune lagoon, period 2002-2011 (Source :Evaluation of the Trophic Level of Kune and Vain Lagoons in Albania, Using Phytoplankton as a Bioindicator, Department of Biotechnology, Faculty of Natural Sciences,)

Vain Lagoon monitored during 2006, is characterized by a trophic state, as annual average, mesotrophic. During 2009, is characterized by a trophic state, as an annual average, mesotrophic again. Comparison with monitoring data in 2006, 2009 shows that the level of trophy is increased approximately 2 and 4 times, respectively. In 2011, in Vain lagoon, the higher value of chlorophyll **a**, in June and September, respectively, 150,9 mg / m^3 . Station with the highest trophy level, are those that are situated far away from communication with the sea. Its observed the presence of chlorophyll **a** and **c** pigments, which are represented by *Raphidophyta*, known for algal bloom in the Adriatic, and *Eustigmatophyta*. The deterioration of the situation in this lagoon regards to eutrophication, requires measures to be taken, especially with regard to communication with the channel and improving the flow of sea water lagoon.

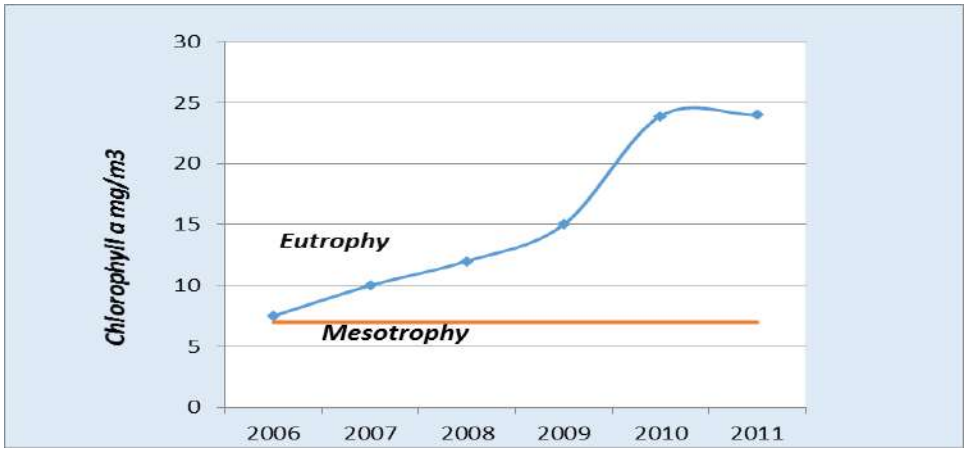


Figure . Annual averages of trophic status in Vaini lagoon, period 2006 - 2011 (Source :Evaluation of the Trophic Level of Kune and Vain Lagoons in Albania, Using Phytoplankton as a Bioindicator, Department of Biotechnology, Faculty of Natural Sciences,)

The factors that may have contributed to the eutrophication it must be emphasized that the communication canals in the Vain lagoon are mostly blocked or in a poor state. Other factors that may impact the trophic state are population dynamics, increase of agricultural runoff, development of tourism activities, including increase in number of bars and restaurants, lack of waste management in the surrounding area, etc

6.1.11 Nature conservation

The Kune Vain Protected Area area is situated in the territories under the administration of Lezha Municipality and Shengjini Administration Unit. The site administration is depended from the Lezha Regional Directorate of Protected Area, which is operating under the National Agency of Protected Areas.

The management categories of Protected Areas of Albania, are respecting the IUCN categories. As mentioned above Kune Vain Tale Protected Area, is a "Nature Managed Reserve", in respect of the IV IUCN Cathegory. All sites, Kune, Vain and Tale, are much related to one sub-ecosystem, and Drini and Mati delta Rivers, that link all sites in one natural body, where all elements interact with each other. The Renci Mountain is a very impressionist site proposed as Protected Landscape, also linked with Lagoon system by its water sources. Cave of "Suka e Vogel, its situated in this Protected Landscape. "Rana e Hedhun", is separated by site under the study from Shengjini Beach and Port.

6.2 Socio/economic environments

Available data on the demographic indicators, employment, incomes, livelihood patterns, service levels, etc, are collected from public national and local registers. Besides the above, the socio-economic data are provided by the following sources:

- INSTAT Albania,
- Kune Vain Management Plan
- Territorial Strategy of Lezha Municipality
- Communes offices
- Field observation for verification and filling data gaps.

In the following are given general data related to the district, administartive units and villages related to Kune Vain Protected Area.

6.2.1 Population size and structure

In the 1938 Lezha district had only 750 inhabitants. In the 1991, Lezhe District counted almost 68.200 inhabitants, meaning about 3,8 times as big of the population of the 1926. Lezha district population constitutes less than 6% of the population of the country and it is placed in 21 local government units organized in three regions: Kurbin region (4 units with the center in Laç); Lezha region (10 units with the center in Lezha) and Mirdita region (7 units with the center in Rreshen). The population of Lezha region constitutes 49 % of the population of Lezha district. It is distributed in 10 local government units.

The favorable geographical position, almost equidistant to Tirana (capital city) and Shkoder, 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 increased 2.7 times. In 2011 Lezha Municipality counted 65,633 inhabitants.

Only 31 % lives in the urban area while the other part lives in the rural area 69 %. Approximately 56 % of the population lives in three units of this area (Lezha municipality and Shengjin and Shenkoll administrative units). These units faced an increase of residents number (Shenkoll 47.3 %, Shengjin 18.9 % and Lezha 7.6 %), while all other units faced a decrease of residents number. The great concentration of population in these units is related to the fast development of tourism in these areas.

Demography									
Local units	**Surface Km²**	**Residences**	**Population 2001**	**Population 2011**	**Population Change 2011/2011 %**	**Male**	**Female**	**Urban area**	**Rural area**
	456.9	**22874**	**67714**	**65633**	**-3.1**	**32974**	**32686**		
Lezhe	5.5	5968	14420	15510	7.6	7659	7851	15510	24835
Shengjin	53.4	4080	6807	8091	18.9	4073	4018		
Balldre	91.2	1778	7203	6142	-14.7	2096	3046		
Dajc	35.2	1300	5183	3834	-26.0	1907	1927		
Blinisht	38.1	1142	4238	3361	-20.7	1638	1723		
Kallmet	18.1	1487	5493	4118	-25.0	1976	2142		
Kolc	38.1	1282	4923	4228	-14.1	2080	2148		
Zejmen	42.2	1422	6713	5660	-15.7	2794	2866		
Shenkoll	32.4	3637	8894	13102	47.3	6890	6212		
Ungrej	102.7	778	3840	1587	-58.7	834	753		
The national	**28748**	**1012400**	**3069275**	**2800138**	**-8.8**	**50.1**	**40.9**		

Table.Population changes in Lezha district. Source INSTAT, Census 2011

The average density of the population for administrative units is 123 residents/km². The urban part (city of Lezha) has the highest density (2864,3 residents/ km^2). Based upon data of Census, 2011, the urbanization level is extremely high in Lezha municipality.

The number of females is 2 % lower than that of males, while the number of female household is respectively: Shengjin administrative unit 11.9%, Lezha 13,9 %, and Shenkoll 9,1% (Refered to data Census,Instat)
21.4 % of the population is under the age of 15, while the group age of over 65 constitutes 11.5 % of the total population.

Munipality/ Administrative Unit	**Total**	**Gender and group ages**							
		Males				**Females**			
		0-14	**15-65**	**+65**	**Total**	**0-14**	**15-65**	**+65**	**Total**
Lezha	15 510	1 779	5 180	700	7 659	1 535	5522	794	7 851
Shengjin	8 091	961	2 671	441	4 073	825	2 687	506	4018
Shenkoll	13 102	1 555	4 689	646	6 890	1 382	4 140	690	6 212

Table.Resident population pursuant to gender, group ages and municipality/administrative unit
Source INSTAT, Census 2011

Table below indicates the total population, number of families and genders in 2017, for Shengjini town and the villages related to Kune Vain.

Administrative Unit Villages	**Total Population**	**Family**	**Male**	**Female**
Shengjini Town	4860	1276	2435	2425
Fshati Ishull-Shengjin	3930	1032	2001	1929
Fshati Ishull-Lezhe	4475	1177	2243	2232
Barbulloje	4150	1150	1880	2270

Source: Shengjin and Shenkoll Administrative Units

From 1979 the population of above mentioned areas was increasing in respect of natural population increase. From 1989 to 1994 the population was artificially increased by migratory movements. New families came in the area built their home and are living there (data refered to KVMP).

Following are given the data of how the population for Shengjini Town and Villages related to Kune Vain Protected Area has changed in the last 10 years.

Administrative Unit	Inhabitants Year 2007	Inhabitants Year 2017
Shengjini Town	3 663	4860
Shengjini Island	3519	3930
Lezha Island	3511	4475
Barbulloje	3480	4150

Table. Changes on inhabitants on last 10 years (data refered to INSTAT, administrative unit)

From the year 2007 to 2017, the population of Lezha Island village, Shengjini Island and Barbulloje are increased respectively with 964 inhabitatnts, 339 inhabitants and 670 inhabitants. In percentage point of view the population of the villages, closes the Kune Vain area are increased respectively 27.4 % in Lezha Island village, 9.2 % in Shengjini Island village and 19.2 % in Barbulloje. That shows clearly that migration movements continue in the region. It means that the pressure in Kune Vain protected Area continues to increase as result of population growth.

Migration

Immigration process, decrease of births and deaths had its impact on the structure of the population.
Lezha is an interesting case because its movement rate is 18 %. Both incoming and outgoing migration rates contribute to the overall movement rate. In some places there are important migration outgoing flows while other areas of the Adriatic coast and close to Lezha city are even attracting migrants from other regions. Migration does not occur only in the center of the area (Lezha municipality), but also in adjacent suburban local units (Shengjin and Shenkoll). Lezha is the preferred district in the northern side of the country and it attracts internal migrants coming from Shkodra (29 %), Dibra (14 %), Elbasan (16 %) and Tirana (16 %).(*Source: Territorial Strategy of Lezha Municipality, data refer to INSTAT, Migration in Albania, 2014).*

Social development

According to the 2012 LSMS in Lezha region the poverty level is 17.5%, poverty depth 4.3% and poverty severity 1.7%. The number of persons in difficulty (disables, sick etc) in Lezha municipality constitutes around 3% of the population of the municipality, where 2% consists of working disables and 1% of physically and mentally disables.

Unit	Economic Aid in 000/leke	Funds for disables (in 000/leke)
Lezhe	24.575,1	90,337
Shengjin	5.792,8	38,137
Shenkoll	9.615,8	59,343

Table. Funds issued for 2013 in Lezha county consisting in economic aid and aid for disables. Source: Territorial Strategy Lezha Municipality

Table below indicates the number of persons in difficulty (disabilities, incapable people).

No	Municipality Administrative units	No. of persons with disabilities %	No. of incapable peoples (eyeless) %	No. of other incapable peoples
1	Lezhe	5.63%	2.25%	687
2	Shengjin	6.3%	2.87%	397
3	Shenkoll	7.59%	2.81%	772

Table. Data on population, Source: INSTAT, Census 2011

Unemployment /Employment structure

According to 2011 Census unemployment rate of the site was 42.4%. Unemployment rate among females and youth results to be higher than the average at national level. Unemployment rate for females is in the average of 42.5 %. Unemployment rate of youth is also high, about 68.8 %. Currently there are 3.840 persons declared unemployed in Lezha district, out of which 81.5 % are residents of Lezha municipality, 12.9 % of Shengjin commune and only 5.6 % of other communes.

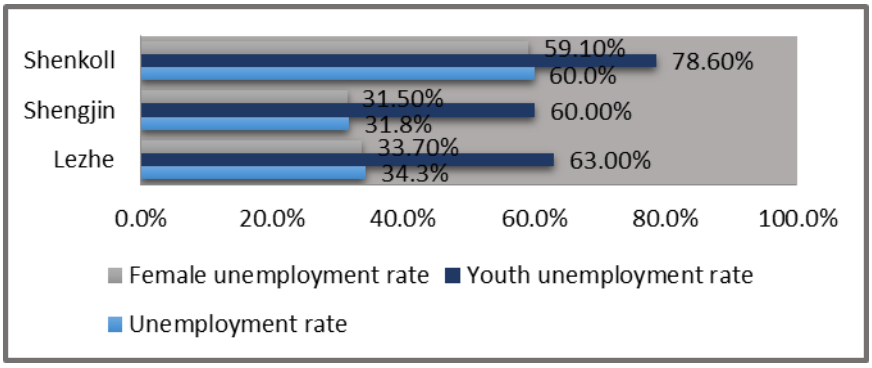


Figure. Unemployment rate based in group of population. Source; INSTAT

In Lezha Municipality there are 4.152 persons declared as employed. Table below shows the employment status of the Lezha City. The majority of employees work for the private sector where 65.7% of the population or 2.729 persons are employed.

Towns and Villages	Employment Status		Total	
	Employees (%)	Own account and contributing family workers (%)	Female (%)	Male (%)
Lezha	70.7	29.3	33.9	43.2
Shengjin	65.3	34.7	18.98	37.9
Shenkoll	67.5	32.5	6.14	16.0

Table . Employment status, employment rate based on gender. Source: Instat , Census 2011

57.6 % of employees in public sector are declared as working in the city of Lezha and the other part is distributed around the counties. (*Refered ISB: Statistic data from Lezha district*).

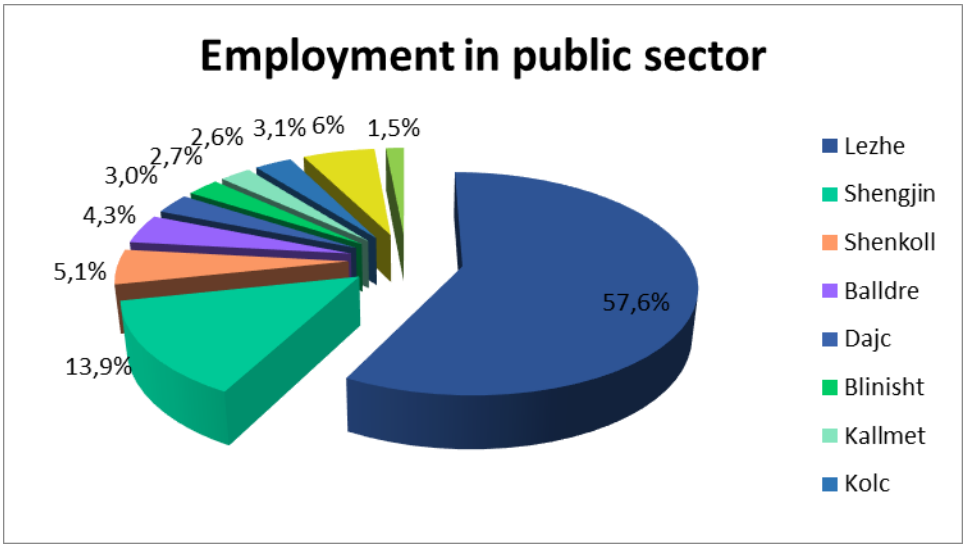


Figure. Employment in public sector by administrative units. Source, ISB,data refered to INSTAT.

Emloyment rate for females wis respectively, in Shengjin 18.98 %, 6.14 % in Shenkoll and 33.92 in Lezha. In the site, employment is mainly concentrates in the food industry (fish processing), agriculture, shoes industry and tourism. Naturally, Lezha district also offers great opportunities in the agriculture field but in this area the job is organized in the form of family economy and self employment. Economic sectors with high development potentials for area are*:* a) Agriculture/Livestock, Forests and Fishing, b) Tourism, c) Different kind of extractive and processing industries

The table below indicates persentage of employees based on economic activities.

Town/Villag	Agriculture	Trade	Constructi	Industry	Services	Undefine

e	, Forest and fishing	and retail	on			d
Lezhe	2.3	18.0	7.9	13.8	56.6	1.5
Shengjin	10.5	16.0	9.8	10.4	51.8	1.5
Shenkoll	10.1	10.7	19.0	10.8	42.2	7.1

Table. Employed pursuant to sectors /economic activities of the site (%). Source: ISB, data refered INSTAT,2011

6.2.2 Agriculture

In the agricultural areas, the private land is generally inherited. Nevertheless under Albanian law, most of the owners of the period before World War II are considered legal owners only for a part of their inherited land. The other lands or occupied agricultural lands are distributed to the farmers.
Most of the agriculture lands are used by private farmers. Reservoirs, rivers, irrigation and drainage channels etc, are all state owned, but can be offered or used with a concession to private developers.

Unit	Argicultural land surface (ha)	Forests,shrubs, woodland,waterplants (ha)	Pastures and meadows (ha)	Un-productive Land (ha)
Lezhe district	18,496	19,256	5,110	2,884
Shengjin	1,398	1,390	10	326
Shenkoll	3,022	-	-	634
Ishull-Lezhe	148.9	23.48		
Ishull-Shengjin	292.49	12		
Barbulloje	79.21	-		

Table. Land structure of the site (2014).Source: Territorial Strategy, Lezha Municipality, data reffered to Agriculture Regional Directorate, Ministry of Agriculture, Food and Consumer Protection

By far agriculture land surface of the area is fragmented. One farmer (family) has under disposal an average of 0.75 ha of land. Agriculture land of the area represents 53% of agriculture land of all district and 3% at national level. The table below shows the number of farms at district level.

Unit	Number of farms

Lezha	-
Zejmen	1850
Shenkoll	3100
Kolsh	1470
Kallmet	1350
Balldren	1620
Shengjin	880
Blinisht	1297
Ungrej	290
Dajc	1360
Total Lezha district	**13217**

Table. Number of farm, year 2014,Lezha district (Source: Territorial Strategy of Lezha Municipality)

Agricultural Production

Agriculture is one of the typical traditional sectors almost in all units of the area. This remains a sector constituting a stable resource of incomes for local residents. In general the production of agricultural lands is increased last few years, but there are factors which hinder this development. The climate change effects are also influencing in reduction of agricultural products. Furthermore, problems of climatic change has created problems of flooding of agricultural lands during extreme rainfall events. The Albanian government is trying to face climate change effects mainly by restoring all irrigation and draining system, to save farm assets and crop production and to improve the standard of living in the communities, using the agriculture activity as a powerful development instrument.
The area is known for its production of field crops as well as arboriculture. Its plantation structure, consisting of field crops such as bread cereals (what and maize), vegetables (peas, dried, watermelons) potatoes, beans, industrial crops (soybeans) and fodder, as provided in the table below, clearly shows that the area has the greatest surfaces in the region where these crops are planted.

Towns/Villages	**Lezha District**	**Shengjin**	**Shenkoll**
Bread Cereals	24,317	1,185	4,427
Vegetables Total	18,474	1,752	2,307
Potatoes	2,076	162	476
Legume	374	50	72
Industrial Crops	1		

Medicinal Crops	4	1	
Fodder	232,629	13,829	59,440
Fruit trees	1,472	82	428
Olives	383	11	130
Agrume	346	48	115
Citrus	554	4	97
Vine roots	691	122	70

Table. Production of field crops in tones, in 2014. Source; Territorial Strategy, Lezha Municipality

The Area is rich of fruit trees, vineyards, olives and citrus. This constitutes another direction for economic development. Productivitiy of citrus of the Area constitutes 90% of the region's productivity and 2% of the national production. Olives constitutes 55% of productivity at district level, vineyards (39%) and fruit trees and vines one third of the regional production.

Towns/Villages	Lezha District	Shengjin	Shenkoll
Fruit trees	159	4	53
Olives	179	4	56
Citrus	9	3	
Vineyard	159	1	34
Vines(roots)	158,135	20,000	11,000

Table. Arboriculture,Total and productive surfaces (Ha), in 2014. Source; Territorial Strategy of Lezha Municipality, data refered to Agriculture Regional Directorate of Lezha

Pests and Crop Diseases

Among the diseases of agricultural plants and pests, the principal ones are:

- Potato blight - *Phytophthora infestans*
- Tomato/pepper/cucumber blight - *Phytophthora caspici*
- Cereal rust- *Puccinia Graminis*,
- Powdery mildew - *Erysiphe Graminis*,
- Grapevine mildew - *Plasmopora viticola*
- Fusarium Wilt affecting tomatoes
- Botrytis bunch rot – grey mould - *Botrytis Cinerea* – affecting fruit
- Olive scab/olive leaf spot or peacock spot - *Spilocea oleagina*

Pests include:

- Various Lepidoptera (moths and butterflies)
- Plant louse and other aphids of the homopterous family *Psyllidae* (or *Chermidae*

- Wood louse or Woodlice form the suborder *Oniscidea* within the order *Isopoda*
- Chafer or beetles living on many plants and crops.

No serious human illness passed from animals such as tuberculosis, bird flu etc have been recorded in the commune.

Fertiliser and Pesticide Use

The administrative units have reported deferent figures of chemical fertilizer using, broken down mainly into of Di-Ammonia Phosphate (DAP), Ammonium Nitrate and Urea.
The application rate of chemical fertilizers per year varies from 1 to 1.5 quintals/hectare (100-150 kg/Ha). Data on pesticide used is limited.
Analyzing carefully the period 1962-1989, it is seen:

- A visible growth of the yield in maize and wheat cultures. Increase of the amount and intensity of using chemical waste on the land.
- In 1985 there are distributed about 62 times more chemical waste in relation with 1950.
- Increase of using herbicide and pesticide in agricultural cultures. In 1985 there is used about 130 times different pesticides in relation with 1950.

Livestock

Regarding to the livestock sector a particular development it is found in family livestock which is specialized in raising cattle, pigs and poultry. Dairy products of the area are: milk and its products, also meat and eggs. Below are given the most common livestock used in the area and an approximate nr. of them per type:

Towns/Villages	Cattle	Wool	Goats	Pigs	Equine	Poultry	Bees (hives)
Lezhe	16,959	17,344	18,628	40,671	456	114,676	4,733
Shengjin	1,250	2,700	1,214	1,400	19	6,962	668
Shenkoll	3,250	3,200	1,060	6,400	50	15,000	720

Table. Livestock structure 2013, Source; ISB, data refered to Agriculture Regional Directorate of Lezha

Usually, one farm/family has one caw for milk and more than 4 fowls for eggs production, and about 2 small ruminants, for milk productions and meat. Catholic families, used to have 2-3 pigs for meat. A small part of the families use equines as working and transport animals

Fishing activity

Geographical position of the area and rich water resources, makes fishing and its processing industry one of the main economic activities. In 2011 fishing numbers were the following: 4 804 tonnes of fish, out of which 2 287 tonnes caught at sea, 495 tonnes at shore (year 2012), 229 tonnes on the sea lagoons, 1 793 tonnes at water basins. Acquaculture production in the country is 1 304 tonnes while mussel production is 1 300 tonnes.
Fishing industry is also an important sector and in national level. In 2006 there were three points for fish processing established in this area and 90% of the caught fish is directed to these processing points. "Eurofish", "Poseidon" "Rozafa" and "Inca" are large businesses (2 Italo-Albanian, and 2 Albanian) which employ above 1.000 employees and supply with sea products the market of Lezha, other cities and export as well. Fishing is an employment opportunity for many residents of the area. In this sector there are about 260 fishermen, organized in association, fishing in seas and lagoons. According to 2011 data the number of licensed fishing boats in Lezha Municipality was at around 50, while the number of subjects dealing with sweet waters and aquaculture was 65.

The table below indicates surface and fish production between the years 1990 and 2010

		Production (tonnes) fish		**Production (tonnes) shell fish**	
Lagoon name	**Surface area (ha)**	**1990**	**2010**	**1990**	**2010**
Kune	250	26.9	29.5	29.5	-
Vain	850	71.6	64	64	

Table. This surface also includes wetlands and marshes. Source: ISB, Fishery Directorate

6.2..3 Infrastructure, services and education

Transport

The area has a very favorable position. It is located at the center of the main transport arteries connecting the north to the south and east to the west.

After the building the new highway Tirana-Lezhe-Shkoder the accessibility of the area is ameliorated drastically and this is one of the reason why the tourism is increased in last 2 years. The city of Lezha is about 70 km far from Tirana, Albania capital. The highway was built in the last years and incited on drastically increasing of the visitors in Lezha and Shengjini city and Shengjini Beach or in the Kune Vain protected area. There is one two path road that links Lezha with Shengjini site. The road is well paved and run in the border of Kenalla Lagoon and in the foot of Renci Mountain to Shengjini Port.

The Highway Tirana, Shkoder, pass through Lezha surroundings and give accessibility of Lezha in the Northern part of Albania as well as in the Montenegro. The road distance, from Lezha to Hani I Hotit (Costum between Albania and Montenegro), is 81 km. The distance from Shengjini to Lezha is around 7 km.

Also in this area is one of the three largest ports of the country, the port of Shengjin and the Gjadri airport. Shengjini harbor is a secondary port, situated in the North-West of the Shengjini Town. Its present capacity is 92 000 t, but projects are proposed on its enlargement. In this port are staying also some fishing boats. The site has a good accessibility by sea water transport. Until now this kind of transport is not used for urban transport.

Urban services are used to the line Lezha-Shengjini. Also other urban services are in use from Tirana and other cities all over Albania.

Energy

The main resource of lighting is electrical power. Regarding the type of heating energy, 70% of households use woods for heating, 20.1% gas, 6,3 % use electrical power, the other part use other type of energy and some of them are not using any type of energy for heating.

No	Towns and Villages	Main source of lighting:	Main source of heating	Family using fix telephon
1	Lezha	Electricity	Gas	1 622
2	Shengjin	Electricity	Wood	358
3	Shenkoll	Electricity	Wood	9

Table . Data on communal service. Source : INSTAT,Population and houses Census 2011

Drinking Water

The area is supplied with drinking water especially from the pump station of Barbulloja where there are four main pumps. There are two reservoirs with a deposit capacity of 4,000 m^3 and a producing capacity of 400 liters/sec. About 45 % of the population of Lezha has access to this service, while 35 % of the population living in the administrative units of Dajç, Blinisht, Kallmet, Zejmen, Shënkoll and Ungrej can not use this service. Based on the secured data, the coverage with drinking water is around 100.0% in the urban areas (Municipality of Lezha) and 35.0% in the rural areas (County of Shëngjin and Balldren). This pumping station supplies about 31,753 residents and the coverage is 90.7 %. There is a growth in network coverage in the second half of 2014.

Waste

The total amount of waste of Lezha district is 12.950 ton in a year or 0,43 kg per person a day. According to data collected, sanitation sewage system perform partially and specifically.

Other villages of the administrative unit's households still use septic tanks. A new Waste Water treatment plant has been built for the Municipality of Lezha and administrative units of Shengjin. The total amount invested by the Albanian Government is 8,3 Million Euro for the plant (4,9 Million) and the sewage (3,4 Million) in the touristic areas in Shengjin and in the city of Lezha. The plant is built to serve a population of 60.000 residents including the city of Lezha and Shengjin. The plant is a biological type with pre processing and with a laboratory with modern equipment for operating and maintenance. It has a producing capacity of 6.000 m^3 /day.

Education

The education system is offered by two sectors: public sector and private sector. 86% of education institutions are public institutions.

In 2014 there were 55 pre-school education institutions (kindergartens), 59 schools of the 9-years system, 13 schools providing general middle education and 1 school providing professional education operating in the site. The overall number of students is respectively: 2 345 pupils in pre-school, 9020 students in the 9 years system, 2 724 students in general middle school and 559 in middile professional school. For years 2014-2015 the number of kindergartens is 8.4 for every 10.000 residents. The number of 9-years schools is 8.9 for 10.000 residents. The number of middle schools is 2.0 for 10.000 residents. The number of teachers for 10.000 residents varies from 12-40 with an average of 24. The number of students for each teacher is 15.7 students. All administrative units are provided with 9-years schools and middle schools *(Source: Territorial Strategy of Lezha Municipality,refered to Regional Education Directorate of Lezha).*

Albanian is the main language used in all schools. The secondary language in upper and secondary schools is English language. The schools are state institutions.

The table below indicates the resident population aged 10 years and over by municipality/administrative unit, education attendance, literacy and educational attainment.

Municipality/ Communes	Literate	Illiterate	Without diploma	Basic education	Upper, Secondary	University
Lezhe	88	414	152	1667	4 710	1 967
Shengjin	70	273	92	3942	2 142	514
Shenkoll	703	354	201	7599	2 236	318

Table School attendance and literacy/educational attainment, Source: ISB, data refered to INSTAT, Census 2011

Health service

Health service is offered through primary healthcare and hospitals. There are 3 hospitals with 319 beds, 92 sanitary centers and totally 155 doctors in Lezha county. The distance from the closest sanitary center/doctor in urban areas is 23 minutes, while in rural areas is 19 minutes.
Primary healthcare in the municipality is offered through a hospital and four ambulances. The regional hospital situated in the city of Lezha offers healthcare services in the areas of pathology, obstetrics-gynecology, surgery, infections, pediatry, resuscitation, radiology and lab services. There are three Health Care centers in Shengjini administrative unit, 4 medicals and 15 nurses are employed in such centers. The Hospital Center Service is covered by the Lezha City. The number of employees consists in 35 specialized doctors, 104 nurses, 17 medical staff (lab technician, pharmacist) and 100 staff members consisting of helping and administrative personnel. This hospital currently has a capacity of 162 beds. Bed number for 10.000 residents is 55.

6.2.4 Currency

The money used in all Albanian territories is the Albanian LEK (ALL). The current currency range with the United States Dollar is 1 USD = 126 LEK.

6.2.5 Ethnicity and religion

The basic ethnicity in communes is Albanian, and also the nationality.There are two religions; Catolic and Muslim.
In the areas under the study the main religion is Katolic , respectively in Lezhe are declared as catolic 65,3 % of popullation, in Shengjin 72,4 %, in Shenkoll 87,4 % ect ; the different religious groups generally get on well together. This compatibility of the religions has implied that there are many inter-marriages between different faiths. In all religion groups, including Islamic faiths there are no cases of fanaticism.

6.2.6 Tourism

The diversity of the environment, the presence of various flora and fauna and the favorable climate offer great potentials for the development of a contemporary and stable tourism with all kinds of tourism asset: coastal tourism, lagoon and valley (river valleys) and also tourism in mountain environments.
The Beach of Shëngjin is the most important touristic attraction in the whole area but also on of the most important in the country. This is one of the oldest beaches in the country.
The Beach of Tale and Rana e Hedhun have not been used for a long time and represent areas with a great development potential. However there is a need for further investments in infrastructure.

Kune Vain Lagoon is an area with a miscellaneous flora and fauna, with a surface of 180 Ha of lagoon land and 1050 ha water surface and a depth of 1, 5-5 meters. There are several different restaurants in the surroundings where the fresh fish of the lagoon can be tasted. During the hunting season there are many hunting activities with the participation of native and foreign hunters.

Ishull Lezhe has a range of hotels, motels, modern and traditional restaurants and so it becomes inviting for both native and foreign tourists.

Costal Tourism. In the area exists an establish infrastructure and large accomodative capacity, especially in Shengjin. The tourism is of the seasonal kind (from may till September) and it offers sun, sea and sand. The Lagoons of Kune-Vain have a variety of flora and fauna. The Coast from Rana e Hedhun and ongoing has a very clean and sand which is also rich in iodine. The beaches are visited from resident and daily tourists, both native and foreign, in the period from may to September. The chaises and sun umbrellas are offered by commercial providers. The beaches are cleaned every night by the hotel owners, whereas the other parts are fully uncovered by the communes. The tourists can move via vans, buses and private automobiles. In this area function 28 hotels, 7 motels, with a total number of 3940 beds. There are 118 bars and restaurants. In Shëngjin there are 550 private houses which are rented during the beach season. According to the data of the commune there are over 5000 visitors every day during the beach season, in addition to the visitors throughout the year who come for historic and ethno-cultural tourism. The utilized area of the Shëngjin beaches has risen in the years from 1990 to 2008 from 4 ha to 13 ha, the number of hotels has risen from 7 to 24, the number of rooms from 214 to 979 and the number of beds from 680 to 3054. The number of tourists in Shëngjin from the year 2008 to 2009 has risen 20%.

Historical and archaeological potentials are very important for the region. The area has a rich ethno -cultural, historic, archeological and ethnographic heritage. There are many historic places and monuments which are interesting to visit. The "Gjergj Kastrioti Skanderbeg" Memorial , The Church of Saint Nikolla, Assembly of the League and Resting place of Skanderbeg, Castle of Lezha , Nympheum (Shëngjin), Don Lleshi Church (built in 1385), Veranda Church in Pllane etc, are some other historical and social potentials, frequently visited by tourists.

Nature tourism is also another tourism type developed in Lezha region. The Renci Mountain is very rich in caves and wonderful geo-morphological forms. Part of its are Protected Landscape. "Ranat e Hedhuna", etc. are same wonderful natural sites that offer great possibility on recreation and education. Also peripheral site of Kenalla, joined by tourism services (hotel/restaurants etc), peripheral area of Vaini, with a range of hotels and restaurants, when can be underlined the "Hunters Lodge", have a beautiful view and offer great visual potentials. Other types of tourism are developed in the site, like scientific ones, economical ones etc., that are conditioned by very great geographical position of Lezha region. Recreation services in Lezha region, lets a lot to pretend. Those are focused only in dishes, sportive boats, and rooms. Except Hunting Lodge, in all hotels or other tourism services are missing gardens, walking areas, playing areas or Luna Parks etc.

6.2.7 Cultural herritage

As it is mentioned before, the traditional activity of the area community was agriculture. So, the first families coming into the villages 100 years before, to 20 century were shepherds. Developing of agriculture incite other education to the communities that consists in agriculture, fruit trees, gardens etc, as well as in fishing and other experiences. The position of the site, very favorable for trading and commerce has incited also development of new experiences on trading, building, several artisan works etc.

Also the religion was not permit after stabilization of Central Economy. By socio-economical changes, the religion was free, and traditional religious cults and facilities were developed in time. So, today there are three main religions in the community. Traditional Christian, Catholic and Muslim communities co-exist in the Shengjini Commune. The inhabitants of the area have continuously respected the religions rituals and have been tolerant towards other religions.

Archaeological artifacts and other historical monuments

Lezha, ex Lissus, is one of the most important Albanian and Adriatic historical cities, 3000 years old. The archaeological studies have made possible the discovery of important objects pertaining to that period and latter ones, such as walls, weapons or dishes idolatry objects etc. All of findings has a national and international importance and indicate the existence of ancient population characterized by a prominent development. The most ancient inhabitants of the region were Pirusts and Abrejts (lirian autochthones tribes) famous as navigators and masters in metal works. The first organized settlement of the region was the Ilirian city named LISS (current Lezha) created by the end of the IV Century B.C., following a previous proturban settlement, as an important political and economical center of the last rulers of Ilirian Kingdom. This settlement is historically mentioned for the first time in the year 385 BC. The walls divided the city into three parts. The Acropolis was the upper part of the city, followed by the lower part inhabited by citizens in the hilly foot named acrolissus, and the last part, that goes to the coast of Drini river. Up to 12 gates have been discovered in time. The Acrolissus reach its maximal development at the second half of the second Century BC, when the first bronze coins, having the name of community, were put into circulation. The city was a prominent manufacture trade and portal center. In the year 213 BC, it was temporarily occupied by Filip *5*, of Macedonia and later, on the year 168 BC, by the Romans, which instituted provisional formal autonomy. Latter, in the city was re-included into Iliricus region. Lissus as a typical Roman municipal city, played an active role during the event of the civil war in Iliria between Pompeus and Caesear. Especially, it portal side, Nimfeus (Current Shengjini), was very active in this war. The city was fortified, respecting Caesars comment and its upper part was divided into two parts by the middle of the first Century. Lissus continues its civil life during the early Medieval Period (7-8 century). During the IX Century, it was included into the Durres Theme, and was built up as a Medieval citadel over the ancient walls Acropolis, consolidated by the circular walls at the top of the Hill. Another medieval citadel was built up at the lower side to insure the protected of the river portal area. The city was an important economic center, famous for the production and trading of salt.

Until 1398, it was ruled by the Dukagjini Family, and was surrendered later on to the Venice's. On the March 1444, Skenderbeu prince, National hero, held the Lezha convention and organize the 25 years resistance against the Turkish invaders. In 1478, the city was occupied by the Osmans and its population was temporarily sheltered in Ishull Lezhe.

Nimfeus, current Shengjini, has been created approximately at the same time as Lissus was. During the XIV century, the port, known as the MEDE Portal site, efficiently protected from storms, played an active role related to the creation of the principalities of the Arberia State (pre Albanian State). Following the Osman invasion the importance of this portal site, declined and in IX Century, Shengjini constituted a small village, populated by several shepherd families, descending from the highlands in North, East, North/East and Central Albania. Even during the period between two World Wars, Shengjini continued to represent un important poorly inhabited center.

Ishull Shengjin, extents in South-West of Lezha. During the Turkish invasion, the Christian catholic people of the village were forced to abandon their village escaping Islams. The village was resettled by the beginning of the 17 Century from people coming from Malesia e Madhe (Shkreli). The new settlers, which relied mainly on their livestock activities, preserved their mountainous pastures and made use of them, particularly during summer for grazing purposes. For a considerable period Ishull Shengjini, was a provisional settlement. The highlanders and their livestock used to settle there during the cold season.

Ishull Lezha, represents a village in the south of Lezha, named Big MEDE Island, dating the medieval period. Following the Osman invasion the flat coastal area was abandoned by the population and in 18-19 Century the village was resettled by the highlanders, descending by the North and Central Albanian areas. After the II World War, the village constituted the center of an agricultural cooperative which included 7 other villages. For almost two centuries, the population increased very slowly, and in 1944, almost 300 inhabitants grouped into 46 families were reported.

Barbulloje is a village in north-west of Lezhë County. It is part of the former municipality Shenkoll.

6.2.8 Landscape and aesthetic qualities

Lezha is a marvelous kaleidoscope of nature, almost a kind of unparalleled ecological principality, where mountain areas, forests, the lagoon and the sea constitute a distinct community. From its natural proprieties and biodiversity, the landscape of the area still account between most important values of the area.

The open view of the sea is accompanied by green colors of the vegetation, shallow waters of lagoons and marshes, running waters of Drini River and his mouth, dunes that gradually are

pooled to the sea, birds passing or staying in the site, agricultural lands etc. In the surrounding area it can be easily observed the beauties of the Renci Mountain, typical karstik with a high morphological diversity.

Photo 1. Landscape in Kune side (Kune Vain Management Plan)

The landscape of Kune surroundings is damaged from buildings and hotels that are too close and that have not any compatibility with natural landscape. This situation goes to be more appropriate at the Kune Protected Area entrance. Some vegetation and woodland are represented in the visitor view and both side of the littoral looks more attractive. But still, vegetation and green is limited, and in the coast can be seen only some woodland that doesn't represent any forest feature. More in the deep, running to the Merxhani road, the vegetation go to be dense and more attractive, till, the littoral is going to be thinner and in both sides can easily observed the lagoon and the sea. The Kune Island has quite a wonderful view from the latest point of Merxhani littoral. The Kune Island has a beautiful view. The view from National highway to Kune side Protected Area is much damaged. The visual values of Kenalla lagoon that give a great relax by its color are really damaged from the views of the other side of the road, when appeared two ex-quarries and another that is still operating. Also some buildings and walls appeared in the crossroad that separates the Shengjini town and Shengjini beach. The road from national highway to Vaini side has really a poor and not appropriate landscape for tourism attraction. The appropriate views are starting quite in the entrance of Protected Area. The road that runs in the south direction, parallel with protected area borders to the "Hunters Lodge" (Lezha Island), is quite appropriate with tourism demands. The "Hunting Lodge" and other complexes around it, has also great visual potentials with its greens, ponds and bridges etc., and prepare the visitor for the wonderful trip expected to the protected area. In the north of the Area, Dropped Sand (Ranat e Hedhura), that consists in a very interesting site, in the mountain foot, that is comprised by sands deposited there by wind activity.

7 Assessment of Alternatives

a) Methodology for selection and evaluation of Alternatives

Two interventions are selected from the scoping study, to be implemented as adaptation measures in Kune Vain; planting and reopening of the channel.

Three alternatives are selected for each of the intervention, during the earlier scoping stage and considered for the selection of the best alternative. The alternatives are defined by a strong collaboration among the UNEP staff, engineering team, forest engineers, administrate of Kuna Vain and Lezha Regional Directorate of the Protected Areas. The proposed alternatives and sections have different positive and negative impacts. The consultants have also considered the respective investment costs of each proposed alternative, defined by consultation groups. One of the alternatives for each of the intervention is the Alternative "Do Nothing".

A deep screening process is done to select the best options for each of interventions.

For plantation, is done a previous territorial evaluation. The sites planned to be planted results the only appropriate sites of the PA. In other sites, the soil characteristics doesn't permit plantation (lands are most of the time under the waters), or planting in some others, will create cumulative social impacts with community that is applying there intensive grazing. So the only remained planting alternatives, remains the options with different species. The evaluation of such alternatives is based in pondering matrix, focused on types and kinds of plants selected, the planting efficiency, considering compatibility of plants/seeds with the soils and lands characteristics, etc based on "Method of comparative ecology". The criteria on the vicinity of raw material (young trees, seeds etc), is considered the same for all so, is not included. The evaluation methodology is expressed in a matrix with shading colors.

Also, for opening of the Sea/Ceka exchange channel, an preliminary evaluation of options was done to select the site to be dredged. From such evaluation, opening of the channel over the existing channel, results as more appropriate, because the efficiency of water exchange is the same, and other options have an higher of value, considering the territory to be dredged, disturbance to wildlife and habitats, habitat fragmentation, giving access to pollution sources etc. For the selected option, the consultant has provide an overall evaluation between the alternatives with or without breakwater. The matrix for opening of the new channel is based in numeric ponding system.

The analysis of alternatives is prepared on basis of impact identification, classification and ranking. The weighting of impacts, evaluated in terms of their effects is multiplied with the environmental values of effected element. This value has two dimensional features – its principal values as well as the real value. A marginal land has for instance a high environmental value but, in case that this land can serve as an forest habitat or grassland, his marginal value is reduced due to its scarcity in compares with grassland, woodland and/or forest habitats. As far as the territories are not compared (not alternatives) socio-economic criteria are the same for each of alternatives (opening of channel and planting). The environmental criteria were divided into:

- Environmental quality criteria
- Ecological criteria

- Socio-economic and financial (cost) criteria

b) Alternatives of amelioration of water exchange between Adriatic sea and Ceka lagoon

The criteria mentioned in the above table, has considered 3 alternatives, including "Do Nothing- the first). For this alternative, the not applied criteria, different from two other ones,
The general formula used for the evaluation of alternatives is based on an assessment matrix. Separate evaluations are prepared for the compatibility of alternatives with socio-economical, health and safety and physical, biological impacts, intervention and construction, operation/maintenance cost etc. The evaluation of impacts for each alternative is based on:

- Iw (impact's weight):
- Aev (affected element value)
- Impact's effectiveness expressed as Iw/Aev.

The ranking points are selected in such a way that allows the possibility to express in realistic numbers the impact's effectiveness. The final ranking points range from 1 to 5. Results and calculations of the evaluation are summarized in the summarized matrix. The temporary impacts, almost those during the construction phase, has the lower weight than long term impacts, which are almost those expected form development/operational/maintenance phase. The criteria for "Adaptation with development plans" is not considered, because all interventions sites are into the PA territory and no other plans are developed till the present. To the other side, protection of coasts, rehabilitation of wildlife habitats and providing of sustainable fishing remains development goals of Kune Vain Tale Protected Area.
The ranking of alternatives is done according to the point system classified on; 1 Inappropriate, 2 Almost inappropriate, 3 Slightly inappropriate, 4 Appropriate and 5 Completely appropriate.
As mentioned above three options with their related alternative are considered for opening/reopening the new channel
Option 1 – Alternative "Do Nothing"
Option 2 – Alternative of reopening of channels without breakwater for sediment control
Option 3 – Alternative of reopening of the channel with breakwater for sediment control.

Summary for evaluation of criteria for three options and related alternatives

<u>Option 1</u>
The option 1, with alternative "Do nothing" has not any significant negative effect in inland biodiversity and habitats. The only negative impact is indirect effect, caused by bad quality of the lagoons water, which reduce its biodiversity, that serves as food for inland wildlife. To the other side, filling of the channel by sediment has reopened a closed pathway in both sides of littoral, which reduce the inland habitat fragmentation.

This option has not any direct financial coast, but their indirect ones are very high, considering reducing of fishes, bad smells in peripheral parts (during the summer – pick tourism/recreation season) because of the eutrophication.

Option 2

The option 2, alternative of reopening of the channel without static barrier for sediments (breakwater) has quite another set of effects. The most important negative effect, can be considered, inland habitat fragmentation. Other impacts are expected to be caused during construction phase, like damaging of surrounding habitats by works and working campus, pollution by sediments during excavation, compress of top soils in the channel slopes, disturbance to wildlife by works of excavator, transport of dredged material etc. Other impacts seems to be caused in the operation/maintenance phase. Those are related also to the cleaning of the channel by sediments, at last 2-4 times/year. The impacts expected in this phase are quite similar with those mentioned in construction phase.

This option has a great number of positive affects like amelioration of lagoon habitats and lagoon water quality, improving the biodiversity and fish population and number per species, increase the incomes by fishery and tourism development, job generation for maintenance of the channel, increase site capability for recreation and education, etc.

The cost for opening of the channel without breakwater is quite lower that this with the breakwater (option 3), but the option 2, has an additional coast for channel maintenance, which is higher than the option 3. The cost for opening of breakwater upon the designer is about 341 446 USD, and maintenance cost during 10 years goes around 15 000 USD/years, with a total for 10 years including construction, operation and maintenance, runs to about 150 000 USD. In total, the amount for option 1 is 491 000 USD.

Option 3

The Option 3, reopening of channel with the breakwater for sedimentation control (around 350m long), has e significant negative impact in sea water habitats, by fragmentation of shelf habitats, risk for intensive erosion in the northern part of the channel, because trapping of sediments in the south of the channel by the breakwater, barrier to water species and fishes using shallow water to come in the lagoon from Mati Delta and Tale coast, etc. This options will create more negative impacts at biodiversity, habitats and tourism users, in phase of construction, because huge of transport and construction activities, (noises, dusts, vibration etc) will be taken to construct a 350m long breakwater. This option will create less issues during operation/maintenance phase.

The cost for construction of this option, in a cheaper case goes around 800 000 USD.

Selection of the best option

As mentioned above, three option are considered between the best options. Option 1, "Do nothing", option 2, channel without breakwater, and option 3, channel with breakwater. 7 multifunctional criteria are selected for the final evaluation. The selection is based in the formula where; the total raking points came as a result of the summary of the ranking point for each criteria divided in the number of the selected criteria, expressed as Cr.1 + Cr. 2 + Cr3+ …… Cr 7

: 7 =. Implementing of this evaluation system, give a clear priority to the alternative of the option , with a total point of 3.42.

No	Criteria	Option 1 Alt – Do nothing	Option 2 Alt – channel without breakwaters	Option 3 Alt – Channel with breakwater
1	Effects on inland biodiversity and habitats	4 Not additional effects, but reduction of wildlife source of foods, because of lagoon waters deterioration	3 Moderate negative impacts on habitat fragmentation by dividing of the littoral continuity from the channel	1 Lost of coast by intensive erosion in the northern part of the channel, habitat fragmentation, loosing of the lagoon water characteristics as natural fish nursery, loosing, reduce food sources for avifauna etc.
2	Effects on lagoon biodiversity and habitats	1 Not negative effects by construction and maintenance activities, but high and cummulative negative impacts will be caused in the lagoon biodiversity and habitats, by eutrophication and destruction of lagoon habitats, reduction of fish, damage of wildlife by changes on food chain etc	3 Temporary but frequent (twice per year) negative impacts caused by works during construction/maintenance phases, like water turbidity by solids during excavation, noises by works and transport, accidental pollution or bad management of wastes and remains/debris etc. Control of natural habitats stability in the channel body Wildlife disturbance by human presence and noises, air pollution etc in construction/maintenance phases	4 Long term control of lagoon species movement in the sea side of the south of the channel by fragmentation of the coastal shelf till 3.5 m. deep. Damages of lagoon water during construction, like water turbidity by solids during excavation, noises by works and transport, accidental pollution or bad management of wastes and remains/debris etc. Wildlife disturbance by human presence and noises, air pollution etc in construction phase
3	Effects on sea waters biodiversity and habitats	5 Not negative effects in sea side and coast	3 Short term but frequent (twice per year) coastal water turbidity in the vicinity of the channel	1 Cummulative and long term negative impacts by construction and operation of breakwater

			during construction/maintenance	in shallow sea (shelf) and coast, like intensive erosion and turbidity of shallow sea waters, fragmentation of one of the main important buffer area, which goes from to 5m. deep of the sea shelf.
4	Effects in fishery and tourism	1 Fish reduction by missing of water corridors between lagoon and sea Eutrofication, Lossing of visual proprieties and reduction of tourism/recreation potentials, like recreative fishing, reduction of local bio-food sources etc	3 Temporary negative effects during construction/maintenance works by noises and water turbidity. Possible generation of wates and visual disturbance	4 Disturbance of fish and wildlife during construction, risk of loosing the northern part of the Vaini beach as a very appropriate area for tourism and recreation Risk of changing of the lagoon morphology, by causing ultimate changes in lagoon/sea borders
5	Effects on community economy (occupation, indirect profits by market etc)	1 Reducing of community incomes by low possibilities for fishery and tourism/recreation. Reduce fish and tourism services, lower employment in the market and other secondary activities related to tourism and fishery	4 Temporary negative effect in tourism users and fishermens during construction/maintenance	4 Temporary negative effects to tourism and fishery users Risk of destroying lagoon water characteristics by fusion of sea and lagoon waters
6	Financial cost of the construction	5 Not cost for construction	4 Low cost of construction	4 Very high cost of construction
7	Financial cost for operation maintenance	5 Not cost for operation/maintenance	3 medium cost for operation/maintenance	2 Low cost for operation/maintenance
Total ranking points		3.14	**3.28**	2.85

Tab matrix for evaluation of the best alternative for opening of the tidal channel

c) Summary of evaluation of the best alternative of Plantation

During the process of alternatives assessment are considered species selection having taken into consideration: a) purpose of reforestation, b) site conditions and c) biological traits of species, d) Stock of seedlings in the region. The method used for species selection is so called "method of comparative ecology". This method is applied for species selection when no experiment is established and is based on the comparison and compatibility between species requirements and site conditions. Therefore for each species proposed for planting are considered their requirements to site conditions (see Table below).

Specie	Specie's requirements						
	Climate	Soil type	Temperament				Advantages
			Temperature	Soil moisture	Light demand	Soil fertility	
***P.halepensis* Mill.**	lowland mediterranean	sandy-greybrown	termophyle	xerophyte	High	low demand	Improve soil conditions
***P.pinea* L.**	lowland mediterranean	sandy-greybrown	termophyle	xerophyte	High	low demand	Improve soil conditions
***Q.pedunculata* Ehrh.**	lowland mediterranean	sandy-greybrown	termophyle	mesophyte	High	medium demand	plastic species
***F.ornus* L.**	lowland - hilly mediterranean	sandy-greybrown	termophyle	xero-mesophyte	High	low demand	high adaptive capacity

Table. Specie's requirements to site conditions. Source: technical design from NCETSD & Diava Consulting

According to the planting consulting team, the species proposed for planting are native and well adopted to site conditions. All species have a high adaptive capacity to severe site conditions and have ability to improve soil conditions and fertility which limits the forest vegetation growing. The reforestation of such soils along the coast might be affected negatively by some factors:

- sand movement from wind
- wind exposure
- shallow underground waters
- excessive heating of upper layers of sand and soils
- summer drought
- lack of soil's nutrients

Combination of all elements was integrated in the figure below in form of criteria, showing their potential values for each of site and soil characteristics, highlighting the species options for each of those conditions, and selecting of the best alternative.

Species proposed	A	B	C	D	E	F	G	H	I	J	K
Pinus pinea (Stone pine)	5	5	5	5	5	5	5	4	4	5	5
Pinus pinaster (Maritime pine)	4	4	4	5	5	5	5	3	4	4	5
Pinus halepensis (Aleppo pine)	5	5	5	5	5	5	5	5	5	5	5
Laurus nobilis (Bay Laurel)	3	3	4	2	3	3	5	4	5	2	4
Ulmus sp (Elm)	3	4	4	3	1	3	4	4	5	1	1
Alnus sp (Alder)	3	4	4	3	1	3	4	4	5	1	1
Fraxinus ornus (Ash)	4	5	4	3	3	4	3	4	4	5	4
Populus sp. (Poplar)	4	5	4	3	3	3	3	4	4	1	4
Quercus robur (English oak)	4	5	4	3	3	4	4	5	5	4	4
Tamarix sp. (Tamarisk)	5	5	5	5	5	5	4	5	5	4	4
Carpinus sp. (Hornbeam)	2	5	4	2	3	4	3	3	5	1	1

Colour key

Optimal **Unsuitable**

A	Establishment*	1	Very difficult	→	5	Easy
B	Spring frost	1	Tolerant	→	5	Very intolerant
C	Exposure	1	Tolerant	→	5	Very intolerant
D	Salt spray	1	Tolerant	→	5	Very intolerant
E	Soil moisture requirements	1	Very high	→	5	Low
F	Soil nutrient requirements	1	Very high	→	5	Low
G	Shade/Light	1	Shade bearer	→	5	Light demander
H	Rooting depth	1	Very shallow	→	5	Deep
I	Soil improver	1	Inconclusive	→	5	YES
J	Seedling stock	1	None	→	5	Enough seedling stock
K	Former experiences	1	None	→	5	Enough experience

Table Matrix for evaluation of alternatives. Source: technical design from NCETSD & Diava Consulting

8 Impact characterization

This chapter is focused on impact characterization, considering their cumulative ability and effectiveness, the sensitivity of object/subjects affected their weight and availability, etc. for the selected alternative. The detailed evaluation is focused on positive and negative impacts during both project phases; construction and operation/maintenance. The first step is identification of the negative and positive impacts in total, and then classification upon their effectiveness. The negative and positive impacts considered in this study are focused on intervention for opening of the channel and plantation activities. The impacts are classified in Environmental quality impacts, social-economic impacts, and health impacts. Such impacts scale is evaluated also in vertical (spatial) level and (horizontal) local/area level. After classification of the impacts by ranking of their effects, are selected those that have more importance to avoid theoretical and academic analyses.

8.1 Positive Impacts

The most important positive impacts are those of local/regional and national scale. Such impacts are almost focused on the improvement of the biodiversity and habitats by ecosystem based adaption interventions, reduce negative effects of climate change by break the first wave of cyclones, soil erosion control and reduction of evaporation, reduce extreme air and soil temperature in the planting sites, and their transferred positive effects on the community and regional standard life level. The positive impacts are elaborated separately for all interventions summarized in two main ones; Opening of sea/Ceka lagoon water channel and planting of trees, shrubs and graces.

8.1.1 Positive impacts of opening of sea/lagoon exchange channel

Positive impacts of this intervention has some direct and indirect effects in several spatial scale. The importance of fishing and tourism/recreation of Kune Vain in national level, enlarge intervention effects in larger scale than local/regional. The table below gives the main positive impacts and their effects:

Impacts on nature environment			
Positive impacts	***Response due to climate change***	***Effects in local/regional scale***	***Effects in national scale***
Improving sea/lagoon water exchange	Combat negative effects of impacts caused by atmospheric events (sedimentation)	a. Improve lagoon water quality b. Improve fish and waterfowl habitats, c. Repair wildlife food chain	Improve national capacity for Protected Areas and specific species conservation

Impacts on socio/culture			
Positive impacts	***Response due to climate change***	***Effects in local/regional scale***	***Effects in national scale***
Improve habitats with scientific values	Awareness and case study for the effectiveness of ecosystem based adaptation	a. Improve lagoon and related biodiversity with scientific values ex. little heron and cormorant b. Increase potentials for scientific research and conservation measures c. increase the recreational potentials of the site d. incite other appropriate household interventions with ecosystem based adaptation	Increase the country capacity for education and recreation in Protected Areas Offering case studies in national level on the success of ecosystem based adaptation
Health effects			
Positive impacts	***Response due to climate change***	***Effects in local/regional scale***	***Effects in national scale***
Reduce eutrophication risk	Incite water movement due to blocking of the channels by sediments in atmospheric events	Reduce health risk by diseases generated by polluted water in the tourism/recreation period and by poisoned fish	Improve health status of population and develop a national scale of healthy recreation and ameliorate food quality
Effects in economy			
Positive impacts	***Response due to climate change***	***Effects in local/regional scale***	***Effects in national scale***
Increase incomes by developing of tourism and fishery	Face the negative effects of climate change in economy	a. Increase fishing potentials b. Increase tourism potentials and local engagement in tourism activity and development instruments c. temporary employment during construction and operation/maintenance	a. Maintain national incomes in appropriate level b. Control un planned migration in the big cities

Tab. Summarized positive impacts by construction of water exchange channel

8.1.2 Positive impacts by planting

The positive impacts by planting are quite diverse and long term. It appeared by its effects in different and several environmental spaces and elements.

Impacts on nature environment			
Positive impacts	***Response due to climate change***	***Effects in local/regional scale***	***Effects in national scale***
Improve of the soil stability and reduce the erosion, break the first wave of storms etc	Face the negative effects of Climate change caused by atmospheric events, high waves, storms etc	Save and improve habitats and biodiversity	Ameliorate the national scale of biodiversity and habitat conservation in Protected Areas
Create better condition to biodiversity by recreation of appropriate habitats, stop loosing of soil parts with its related vegetation, reduce drying effects in interventions space	Reduce negative effects by pick extreme (hot and cold) days, maintain satisfactory ratio of evaporation and albedo	a. Protection of natural habitats and biodiversity in Kune Vain b. Increase the species and populations of natural decorative and singing birds (improving of habitats for *fringilides* and other *Passerines*) c. Improve food chain in the inland habitats and provide a better status of inland wildlife	Upscale Protected Area conservation and their specific values via ecosystem based adaptation measures
Impacts on socio/culture			
Positive impacts	***Response due to climate change***	***Effects in local/regional scale***	***Effects in national scale***
Better conditions for recreation activities	Face decreasing of recreational potentials by climate change	a. Awareness on effectiveness of ecosystem based adaptation, b. Increase local regional capabilities for recreational and education activities, like tourism nature potentials (biodiversity, green areas, appropriate visual sites	a. Increase national capacity for recreation and education b. Incite similar actions in other coastal sites

		and landscaping) etc.	
Health effects			
Positive impacts	***Response due to climate change***	***Effects in local/regional scale***	***Effects in national scale***
Improve health conditions by effects of planted trees in the future	Decrease negative effects in health by changes of extreme temperatures, rainfalls etc.	Reduce health risk by extreme climatic effects	Better health conditions for visitors from all over the country
Effects in economy			
Positive impacts	***Response due to climate change***	***Effects in local/regional scale***	***Effects in national scale***
Increase incomes from tourism and recreation	Face financial losses by climate change effects Addaptation of appropriate interventions to face future effects of climate change	a. Improve financial incomes by development of eco-tourism in the community. b. Temporary employment during planting and maintenance phases	Up scale nature tourism development in national coastal areas. Awareness in national level on the economic/financial effects of appropriate interventions in ecosystem based adaptations

8.2 Negative Impacts

Characterization of negative impacts remains the most important part of this chapter, by considering the project effects toward natural and human environments. Those impacts, like positive impacts are considered separately for opening of sea/lagoon water exchange channel and planting. The most important negative impacts are considered in the Mitigation Measures, sub chapter of Management Plan of this EIA.

8.2.1 Negative impacts by intervention for re-opening and maintenance of Sea/Ceka exchange channel

Potential/cumulative negative impacts are classified upon the project's development phases. In case of reopening of the water exchange channel, the impacts are quite similar in both construction and operation/maintenance phase, because the designer has planned at last two cleaning/dredging interventions/year, to maintain the opened channel and save its efficiency. The

works required to be done are quite similar, but in lower level of interventions and their intensity during operation/maintenance phase.
The risk of miss-functioning of this intervention is very high in case of miss collaboration of Kune Vain Protected Areas staff/Regional Directorate of Protected Area and National Agency of Protected Area, on the process of construction or missing of their full responsibility for interventions in the maintenance/operation phase.
The main negative impacts are the pollution and contamination by construction works and operation/maintenance phase. Impact/risk significance (effects and duration) and possibilities to be mitigated are summarized below. The most important negative impacts, during can be considered those generated by works like life risk by accidents, air pollution from noises and dust from working and transport activities, land and water pollution by dredging and transport activities, soil compressions, pollution created in working campus, soil pressure and erosion by using of heavy tracks, etc.
Damaging in habitats, disturbance to biodiversity by work and transport, are some of the major impacts expected by this action. Also illegal fishing or hunting by workers can be considered as a risk during interventions. Health risk of workers, by miss management of working campus, accidents risk by increasing of transport activity during interventions, risks from fires, miss management of solid and water wastes etc, should be considered as possible impacts.
Other negative impacts are those that can be generated by unplanned disposal of dredged material, soil and water pollution by accidental oil leakage, from the transport vehicles, conflicts between workers and surrounding community,
All of such impacts can be partially or fully avoided as it is shown in summarized Mitigation Measures, following chapter.

8.2.2 Negative impacts by planting activities

The negative impacts by this activity, can be clearly considered in two phases, planting and maintenance, which has quite different effects. Most of the negative impacts are considered those during planting activities or replanting actions in case that some of the first planted species have felt. In the planting phase the most expected negative impacts are similar with those considered in opening of the exchange sea/lagoon channel, but in lower scale. This because not need to used heavy vehicles for transport.

a. Negative impacts during construction phase

The possibility of pollution of waters by working activity (opening of the wholes), damaging of surrounding habitats, damaging of habitats in places where will be taken the *tamarix sp.* and *Ammophila arenaria*, wildlife disturbance, risk of illegal hunting or fishing, inciting erosion and generating wastes, risk of accident during works, damaging of existing mini habitats, in sites defined for planting, conflicts of workers with the community, and over all with those which use such areas for grazing, can be considered as some of the main impacts that can be generated in this phase. The Management Plan, considers all such impacts but the collaboration of Kune Vain

Protected Areas staff/Regional Directorate of Protected Area and National Agency of Protected Area in this phase is very imperative.

b. Negative impacts during maintenance phase

Beside the impacts expected in the planting phase, similar with those can be generated in the replanting actions in case of planting failure, additional impacts can be generated during maintenance phase. Risk of failure of full action, can happen by missing of the maintenance actions as it is required by planting designers into the Planting Design Report. Habitat fragmentation by fencing, nevertheless with organic matter like dead woods etc, will create artificial micro-habitats and isolation of planted sits from other habitats in surroundings. But this impact will continue only fey months (at last two years), so it has a temporary effect, easy vanished in the future years.

8.2.3 Remained Impacts – Impacts that cannot be mitigated

All of Impacts mentioned before, can be mitigated or partially mitigated. In some cases, the negative impacts cannot be mitigated but their effects has a temporary nature. But some others cannot be mitigated and are not part of mitigation measures. Such impacts are:

A) *Incite sedimentation of lagoon body by re-opening of the sea/Ceka channel*. This impact can be a pathway for sediments coming from the sea waves and springs to the lagoon body. This phenomenon can shallow the lagoon deep and incite reduce the vertical circulation of lagoon waters. This effect can be overpassed by dredging the lagoon body, which is not part of the project interventions. Dredging of lagoon bodies, upon international best practices, can be very useful for a long period of time, to control the eutrophication and increase the fish populations, but should be joined by replanting of lagoon body with native plants damaged or dredged out by dredging activity. After such interventions, it needs one or more years that the lagoon diversity to be replaced.
   Another way, less expensive and with less negative impacts used in specific lagoons, is dredging of vertical channels into the lagoon body, to incite water circulation. A big and deep whole, opened where the exchange channel, join the lagoon body, can serve as a trap for sediments coming into the lagoon. This whole, should be cleaned frequently, to maintain its efficiency.
   Both of such measures, should be part of a detailed study and joined by an agreement between the stakeholders and Protected Area authority
B) Using pines for planting, may control the forest floors (doesn't permit the development of first floor with native shrubs and graces, which will result in a poorer habitat than in cases of planting with deciduous native plants. Still, in case of planting pines as the most appropriate species for defined territories is better than leaving this territories in present status (please refer to technical design from NCETSD & Diava Consulting).

C) Noises will be generated by transport vehicles and excavator during dredging and transport activities. Selection of the good quality of vehicles, to be used by contractor for dredging activity, will help on reduction of high level noises, but not avoid it.

9 Environmental Management Plan

9.1 Introduction

Environmental Management Plan is considered one of the most important chapters of the EIA. This plan includes the program of mitigation measures, a monitoring program and proposals for institutional strengthening to achieve the expected results proposed in both above mentioned program. To avoid repetitions all interventions are considered together, as well as their expected negative impacts an mitigation measures.

9.2 Mitigation measures

The mitigation and optimization measures are presented in the following order:

- Measures that avoid impacts altogether
- Measures that partially avoid impacts altogether
- Measures that enhance already positive impacts

Broadly speaking, avoidance of impacts altogether is more preferable than reduction, which in turn is more preferable to reparation.

9.2.1 Measures avoiding impacts altogether

Health and safety hazards, especially during the construction/planting phase, can be completely avoided with the provision of an adequate and clear health and safety working policy: This can be provided by incorporating the following measures into contractor tender documentation and upholding strict contractor supervision during the construction/planting stage:

- Appointment of experience contractors that have a proven track record of good health and safety procedures.
- Incorporation of precise safety and environmental requirements into contract documentation.
- Adherence to environmental, health and safety policies and full compliance with EIA report (this document).
- Adherence to all relevant laws, regulations and guidelines that are in force within Albania.

- Adequate capacity building amongst key stakeholders to emphasize the need for safety at work.
- Implementation and maintenance of effective speed control measures (for example; speed humps and semi sinuous roads) and clear signage can completely avoid on site/near site related accidents.
- Implementation of a complete ban on the use of asbestos in construction campus.

Breakdown in trust between stakeholders and the public can be avoided with full transparency shown by all stakeholders on all issues involved on the work activities. This can be assisted by:

- Public awareness campaigns focused on the local community informing of what is going on.
- Regular involvement of community representatives concerning all matters that have impact on the public.

During the construction/planting phase, erosion of exposed areas can be circumvented by employing a working policy that completely avoids such prone areas during adverse weather conditions.

Solid waste pollution is unsightly, pungent and a contaminating source of water supply and will be generated in large amounts, especially during the construction phase of the channel, due to dredging and disposing activities, contractor's camps etc. Disposal of waste in accordance with international health and Safety Guidelines and Albanian legislation is a mandatory requirement. A policy of regular refuse collection and disposal can completely avoid this impact from occurring. Furthermore, appropriate training of construction workers in proper methods of solid waste disposal will also prevent this impact from occurring.

Any damage to private property made by carelessness or accidentally will need to be compensated fully by the contractors.

9.2.2 Measures partially avoiding impacts altogether

Many of the potential impacts can be partially avoided by good tender document planning. A requirement of the tender should include the need for Contractor Method Statements for;

- Disposal site or reuse for any dredged material, with details of location, working, closure etc.;
- spoil disposal with details of authorization, location, placement, closure etc.;
- standard operating procedures for vehicle washing, refueling, working in water, and emergency response plan
- A waste management plan

Measures for prevention of risks or problems due to construction and operation should be taken up in the pre-construction, construction and operation phase. The Kune Vain Tale Protected Area staff/ Lezha Regional Directorate of Protected Area/National Agency of the Protected Area, and other stakeholders such as MOE etc. should closely monitor the proposed designs and closely monitor the construction/planting phase, either directly or indirectly through a Consultant, by inspecting the Contractor in order to ensure appropriate construction/planting quality. Regular inspections of operation should be done within the legislative measures and standards.

Mitigation from siltation will be undertaken through rebuilding sediment traps if possible or a sedimentation basin prior to the channel slope, and also maintaining the current policy of not operating the channel at times when the turbidity of the sea/lagoon waters is high.

The risk of deteriorating surface and groundwater quality should be mitigated by strict control of fertilizers use in case of planting. Also the taking off of tamarix and grace for planting as planned, should be previously approved by the Kune Vain Tale Protected Area authorities. The sites where the plants should be taken, must be prior defined, based on such plants abundance. The methodology of removing such plants should be leaded by a short and precise study why this interventions doesn't impact negatively the defined sites. There needs a strong monitoring system for the intervention works, leaded by the Administrative staff of Kune Vain Tale Protected Area.
Following is the table on the program for Environmental and Social Mitigation Measures.

Table : Environmental and Social Mitigation Program for Project Interventions

Topic/ Indicator	Possible Impact	Mitigation Measures	Responsibility	Schedule	Cost
Pre-Construction Phase					
TENDER AND DESIGN MEASURES					
Execution of the Works	Unsatisfactory working practices leading to negative impacts	Contractors Method Statement for execution of the works to be approved by the Client (see below for more details)	Ministry of Environment Lezha Regional Directorate of Protected Area Kune Vain Protected Area Management Staff	during tender process	Include in tender for contractors
Construction/planti	Unsafe access routes and construction traffic	Repair and upgrade existing roads Require implementation of a comprehensive	Ministry of Environment	During tender	Include in tender for

ng access and traffic	hazards poor quality of access roads	Traffic Management and Safe Driving Plan during construction (tender documents). Coordinate with contractor that is planning to rehabilitate access road to dam Prepare an emergency plan in case of accidents, health and safety emergency traffic solutions on community emergency possible needs	Lezha Regional Directorate of Protected Area Kune Vain Protected Area Management Staff	process	contractor
Construction Materials	Impact of borrow pits and quarries: land, health, Safety	Require necessary licenses in rehabilitation and associated works from experience contractors Require Method Statements for borrow pits and quarries, with details of License availability, location, working, closure etc. (tender documents).	MOE	During tender process	Include in tender for contractor
Spoil Disposal	Improper disposal and treatment	Require Method Statements for dredged material disposal with details of authorization, location, placement, closure etc. (tender documents) Analyze soil quality in specialized laboratories Involve NEA and municipality on process development and evaluation In case that the disposal material is not polluted use it to feed eroded coasts into the Protected Area Territory	MOE Lezha Municipality National Environmental Agency Kune Vain Tale Management Staff	During tender process	Include in tender for contractor
Siltation	Sedimentation and blockage of I&D canals and waterways	Require Method Statement for design and construction of sand traps to prevent siltation and sedimentation in I&D canals	MOE	During tender process	Include in tender for contractor
Waste	Improper disposal of	Require Waste Management Plan to be	MOE	During	Include in

Management and Pollution	solid and liquid wastes; spills & inadequate clean-up	prepared by the Contractor and approved by the Client. Prohibition for vehicle washing, refueling, working in water, and Emergency Response Plan etc. (tender documents).		tender process	tender for contractor
Human Health and Safety	Potential Health and Safety hazards	Incorporate safety and environmental requirements in contract documents. Provide information on mitigating safety and warning measures; Capacity building to emphasis need for safe working environment, good supervision, etc. Careful planning and scheduling of work activities, Include provision for driving code of conduct in tender documents	MOE Regional Hygienic Directorate	During tender process	Include in tender for contractor
Project Interventions failure	Continuity of site sensitivity due Climate change and financial and social stress	Prepare and assign an agreement between Kune Vain Tale Management Staff, Regional Directorate of Protected Area, National Agency of Protected area and fishery stakeholders/representatives of community to maintain the channel with cleaning during years, considering all protective and conservation measures Ensuring of collaboration between Kune Vain Tale Management Staff and representatives of community to protect the planted sites during first 5 years (avoid grazing and forest fires)	MOE NAPA LRDPA KVTMS Representative of community and local stakeholders	Prior the project commence The agreement to be prepared by a specialized expert in P.A. and KVTMS	No cost

SOCIAL – ECONOMIC FACTORS					
Human Health	Potential Health and Safety hazards:	Involve communities, Fence working areas. Correct design and safety procedures, Correct disposal of waste and dredged material,	MOE	Prior to construction/planting	Include in tender for contractor
Health – (Lighting)	Potential light disturbance in specific areas of settlement	Define works only during the daylight	MOE	Prior to commencement of dredging and planting works	Include in tender for contractor
ENVIRONMENTAL FACTORS					
Habitats and Biodiversity	Risk for contamination and/or eutrophication by use of fertilizers for planting process Illegal hunting and fishing	Apply strictly proposed amount of fertilizers suggested in the planting design Inform workers on the policies regarding hunting and poaching control and penalties	KVTMS LRDPA NAPA	Prior to commencement of intervention works	Included at BoQ of planting design
Climate Change	Climate extremes affect project area	Stop works and restart after normalization of situation	MOE	Not defined	Not defined
Construction phase					
SOCIAL – ECONOMIC FACTORS					
Contractor's	Temporary loss of	Apply best practice for site management	Contractor	Throughout	Include

for opening of the channel Camp Contractors for planting	land and impacts of inadequate physical and social management of camps and workforce Damaging of visual proprieties, privat lands and assets during transport and works	including social aspects Remove all temporary facilities and restore land to original condition or better Hand over any contractor's facilities in good condition		all interventio n sites. At end of contract	under works contract
Human Health	Work related accidents during construction.	Maintain strict health and safety regulations in compliance with Albanian law Provide regular information/signage on danger spots on site regarding mitigating safety and warning measures; Continued capacity building to emphasis need for safe working environment, good supervision, Careful planning and scheduling of work activities during construction phase. Maintain regular contact with communities, Introduce strict policy for all workers to wear safety equipment, hart hats etc. Fence all working areas and prevent visitor playing in the planted territories and swimming in the channel Keep emergency first aid kit easily accessible at all times Undertake correct disposal of waste water and	Contractor	Throughout all interventio n sites rehabilitati on constructio n.	Include under works contract

		solid waste,			
Health – Road Safety	Road accidents exacerbated by construction traffic	Implement and maintain effective speed control measures.	Contractor	All road to be used for transport reopening of channel /planting	Include under works contract
Health – (Noise/ Vibration)	Noise and vibration disturbance from Construction works.	Limit construction times to daylight hours. Fit covers to all powered mechanical equipment, generators, compressors etc. Keep public informed for on-site activities likely to cause disturbance (using local media)	Contractor	Throughout interventio n sites. reopening of channel /planting	Include under works contract, Cover for generators ~Euro200/ unit
Health – (Dust)	Dust in the atmosphere caused by dredging and traffic.	Use dust suppression techniques (access road watering) throughout hours of construction Prohibit burning of waste materials on site	Contractor	Throughout interventio n sites reopening of channel /planting	Include under works contract
Health – (Lighting)	Potential light disturbance in specific areas of settlement	Use non-intrusive lighting in operational areas as much as possible.	Contractor	Throughout interventio n sites reopening of channel /planting.	Include under works contract
Infrastructur e	Damage infrastructure on the	Stop working, and restart only after repairing the damaged facilities	Contractor	During constructio	Include under works

	access road, drinking water pipes, electric net etc by transport vehicles			n/planting	contract
Use of Raw Materials	Uncontrolled exploitation of natural resources	Use raw materials from approved suppliers with valid licences issued by REA or Municipality Take off the tamarix sp and grass from the defined sites only after approval of Protected Area authorities	Contractor KVTMS LRDPA	During constructio n/planting	Include under works contract
Public Relations	Breakdown of trust between stakeholders and the public.	Full transparency between stakeholders and the public on all activities.	MOE KVMS LRDPA Contractor	Throughout all inhabitat sites in surroundin g areas Reopening of channel/pla nting and maintenanc e	Include under works contract
Employmen t	Large amount of existing unemployment	Maximise/ prioritise employment opportunities for local people	MOE with cooperation of the Contractor	Ishull Lezhe Ishull Shengjin Barbulloje Tale reopening	Include under works contract

				of channel /planting and maintenance	
Disruption of Access	Disruption of existing access to working sites due to construction	Create new opportunity acces to all weather standard if needed	Contractor Lezha Municipality	reopening of channel /planting	Include under works contract
ENVIRONMENTAL FACTORS					
Fish	Barriers to fish passage Fish entrainment in canal	Work not more than 8 hours during daylight Respect time frame for working for opening of the channel	Contractor KVTMS RDPA REA	In the channel construction/maintenance	Include under works contract
Flora	Loss of indigenous vegetation due to construction and planting wors works.	Strictly protect the existing vegetation with specific value In collaboration with KVMS, replant / reintroduce the same indigenous species at appropriate sites	Contractor KVMS	Throughout all working sites reopening of channel /planting	Include under works contract
Flora	Accidental Introduction of Invasive Species	Keep all construction equipment and vehicles clean and wash in safe location to prevent seed dispersal	Contractor KVMS	At all working sites reopening of channel /planting.	Include under works contract
Soils	Damage to soil	Protect non-construction areas, avoid work in	Contractor	At all	Include

	structure due to material storage, construction traffic, etc. Erosion due to uncontrolled surface run off and wastewater discharge:	sensitive areas during highly adverse conditions, restore damaged areas Strip topsoil as necessary and store, replace/reuse post construction Design drainage +disposal facilities to ensure soil stability.	KVMS	working sites reopening of channel /planting.	under works contract
Land	Damage to land during construction, landslides on embankments etc. Impacts from excavation for disposal of dredged materials and other materials.	Protect non-construction areas. Design works to minimise land affected.	Contractor	At all working sites reopening of channel /planting.	Include under works contract
Water Resources and Water Quality	Interruption of surface drainage patterns during construction, creation of unsightly areas of standing water Contamination/pollution by construction, human and animal	Undertake careful design, maintain natural drainage where possible, and provide suitable wastewater drainage, Safe and sanitary disposal of any hazardous wastes. Don't wash construction vehicles and machinery in the territory of PA and set up sediment traps Adequate protection from / control of livestock, agriculture, casual human contact, hazardous	Contractor Lezha Municipality REA of Lezha KVMS	At all working sites reopening of channel /planting.	Include under works contract

	waste, including fuel and oil spills, hazardous waste, wastewater etc.	materials – fuel oil etc. (including suitable storage)			
Sedimentation	Sedimentation in the lagoon body, river or channels.	Construction of small-scale weirs/sediment traps in the upper catchments to trap temporary disposed dredged material that can ba washed down from heavy rainfall and subsequent removal.	Contractor	At all working sites reopening of channel /planting.	include under works contract
Air Quality	Dust and fumes during construction/ planting activities	Control dust with water spraying, control construction methods and plant, Fit covers/tarpaulins to lorries Schedule work during more socially amenable times. Control vehicle speeds in surrounding/ residential areas. Prohibit burning of construction/waste materials on site Ensure local community is kept fully informed about the works	Contractor Lezha Municipality REA of Lezha KVMS	At all working sites reopening of channel /planting.	Include under works contract
Acoustic Environment	Noise disturbance from construction works and traffic	Time work to minimise disturbance. Appropriate construction methods + equipment with covers to generators Restrict through traffic in residential areas.	Contractor Lezha Municipality REA of Lezha KVMS	At all working sites reopening of channel /planting.	Include under works contract Generator cover around Euro

					200/ unit
Historical / Cultural Sites	Disturbance or degradation to known cultural sites (considered unlikely)	Careful siting alignment of construction/ rehabilitation works. Special measures to protect known cultural resources	Contractor Lezha Municipality REA of Lezha KVMS	At all working sites reopening of channel /planting.	Include under works contract
Solid Waste	Disturbance from Solid Waste disposal Pollution to groundwater and animal health risk	Mitigate and prevent against solid waste pollution during construction/planting phase Construction workers to be properly briefed regarding garbage disposal and protection of the environment. Fix portative toilets in working campus for dredging of the channel Organise appropriate refuse collection and disposal regime Stimulate a recycling policy for re-use of dredged materials if appropriate for filling of eroded coasts	Contractor Lezha Municipality REA of Lezha KVMS	At all working sites reopening of channel /planting.	Include under works contract Waste managemen t fee about USD 70/year Bins about USD 140 each x 2 Septic tank about USD 1500 x 1
Maintenance /Operation Phase					
SOCIAL – ECONOMIC FACTORS					
Infrastructur e	Degradation of existing infrastructure in the areas of access	Restore of the infrastructure used as it was in the conditions prior to start works	Contractor Lezha Municipality MOE	At the start of operation/ maintenanc	

				e	
Social/ Recreational activities along the working place	Isolation of sites for construction/planting purposes	Introduce information tables for the place/sites under the works	KVMS	At the start of operation	No cost
Human Health	Exposure of labourers to chemical fertilizers	Provide training on the risks, hazards, safe practices for handling, storing, using and disposal of fertilizers	MOE Lezha Directorate of Hygene	Throughout operation	To be determined
ENVIRONMENTAL FACTORS					
Blocking of the opened channel	Missing of water exchange between Adriatic Sea and Ceka Lagoon	Frequent maintenance of opened channel	Fishing stakeholders LRDPA KVTMS	During operation	15 000 USD/year
Faillure on some planting	Minimizing of project implementation positive effects	Replanting of native species, in the failure sites	Contractor KVTMS	After planting (second year)	Not defined
Sedimentation	Sedimentation of channel and lagoon body by sediments caming from the reopened channel	Frequent cleaning of the channel Sedimentation in lagoon body and possible solutions are proposed on the sub-chapter of negative impacts that cannot be reduced by this project	NAPA Fishing stakeholders LRDPA KVMS	During operation	To be determined

9.3 Monitoring Program

In accordance with Albanian Law there is a requirement for monitoring programmes during the interventions in the Protected Areas. Monitoring also allows the actual environmental effects of implementing the works to be tested against those predicted. It thus helps to ensure that any problems that arise during implementation, whether or not they were foreseen, can be identified and future predictions made more accurately. Follow up monitoring is used to answer questions such as:

- Were the assessment's predictions of environmental effects accurate?
- Are the interventions at Kune Vain Tale Protected Area contributing to the achievement of desired environmental objectives and targets?
- Are the mitigation measures at Kune Vain Tale Protected Area performing as well as expected?
- Are there any adverse environmental and social effects?

In describing the envisaged monitoring programme the following six steps are envisaged to design an outline of an appropriate monitoring program:

- Step 1: What needs to be monitored for interventions in Kune Vain Tale, in the frame of the Kune Vain Resilience project?
- Step 2: What sort of information is required?
- Step 3: What are the existing sources of monitoring information for interventions?
- Step 4: Are there any gaps in the existing information, and how can they be filled?
- Step 5: What should be done if adverse effects are found in Kune Vain Tale?
- Step 6: Who is responsible for the various monitoring activities, when should these be carried out, and what is the appropriate format for presenting the monitoring results?

Monitoring will also be integral to compiling baseline information for future plans and programmes. Monitoring and evaluation of progress towards objectives and targets can form a crucial part of the feedback mechanism. Feedback from the monitoring process helps to provide more relevant information that can be used to pinpoint specific performance issues and significant effects, and ultimately leads to more informed decision-making.

An EIA for interventions in Kune Vain Tale, needs to be considered by the stakeholders within the surrounding communes.
The Consultant has also provided on the Environmental and Social Monitoring Program the impact, parameter, indicator, monitoring methodology, frequency, and broad indications of responsibilities although more consultation between the different stakeholders will be required prior to implementation; and finally cost or indication where costs would be applied. Many of the costs are not shown at present as it needs to be confirmed with the relevant stakeholders at Kune Vain Tale and nationally who are responsible during the preconstruction/pre-planting, construction/planting and operational/maintenance periods of the projet implementation.

Monitoring and supervision arrangements are agreed by the UNEP and MOE to: ensure timely detection of conditions requiring remedial measures in keeping with good practice; furnish

information and the progress and results of mitigation and institutional strengthening measures; and, assess compliance with national and International safeguard policies.

Organisation of Monitoring

The implementation of the project in term will need to be monitored responsibly and in accordance with the Albanian legislative requirements currently in force.

Current responsibility for monitoring of indicators is split between many different stakeholders and also at national and municipal level. The Lezha Municipality, the National Environmental Agency (NEA) and the REA of Lezha, the KVMS/LRDPA and the NAPA will play a prominent role in the setup of the monitoring plan for such interventions. PA Administrator/NEA need to decide what elements of monitoring are the Kune Vain Tale contractor's responsibility and those that should be integrated into the national monitoring program for environmental status.
Considering the mitigation measures proposed in the above chapter a monitoring program is proposed in following table. The monitoring program, includes both phases; this of construction/planting activities and that of Maintenance activities. Most of the times, the same or similar mitigation measures are applied in construction/planting phases and operation/maintenance phases. Also, for several mitigation measures, a set of monitoring parameters is included, in respect with a basic overall impact. So, this methodology facilitate and simplifye the Monitoring Program, by including subgroup of impacts into a comprehensive impact indicator. As it is proposed in the following chapter, chapter 10, "Institutional Strengthening", the Mitigation measures and Monitoring Program should be an integral part of tendering documents and bill of quantities for implementation consultants. The table of Monitoring Program, includes the:

- Overall impact,
- Monitoring Parameters
- Monitoring Indicators,
- Monitoring Methodology,
- Frequency of Monitoring,
- Responsibility for Monitoring and
- Monitoring Cost

Table : Environmental and Social Monitoring Plan for Interventions in Kune Vain Tale

Impact	Parameter	Indicators	Methodology	Frequency	Responsibility	Cost
Construction Phase						
Efficiency of planting	• Number and type of species planned to be planted • Sites to be planted	• Number and type of species in compliance with planting dezign • Sites to be planted in accordance with planting dezign • species status	• Field observation	• Daily - during planting action	•KVTMS •LRDPA	• Not cost
Efficiency of reopening works of the new channel	• Parameters defined in the Technical Design	• Physical parameters • Envrionmental parameters	• Field observation	• Daily – during construction works	• KVTMS • LRDPA	• Not cost
Damaging of surrounding habitats during construction planting	• Conditions proposed in Mitigation Measures Program	• Envrionmental parameters	• Field observation	Daily – during construction and planting works	•KVTMS •LRDPA	• No cost

phase						
Air Pollution in case of compliance	• Fugitive dust and exhaust fumes	• NO_2, SO_2, CO, TSP and PM_{10}.	• Instrumentation equipment including dust gauges and hand held meters.	• Daily	•Contractor •Regional Environmental Inspectorate •Regional Directorate of hygiene	• Include in contractor cost Not defined
Noise Pollution	• High background levels >90dB	• Decibels (dB)	• Instrumentation equipment including noise hand held meters.	• Daily	•Contractor •Regional Environmental Inspectorate •Regional Directorate of hygiene	• Include in contractor cost Not defined
Water Borne Diseases	• Disease prevalence	• Flagrant cases of water borne diseases at workers	• Review of health records	• Twice during construction/planting	•Regional Directorate of hygiene	• Contractor budget
Safety Hazards In case of compliance	• Safety to Humans and Livestock	• Reported cases of incidences and accidents • Colour, turbidity and change in lagoon chemical content	• Review and evaluation of incidents and accidents register • Direct observation of lagoon water	• Continuous monitoring of leakages, seepages through instrumentation	•Contractor •MOE •Regional Directorate of hygiene	• To be determined
Water and	• Water Quality	• Functioning and	• Visual observation	During	•Contractor	• Contractor

soil Pollution by waste waters	within Ceka and Zajet lagoons	frequent cleaning of portative toilet and septic tank in working campus		construction/planting	•KVTMS •Regional Environmental Agency	budget
Soil erosion	• Soil cover loss	• Soil productivity, gulleys, water turbidity	• Observation	• Continuous during construction/planting	•KVTMS	• Not cost
Employment of community in construction works	• No. of employed from the site surrounding community	• No of community employed in ratio with total employed people	• Verification of documentation	• During construction/planting	•MOE •REA	• Not cost
Biodiversity	• Accidental killed species of wildlife or fish • Poaxhing or illegal fishin	• No. of species killed or damaged	• Field observation • Consultation with community	• During construction/planting	•KVTMS	• Not Cost
Operation/maintenance phase						
Development of planted species	• Health status of planted species	• No. of failed planted species or m^2	• Observation	• Seasonally	•KVTMS	• Not Cost
Maintenace of water	• Appropriate quantity and quality works	• Compatibility of works quality and	• Observation • Consultation with	• During maintenance	•KVTMS	• Not cost

exchange channel		quantity with requirements of dezign and Environmental managment Program	stakeholders and community	actions		
Efficiency of water exchange channel	• Well functioning of exchange channel	• Amount of water circulating in the channel	• Observation • Testimony of fishers	• Seasonally	•KVTMS	• Not cost

10 Institutional strengthening

This section defined the responsibilities for mitigation and monitoring along with arrangements for information flow, especially for coordination between agencies responsible for mitigation. This section of the EIA also indicates how can be managed the responsibilities of mitigation measures and monitoring programs.

The roles and responsibilities of different levels of government and stakeholders have been described in the Management Plan above. The institutional arrangements proposed for the successful mainstreaming of the environmental and social considerations are as follows:

- The MOE and RDPA/NAPA need to ensure that they dependant KVTMS and REA have the necessary staff allocated for the project, once the construction/planting starts at Kune Vain and to ensure that the mitigation measures proposed within the EIA are included in the Bidding document, including the Bill of Quantities, and that a specific budget is allocated for implementing the mitigation measures.
- The interventions in Kune Vain Tale Protected Area will be built by contractors commissioned through a tender process. During the construction period and defects liability period, the contractors will be supervised, on behalf of the MOE, by specialized persons of KVTMS.
- When the interventions will be finalized, and after the obligation of the planting consultant for maintenance (2 years after planting activity) KVTMS will take over the Operational and maintenance activities on behalf of MOE.
- A management plan should be re-elaborated for Kune Vain Tale Protected Area, where to be included measures to be taken as Ecosystem Based Adaptation.
- A flexible budget plan, should be approved and allocated for Kune Vain resilience to ensure the continuous interventions according ecosystem based adaptation. In this budget should be comprised also the financial needs for a range of trainings of KVTMS on EbA.