REQUEST FOR PROJECT/PROGRAMME FUNDING FROM THE ADAPTATION FUND

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. The final project/programme document resulting from the appraisal process should be attached to this request for funding.

Complete documentation should be sent to:

The Adaptation Fund Board Secretariat
1818 H Street NW
MSN P4-400
Washington, D.C., 20433
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Fax: +1 (202) 522-3240/5
Email: afbsec@adaptation-fund.org

Centre de Suivi Ecologique

FULL PROJECT DOCUMENT

January 2016

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Abreviation and acronyme

ADD	Association for the Development of Dionewar
AF	Adaptation Fund
ANA	National agency for Aquaculture
ANACIM	National Civil Aviation and Meteorology Agency
ANSD	National Agency of Demography and Statistics
CADL	Local Development support center
CEGEP	General and Vocational College
CLPA	Local Artisanal Fisheries Committee
COGER	Management committees of the Natural Resources
COMNACC	National Committee for Climate change
CONAF	National Council for Functional Litaracy
CSE	Centre de Suivi Ecologique / Ecological Monitoring Center
DADL	Direction de l'Appui au Développement Local
DEEC	Direction of the Environment and Classified Establishments
DNA	Designated National Authority
ENDA	Environment and Development Organization
FAO	Food and Agriculture Organization of the United Nations
FELOGIE	Federation of Local GIE
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIE	Economic Interest Groupings
GPF	Women's Promotion Groups
IPCC	Intergovernmental Panel on Climate Change
IRD	French Research Institute for Development
MEDD	Ministry of the Environment and Sustainable Development
MEP	Monitoring & Evaluation Plan
MERAS	Monitoring and Evaluation, Reporting and Analysis System
NAPA	National Adaptation Plan of Action
NGO	Non-Governmental Organization
NIE	National Implementation Entity
NSC	National Steering Committee
PAEL	Local Environmental Action plan
PAP	Priority Action Programme
PAPIL	Support to Local Small scale Irrigation project
PISA	Program for International Student Assessment
PLAE	Local plan of action for the environment
PLD	Local □evelopment Plan
PMU	Project Management Unit
PSE	Strategic Plan for Senegal's Emergence
PTBA	Annual work plan and budget
RBDS	Reserve of the Biosphere Delta of Saloum

SDLAO	Master Plan for the West African Coastline
SNDES	National Strategy for Economic and Social Development
SNEEG	National Strategy for Gender Equality
TURF	Territorial user rights fisheries
UEMOA	Economic Community of West African States (ECOWAS)
UICN	International Union for Conservation of Nature
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change

ADAPTATION FUND

PROJECT PROPOSAL TO THE ADAPTATION FUND

PART I: PROJECT INFORMATION

Project Category:	REGULAR PROJECT
Country:	SENEGAL
Title of Project:	Reducing vulnerability and increasing of coastal communities in the Saloum Islands (Dionewar)
Type of Implementing Entity:	NIE
Implementing Entity:	Centre de Suivi Ecologique (CSE)
Executing Entities:	Comité National pour l'Alphabétisation et la Formation (CONAF), Agence Nationale pour l'Aquaculture (ANA)
Amount of Financing Requested:	US$ 1,351,000

1.1. Project Background and Context

1.1.1. Summary of the problem that the project is aiming to solve

Under the combined effects of climate change and economic activities (anthropological), the mangrove of the estuary of Saloum knew a negative main evolution of 34.8 % of the mangrove swamp of the estuary characterized by an important disappearance (38.3 %), essentially located in the northwest periphery of Saloum. This trend to the degradation of the mangrove has led to a significant loss of its ecological and economic functions, of which one of the main consequences is the opening of breaches on the Sangomar arrow, who threaten the existence of several human establishments, of which the most exposed is the village of Dionewar.

Recent studies[1] conducted on the coast and on the estuary of Saloum, indicate that the recent climatic variations in Senegal (from 1971 till 2010) are translated from multiple manners in the ecosystem of the mangrove of the estuary of Saloum and that the

[1] UEMOA, UICN, 2010: Programme de lute contre l'érosion côtière de l'UEMOA. "**Etude régionale pour le suivi du trait de côte et l'élaboration d'un schema directeur du littoral de l'Afrique de l'Ouest;** Schéma directeur, prescriptions générales".

Dieye EL Hadji Balla , Diaw Amadou Tahirou , Sané Tidiane et Ndour Ngor , 2013 : **« Dynamique de la mangrove de l'estuaire du Saloum (Sénégal)** entre 1972 et 2010 », *Cybergeo : European Journal of Geography* [En ligne], Environnement, Nature, Paysage, document 629, mis en ligne le 09 janvier 2013, consulté le 19 décembre 2015. URL : http://cybergeo.revues.org/25671 ; DOI : 10.4000/cybergeo.25671

pluviometry is the main driver. Indeed, the succession of the dry years appreciably pushed back the tidales limits, and the fronts of salinity sometimes went back up far upstream. This is how extrem cases of hypersalinity are even described in the estuaries of Saloum, while it is established that the salinity plays an important role on the metabolic efficiency of the botanical species, in particular on the productivity of the mangrove which decreases when the salinity increases. These hydrological and ecological conditions explain the reduced size of the mangrove of the estuary of Saloum, but also its density, its floral composition and its productivity.

On top of this climatic cause of degradation of the mangrove, is added that of its intensive economic exploitation by communities, in particular with the harvest of oysters and the intensive use of the mangrove as the wood energy and wood for the house.

This regression of the mangrove has a direct influence on the sedimentary dynamics which assures the stability of band of sand that is the "arrow of Sangomar ", by weakening it in particular because of the reduction of sedimentary contributions. This is how in 1987, a breach opened on the arrow of Sangomar provocating important ecological upheavals, because of the acceleration and of the worsening of the marine coastal erosion.

Thus, it is on the basis of the threats that the effects of the climate change and the marine coastal erosion above described which weigh on the village of Dionewar, that this project of adaptation ecosystem and to community base, was initiated. This project answers specifically:

- to the economic and ecological reduction of functions of the mangrove consequent to the climatic variations. This reduces considerably the productivity of the ecosytems of the estuary on which depend the populations for their existence;

- to the risks which the coastal erosion (with in particular the opening of the breach of Sangomar) that threats human establishments and the ecosystem of the estuary;

- to recurrent flooding resulting from extreme events like storm surges and heavy rains, inudicng a loss of livelihoods as well as safety issues;

- to the deficit of climatic data, which allow to set good policies and strategies of local development. This is translated by a rather weak legal and regulatory framework, in particular characterised by the low integration of the issues bound to climate change with regard to local development strategies.

This adaptation project is proposed as an answer to the raised problems. It is a project of adaptation based on ecosystem as well as on community. Proposed activities focus on strengthening of the resilience of the mangrove, implementation of adaption measuresto reduce the anthropological pressure on the mangrove, protection works

against the floods for human settlements, and development of legal and regulatory conventions for protecting the ecosystems of the estuary in general and the mangrove in particular.

1.1.2. Background information

The municipality of Dionewar is located in the coastal zone in the West of the country. It is part of the district of Niodior, the department of Foundiougne and the region of Fatick and includes the following villages: Dionewar, Falia and Niodior. Based on the projections (2008-2025) of the National Agency of Demography and Statistics (ANDS), the the 2011 population of the Municipality of Dionewar was 12 988 inhabitants and is estimated at 14,525 inhabitants by 2015.

Dionewar is part of the archipelago of the Saloum Islands, a geographical area bounded by the sea inlets (called bolong) of Diombos and Saloum. This Niominka Island is historically called Gandoul. The archipelago consists of nineteen (19) inhabited villages and many other uninhabited ones (some of them are used for rice growing). They are mainly located in an environment characterized by a strong presence of mangrove ecosystem surrounded by tidal reservoirs and bolongs ".

The Saloum estuary (figure 1) is of particular interest due to the important biodiversity it supports. It is a big estuarine complex with a drainage basin of 29,720 km2 (4,309 km2 for the estuarine part), opening in the Atlantic Ocean by three main distributaries with an estuarine functioning: the Saloum to the north, the Bandiala to the south and the Diomboss in between[2]. The Saloum is relatively wide (1-2 km) and deep (13 to 25 m) between its mouth and Foundiougne but after till Kaolack it is narrow (<500m) with depths always less than 8 m. The Diomboss has a main width of 4 km with depths between 10 and 25 m.

This estuary isolates two large groups of islands: the Gandoul islands in the north, Betanti and Fathala in the south formed from beach ridges. The Saloum River is bordered by a 14-19 km-long sand spit, the Sangomar Arrow, a 15-18 km-long sand spit between Palmarin and its distal end.

One hundred and fourteen (114) species from fifty-two (52) families were identified in this estuary. The presence of the manatee *(Trichechus senegalensis)* and the dolphin *(Sousa teuszii)* in the Saloum and its “bolons” shows the richness of the specific aquatic fauna of the river watershed[2].

[2] DIOP, I and al., 2002. Senegal national report. Phase 1: integrated problem analysis. GEF MSP Sub-Saharan Africa Project (GF/6010-0016): "Development and Protection of the Coastal and Marine Environment in Sub-Saharan Africa"

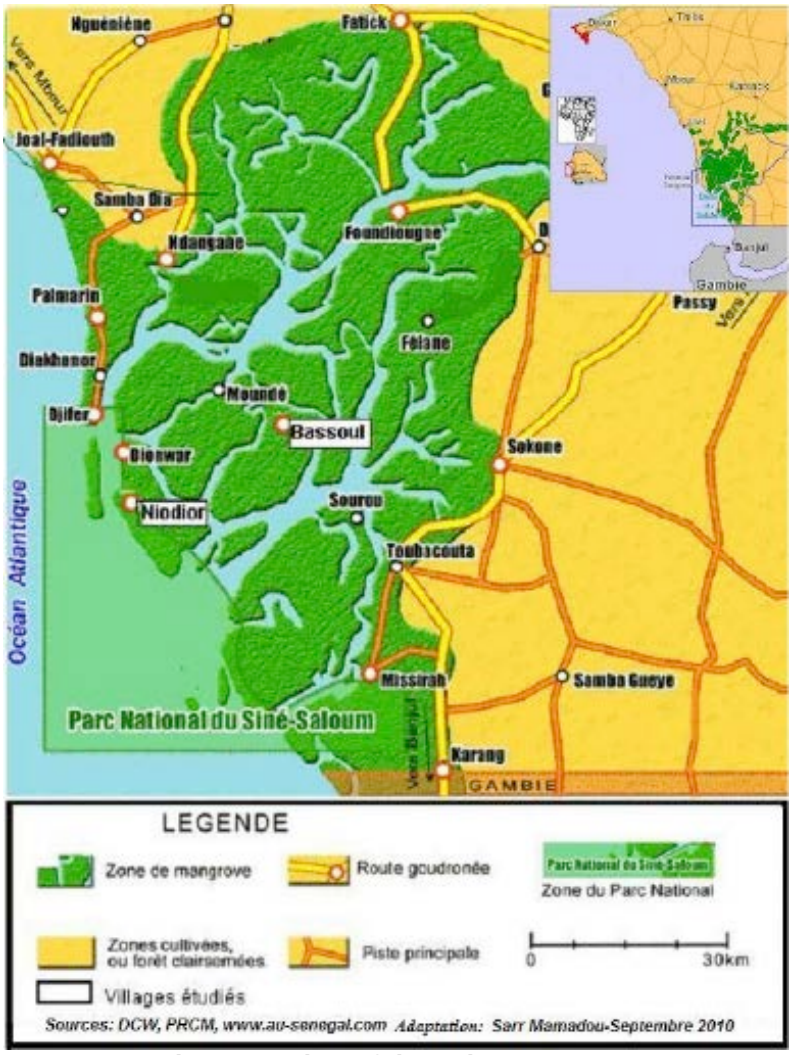


Figure 1 : View of the Saloum estuary

1.1.2.1. The Senegalese coastal area: a key area for socioeconomic development

Senegal has 700 km of coastline concentrating 60% of the population (estimated at 12.5 million inhabitants in 2010) and most of the urban sites and economic activities in the country. Indeed, 85% of industries and services are located in this area which is home to two economic sectors: fishing and tourism. This concentration is increasing and the coastal area will continue to play a key role in the national development process over the next decades.

This part of the country shows a high population growth. Prospective components from the Master Plan for the West African Coastline (SDLAO[3] in French) indeed show a sharp increase in the coastal population, mainly urban.

[3] Conducted in 2011 in collaboration between IUCN and the WAEMU

Fishing is a strategic economic sector in Senegal, contributing for 2% to the national GDP and generating 600,000 direct and indirect jobs. On average, its part in Senegal's total exports is nearly 32%. Hence, coastal areas are host to important fisheries related installations like fishing docks.

Fishing is also the major activity for the Saloum Estuary inhabitants. The annual fish production is estimated at 10,000 tons on average. Landings reached a record of 29,290 tons in 2003. However, it is noted a depletion of fish stocks against the performance recorded in the 1960s and 1970s, due to climate change and over-exploitation.

The location of the Dionewar Island in a Delta area gives huge potential for fishing which is the population's primary activity. This is why the Serere ethnic group in the island, mainly fishermen by tradition, is commonly known as "Serere Niominka" or "Serere *with feet in the water*". Fishing is considered the main cash activity, unlike in other parts of the country where agriculture is leading.

Women are very active in the processing (drying, smoking, salting and fermentation) of fish products. In the Dionewar Island, they are grouped into 18 groupings with 270 members. Indeed, the collection of *Arca sinelis*, a bivalve (shell) shellfish locally known as ''pâgne'', its processing and marketing are exclusively done by women. They have processing facilities but are faced with the availability and quality of the raw material. The amounts collected continue to decline, as the size of individuals, despite the biological rest implemented annually from July to September. After all, the Federation of GIE (Economic Interest Groupings) "FELOGIE" Dionewar received the Presidential Award for women empowerment in 1996 and 2003. Fish products (fresh or processed) from the island are marketed in nearby urban centers or in Dakar (PNDL, 2011, in Communauté Rurale de Dionewar, 2011[4]).

In the past, populations in Dionewar would grow rice in the island and in satellite islands with several hectares of rice fields. With drought cycles recorded in the late seventies and the lack of varieties fit for the new rainfall context, rice cultivation was abandoned. Nevertheless, with the restart of rains over the last years, some producers have slowly resumed rice cultivation. Exploitation of non-timber forest products is of great importance for the local economy and for food security. However, the plant cover has gone through significant damage due to the combined effects of overexploitation and climate change. Vegetation in the island mainly comprises mangrove along the submersible areas and their surroundings while in the inland one may find a Sudanian-type vegetation with mainly: *Detarium senegalense*, *Parinari macrophylla*, *Tamarindus indica*, *Ceiba pentandra*, *Elaeis guineensis* and *Cocos nucifera*. The mangrove has suffered the silting impact from the breakdown of the land strip and its disappearance accelerates coastal erosion in the island and neighboring islands. Indeed, mangrove plays a physical role in stabilizing soils in place through the action of mangrove roots and serves as a transition zone that protects the coast from attack due to waves, storms and typhoons. Mangrove serves as a surge swell. Its depletion also impacts on the

[4] Communauté Rurale de Dionewar, 2011. Plan Local de Développement 2011-2016

wildlife that uses it as a refuge. Here fish and crabs reproduce, mollusks grow and some predators come to hunt. Some birds hunt while others nest there. Mangrove helps fertilize the estuary, fostering the development of the phytoplankton which is the first element in the food chain. They provide the populations seafood *(Murex sp, Anadara senilis, Crassostrea gasar, Thympanothonus sp, Cymbiumsp,* etc.). Total annual revenues from shrimp fishing are estimated at 22 million US dollars[5] (Niane 2004 in Ndour and al, 2011).

1.1.2.2 Environmental context

The environmental contex in Dionewar is characterised by a trend of natural resources degradation under the combined effects of the climatic variations, the coastal erosion and the anthropic activities. This context will be analyzed by means of the model Pressure-State-Response (PSR) by presenting in particular the state of natural resources, the pressures they undergo (as well natural as antrhopics) and the answers which were brought to reduce or put an end to the pressures.

a) State of natural resources

Vegetal resources: spaces covered with vegetation represent 45% of its total surface. The vegetation consists essentially of three strata:

- the tree stratum composed of two (02) types of forest areas; that of littoral constituted by the mangrove and that on dry land made up of soudano-guinean essences. The mangrove is made of *Rhizophora racemosa*, *Rhizophora Mangle*, and *Avicenia africana* species. This very important ecosystem covers 17% of the area of the municipality. It also serves as breeding and growing area for certain species of the flora and the fauna, which explain this awareness of the population for its protection.

The diachronic analysis[6] of Landsat and SPOT satellite images (1972-1986, 1986-2001 and 2001-2010) shows that rainfall is the major driver of the dynamics of the mangrove in the estuary of Saloum. It indicates that during the decade 2001-2010 the mangrove evolution remains weak (18.96%) but characterized by a drop of the disappearance (4.36%) with an increase of the regeneration (23.31%). However, this general trend in the Saloum estuary contrasts with that observed in the municipality of Dionewar, which is located directly in front of the breach opened on the arrow of Sangomar. Indeed, the increase of the salinity resulting from this break and especially the hydrodynamic marine

[5] Niane 2004, in Ndour N., Dieng S. & Fall M. Rôle des mangroves, modes et perspectives de gestion au Delta du Saloum (Sénégal). VertigO – la revue électronique en sciences de l'environnement [En Ligne], Volume 11 Numéro 3 | décembre 2011, mis en ligne le 07 février 2012, consulté le 27 juin 2015. URL : http://vertigo.revues.org/11515 ; DOI : 10.4000/vertigo.11515

[6] EL Hadji Balla Dieye, Amadou Tahirou Diaw, Tidiane Sané et Ngor Ndour, « Dynamique de la mangrove de l'estuaire du Saloum (Sénégal) entre 1972 et 2010 », *Cybergeo : European Journal of Geography* [En ligne], Environnement, Nature, Paysage, document 629, mis en ligne le 09 janvier 2013, consulté le 12 janvier 2016. URL : http://cybergeo.revues.org/25671 ; DOI : 10.4000/cybergeo.25671

strengths which it favors caused a rough and continuous disappearance of the mangrove swamp to the right of the breach which undergoes directly the sea influences.

The forest on dry land is located in the continental zone after the curtain of mangrove. Approximately 8.7 % of this area is dedicated to the activities of agriculture and breeding. It consists of soudano-Guinean essences such as *Neocarya macrophylla*, *Detarium senegalensis*, *Borassus aethiopium*, *Elaeis guineensis*, *Adansonia digitata*, *Cocos nucifera*, etc.

The shrubby stratum is essentially made up of *Daniella oliveri*, *Raffia sudanica, Dialium guineensis*.

The herbaceous stratum is seasonal and depends on the rainfall which spreads out from June till October. During the rainy period, the grass cover is supplied well and highly varied. This stratum is of a big utility for the municipality because constituting a source of fodder which is key for the survival of the cattle.

Land resources: With a small extent, (297 km2)[7] the municipality of Dionewar does not have enough lands suited for agriculture. The main part of arable lands is quite hardly affected by saltwater intrusions and by degradation due to an intensive monoculture and the absence of fallow.

With regard to soil resources, types of soils encountered in the area are: “dior” soils (tropical ferruginous washed soils) favorable to agriculture and located in the Center and the North; “deck-dior” soils (ferruginous tropical few washed) located mainly in the eastern and northen part of the island and very adapted for market gardening, arboriculture and rainfed agriculture ; and halomorphe soils which are met alongside of bolongs, behind the tidal reservoir and constantly washed away by the flow of tides. Halomorphe soils are not generally covered by the vegetation because of their clayey texture and their salinity and acidity; their continuous extension is a source of concern with regard to agriculture.

Water resources: the hydrographical network consists mainly of the Atlantic Ocean, bordering all the western part of the Municipality and the Saloum river feeding several bolongs and puddles.

The main bolongs fed by the Saloum river are the sea inlet (called bolong of Falia) which originates from the Saloum" river before splitting into two (02) streams between the villages of Dionewar and Falia; and the sea inlet (called bolong of Diagne) which runs through the Eastern part of the village of Niodior after originating from the mouth of the Saloum river.

The temporary pools are numbered at eighteen (18) and allow the market gardening

[7] *Direction de la Prévision et de la Statistiques / Division des Enquêtes Démographiques et Sociales. Direction de L'Aménagement du Territoire (D.A.T.)*

and also livestock watering.

The hydrology concerns the harnessing of subterranean waters stemming from the groundwater. Indeed, the freshwater used by the Municipality comes from the Continental Terminal aquifer caugth by the numerous wells of three (03) villages. The depth of the aquifer varies from 4 to 7 m. This water is used for multiple purposes.

Excepted wells, there is no network of drinkable water conveyance to Dionewar and Niodior, only the village Falia has a water conveyance from the drilling of Mounde (Municipality of Djirnda).

The constraints of the drinking water supply are numerous and can be summarized as follow: brackish water, absence of functional equipped drillings, not use of the maestrichtian ground water table, fast drying up of wells as well as the bad quality of the water, the absence of rainwater collection system.

b) Pressures on natural resources

The pressures on natural resources are of natural and antrhopic origins.

The pressures of natural origins: relates to the effects of climatic viariations and marine coastal erosion further to the natural opening of the breach on the arrow of Sangomar.

- Effects of climatic variations:

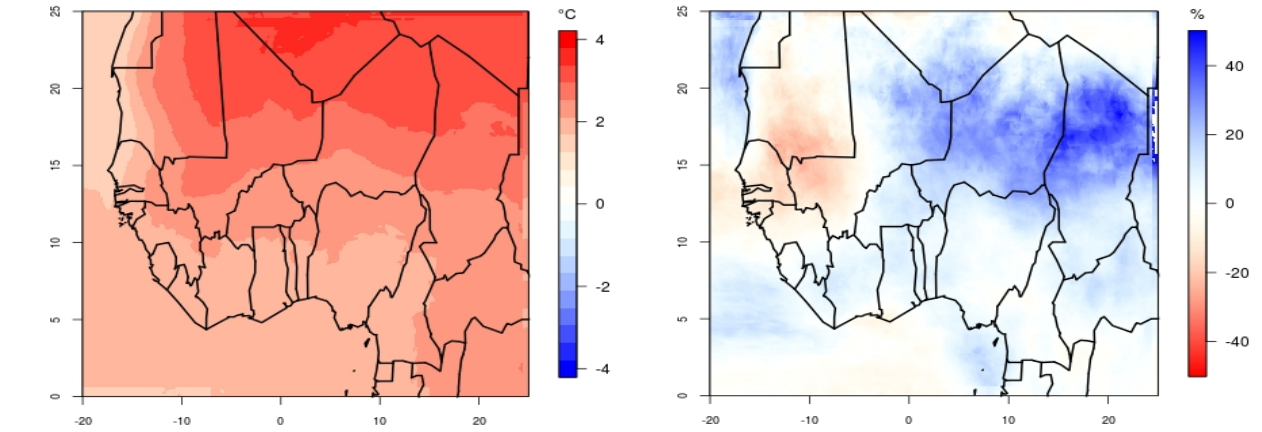
The globe temperature surface increased significantly in the order of 0.8°C since the beginning of the 20th century[8] with a more pronounced warming on the last decades as shown by most of the analysis on the basis of the sets of available observations, affecting developement sectors such as agriculture, in particular.

Recent analysis on the African continent, in particular in the western Africa Sahel region, has shown a significant upward trend, more specifically since the 2000s. A fast and premature increase of the minimal temperatures compared with the maximal temperatures has for consequence to make the thermal gradient decrease. This global warming observed since the middle of the century is characterized on the indications of the climatic extremes by an increase of the number of hot nights and an increase of the occurrences of heat waves at the level of all the sub-region[9].

[8] **Kevin E. Trenberth, John T. Fasullo**, 2007, IPCC, 2013. **An apparent hiatus in global warming?** Eath's future journal. December 2013

[9] **Agali Alhassane, Seyni Salack, Mohamed Ly, Issaka Lona, Seydou B Traoré, Benoît Sarr**. 2013. Évolution des risques agroclimatiques associés aux tendances récentes du régime pluviométrique en Afrique de l'Ouest soudano-sahélienne. Science et changements planétaires / Sécheresse. 2013;24(4):282-293. doi:10.1684/sec.2013.0400

The climate change projections based on 29 global models[10] indicate a significant increase of the surface temperatures in all the sub-region with regard to period 1981-2010. In the Sahelian regions, this surface temperatures increase exceeds 2°C during the rainy season (June-September) on the mid-term (2040-2069) and weakens towards the coastal regions (Fig 2.a). The projections on the precipitation (Fig 2.b) are translated by a rate of increase of the order of 30 % on the Eastern parts of the Sahelian region, from Mali, Niger and towards Chad. Whereas on western regions the situation seems to evolve towards a deficit of the order of 20 % with regard to the seasonal climatological average of 1981-2010, in Senegal, Mauritania and Guinea and in the western part of Mali.



a) b)

Figure 2: a) Median of the difference of temperature °(C) of the air on the surface of the Earth on the season JJAS between reference period 1981-2010 and the future period 2040-2069, simulated by 29 global models by considering the extreme scenario RCP8.5 for the evolution of the radiative forcing on the mid-term (2040-2069). B) Median of the rate of precipitation (%) on the season JJAS between reference period 1981-2010 and the future period 2040-2069, simulated by 29 global models by considering the extreme scenario RCP8.5 for the evolution of the radiative forcing on the mid-term (2040-2069). (AGRHYMET)

According to a World Bank funded study (2013), the observation of the climate trend suggests climate change over the last 50 years with a protracted dry period from 1968--1969. This climate deterioration appeared in an erratic inter-annual rainfall but also a decrease in rainfall volumes resulting in a significant shift of isohyets towards the south (Figure 3).

[10] Experience CMIP5 for the horizon 2041-2069 with regard to the most pessimistic scenario or RCP8.5

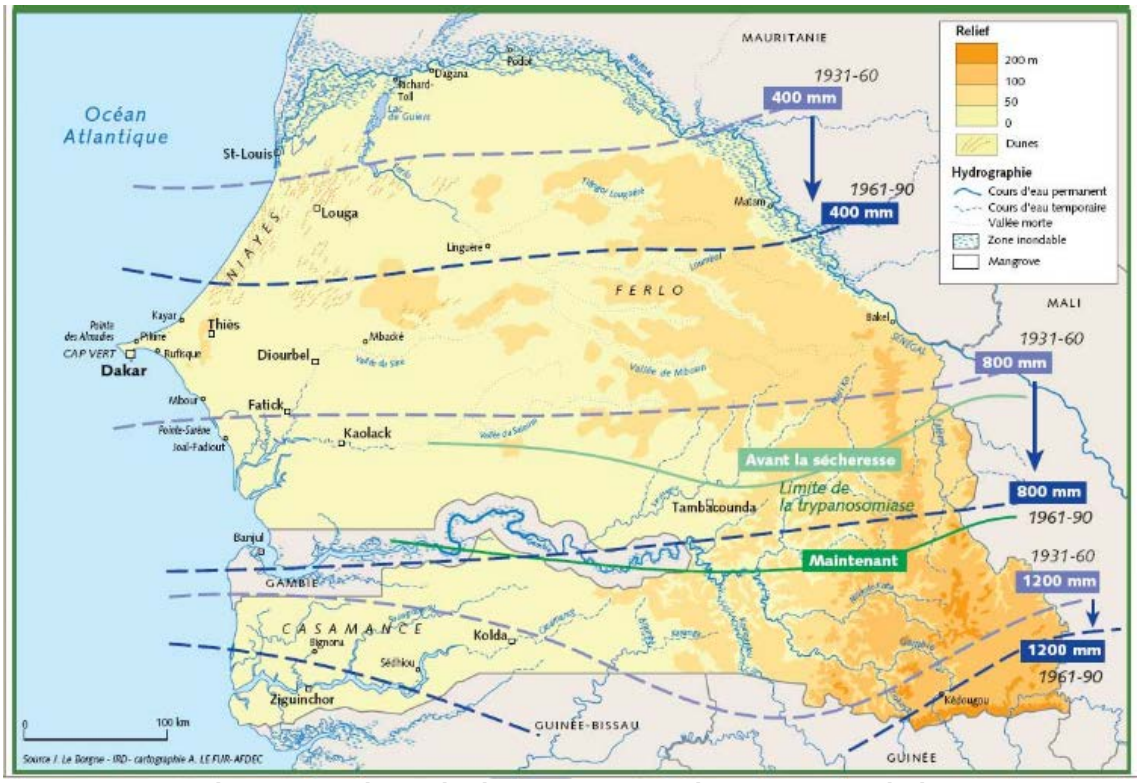


Figure 2 : Isohyets in the 1931-1960 and 1961-1990 periods
Source : Institut de Recherche et Développement
(http://www.cartographie.ird.fr/SenegalFIG/secheresse.html)

With the reduction in the pluviometry observed since the 70s, the Sahelian countries entered a period of drought resulting in considerable consequences for the vegetation generally and the mangrove in particular[11]. The supply of fresh water strongly decreased, drastically reducing the flow of rivers throwing into the estuary of the Saloum. So, the flow of the Nema Bah River, the tributary of Bandiala in the southeast of the estuary, decreased from 0.29 $m^3.s^{-1}$ in 1976 to 0.03 $m^3.s^{-1}$ or less in 1981[12]. This reduction in fresh water supply, combined with a strong evaporation and a penetration of marine water, caused an increase of the salinity.

As a result, this rainfall variability has led to increased salinity with rates above 50‰ in the rainy season. This phenomenon became persistent from the 1990s with surface water becoming hypersaline, especially in river upstream where the salinity level

[11] Marius C., 1995, « Effet de la sécheresse sur l'évolution des mangroves du Sénégal et de Gambie », *Revue Sécheresse,* No.1, vol. 6, 123-125.

[12] Diop E.S., 1986, « *Estuaires holocènes tropicaux. Etude de géographie physique comparée des 'Rivières du Sud' du Saloum à la Méllacorée* », Doctorat d'Etat, Strasbourg, Université Louis Pasteur, 498 p.

exceeds 150‰. This salinization influences the size of the fish at maturity[13], growth and movements[14]. Moreover, various studies[15] have associated mangroves degradation or dynamic with rainfall variability, while this ecosystem plays a key role in the development of fishery resources.

The climate in Senegal is Sahelian in the North to Sub-Guinean in the South and characterized by alternating dry season from November to May and rainy season from June to October. The average annual rainfall ranges from 300 mm in the semi-desert North to 1,200 mm in the South with inter-annual variations. The country suffers the adverse effects of climate change which is felt more on its 700 Km long coastline and from the impact of the rising sea level with, as corollary, costal erosion, sea water intrusion in farmlands, salinization of water resources and destruction of infrastructures.

The main characteristic of the rainfall in the estuary of Saloum remains its strong interannual variability with important deficits during decades 1970 and 1980 (Figure 4).

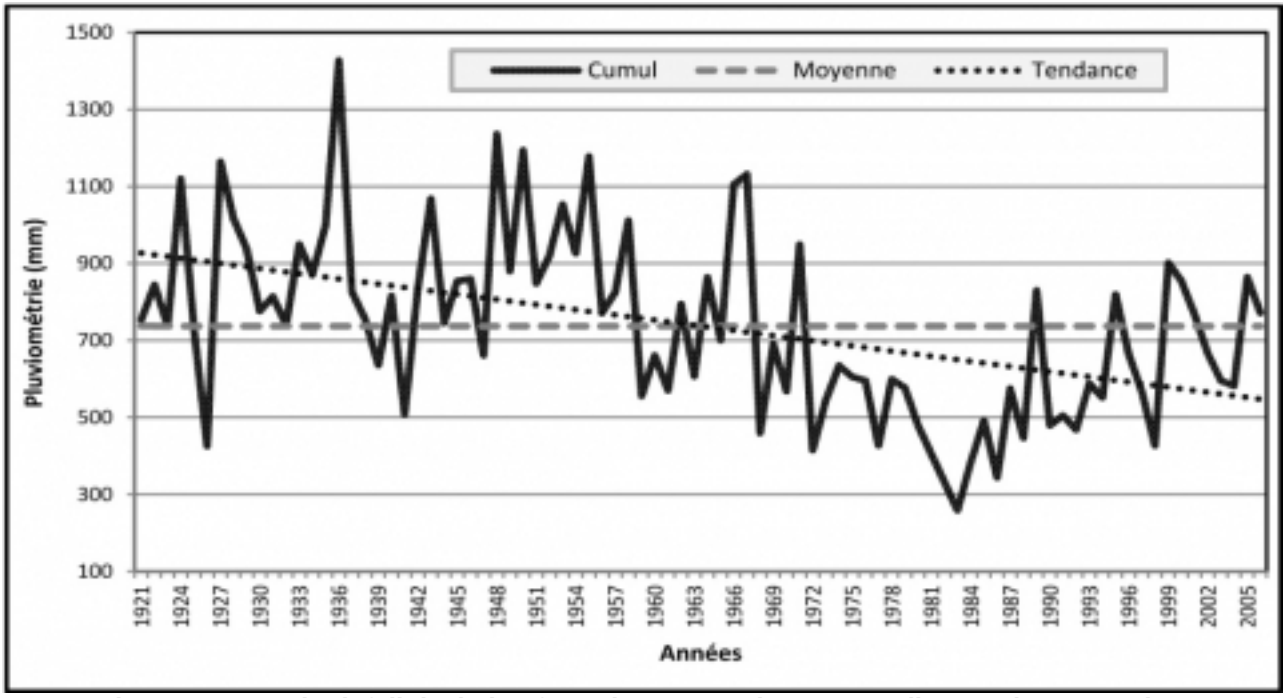


Figure 4: Annual rainfall deviation from the mean value at Foundiougne (1950-2003)

Future projections around 2030 (2010-2039) and 2080 (2070-2099) (IPCC Data Center) forecast an increase in average annual temperature on the Senegalese coasts from 1.12 to 1.23°C. This will further increase around 2080 from 2.65 to 4°C in coastal areas.

[13] Panfili and al. 2004a, 2004
[14] Diouf & Goudiaby 2006
[15] Diaw, 1990, 1999, 2000; Soumare 1992; IUCN 1998; Diop and al 2000; Moreau 2005; Dièye and al 2008; Andrieu and al 2008; Niang 2009

As for rainfall, predicted variations in the great North-West quarter of Senegal range from -4.5 to -19% by 2030 to -18% to - 55% by 2080. For the same period with a more pessimistic climate scenario, rainfall on the Senegalese coasts should drop almost twice more.

Therefore, considering the whole country, it is expected more years of severe drought and a global sea level rising to 20 cm by 2030 and to 80 cm by 2080.

According to Senegal's second National Communication to the UNFCCC, although changes in precipitations suggest a general downward trend in most part of the country, there are few indications on their variations particularly in terms of extreme events. On the one hand, global warming could increase decline in rainfall leading to increased drought. On the other hand, increasing the holding capacity of moisture in the atmosphere due to rising temperatures could result in rainfall events of larger intensity making the region more vulnerable to flooding.

At the station of Foundiougne (studied here as the closest station to Dionewar), the rainiest years belong to the period 1950-1970; and the least rainy are essentially recorded from 1971 with a few years with normal to surplus pluviometry (1989, 1995, 1999, 2000, 2001 and 2004).

In the Saloum estuary, salinity increases from downstream to upstream (120 per thousand salinity, measured upstream Saloum), which comes with certain peculiarities as to the mode of tide penetration into the river. Indeed, there is a time and flow speed higher than those of the ebb[16]. In addition, the amount of water into the estuary is larger than that coming out, partly due to the inertia caused by the adjacent areas of mangroves, salt flats and "bolons". This very special hydrological functioning is essentially attributed to a low slope, in particular in the downstream part of the river, and the rainfall deficit recorded since the late 1960's leading to a virtual absence of freshwater flows during rainy season[17] and a concentration of salts by evaporation[18].

Fish catches in the Saloum Delta shrank from 30,000 to 10,000 tons between 1970 and 1990, along with declining populations' livelihoods[19].

Predicted temperature increase, ranging from 1.4°C to 5.8°C by 2100 (IPCC, 2007) will have significant effects on fishing stocks, in terms of distribution, composition and abundance. By 2030, it is foreseen a major decrease in captures and estimated market value of fishery products. This will result in accumulated losses amounting at USD 136 million between 2020 and 2050, representing 3.23% share of the average GDP 1981-2005.

[16] Barusseau and al., 1985, 1986
[17] Dacosta, 1993
[18] MEPN, 2005
[19] Diouf, 1996, in Ndour and al., 2011

This situation has created great distress among the population, leading the youngest fringe to turning to clandestine emigration in poor security conditions, resulting in loss of life. Furthermore, it is observed a drop of fish and seafood consumption and animal protein intake.

- Coastal erosion:

Under the combined effect of all these changes, the Senegalese coastline shows widespread erosion. Most sensitive parts to this hazard are the deltas and estuaries of the three major rivers, as the sediment supplies can barely compensate losses to erosion in these low zones. Since these areas are of great ecological importance, erosion can cause significant losses of biodiversity. Erosion rates generally do not exceed 2 m/year but the beaches may recede by more than 10 m/year locally.

Figure 5: Erosion of sandy coasts from the 1950s according to bibliographic data (source: I. FAYE)

One of the most severe signs of these hazards is the breaking of the Sangomar Arrow on 27 February 1987 in the wake of an extraordinary swell. This event occurred towards Lagoba (or Diohane), which is the most fragile part (80 to 110 m wide).

The natural functioning of this arrow is an extension to the south in favor of littoral drift that dumps part of its sediments there, appearing as successive hooks partly from shoals bordering the tip of the arrow. From 1927 to 1987, it was reported to have increased by 4 km. Hooks identify small lagoons which are filled gradually, and inhabited by mangrove or marsh vegetation. Based on bathymetric, photographic and satellite topographic substrates, evolution of the Sangomar Arrow distal end was restored between 1907 and 1987[20]. It is primarily characterized by a period of decline northward between 1907 and 1927, with 88 m annually, and by an almost continuous southward extension from 1927, with 31 m annually and values higher than 100 m annually (between 1946 and 1969). Meanwhile, the end experienced strong thickening between 1954 and 1969.

Then comes a sharp slowdown in expansion rates to the South, which varies from 22 to 35 m annually, between 1969 and 1981. The 1981-1984 period was characterized by stability of the Arrow. Then from 1984 until 1987, extension resumed southward at a rate of 175 m annually. It should also be noted that the hooks seemed to appear only from 1958. Between 1986 and 1987, two small hooks, surrounding a lagoon, formed successively at the Arrow tip.

According to Diaw (1997, 2003) and Thomas and Diaw (1997) the breakdown of this Arrow could be explained by a range of sedimentological, geomorphological and hydro-climatological factors that are non-exclusive one another: temporary absence of "upstream" sedimentary power by reduction of products from northern areas of the Petite Côte, strong tightening and fragility of the arrow at a place called Lagoba, improvement of the rainfall situation contributing to the ebb flushing effect and slowing fattening changes, preferential erosion of the inside of the Arrow against the configuration of the river bed and the existence of inter-hooks corridors, modifying pre-littoral shoals at Lagoba which can be seen on the SPOT *ante* and *post breakdown* satellite images, waves of high amplitude (2.5 to 3.5 m) combined with high water tides (levels of 1.71 m in Dakar and 1.95 m in Banjul).

With the Arrow breakdown in 1987, a new evolution began, marked by a very strong erosion of the northern edge of the breach and the external shore while the end of the new Sangomar Island continues to advance southward at average rate of 229 m annually (Figure 6) with the development of two hooks[21]. Based on these observations, several authors believe that sedimentary transits by longshore drift are thought to be estimated between 160,000 and 180,000 cubic meters annually[12].

[20] Diaw and al, 1991 and Diaw, 1997
[21] Diaw, 1997

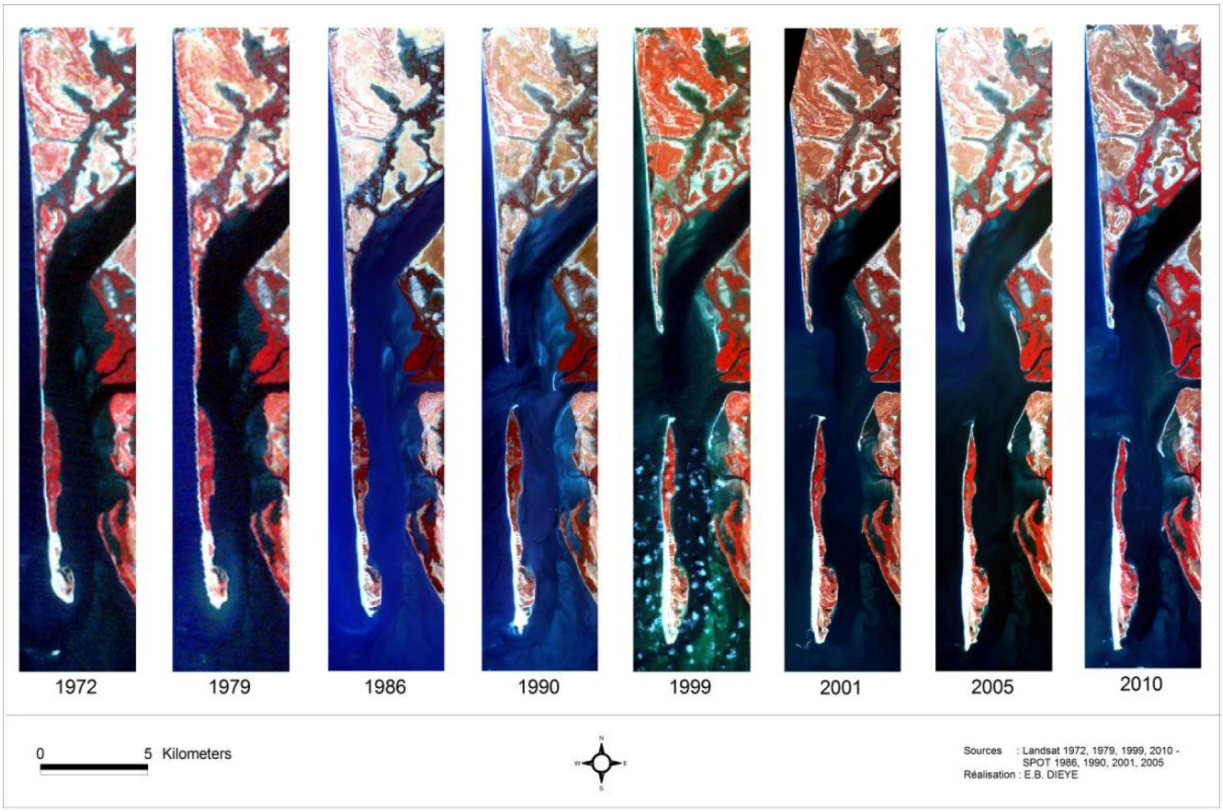


Figure 6: Dynamic of the Sangomar Arrow between 1972 and 2010 (Thomas and Diaw, 1997)

This event feeds into the formation and evolution process of the Saloum Delta and comes with (Diaw, 1997):

- an intense erosion of the northern edge of the arrow with rates up to 128 m annually (down to 640 m between 1987 and 1992);
- a continuity and even acceleration of the southward extension of the distal end of the new Sangomar Island at an annual rate of 198 to 264 m between 1987 and 1991. One year after the breakdown, the gap measured 1 km wide, 10 years later, it reached 4 km.

This breaking occurred just opposite the Dionewar Island, leading to profound changes in the estuary hydrodynamics and sedimentation. With this breach, the Atlantic Ocean runs into the Saloum River at the island with deep changes both in the hydrodynamics and sedimentology of the estuary.

These phenomena compound the depletion of fish stocks, coastal erosion and degradation of the vegetation on the island due to human pressure and drought cycles that prevailed from the early 70s to the mid-2000s. In Dionewar, the impacts are felt particularly in the mangrove which, since the breach was opened, has been hit by silting, fostering its depletion, thus compounding erosion and flooding. Mangrove ecosystems provide refuge and are reproduction zone (spawning areas) for fish and seafood.

Figure 7: Overview of coastal erosion in Dionewar (CSE, January 2015)

All these changes have heavily affected the island's socioeconomic situation, because most economic activities are driven towards the use of resources from the sea (fish, shrimps, shellfish, etc.).

Flooding associated with storm surges is another impact of climate change, which, in conjunction with sea-level rise, places more people and socioeconomic infrastructures (mainly fishing docks and hotels) at risk in the coastal zones.

The pressures of antrhopic origins are linked to the overexploitation of natural resources, the demographic pressure and the pollution by household waste.

The numerous services of the mangrove ecosystems allow a multitude of economic and social activities, related to the vital needs of the populations. Among those, are fishing, harvest of oysters and use of mangrove wood as well for the processing of halieutic products as to serve as timber for manifacture work or for house building.

This situation is all the more disturbing as this demand in mangrove ecosystem services increases withgrowing population. The 1988 general population and housing census estimated the population of the Municipality of Dionewar at 8,437 inhabitants, while the projections of the population (2008-2015) made by the Statistics and Demography National Agency (ANDS) gives to the Municipality of Dionewar a size 12,988 inhabitants

for 2011 and 14,525 inhabitants by 2015; which almost has doubled in 25 years.

The growing needs in resources threaten the ecological balance of these zones and the well-being of the populations. This situation contributes to worsening the degradation process of the littoral (Ndour, 2005).

The illegal logging of the green wood of mangrove still remains important in some villages, particulary in Dionewar and Niodior. This illegal logging, which feeds and maintains sales network of mangrove wood, is the main anthropogenic aggression of the mangrove today.

c) Responses

In order to stop and reverse the degradation trend of natural resources, several strategies are developed and implemented by the communities, which act either by their own, or supported by the Governement or development partners. Among these strategies, the most remarkable are, the following ones:

Fighting erosion: the marine erosion causes the destruction of the vegetation cover and the loss of biodiversity for the mangrove ecosystem. It also results in the reduction of the cultivable land area and the destruction of the physical resources (wells, houses). The silting phenomenon slows down the mobility of dugouts and stresses the navigation risks.

In front of these threats, the populations have developed several strategies. Some are effective and long-lasting as the reforestation of filaos (Casuarina sp.) intended for the fixation of the beaches or the fish farming which assures them the availability of quality products. It is also the case of the relocation of infrastructures destroyed by the erosion and bypassing of the bar, the only solution to avoid sandbanks at sea.

If the occupation of new lands allows these populations to continue the agricultural activity, it needs nevertheless important investment because most of the individuals have low financial income. However, as land reserves are available on the uninhabited islands, the envisaged alternative solution is to set up a collective field to share investments (water, transport, food, etc.). The conditions favorable to this project are the existence of an associative dynamics, includinga women groupment (GPF) which had the initial idea. This will bridge the insufficiency of the farm inputs, and assure an efficient implementation of that initiative.

To avoid navigation risks, the practice of desilting of the channels with shovels turns out neither effective nor long-lasting; the viable strategy would be the dredging of the channels which asks for big means, and thus the gouvernment intervention. However, it delays coming true because of an insufficiency of lobbying on behalf of local authorities.

Strategies to combat flooding:

The flooding hazard can be seen in two different forms: river flooding and flood run-off. These floods are caused by weather, although of different nature: river flooding caused

by cumulative rainfall during the rainy season and urban flooding caused by short heavy rains. In coastal areas, the sea level can be an aggravating factor.

Figure 8: Dike protecting against rising sea water built by populations in Colbasssy (CSE, January 2015)

Damaged houses are rehabilitated through social mobilization and waterbone diseases (malaria and the diarrhea) are addressed by means of vector-control actions. However, local populations are struggling to find an appropriate solution to the disturbance of the school year due to the use of premises as shelter for affected populations. Floods hinder economic activities and entail loss of incomes. Seasonal exodus for the youth and money transfer from expatriated natives often constitute the only recourses.

In case of extreme weather events, the dikes built to prevent flooding are destroyed or damaged, requiring very often restoration actions. The best solution would be to raise the height of these dikes, mainly built by local populations. The workforce and the required material (sand and shells) are locally available. However, the lack of logistic means (trucks and tractors) and financial resources make it difficult to perform an appropriate rehabilitation.

Strategies to deal with pluviometric deficit:

The pluviometric deficit entails loss of productions and causes the lowering of the the water table. To stock up with water, communities are obliged to deeper dig deeper

existing wells or to open new ones. These strategies are effective but not long lasting. The problem could be settled by the water conveyance, but this strategy also asks to make heavy investments.

The pluviometric deficit also results in land salinization, forcing the communities to abandon their fields and to move to new cultivable lands. This is effective but not sustainable, especially in a context of limited land availability. Salinization due to the pluviometric deficit also causes a loss of biodiversity. The strategy developed by communities consists in mangrove and rangelands reforestation, which solution is beffective and sustainable. The building of an antisalt dike is a priority to address properly the salinization issue. The material (sand, shell, wood), the workforce and the know-how are locally available, but the heavy equipment and the financing are lacking.

To address the issue of drinking water quality (salinisation), the populations also dig shallow wells (4m) to access the fresh water lens. To this effective but not long-lasting strategy, could be substituted the desalination of the water; however, the cost would be too high.

The strategies to address poor management of natural resources: the most remarkable initiative in this regard is the establishment of a biological rest period which is strictly observed. During three months, the community proceeds annually to the suspension of fishing and shell extraction activities, in order to allow the species to reproduce and to grow. These joint local initiatives widely bear fruit because according to the population, it is often noted a considerable increase of the halieutic resources and especially a diversity of those resources. In addition, the populations undertook during the last ten (10) years vast mangrove reforestation campaign, leading to the reforestation of five (05) ha. Management committees of the Natural Resources (COGER) have been also established in every village to follow these experiences and perpetuate them.

The municipality of Dionewar has developed a local developement Plan (PLD), as well as a Local Action Plan for the Environment and the natural resources (PLAE) which is a sectorial plan. The latter is an instrument of strategic orientation and planning that comes to improve the visibility of a sector that matters. Natural resources region are rather seriously threatened today in this island.

1.1.3. Issues identified

The Senegalese coastline is morphologically fragile and suffers from the effects of an almost anarchic occupation, combined with coastal erosion. This situation entails a degradation process and the destruction of hotels and housing, loss of productions (agriculture and fishing), reduction or loss of beaches as well as disruptions on mangrove ecosystems and natural habitats.

More specifically, the vulnerability assessment has highlighted the following three (03) major issues:

Issue 1: Reduction in ecological functions and socioeconomic services of the ecosystems.

Because of the combined effects of the climatic variations, the coastal erosion and the anthropic pressures, the ecosystems of the estuary including the mangrove, are losing their ecological functions (natural habitat of birds and fishes, protection against the floods, etc.) and show a reduction in their productivity.

In answer to this problem, a number of activities were proposed under the **component 1** of the project "***Enhancing resilience of main ecosytems in Dionewar island***"

Issue 2: Human establishments and infrastructures threatened by coastal erosion.

Many houses and numerous community infrastructures (schools, fish processing areas, dikes, etc.) are exposed to recurring floods, which every time cause enormous material damages to the populations and seriously affect the local economy.

In answer to this problem, a number of activities were proposed under the **component 2** of the project "***Enhancing resilience of main ecosytems in Dionewar island***"

Issue 3: Low knowledge of adaptation strategies in an island environment.

Although Senegal has a long coast, experiences of adaptation in coastal and island zones are still not yet enough documented.

There is also a low availability of data and specific climatic knowledge in the area, for the promotion of a legal and regulatory environment that support the resilience of the productive ecosystems of the estuary.

The deficit of climatic data specific to Dionewar is striking. There is no meteorological station in the locality and the climatic events are not enough documented and disseminated. In addition, this deficit of climatic data reduces the reach and the relevance of the diagnoses that underpin all the strategies of local development.

In answer to this problem, a number of activities were proposed under the **componen3** "***Enhancing resilience of main ecosytems in Dionewar island***".

1.1.4. Selection of the project's intervention area

The reasons for the selection of the areas of intervention are essentially due to the following considerations: a) the severity of these combined hazards in the Saloum Islands; b) heavy disruptions caused by these hazards on the lives of thousands of populations especially women; c) the significant impacts of these disruptions on the natural habitats and the biodiversity characterizing this part of the country.

The project will therefore intervene in the Island of Dionewar and its satellite islands which host major economic activities for populations.

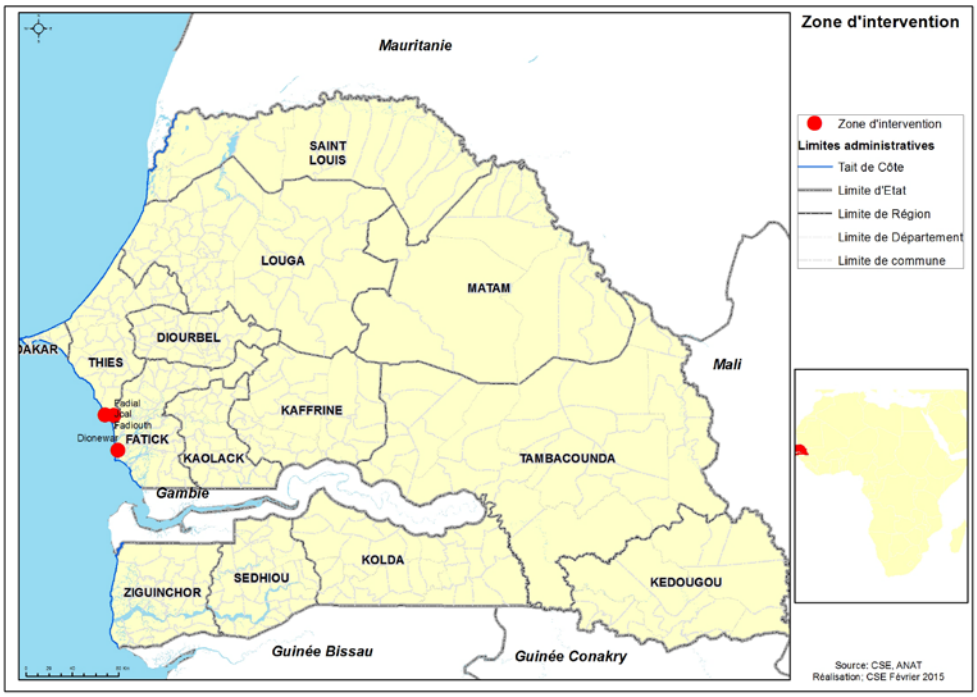


Figure 9: Location of the intervention areas

The location of planned realizations (ridges, dikes, fish farms) is shown in the next figure.

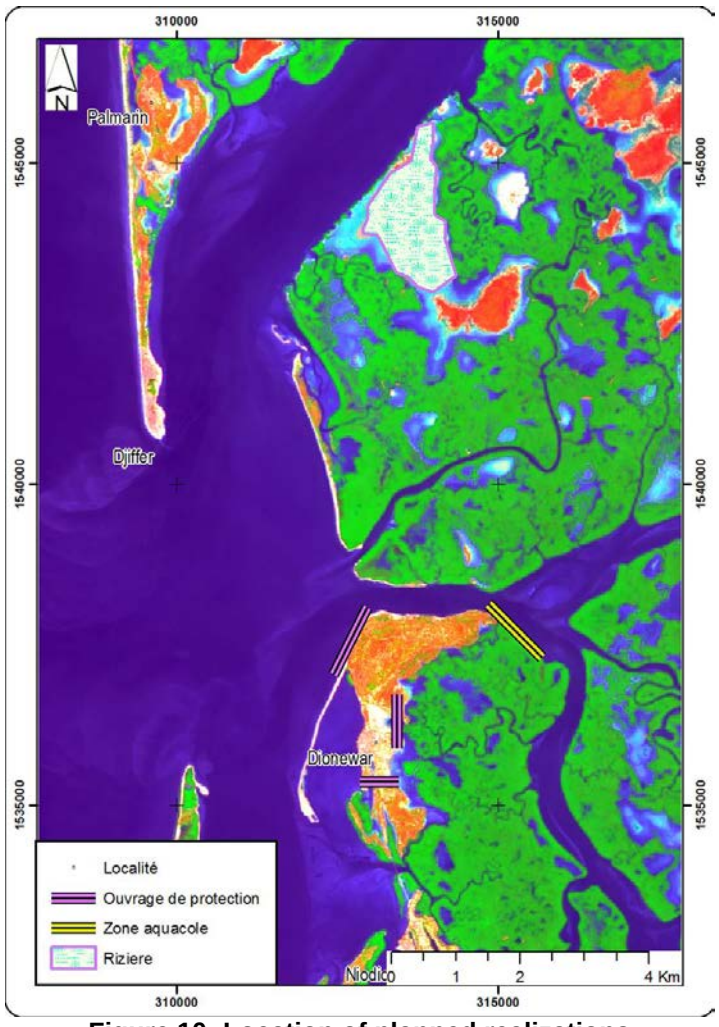


Figure 10: Location of planned realizations

1.2. Project Objectives

1.2.1. **Overall project objective**

The overall objective of the project is to reduce the vulnerability of populations in the Saloum Islands to flooding and coastal erosion. The resilience of natural habitats and populations will be enhanced through the implementation of protective measures, revival of the main productive sectors and promotion of local adaptation strategies to cope with the adverse effects of climate change.

1.2.2. Specific objectives

The project specific objectives are to:

- ✓ *SO1:* Improve the resilience of the sectors of fishing, aquaculture and forestry to natural hazards.
- ✓ *OS2:* Reduce the vulnerability of populations and natural habitats to hazards

through the establishment of structures to better regulate flooding, control coastal erosion and fight against land salinization.

- ✓ *OS3:* Enhance local development planning through integration of climate change, setting up local conventions and documenting lessons learned.

1.3. Project Components and Financing

Table 1: Project's components and budget

Project Components	Expected Concrete Outputs	Expected Outcomes	Amount (US$)
1. Enhancing resilience of main ecosytems in Dionewar island	*1.1. Alternative fish and oyster farming production system developed for 18 women associations, including the setup of 10 fish ponds, 200 spat collectors and 1000 growout bags (USD 81,975)* *1.2. At least 6 ha of trees planted (enrichment planting with especially coconut and oil palms) and 5 ha of mangrove rehabilitated in Dionewar and its satellite islands in order to revitalize the main productive sectors (USD 35,200)* *1.3. At least 18 women economic interest groupings and natural resources management committee trained to improve their technical performance (USD 40,800)* 1.4. Business plan for *Fish and oyster farms management developed (USD 15,400)*	**Outcome 1**: Improved resilience of the main ecosystems of Dionewar Island and sustainable livelihoods of populations	173,375

2. Protection against flooding, coastal erosion and salinization in Dionewar	*2.1. The 2 dikes to protect against flooding are rehabilitated and extended over 2 km (USD 624,000)* *2.2. Dead palm trees are planted over 2 km in the water to serve as breakwaters and mitigate coastal erosion in Dionewar Island (USD 187,000)* *2.3. Ridges are built around rice plots in Dionewar (USD 31,000)* *2.4. A maintenance plan developed, involving key stakeholders (USD 21,000)*	**Outcome 2**: Reduced vulnerability of populations and socioeconomics infrastructures in Dionewar to hazards with the construction or rehabilitation of protection structures	863,000
3. Strategic planning and knowledge management	*3.1. The Local Development Plan (PLD) is reviewed in order to integrate adaptation to climate changes options & costs benefits (USD 21,000)* *3.2. Rules governing the exploitation of timber and non-timber forest products and the biological rest updated and formalized through a Local Convention (USD 7,946)* *3.3. Project's lessons learned documented and shared (USD 32,150)* *3.4. One (01) meteorological station is installed in Dionewar (USD 29,400)*	**Outcome 3:** Strengthened capacity of local institutions to mainstream climate change in local development planning, sustainable natural resources management strategies and to document and disseminate lessons learned.	90,496
4. Project Execution cost			118,290
5. Total Project Cost			1,245,161
6. Project Cycle Management Fee charged by the Implementing Entity (CSE)			105,839
Amount of Financing Requested			**1,351,000**

1.4. Projected Calendar

Table 2: Project claendar

Milestones	Expected Dates
Start of Project Implementation	June 2016
Mid-term Review (if planned)	December 2017
Project Closing	June 2019
Terminal Evaluation	December 2019

PART II: PROJECT JUSTIFICATION

A Description of project components

Climate change/variability is impeding development efforts in Dionewar Island. The populations are making their earning mainly from fishing activities, agriculture and forestry. Since the breaking of the Sangomar arrow, the communication has been established between the sea and the river, increasing salinity and resulting in the degradation of the mangrove that is key to fishing activities, but also plays an important role in the control of flooding events. The increase of salinity has been exacerbated by rainfall decrease in the seventies and the eighties. Extreme climate events like heavy rains, combined with sea-level rise have resulted in more frequent and more unpredictable floods that threaten populations' security and goods. The fisheries sector is facing fish stock scarcity linked to changing climatic conditions, but also to overfishing. This situation leads fishermen to go farther and farther out to sea to make acceptable captures in view of the time and fuel invested.

The project ''Reducing vulnerability and increasing resilience of coastal communities in Dionewar" aims to be a response to the economic hardships and environmental challenges facing populations due to a high exposure to natural hazards. It will be implemented through: (1) investments for the development of aquaculture, the revival of fishing and processing of fishery products and replenishment of the vegetation ; (2) the establishment of protection structures to protect the Dionewar Island against flooding and coastal erosion; (3) the development of planning and local regulations activities associated with a knowledge management system in order to ensuring an equitable and sustainable use of productive assets.

The three components work in perfect synergy to enable the achievement of the general objective of the project.

Component 1 aims to enhance the resilience of the main productive sectors on the Dionewar Island through the development of fish and oyster farming, the replenishment of the vegetation cover and capacity building activities. It includes a set of measures to strengthen value chains for improved market access through better quality products, marketing development and greater efficiency in the use of natural resources. To cope with the rarefaction of fishery resources due to climate change and over-exploitation, quality improvement is one of the alternatives offered for maintaining or increasing incomes. Moreover, markets that guarantee fair and remunerative prices for seafood are those requiring stringent quality and safety standards. Therefore, the introduction of new production, processing and conservation techniques will help generate added value for local productions, resulting in increased incomes and food security for the whole community. Planned activities will ultimately help increase the influence of local producers in the various links of the value chain: production, processing, marketing. Component 1 is closely linked with Component 2 and 3.

Through **Component 2**, the resources of the project “Reducing vulnerability and increasing resilience of coastal communities in the Saloum Islands (Dionewar)” will be used to protect production areas, housing and processing and conservation facilities against water and salinity. Protection through dikes rehabilitation will contribute to mitigate one of the village major concerns, which is flooding. It involves existing dikes heightening and installation of flood control structures. The plantation of palm-trees will serve as a “break-water facility” and protect this part of the island against coastal erosion. Locally used in many parts of the Senegalese coast, this technology is based on traditional knowledge and is environmentally friendly. It has been successfully used to protect the neighborhood of Guet-Ndar (North of Senegal) and some parts of Fadiouth and Palmarin (Petite-Côte) against coastal erosion. It is appropriate in this context because of its low-cost for establishment and maintenance by communities themselves. Dionewar is an island and it would be time and resource consuming to bring in construction materials and machines from the continent if it was decided to build other types of facilities like stone dikes. The vegetal material to be used (dead palm-tree) is available less than 40 km from Dionewar and easy to carry in. Component 2 will ensure strict compliance with the provisions of the Environmental Code, especially regarding environmental and social impact studies and development of an environmental and social management plan. It will help secure investments made in Component 1 and will generate lessons learned that will feed into Component 3.

Component 3 seeks to enhance local development planning and natural resources management while documenting lessons learned. It will foster the integration of climate change in the Local Development Plan and promote a local regulatory framework to rationalize the use of natural resources. Component 3 also includes the installation of a meteorological station in the locality in order to improve weather forecasts for local producers and to better inform local development strategies. Finally, it will draw from lessons learnt from all project activities for documentation and sharing at local, national and international levels.

The project strategy is to take an integrated approach linking up the 3 components.

Component 1: Enhancing resilience for productive sectors in Dionewar Island

Activity 1.1: Development of fish and oyster farms

This activity aims to boost the fisheries sector which is faced with the scarcity of fish stocks prompting populations to go further in order to make acceptable captures given the time and fuel spent. The project resources will be used to setup 10 fishponds for fish production. The project will also install 200 spat collectors in order to recover the spawning oyster mothers in the lagoon. It includes as well putting in place a suspension culture system above the seabed with 1000 growout bags which will collect larvae that have reached a fairly large size and that will grow there. Only indigenous species will be used and there will be no introduction of exotic species. In addition, the project will purchase production equipment (ropes, fishing nets, boots, life life-jackets…).

The fishponds will be 2.5 X 2.5 X 1.6 of size, meaning a capacity of $10m^3$ each. The species chosen is a local one (Tilapia) and will not be stocked from the wild, but developed in hatchery by the National Aquaculture Agency (ANA).

In the implementation of this activity, the project will build on aquaculture experiences now underway in the Saloum Delta. The collection and growth of shells, which are the latest activity, are tested in Missirah, Sandicoly and Betenty with the support of PISA, FAO, ENDA and IRD but also WAAME-CIDEAL and the National Aquaculture Agency (ANA). The oldest experiment remains oyster farming with oyster farming GIE (economic interest groupings) in Joal and Sokone that produce, transport and market fresh oysters to Dakar.

This activity is intended mainly to local women association (economic interest groupings) and the use of the assets provided will be community based. The project will foster the adoption of an agreement between women association, the local government unit and the executing agency. This agreement will setup a saving mechanism (fees) from revenues generated by the oyster and fish production activity and the financial resources made available will be used to extend the establishment of spat collectors and to renew the equipment when required.

The beneficiaries (mainly women) have already a good organizational framework and a good experience of sharing such equipment. Therefore, they have already appropriate mechanisms and rules for managing and sharing the production and outcomes of the assets provided by the project.

Activity 1.2: At least 6 ha of trees planted (enrichment planting with especially coconut and oil palms) and 5 ha of mangrove rehabilitated in Dionewar and its satellite islands in order to revitalize the main productive sectors

Through activity 1.2, the project resources will be used to increase the density of the stands of coconut and oil palm trees that have long been an important source of income for populations in Dionewar. The enrichment planting will target 6 ha at least (especially coconut and oil palms) and 5 ha of mangrove will be rehabilitated. The population will

contribute in terms of human investment.

The main activities will be:

- The setup of a tree nursery in close collaboration with the Forest Service
- The setup of an “access restricted forest area” (“*mise en defens”*) to facilitate the natural regeneration of species like *Detarium senegalense* and *Parinari macrophylla*
- Mobilization sessions to organize populations around tree planting activities
- The planting of trees
- The setup of committees tasked to monitoring the plantations. These committees will be composed of members of the islands committee for natural resources management, which will be reinforced if required.

Activity 1.3: At least 19 women economic interest groupings and natural resources management committee trained to improve their technical performance

Activity 1.3 will make it possible to train women oyster farmers and processers on new techniques for better recovery of products. About 270 women will be trained. New production techniques will ensure better quality products and more competitiveness, meaning access to new market and more remunerative prices.

Partnership will be developed with the National Aquaculture Agency (ANA) that has national mandate to support the development of aquaculture nationwide. They will provide support in the selection of performing species, quality of fish larva, biological monitoring and trainings.

For oyster farming, women will be trained on the garlands making techniques for capturing spat, transfer of juveniles in pouches for the growth and quality monitoring during growth.

For fish farming they will be trained on the fish feeding and water quality maintenance techniques.

Capacity building activities will also include linking producer organizations with traders and processors to ensure consistent supply and quality standards, training women groups on entrepreneurship, marketing of products, managing value chains, and accessing financing and credit. Participation of women groups to regional/international commercial fairs will be part of this capacity development activity.

Sustainable management of shellfish other than oysters (*Crassostrea gasar*) will also be taken into account in this community aquaculture: this is the arch (*Anadara senilis*), yet the (*Cymbium sp.*) and “touffa” (*Murex sp.*). Parks will be built around villages to create seeding and fallow areas where juveniles will be isolated until maturity. They will operate according to a schedule and allow these species to renew.

Activity 1.3 is also designed to build the capacities of the committee entrusted with the surveillance of natural resources and women transformers on valuation of non-timber forest products (*Detarium senegalense*, *Parinari macrophylla,Cocos nucifera and mango tree*). Doing so, it will strengthen the achievements already made with the establishment of a natural resource management committee.

The main activities will include:

- The identification of trainees, taking into account gender considerations
- The preparation of training materials
- The elaboration of a training programme
- The organization of training sessions, including exchange visits in neighboring areas in the Saloum islands where similar programmes took place in the past

Activity 1.4: *A management plan is developed for the fish and oyster farms*

Intensive fish farming requires constant maintenance and vigilance. If the management is poor or the funding inadequate, things can get pretty bad: toxic runoff, introduction of diseased species into populations, excess of food and waste influencing population densities, stressed out fish. This activity is designed to allow the recipients to benefit from the advantages resulting from the Oyster farms without jeopardizing objectives for sustainability and environmental safeguards. In partnership with ANA and target communities, management plan will be developed and implemented.

Component 2: Protection against flooding, coastal erosion and salinization in Dionewar

Activity 2.1: Rehabilitation and extension of dikes to protect against flooding

Activity 2.1 seeks the rehabilitation of the two dikes and their extension over 2 km to better protect housing, infrastructures and agricultural lands. With this activity, the project resources will help reduce the vulnerability of the Dionewar village and rising waters especially during the rainy season with start of high tides and storms. Activity 2.1 will be strengthened by activity 2.2 and will be implemented in close collaboration with researchers with focus on coastal management, civil engineers, local extensions, the local government unit and the communities themselves.

The main activities will be:

- A technical review of the functioning of existing dikes
- A feasibility study of the extension of these dikes, including environmental and social safeguards requirements
- The preparation on an environmental and social impacts management plan
- Social mobilization actions to ensure a fruitful involvement of the population through human investment sessions
- The heightening of dikes where it deems necessary
- The extension of the dikes

***Activity 2.2*: Planting 2 km of dead palm trees into the water**

Activity 2.2 aims the planting of 2 km of dead palm trees into water to serve as "breakwater" and mitigate coastal erosion on the Dionewar Island. This tree planting will be set up where the phenomenon is most acute that is the north-eastern part of the island. Palm trees will be taken from the palm tree stands in the neighboring village of Samba Dia and will be cut into 2.5 m ridges and directly planted into water. Only dead stumps will be taken but as provided for in the Forest Code, a compensatory tree planting will be conducted.

Activity 2.2 is linked with activity 1.2 through which a dense tree planting will be put in place to fix the shore just opposite the place where component 2 will plant dead palm trees. This planting will contribute to the stabilization of the beach.

The main activities will be:

- A feasibility study, including environmental and social safeguards requirements
- The preparation on an environmental and social impacts management plan
- Social mobilization actions to ensure a fruitful involvement of the population through human investment sessions
- The cutting and transport of dead palm trees from Samba Dia
- The planting of the dead palm trees in the water

***Activity 2.3*: Development of ridges around rice plots in Dionewar**

Through activity 2.3, the project resources will be used to protect rice plots against seawater intrusion. It will help boost rice cultivation in the area, thus enhancing the sustainable livelihoods of women.

The operating costs will be handled by the project the first year of operation. A depreciation schedule will be elaborated through consultations with producers in order to amortize the equipment and to recover the operation cost related expenses. The money recovered will flow back into the Fund for Integrated Development of the Islands.

The main activities will be:

- Prepare a "cadastral map" for rice-growing areas
- A feasibility study, including environmental and social safeguards requirements
- Social mobilization actions to ensure the involvement of the population
- Purchase of equipment (ploughing, weeding, harrowing, harvesting, husking and bagging)
- Consultation with producers to design the appropriate arrangements to be put in place for the amortization of the equipment
- Realization of the ridges

Activity 2.4: A maintenance plan of coastal infrastructures developed, involving key stakeholders

This activity is geared toward creating the conditions for the maintenance over time of coastal infrastructures developed by the project. Its execution will include a partnership with the Rural Engineering Directorate, the Directorate of Environment and the Directorate of Civil Defense.

The main activities will be:

- Prepare a maintenance guide for each category of infrastructure
- Setup and train a management committee including the Local Government Unit, the extensions, the main community based organizations (including women) and the Sub-Prefect.
- Organize a report back session to present the outlines of the guide to the members of the management committee.

Component 3: Strategic planning and knowledge management

Activity 3.1: *The Local Development Plan (PLD) is reviewed/updated in order to integrate climate change adaptation options & costs benefits.*

Dionewar Local Development Plan (PLD) will be reviewed and updated to include risks and opportunities associated with long-term climate change and to make community investments more resilient. This revision will also allow incorporation of sustainable fisheries management measures. The different steps for this phase will include: (i) coordination of decision makers and the service provider team selected to revisit the local planning instrument; (ii) sharing tools for mainstreaming climate changes issues; (iii) climate changes vulnerability assessment and costs benefits of adaption options; (iv) revision and adoption of updated plan; (v) identify funding mechanisms for adaptation measures; and (vi) dissemination of revised local development plans.

Activity 3.2: Preparation of a Local Convention to better regulate the use of forest products and the biological rest

Activity 3.2 will allow updating and formalizing existing rules on use of forest products (timber and non-timber) and biological rest. To this end, a Local Convention will be prepared in order to promote environmentally appropriate, socially responsible and economically viable use of forests and fisheries resources.

Particular attention will be paid to vulnerable groups. The most relevant negotiating tools will be used in this regard. In particular, participatory mapping of resources will be an important part of this activity, with separate mapping by women and men, followed by each group reporting its findings and decisions in a plenary for joint decision making. During these sessions, important efforts will be put in tackling the causes of the unsustainable practices.

In order to facilitate the enforcement of the new rules, the project will seek the commitments of communities, more specifically through engaging with those whose

livelihoods rely mainly on activities that could be targeted by these new rules. Community leaders, elders and administrative authorities will be involved in order to foster acceptance of new rules. In addition, those who could be affected in terms of economic survival would be given priority in the development of alternative livelihoods, for example through the setting up of surveillance committees. As members of these committees, they may be supported by the project in developing bee-keeping activities.

Activity 3.2 will also include a baseline study on land tenure in order to make sure that land use and land rights issues will not arise.

Activity 3.3: Project's lessons learned documented and shared

Through Activity 3.3, collaborative planning approaches to be developed will enable multiple stakeholders to share knowledge, develop awareness, improve learning and improve replication.

Activity 3.3 is designed to regularly collect and document lessons learned at each stage of the implementation and integrate these into planning processes and future activities. Through this activity, at least 3 general reports on lessons learnt will be produced, one every year and shared in the region as well as at national level. The information packet will be translated into the appropriate formats and languages to allow dissemination through the community radios or television channels in the national languages. A particular emphasis will be put on strategies that led to improved adaptive capacities, considering gender specificities.

Activity 3.4: Installation of a meteorological station at Dionewar

A standard meteo station to collect the climatic data on the wind speed, the temperature, the pluviometry and the hygrometry, will be installed at Dionewar in association with ANACIM[22]. Activity 3.4 includes; i) buying a standard automatic meteorological station, ii) laying out the site where the station will be installed, iii) installation of the station, iv) enclose (securing) the station, and v) assuring the maintenance of the station.

B. Project economic, social and environmental benefits

The project will generate economic, social and environmental benefits. It will bring about and promote a set of innovations that will help improve the lives of the most vulnerable communities through the strengthening of sustainable production means, the use of revolving funds and the improvement of value chains (production, distribution and access to alternative markets). This will facilitate beneficiaries' climate resilience with a menu of options.

[22] Agence Nationale de l'Aviation Civile et de la Météorologie (*National Agency for Civil Aviation and Meteorology*)

Vulnerable groups to take advantage of this project include:

- fishermen and women oyster farmers and processors: young men form the bulk of the workforce in fishing, oyster and cymbium collection activities.They are grouped in the CLPA (Local Artisanal Fisheries Committee). The Dionewar village has a fleet of 89 canoes with 12 having an average 3 crew (36 men) engaged in the oyster farming. They sell fresh products to women who are in charge of processing them. Considering the technical innovations and training proposed, the project will involve, at the start, about one hundred men, including 75 youth.
- as for women, they are much better organized within the Federation of Local GIE (FELOGIE) of 510 members and they run a mutual savings and credit Fund. In these 510 women, 80% (or 408) sell "loincloth" and the 20% (or 102 members) are oyster farmers which at the same time manage the infrastructure of the center. Apart from women members of the FELOGIE, others (over a hundred) are engaged in the sale of "loincloth". New production techniques to be introduced by the project will enable all of these actors to increase the productivity of their activities, to maintain their income and be more resilient to climate change. The capacity building they will get will help them improve the quality of their productions giving them greater value.
- women rice farmers: the protection of rice plots from against salinity will contribute to boost production, reinforce food security and improve their income ;
- Community-based organizations: the training to be delivered by the project will improve natural resource management on the island while generating more income from the exploitation of non-wood forest products;
- The State and local government units: these two actors are the first ones to be called upon by populations whenever they face flooding or other hazards. Securing people and their goods through the protection structures put in place will therefore reduce the level of stress enabling them to dedicate their resources to other sectors.

The trees planted will contribute to reduce wind erosion and increase populations' income in the medium term. In addition to contributing to regulate flooding, the mangrove offers other opportunities in the socio-economic plan allowing the diversification of income (eco-tourism, mangrove honey production, etc.).

To avoid or reduce potentially negative impacts of the project activities, an initial environmental impact study has already been conducted and this study identifies the potential risks and proposes mitigation measures. It is a preliminary study realized with the purpose to verify the alignment of the project activities with the AF's Environmental and Social Policy and to identify the potential negative impact that might result from these activities.

In addition, during the project implementation, environmental and social impact studies will be conducted prior to any physical achievement as required by the Senegalese Environmental Code and the environmental and social policy of the Centre de Suivi

Ecologique (CSE), and in line with the requirements of the Environmental and Social Policy of the Adaptation Fund. These studies will also produce an environmental and social management plan to address potential negative impacts from the project interventions. It is the normal procedure that ESIA reports are approved by a technical committee and by the local communities. The environmental endorsement is issued only after this validation.

Land tenure can be a sensitive issue and will receive therefore particular attention. The Saloum estuary is characterized by a multitude of bolons and it is not difficult to find the necessary space to conduct oyster activities without interfering with navigation and other fishing activities. However, expansion of oyster farming requires communication across all Saloum islands to identify production areas while making sure to avoid barriers to seaworthiness.

Oyster farming actors shall inform the Dionewar City Council about the conduct and location of activities. For fish farming and planting of community coconut palms, committed groups will file an allocation request to the City Council. Indeed, decentralization texts give the City Council the authority to allocate land by authorization under the State-ownership. Oil palm plantations will be conducted on community basis and on the village forest reserves.

Mangrove reforestation will also be performed on the banks of bolons on spaces under the State-ownership of land.

Table 1: Project economic, social and environmental benefits

Table 3: Project's benefits

Benefit type	Baseline	At project completion
Social benefits	- Rural exodus due to isolation, scarcity of fish stocks and lack of income-generating activities - Poor response capacities - Lack of mechanisms for disseminating proven strategies to adapt to risks - High exposure to hazards	- Aquaculture development - New capacities acquired by populations on coastal protection and aquaculture Improved food security - Leverage on lessons learnt on coastal management and adaptation to climate change - Decline in rural exodus
Economic benefits	- Housing and infrastructures threatened - Low cost-effectiveness of investments din the main productive sectors - Processed fish products	- Improved revenue particularly of women, - Revival of the economic activity - Securing investments

Benefit type	Baseline	At project completion
	non-compliant with the quality standards - Continuous decline in populations' revenue	
Environmental benefits	- Mangrove degradation - Degradation of the vegetation - Land salinization - Coastal erosion	- Rebuilding the vegetation - Protection of rice fields against salinity - Fixing of the shore and protection against coastal erosion

Equitable access to assets financed by the project is a core principle of this project. All members of the women grouping will benefit from these assets. The assets will not be allocated on an individual basis, but they will be shared and used in rotation. All of the women will be trained on feeding and maintenance techniques. Backed by the technical staff from the National Aquaculture Agency (ANA), they will undertake feeding and maintenance tasks in turns. When they harvest and market the products, part of the revenues will be used to purchase fish feed and another part will go to the grouping fund. This fund could be used through the grouping's central purchasing in order to extend the shop or to provide loans to its members (revolving fund).

C. Cost-effectiveness

Cost-effectiveness is embedded into the adaptation full cost approach used for the design of this project. This approach makes a distinction between costs directly related to the country's economic development (investment for business as usual), and those relating to the implementation of concrete adaptation measures. While the investment allows the Senegalese Government to improve socioeconomic conditions in the area, AF funds are focused on financing adaptation related activities. The project will focus on the combination of adaptation options based on communities and ecosystems to better address the specific priorities of local populations. The emphasis is laid on new coastal protection measures that are cheap and more environmentally friendly.

This approach helps avoid duplication, and, what is more, due to a joint use of means for cost-shared staff payment makes it possible to significantly reduce project management and coordination costs. There are currently several initiatives with among other objectives to enhance the resilience and improve the sustainable livelihoods of populations in these areas. They are driven by technical services with human resources whose experience and expertise will be a definite asset for the project. It also applies for example to the shelfish collection and growth techniques already experienced in Missirah, Sandicoly Betenty and with the help of the FAO PISA Programme, ENDA, IRD and ANA. These achievements will be enhanced to fully utilize the project resources.

Oyster GIEs in Joal and Sokone produce, transport and sell fresh oysters in Dakar (Almadies), on top of some orders by the hotels in the Saloum islands and the Petite Côte. Export opportunities to Africa, Asia and Europe exist, but oyster production remains very low to meet demand. Regarding fish farming, there are still no fish farms in Dionewar but there is a success story in Senghor Valley in Sokone and the population showed great interest in fish farming because of the worrying situation of declining fish stocks. Yet the majority of these families depend on fishery resources.

Local stakeholders also benefit from the support of several Non-Governmental Organizations (NGOs) and other multilateral or organizations or cooperation agencies in various areas. Thus the project "Women's Entrepreneurship and adaptation" launched by the COLLEGIA Groupe, CEGEP de la Gaspésie des Iles (Quebec-Canada) supported the Dionewar village women in fish processing providing the infrastructure serving as areas of processing, storage and office, but also by organizing training in accounting, financial management and organizational development. This project will consolidate these gains by allowing women processors to master new production techniques that will generate added value. In addition, this project will build protective infrastructure, which in turn will be used to secure the facilities established under the COLLEGIA project.

Synergies and additionally will be sought wherever the opportunity arises and the project resources will reinforce or value those of various organizations operating in these areas whenever possible.

The populations of Dionewar will contribute to the realization and the maintenance of infrastructures under activities 2.1, 2.2 and 2.3 in terms of human investment (labor force). This will allow to optimizing the financial resources of the project.

CSE’s administrative and financial management procedures, especially those related to procurement, contribute to cost-effectiveness. Goods and services procurments should be made on a competitive basis between service providers.

D. Project consistency with national or sub-national sustainable development strategies

The project concerns are consistent with the Local Development Plan (PLD) and the local plan of action for the environment (PLAE) in the commune of Dionewar. These plans are based on the increased revenues with the introduction of technical innovations, the management of fisheries and development of fishery products. These plans also underscore the achievements for the protection and preservation of the village with focus on the mangrove. One of the priority actions of the PLAE of Dionewar relates to the construction and rehabilitation of dikes fight against coastal erosion and its consequences. The PLD of Dionewar also put priority on the capacity building of the population on dike construction techniques in order to address coastal erosion and

saline water intrusion. In the Priority Action Programme (PAP) of this PLD, actions considered for the Axis “Environment, Natural Resources Management and Living environment” include the realization of dikes against coastal erosion and salinity and tree planting (including fruit-trees).

The project objectives are also in line with the strategic objectives of the 2013-2017 National Strategy for Economic and Social Development (SNDES in French) in terms of employment promotion and integrated development of rural economy. With respect to the second component, the project will contribute to diversify the production, reduce the vulnerability of agricultural activities and improve production and productivity of fisheries which are addressed in the SNDES (2013-2017). Through Component 1, the project is consistent with the objectives of Policy Statement of the Fisheries and Aquaculture (LPS-PA) Sectors, which aims, among other things, the development of inland fisheries and aquaculture.

The implementation of protective measures will contribute to the Priority Axis n°2 (“Human Capital, Social Protection and Sustainable Development”) of the Strategic Plan for Senegal’s Emergence (PSE). The PSE which is currently the main development strategic framework put emphasis on the improvement of living environment through flood control inter alia, but also on the prevention and management of risks and disasters, mainly in coastal zones. The revival of the main productive sectors and the promotion of local adaptation strategies will contribute to the Priority Axis 1 (“Structural transformation of the economy and growth”) of the PSE, more specifically to programme on “agriculture, livestock farming, fish and seafood products and agrifood”: targeted actions through programme aim at implementing integrated approach to develop value chains and sector structuring. Aquaculture is one of the six priority areas and 27 flagship projects that can help to drive Senegal towards economic and social emergence.

The project considers the objectives of the “2013-2017 Five-year Agricultural Programme” (PAQ in French), which aims to ensure food security and improve rural living conditions by creating conditions allowing rural populations to find interesting to stay. The PAQ is structured around five major pillars including ‘’the issue of farmlands’’ this project is looking to protect and preserve.

The project reflects the priorities defined in the National Adaptation Plan of Action (NAPA) to Climate Change which considers that the main environmental concerns (flooding, coastal erosion, water and soil salinization, mangrove degradation and variations of fish stocks) the Senegalese coasts are witnessing are somehow directly related to climate factors. The NAPA thus includes a priority programme (Programme 3: “Protection of the littoral”) dedicated to coastal protection, reforestation, the construction of protective structures and training/information among the adaptation options selected.

Activities under this project will contribute to the overall objectives No 1 (Maintain existing natural and archaeological heritage and restore degraded areas) and especially No. 3 (Promote eco-development activities for populations in the RBDS) of the

Integrated Management Plan of the Saloum Delta Biosphere Reserve. Expected results of this management plan include: "strengthening conservation and management measures of the RBDS areas", "mitigation of natural factors of environmental degradation (drought, salinity)", "strengthening organizational and mobilization capacities of village communities and local institutions" and "improving the living conditions of local populations through the implementation of income-generating projects".

E. Project relevancy with national technical standards

The project activities are in compliance with the spirit of the Coastal Act, especially ‘the maintaining of environmental balances, fight against coastal erosion, preserving site integrity, sea landscapes and heritage’’. Component 2 will be implemented in the spirit of the text.

The project also ensures adherence with the provisions of the Environmental Code, especially Chapter V which Section L48 stipulates that ‘’any development project or activity likely to harm the environment as well as policies, plans, programmes, regional and sectoral studies should be subject to an environmental review’’ that is why the environmental and social impact studies will be an important part of component 2.

The project will also comply with requirements of the National Strategy for Gender Equality (SNEEG 2005-2015) which aims: ‘’(i) to build an institutional, sociocultural, legal and economic environment enabling the achievement of gender equality in Senegal; (ii) and effective gender mainstreaming in development interventions across the sectors. All project components will comply with these principles in their implementation.

The project will finally observe the provisions of the Fisheries Code, especially regulations on the quality control of fish products. Component 1 under the project seeks, among other things, to help women processors comply with the standard defined under this Code.

The installation of a meteo station has to be done according to regulatory measures and directives of the World Meteoroligical Organization (WMO). As regard the standards of coverage the horizontal resolution required according the standards of the WMO ranges from 10, 50 to 100 km based on the meteorological data to be collected. The installation of the station under this project (Component 3, activity 3.4) respects these standards and even contributes to reduce the deficit of cover in the zone, because there is no meteorological station in the entire island.

F. Description of any is duplication of project with other funding sources, if any.

The project will strive to avoid potential duplication with other funding sources for similar activities. The design of the project activities is based on complementarity and additionality with existing projects and programmes under development. This will be the case namely with the PAPIL (Support to Local Small scale Irrigation project) operating in the Saloum Islands mainly in the neighbouring islands of Djirnda and Niodior for the construction of protection dikes and mangrove reforestation. This project will cover the Dionewar Island that was not covered by the PAPIL project.

Initiated by the COLLEGIA Group, CEGEP de la Gaspésie des Iles (Quebec-Canada), the project ‘’Women Entrepreneurship and Adaptation’’ supports women in the village of Dionewar in processing fishery products by providing them with facilities used for processing, storage and offices. This project will consolidate these gains by helping women processors to control new processing and conservation techniques that will generate added value.

The project design has also been informed by The GEF and World Bank project “Integrated Marine and Coastal Resource Management” which aimed at promoting a sustainable management of coastal and marine resources through:

- an ecosystem approach to conservation;
- involving local communities and resource users, including building on local knowledge;
- strengthening local and national institutional capacity to address environmental issues;
- strengthening inter-institutional, and multiple stakeholder forums;
- and strengthening regional networks for conservation and sustainable use of marine biodiversity.

At a smaller scale, lessons drawn from this project has served especially in designing the components 1 and 3. The territorial user rights fisheries (TURF) agreements approach has been explored for the design of Activity 1.4 (Fish and oyster farms management plan developed).

G. Description of the learning and knowledge management component to capture and disseminate lessons learned

It is important to document and share the lessons learnt from positive experiences resulting from the achievement of the project objectives or the negative ones resulting from these failures. This information has a huge potential to bring crucial knowledge to the design and implementation of strategies enhancing resilience to climate change. To make sure that throughout the project steps, lessons are documented and shared; documentation of lessons learnt will be included in the monitoring-evaluation process.

Such approach helps ensure that the project can be reviewed at each stage and the lessons learnt and best practices can be valued in planning the next steps. It also helps record knowledge and enters them into a common reservoir where they can be shared with other stakeholders of the Senegalese coastline and the sub-region.

In addition, the project generates new climate information with the installation of a meteorological station that will provide specific data on the archipelago. This will be in collaboration with ANACIM which is in charge of collecting, gathering and disseminating climate information at national level.

The knowledge management process will comprise four major steps:

1. Make an inventory of knowledge: the project managers and the Monitoring-Evaluation Team will collect information through structured or non-structured approaches (interviews and observations) by filling out ‘‘lessons learnt’’ cards.

2. Check and summary: the project managers check the accuracy and applicability of knowledge gained in relation with the Monitoring-Evaluation officer. The reports are then forwarded to the project coordinator who will ask experts to determine whether a lesson is specific to a particular component of the project, the entire project or the projects in general.

3. Reporting: the project coordinator will then produce a general report on the lessons learnt for the period under review.

4. Dissemination: the coordinator distributes the report internally (to the steering committee, the project managers and members of the project team) and externally (on the project website and other electronic forums). By the end of the project, a lessons-learning document will be prepared and published.

The project will work with other projects and programmes to disseminate the information with cost-effectiveness.

The achievements planned under the project, mainly with the introduction of technical innovations in the fishing sector through the involvement of the National Aquaculture Agency (ANA) and the replenishment of local essences could then be capitalized and shared with other islands in the Saloum Estuary. This experience can be extended in villages located in Lower Casamance, which have similar landscape and are also faced with deteriorating living conditions resulting from the depletion of fish stocks, poor environment with aggression of the mangrove and farmland salinization.

Component 3 of the project is designed to document and share all lessons learnt as well as the adaptation strategies identified.

The knowledge management process will be linked to the Monitoring and Evaluation process in order to allow lessons learned to constantly feed into the planning strategy.

H. Description of the consultative process

The project itself results from a forum organized on Dionewar Island in May 2009, focusing on its economic and social development and the constraints posed by climate change and its adverse effects. This forum gathered the natives of the island, residents or coming from other cities of Senegal and even The Gambia. This forum was the place to carry out a diagnosis and analysis of key sectors (health, water supply, economic activities, education, environment, sport and culture) and to come up with solutions. An important outcome of this forum has been an action plan including major issues and possible remedial activities. These activities have been later on prioritized by the Association for the Development of Dionewar (ADD), leading to a bank of projects. Combining the “environmental management” and the “social” components, the ADD developed this project idea.

The selection of the project idea was also made through a consultative process at national level. In consultation with the Designated Authority and the National Committee for Climate change (COMNACC), it was agreed to issue an open call for proposals at national level in order to identify the second proposal from Senegal to submit to the Adaptation Fund. The reasoning underlying such decision was to ensure fairness, transparency and competiveness. An evaluation committee was then set up, co-chaired by the designated authority and the Chair of the COMNACC. This committee included representatives from various sectors: agriculture, environment, livestock, fisheries, universities, etc. This process led to the selection of this project idea submitted by CONAF-ADD (National Committee for Literacy and Training and Association for the Development of Dionewar) on behalf of communities in Dionewar.

After this selection, many working sessions were organized with the project initiators to further discuss the issues, objectives, outcomes, etc.

Several consultations were also organized at various levels with other categories of stakeholders: project sponsors, local elected representatives, women oyster farmers and processors, women rice farmers, fishermen, the civil society, technical services, communities, customary and religious authorities, etc. These consultations have ensured that their concerns and opinions about the project are captured and taken into account in the design of the activities. This was successful in securing a strong support from these stakeholders, as shown by a letter to that effect from the Mayor of Dionewar expressing clearly its willingness to participate in the proposed activities.

Figure 11: Meeting with the community

Field missions were organized with aim to identifying aquaculture potentials in the Dionewar village with the aim of exploring the sites due to host the aquaculture infrastructures, but also to better investigate the relevancy of the protection measures considered in the project. Some of these missions included two civil engineers and a resource-person who has a great experience in coastal management. The technical design of these measures was discussed extensively, as well as cost-related aspects.

The outcomes of these meetings and visits were captured in the design and planning of the project activities. For instance, the initial option as regard to tree planting (Activity 1.2) was to do it in forests areas using species like coconut tree, palm tree, etc. After discussion with the communities, it deemed more appropriate to plant trees in selected sites located directly opposite the inlet and highly exposed to coastal erosion. Setting up an “access restricted forest area” (“zone mise en défens”) was the preferred option in order to foster natural regeneration in forest areas. When it comes to the rehabilitation of the dikes (Activity 2.1) to address flooding, the populations suggested the extension of one of the two dikes in order to ensure optimum efficiency. To take this into account the discussions between the populations and the experts (civil engineers) led to the conclusion that to make this extension feasible within the planned budget, the populations will provide the workforce while the project provides the inputs and the technical backing. The populations also suggested to consider raising the height of the dikes and to include spillways in order to allow controlling the flow of rainwater and seawater. All these concerns have been taken into account, leading to revising the budget planned initially for this activity.

I. Justification for funding requested, focusing on the full cost of adaptation reasoning

The budget of 1,351,000 US requested from the Adaptation Fund with this project (Adaptation alternative) is to finance concrete adaptation activities, in answer to the vulnerability of the productive ecosystems, the communities as well as the infrastructures, in the municipality of Dionewar. It is as well about a conjonctural as a

structural approach, because besides solving current problems, which arise with severity, the adaptation options will be mainstreamed into the planning document of Dionewar.

The full cost financing of these adaptation activities justifies itself in particular by their relative low level of coverage, by the current strategies of fight against climate change in Senegal (Baseline scenario), even though that the protection of the coast is a priority. These phenomena weigh heavily on populations' sustainable livelihoods and safety and are a major concern for national and local authorities.

The cost effective use of resources sollicited through the various components of the project will help reduce constraints and obstacles and build assets so as to make main productive ecosystems resilient to climate and natural risks.

Direct benefits generated for beneficiaries include an effective reduction of flood losses for 451 households, an increase in incomes for more than 500 persons (most of whom are women), an increase of the resilience and productivity of 6 ha of dry land ecosystem, 5 ha of mangrove, and an increase of awareness of local decision makers on climate issue.

Ultimately the Adaptation Fund resources will generate significant benefits at different levels and for various actors, justifying investments made.

Baseline (Without project)

Under the baseline scenario, the fight against climate change adverse effects in Senegal is essentially made through the programmatic framework of the NAPA in which a number of priority projects are defined. For Senegal, it was estimated[23] as it would be necessary to protect 700 km of coast with a total cost USD 1,596 million. These costs were revalued at USD 3,623 million, which is the annual cost of 1.72 % of the GDP. Finally, this study estimated the surface of coastal ecosystems at risk at 20,600 ha of salty swamps, 104,100 ha of intertidales zones and 364,300 ha of mangrove swamps. In this scenario, the protection of the coast is certainly a national priority, but due to scarce financial resources, the interventions of the Government of Senegal are limited to certain recognized vulnerable sites. Most of these interventions take the form of emergency measures and consist mainly of physical barriers allowing to protecting important human establishments and infrastructures. However, this approach of protection integrates no adaptation options, which explains that in most of these zones, productivity of the surrounding marine and coastal ecosystems keep declining.

Under the same baseline scenario, specifically in the estuary of Saloum, the Government of Senegal assures the fight against coastal erosion through the

[23] Banque Mondiale, 2005. *Gestion des risques en milieu rural au Sénégal : revue multisectorielle des initiatives en matière de réduction de la vulnérabilité*, 2005. .

management plan of the Delta of the Saloum Biosphere Reserve (RBDS). The reach of the interventions in this framework is also strongly limited by the low financial resources, the main part of which is firstly directed to the preservation of the biodiversity. The questions of adaptation to climatic changes and variabilities are marginally addressed.

More specifically at the level of the municipality of Dionewar, the Local Development Plan (PDL) and the Local Environmental Action Plan (PLAE) are respectively reference frameworks for the socioeconomic development and for the sustainable management of natural resources. In none of these strategic planning documents,the questions of adaptation to climate change is considered. The social and economic development activities, as well as those of sustainable management of the environment are classically the ones proposed. It explains why the populations of the municipality have difficulties to understand the underlying causes of climatic variations, which affect them. This leads most of the time population to adopt solutions with a limited reach.

From the preceeding analysis are pulled the baseline specific scenarios of the three components of the project.

Component 1: Enhancing resilience for productive ecosytems in Dionewar Island: Populations in the Saloum Islands derive most of their sustainable livelihoods from fishing, agriculture and exploitation of forest products. With the rising sea level and the deterioration of weather conditions (rainfall and temperatures), these populations are at risk of several hazards such as farmland salinization, mangrove regression due to silting and salinity.

Populations have taken several initiatives to cope with these disruptions namely the construction of rudimentary protection dike, the establishment of natural resource management committees, etc. The Senegalese State has also responded several times during serious flooding that caused the breakdown of the protection dikes to assist populations. However all these interventions had mixed success and were limited in time for lack of financial resources and particularly of technical resources to meet the challenges.

Mangrove reforestation requires a smart choice of suitable species easy to transplant, but also a good knowledge of techniques for the transport, storage and, transplanting of seedlings. The choice of the most suitable for transplanting is also a key element to increase the rate of success of reforestation activities. On aquaculture, weaknesses in the organization and regulation of the operation compromise the resource sustainability.

Component 2: Protection against flooding, coastal erosion and salinization in Dionewar: In Dionewar, populations are at high risk of frequent flooding during rainy events of great importance. These floods are a constant threat to homes and socioeconomic infrastructures. The damage they cause weigh heavily on the already scarce financial resources of populations. In addition, the Island in many parts is facing the advance of the sea that is gradually encroaching into the vegetation and farmland located on the shore, damages the socioeconomic infrastructures and hinders mobility.

Populations are powerless to this situation, which requires large financial and technical resources.

Component 3: Strategic Planning and knowledge management: For instance, none of the Local Development Plans (PLD) in Dionewar includes strategies, activities and/or options that tackle future climate change. As it appears, when preparing these plans, the council did not have the information and the tools needed to integrate climate change concerns into these plans. Therefore, support for mainstreaming climate change within PDCs is needed.

Furthermore, communities are well organized through existing communities groups but any local convention exist for the regulation of natural resources uses. There is no specific climate data on Dionewar available.

Finally, the interventions of various stakeholders to address the adverse effects of climate change generate useful knowledge but these are rarely documented and shared. In addition, these interventions rarely provide for sustainability measures. Very often, lessons learnt from the implementation of these interventions are lost at project completion.

Adaptation alternative (With project)

Under the adaptation alternative scenario proposed with this project, solutions to reduce the vulnerability of the municipality of Dionewar will be implemented. It is about protective measures of the human establishments and about infrastructures against the floods and the salinisation of lands, measures of strengthening the resilience of ecosystems of the estuary, and measures for strengthening the resilience of the community at the systemic level (mainstreaming of the adaptation in the PDL and the PLAE), at the organizational level (adoption of local convention) and at the individual level (training of the members of the GPF on alternative modes of production). It is about concrete measures of adaptation; on ecosystemic basis and on community basis.

Ecosystem based adaptation measures are about the strengthening of the resilience of the main ecosystems of the estuary to improve as well their ecological function, as their capacity to supply services to the populations that depend on it. As such reforestation of the mangrove with salt tolerant species is envisaged, as well as planting tree species in terrestrial forests.

Community based adaptation aims at strengthening the adaptation capacities of the populations, in particular the most vulnerables that are women, to face the negative effects of climate change by adopting especially alternative modes of production which maintain the potential of production of ecosystems on the island. Thus, fish ponds and cages of oyster farming will be implemented and the women trained for their exploitation. These activities will allow the increase of the food availability as well as the incomes of the populations. This increase of financial capacity will enhance their ability

to face climate change effects, as it will impact the living conditions of a large part of the community including women.

Projects resources will also help improving food security for approximately 5,600 persons through the support of alternative mode of production of rice, fish and seafood productions. These alternative modes of production aim at decreasing anthropic pressure on mangroves ecosystems while contributing to an increase of seafood products. The planting of coconut and oil palm trees will contribute to diversifying and developing local productions which, in turn, will generate incomes for hundreds of people and reduce expenditures on food products.

The central Government and the local Government will also draw concrete benefits from the project's investments as the construction and rehabilitation of protection facilities will limit spending for emergencies, including flooding and tidal waves. This will allow not only to securing Government's equipment investments, but also mobilizing more resources for other priority sectors.

More specifically adaptation alternatives to be implemented through the project components are as follows.

Component 1: Enhancing resilience for productive ecosystems in Dionewar Island: The 'adaptation alternative' to be implemented through this project under Component 1 builds capacity 'on the ground' at the local level to establish effective approaches and techniques which increase the resilience of vulnerable communities, and of value chains to climate change and climate variability. Component 1 is designed to enhance the resilience of key productive sectors on the Dionewar Island. It builds the capacity of local organizations to support real 'on the ground' impact in order to demonstrate the social and environmental benefits of climate change resilience in a range of local productions systems. Activities build on and partner with a number of important existing initiatives to support the 'additionality' of climate change adaptation in key value chains.

The project resources earmarked for this component (USD 173,375) will be used through the revitalization of fish and oyster farming activities, the replenishment of the vegetation, stakeholders' capacity building and product development. Populations will have a good knowledge of the techniques of selection, transport, storage and, transplanting of seedlings but also in the selection of sites for reforestation. The introduction of new production, processing and storage techniques will help generate added value for local productions. The project also seeks to organize beneficiaries around sustainable farming through local regulation and protection of vulnerable areas as well as improved recovery. Ultimately, the activities implemented under component 1 will make it possible to improve the sustainable livelihoods of communities and restore natural capital in the island. They will allow higher production in better quality and reduce pressure on resources currently used in collection situations.

Component 2: Protection against flooding, coastal erosion and salinization in Dionewar. The project resources for component 2 (USD 863,000) will contribute to protecting, socioeconomic infrastructures (highschool, health centre, infrastructure and housing), the vegetation cover and croplands against water and salinity. The living conditions of populations will be improved and sustainable livelihoods enhanced. People will be trained and involved in the construction of works. They will also be organized to perform simplest tasks of maintenance.

Component 3: Strategic Planning and knowledge management. With the resources (USD 90,496) mobilized for component 3, the project will provide support for equitable and sustainable use of project's access and sustainable use of natural resources. Local development plan will be updated to integrate climate changes options and costs benefits and local convention on the sustainable use of natural resources established. Lessons learned will be shared to enable replication.

J. Sustainability of the project outcomes at project design

The first element aiming sustainability of the results of the project holds in the process of selection of the project idea, made through an open and competitive call for projects launched by the CSE. This approach permitted to select the present project which answers urgent needs for the populations which assure the porterage of the project through a federation of community base organizations for which the CONAF assures the leadership. The assurance that the project addresses needs expressed by the community is the first security of sustainability of the results of the project.

In the same vain, the implementation of a local project management unit (PMU) based in Dionewar and led by natives of the community, is a sign of appropriation, which is also going to assure the sustainability of the project beyond its planned 3 years duration.

In addition, during the process of negotiation of a local convention for the sustainable management of natural resources, it is planned to strengthen the management of various existing financial community mechanisms, in a main financial mechanism for supporting local development inititives. Several protection dikes were already built or reconstructed with funds from these mechanisms.

To note also that the municipality of Dionewar made a commitment to put in its next budget a specific allocation for the maintenance of the protection dikes to be built by the project.

Moreover, various specific conventions that will be signed between the CSE and certain decentralized structures (CADL[24]) or specialized (ANA, ANACIM) of the government,

[24] Local Development Support Center

aim at assuring a technical support of the government for the project, which in the last resort assures the sustainability of the project.

Furthermore, the project's M&E system includes the development at an early stage of a sustainability/exit plan, which will be the main strategy to ensure the sustainability of the project achievements.

Generally, the project will take an adaptation approach based on sustainable livelihoods by building the basis of human, natural, physical and financial assets. The human capital will be enhanced with improved access to knowledge and know-how.

Component 1 includes capacity building activities for recipients.

The Federation of Women's Promotion Groups (GPF) has a strong experience in organization and management of common equipment, acquired through the intervention of various partners. They will be the main beneficiaries of activities implemented under Component 1, and will be responsible for sustaining the gains and profit sharing. Members of the GPF will be trained for optimal resource management. For equipment maintenance, an amount is paid in a bank account after each sale. Establishment of such mechanism will be facilitated by women's experience through the management of the mutual savings and credit Fund they have created. In the past, they developed their own community projects such as building a school for the village, or the introduction of a loan scheme to members who repay at a very low interest rate. In this way they are able to gradually increase their capital.

Through their involvement in Component 2 activities, the population will also gain new capabilities for the maintenance of the realizations, and potentially their extension.

While the natural capital is developed through adaptation measures based on ecosystems such as reforestations, the physical capital is strengthened through coastal protection. All these capitals will contribute to enhance the financial asset of fishermen and women transformers contributing to improve the adaptive capacities both in households and the community. The combined effects of the 3 components will ensure the sustainability of outcomes in the long run.

K. Overview of the environmental and social impacts and risks identified as being relevant to the project.

Analysis of risks

Compliance with the Law

Though designed to address the adverse effects of climate change and climate variability and to build resilience, the activities planned under components 1 and 2 might generate some negative impacts for the natural ecosystems and the communities.

There are a regulatory regime and development strategies relating to mitigating such risks:

- Law N° 2001-01 of 15 January 2001 (Environment Code)
- Law N° 86-4 of 24 January 1984 (Hunting and Nature Protection Code) ;
- Law N° 81-13 of 4 March 1981 (Water Code) which provides provide for preventing water pollution and requirements in terms of securing drinking water supply and public health, agriculture, biological life of receptor medium, fish fauna…;
- Land legislation: the most relevant section with regard to the project activities are:
    - Land Act N° 64-46 of 17 June 1964 pertaining to the National Domain and creates spaces that are not likely to be owned ;
    - Law N° 76-66 of 2 July 1976 (State Domain Code) which organize the public domain and the private domain;
    - Law N°96-06 of 22 March 1996 (Local Government Code) and Law N°96-07 of 22 March 1996 related to transfer of powers to Local Governments, as well as the Decret N°96-1134 of 27 December 1996 deifning the powers of the Local Government for managing the environment in its territory.

Access and equity

The revival of rice cultivation will include activities in Ndimsane Island, which is a satellite island of Dionewar. The re-launch of rice growing activity could be source of conflicts, if appropriate measures are not identified and implemented.

Marginalized and vulnerable group

The project perfectly includes vulnerable groups (especially women) in its approach. Activities such as arches and oyster collection or processing of fish product are exclusively dedicated to them. But they are also associated with the implementation of other components such as tree planting and rice cultivation. However, they could face constraints related to husbands permission that men could use as a mean to control part of their improved incomes.

The baseline studies and Project Benefit Assessment will include identification of impact on marginalized and vulnerable groups

Gender Equity and Women's Empowerment

Women are involved in all project components. Even better several components such as the collection of arches and oyster or processing of fish products are specially dedicated to them while they will get a quota to plant trees like oil palms or the *Detarium senegalensis*. In some

components such as processing of fish products they will benefit from capacity building in dedicated techniques. The environmental monitoring of the project will ensure compliance with these provisions. However, there is a risk for these actors to lose control on part of their improved incomes.

The project should comply with the principles of the National Strategy for Gender Equality in this regard.

Core labour rights

Modalities for the project implementation eliminate constraint in its implementation. Populations freely organized to propose the project that they believe is relevant to the economic and social development of their community. This is reflected in the project document, which advocates for sharing of benefits generated by the project. Moreover, payments for the work done under this project will be made in strict compliance with the current national standards (Labour Code).

Indigenous people

The population of the Dionewar islands consists mainly of the same ethnic group (sere niominka) and a well-established social rule is respect and equity. Therefore, there is no risk related to indigenous people for this project.

Involuntary Resettlement

The project activities do not require the displacement of any community and hence issue of resettlement does not arise.

Protection of natural habitats

The project is planning to rehabilitate natural habitats, namely the mangroves and the forests.

Component 2 of the project includes a ‘’mangrove planting’’ component, which is a vital ecosystem in the reproduction and development of some species of fish and shellfish. That is the favorite habitat for arches and oysters that will be utilized by the project. The tree planting activity is therefore crucial at a time when the mangrove is facing degradation factors such as salinity and deforestation for various purposes. Similarly, the planting of typical species of the Island like oil palm, coconut tree or “ditakh’’ (*Detarium senegalensis*) will contribute to restore vegetation on the site.

Conservation of Biological Diversity

The project area of intervention, the Saloum Delta has been classified as biosphere reserve (RBDS) since 1981 by UNESCO and a site of international importance since 1984 by the RAMSAR Convention. This biosphere reserve covers an area of 334,000 ha. In addition, the Saloum Delta has 9 protected forests, a natural park (National National of the Saloum Delta), a Marine Protected Area (Bamboung) and community natural reserves (Mansarinko, Missira, Nema Bah, Same Saroundia, Ndinderling, Baria

Valley). A second Marine Protected Area in Sangomar is under preparation and will include the communes of Dionewar and Palmarin and cover an area of 87.437 ha.

Regarding tree planting as well as fish and oyster farming, only local species will be used. However, equipment used in activities under components 1 and 2 could generate some negative impacts for the marine biodiversity.

An assessment of possible impacts will be conducted and mitigation measures will be identified and implemented if there is any risk for the biological diversity.

Climate Change

The island nature of the area of intervention under the project makes it particularly at risk of rising sea level, one of the major consequences of climate change (increased temperature). The findings of templates taking into account the full range of the 35 scenarios forecast an average increase from 0.09 m to 0.88 m of the sea level between 1990 and 2100 (IPCC, 2001). In this context, the project will make sure to reduce greenhouse gas emissions. This is reflected in the ''tree planting'' component that can contribute to carbon sequestration. At the same time, the development of rice fields will almost not cause logging given the low rate of recovery on the site.

Pollution Prevention and Resource Efficiency

Some activities under the project such as processing of fish products or rice cultivation can be sources of water and soil pollution. The processing of fish products can generate solid and liquid waste while rice cultivation could use fertilizers that will be thrown through drainage waters. The Environmental and Social Risk Management Plan will suggest the development of plans to manage waste and drainage waters so as to mitigate site contamination. At the same t time, the use of herbicides in rice cultivation will not be promoted.

The project looks for higher resources efficiency for better management of available natural resources like fish species, plantation species (locally available), etc.

Public health

In the ''dike construction'' component, the possible and extended presence of workers can foster contact with local populations and cause outbreak of sexually transmitted infections, including HIV/AIDS. It may be the same for the construction of pirogues and banners for garlands for aquaculture.

Physical and cultural heritage

Shellfish beds are a cultural heritage in the Island and often associated with the presence of baobabs symbolizing former life on the site. Baobabs are also linked to necropolis frequently mounted on shellfish beds. These huge trees often mark sacred places such as the Griot baobab found in Dioron Boumak.

The gravesite baobab which was a funerary practice has been reported only in the centre-western part of Senegal among the Sereres

In its implementation, the project will make sure not to prejudice the integrity of this heritage.

Land and soil conservation

Waste from processed fish products can contribute to land and soil degradation if poorly managed. The same for fertilizers to be used in rice cultivation as well as in the preparation of rice plots which can destroy soil and foster salt upriver.

Coastal erosion is a reality on the coast namely upstream the coast Arrow protecting the commune. The construction of a protection structure here should not transfer the phenomenon to another part.

Table 4: Environmental and social impacts and risks

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Compliance with the Law		Potential risks: - Contamination of the site by construction equipment; - Increased pressure on resources following capacity building - Changes in drainage patterns Requirement: Environmental and Social Impact Assessment
Access and Equity		Potential risk : - Conflicts on sharing of benefits from revival of productive sectors Requirement: - Environmental and Social Impact Assessment
Marginalized and Vulnerable Groups	.	Potential risk: - Loss of control on part of their improved incomes (women oyster farmers or rice growers) Requirement: - Baseline studies and Project Benefit Assessment
Human Rights	No violation of human rights is foreseen through the project implementation.	None
Gender Equity and Women's Empowerment		Potential risk: - Loss of control on part of their improved incomes (women oyster farmers or rice growers)

		Requirement: - Baseline studies and Project Benefit Assessment - Environmental and Social Impact Assessment
Core Labour Rights	No risk identified with regard to labour rights. Human investments will be used as a contribution of the beneficiaries for the building of the dikes. This will also allow them receiving required capacities for the maintenance of the facilities after project completion.	None
Indigenous Peoples	Not relevant for this project	None
Involuntary Resettlement	Not relevant for this project	None
Protection of Natural Habitats	The project activities comply with the requirement in terms of protection of the natural habitats.	None
Conservation of Biological Diversity		Potential risks: - Solid and liquid waste generated by the processing of fishery products and fertilizers that could be used in rice cultivation may be thrown through drainage waters and be harmful to the biodiversity. - Poor management of fish and oyster farms could also lead to toxic runoff, introduction of diseased species into populations - Excess of food and waste may influence population densities or stressed out fish. Requirement: Environmental and Social Impact Assessment
Climate Change	The project activities comply with the requirements as regards climate change	None
Pollution Prevention and Resource Efficiency		Potential risks: - Solid and liquid waste generated by the processing of fishery products and fertilizers that could be used in rice cultivation may be thrown through drainage waters. Requirement: Environmental and Social Impact Assessment
Public Health		Potential risks : - Outbreak of sexually transmitted infections, including HIV/AIDS Requirement: Sensitization of workers and populations (through the environmental and social management plan)

Physical and Cultural Heritage	In its implementation, the project will make sure not to prejudice the integrity of this heritage.	None
Lands and Soil Conservation		Potential risks - waste from processed fish products can contribute to land and soil degradation if poorly managed - fertilizers to be used in rice cultivation as well as in the preparation of rice plots can destroy soil and foster salt upriver - transfer of the coastal erosion phenomenon to other parts. Requirement: - the waste management plan proposed by the ESIMP will help limit possible soil contamination - the feasibility study will ensure that the nature of the structure will allow avoiding to foster gullying in other sites

Categorization

In view of the above, the project is categorized as “Category 2” of the Environment Code of Senegal, which means that it has limited impacts on the environment or the impacts can be mitigated by implementing measures or changes in its development. This category is subject to an initial environmental and social assessment.

With regard to the Adaptation Fund AF categorization, the project can be categorized as Category B, meaning that it has potential adverse impacts, but in small number and scale, not widespread and easily mitigated.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Arrangements for project implementation

Institutional framework

Several institutions are involved in fighting climate change in Senegal. For the needs for implementation of this project, only those who are the main stakeholders to the project will be analyzed.

The **Direction of the Environment and Classified Establishments (DEEC)** of the Ministry of the Environment and the Sustainable Development (MEDD) is the Designated National Authority (DNA) of the Adptation Fund (AF) in Senegal; she has endorsed the current request of financing. (See letter of endorsement)

The **Centre de Suivi Ecologique (CSE)** is semi-autonomous body created in 1993, which the long-term mission is to contribute to the economic development of Senegal by facilitating the participative management of the natural resources and the environment by the gathering, the treatment, the analysis and the dissemination of data and information about the territory and the resources. The CSE covers a wide range of interventions including the monitoring of the environment, town and country planning, decentralization, early warning, disasters management, capacity building, costal aeras management, etc. Its activities in all these themes are based on the use of the geomatics combined with field works. The CSE was accredited as National Implementation Entity (NIE) as well with the Adaptation Fund (AF), as with the Green Climate Fund (GCF). The CSE led with success an adaptation project to in coastal zone in Senegal (Adaptation to coastal erosion in vulnerable zones). It has also recently successfully submitted to the GCF a project proposal, which is one of the three first projects approved for Africa by the Green Climate Fund.

The **National Council for Functional Litaracy (CONAF)** was created in October 1993. It was registered as a national Non-Governmental Organization (NGO) under the number 03140 / MFSAEMFMPE / DDC of April 01st, 2010. The CONAF is a NGO that works for the development and the promotion of well being of the Senegalese populations, mainly the vulnerable ones. The CONAF fights to reduce the poverty and the ignorance by the training of vulnerable groups (women and girls), raising awareness and provision of tools and economic means through functional community base organizations. It's in this context that the CONAF in partnership with the **Association of the Natives for the Development of Dionewar (ADD)** collaborate actively in activities of research actions to protect the village of Dionewar against the coastal erosion and the floods. The synergy between both structures is visible on the field through mangrove reforestation actions and the installation of dikes of misfortunes to face floods and coastal erosion, which threatens the village of Dionewar.

The **National Agency for Aquaculture (ANA)** is an autonomous administrative structure, created by decree 2011-486 of April 8th, 2011 (repealing the decree 2006-766) and placed under the authority of the Ministry of Fisheries and Maritime Economy. ANA has for general mission to contribute to the development of fish farming by closely assisting the professionals of the sector, and by the necessary specific support for the sustainable development of the aquacultural exploitations and the realization of the objectives of the National Program of Development for Fish farming. It is in charge, in synergy with the appropriate structures, to:

- identify and exploit sites favorable to marine and continental fish farming;
- sensitize and supervise enterprenors project leaders in the various segments of the aquacultural sector;
- strengthen management capacities of fish farming professionals, in particular in the technical, financial, commercial and organizational aspects;
- support the implementation of aquacultural productions farms;
- assure, in partnership with the specialized structures, the required quality monitoring services for the aquacultural companies;

- seek national and foreign investmentsfor the aquacultural sector.

The **National Agency for Civil Aviation and Meteorology (ANACIM)** was created by decree 2011-1055 of July 28th, 2011. It arose from the fusion of the former agencies of the civil aviation and the meteorology service. Through its Directorate of Meteorology, ANACIM is the body in charge with the collection and dissemination of meteorological data on the entire national territory. At provincial level, ANACIM has standard meteo stations allowing it being able to collect data and to perform the forecasting of several parameters namely: rainfall, wind, humidity, tide. These data are regularly collected and analysed To produce weather reports that are distributed through various broadcastings channels among which the written press, radios, TVs and Web sites.

D**ecentralized services (Sub-Prefecture and CADL).** The municipality of Dionewar is under the administrative authority of the sub-prefecture which is based in the village of Niodior. As representative of the Government at local leve, the Sub-prefect has under his authority all government employees and civil agents in the Arrondissement (third administrative level in Senegal). As such, he coordinates the economic and social development actions within the framework of the local planning strategies. He is also in charge of mobilizing all appropriate means to arouse and to encourage the participation of the populations to the development actions. In this respect, he chairs the local development support center (CADL) among which the attributions, the organization and the functioning are fixed by order.

The **Local Development support center (CADL)** is a decentralized body of the Local Development Support Directorate (DADL). It is charged with to impulse and to follow all the development actions at the community level, within the limits of the territory of the district. The agents of the CADL assure a function of support, council and training in diverse domains such as: agriculture, environment, fishing, community base organization, the acts and laws on decentralization etc. In this regard, the budget of the municipality is always developed with the support of the CADL.

Project management's bodies

The **National Implementing Entity (NIE)**. The Centre de Suivi Ecologique is the implementing entity of the project for the Adaptation Fund and assures as such the administrative and financial Management of the project. Besides the bookkeeping of the project, the CSE will be in charge of: a) the implementation of a financial accounting system and management of the projects resources; b) drawing up expenditures forecasts for activities planned in the annual work plan and budget (PTBA); c) the the project account management; d) the accounting recording for the project operations, the preparation of the annual financial statements and the kept up to date of all the documentation of financial and accounting management of the project; and e) the programming of the annual audits, the transmission of audit reports to the Government and to the AF, and the implementation of the recommendations of audits. The implementation of the financial management activities will be made correspondingly and in the respect of the administrative, financial and accounting procedures such as

defined in CSE's Handbook of Procedures. This latter defines the scoop of work of the project staff and the modalities of appreciation of their performances.

The **National Steering Committee (NSC)**: the implementation of the project will be overseen by the NSC which will be invested with the responsibility for approving the plans, operational and annual reports of the project and for guaranteeing that the activities of the project are in line with those in the document approved by the AF and with the policy framework of the country. The NSC will hold its first meeting during the phase of starting up of the project and will meet then twice a year to make an assessment of the progress of the project, monitor the results, receive other reports for which it can ask for that purpose and get on annual continuous plans of work. The NSC will be composed of the representatives of (i) the Designated Authority for the Adptation Fund (ii) the climate change national committee, (iii) the decentralized bodies operating in Dionewar, (iv) the community base organizations, (v) the private sector, (vi) the research institutions, (vii) and the CSE.

The **Project Management Unit** (**PMU**): The Project will be executed by a project team, called Project management unit (PMU) that will be based at Dionewar. The PMU will include the key following staff: i) A Project Local coordinator; ii) a Monitoring and Evaluation specialist; iii) an administrative and financial assistant; and v) two field officers (Members of the CADL). Additionally, staff members of ANA and ANACIM will also be mobilized when needed for specific tasks.
The CSE will not be directly involved in executing project's activities, but will be supervising the project execution.

The PMU will be responsible of: i) the preparation and the implementation of working programs and annual budgets (PTBA), ii) relations with administrative authorities and other partners, iii) coherence between the components of the project, iv) the supervision and the follow-up of execution of all the activities promoted by the Project. It will establish a synergic partnership with current projects under implementation in the zone, as well as other projects the interventions of which are complementary of those of this project. It will contribute to the harmonization of the approaches of intervention (compatibility between the PTBA, the harmonization and the alignment of the activities etc.) to facilitate exchanges of information, experiences and lessons learned between all stakeholders.

Coordination and implementation modalities

The **annual workprogram and Budget (PTBA).** The PTBA will be prepared by the PMU on the basis of activities planned under the different components of the project. The PTBA will contain the detail of the activities, their unit and global costs, the monitoring indicators as well as the modalities of execution. It will be subject to approval by the NSC and an opinion of non-objection by the CSE before its implementation. The populations will adopt a flexible approach allowing regular revisions of the PTBA during

the budgetary year so as to take into account the request formulated with regard to the planned deadlines of execution.

Service providers. The Project will subcontract the execution of some of the activities to service providers being of the associative, public, and private sectors. The PMU will develop specifications and will sign performances contracts with the service providers specifying the activities to be executed, the expected results, the obligations and the rights of each party, the deadlines of execution, the delivrables, the reports and monitoring-evaluation indicators. For information purposes and not restrictive, contracts and procurements for the project activities can be made with the potential service providers below: i) the public institution providers: the institutions of research and the regional and departmental technical services of the relevant Ministries on the subject, in particular for the activities of specialized technical support, supervision or follow-up; ii) associative providers: NGO, GIE, umbrella organizations and local development associations , in particular for advice and training; and iii) private operators: works firms, engineering consulting firms, independents consultants, toilers.

Implementation appoach of the components. In a general way, the implementation approach is articulated around three main principles: i) the full and active participation of local populations and their representative institutions in all the stages of the Project implementation , ii) the contractualization of persons in charge of the execution of the actions promoted by the Project (development of the local offer of service), and iii) the research and the promotion of an operational partnership between the Project, the local actors and the other development partners intervening in the same area.

Activities of starting up. It will be mainly about following activities: i) the selection and the recruitment of the key staff of the Project; ii) the elaboration of a PTBA, iii the preparation of a monitoring-evaluation (M&E) plan and the implementation of the M&E system; iv) the identification of the potential service providers, the preparation of the files of calls for tender of the main service providers; v) the organization of the inception workshop and starting up of the Project.

B. Measures for financial and project risk management

Risks	Level	Proposed mitigation mesures
Institutional and political The local elected representatives and the representatives of the State who already have been trained by the project have changed after the local (and maybe presidential) elections in 2017	Low	Training sessions are organized every year by the project and the new elected representatives or officials appointed by the government can benefit from trainings

Risks	Level	Proposed mitigation mesures
Climatic Exteme wheather events affect the realizations of the project	Low to medium	The technical specifications for constructions of dikes, ridges, fish ponds, spat collector and grow out bags, take into account the most extreme events having affected the project's zone
Financial The implementation of alternative options of production (fish farming, oyster farming, etc…) will generate important financial resources, which can be source of conflict between stakeholders or subject to embezzlement	Medium	Management committees are put in place and their members trained on transparent and fair management of the generated funds. Businesses plan are also developed for production efficiency purposes.

C. Measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund

With regard to compliance with the regulatory framework, there is a need for the project to enforce the relevant provisions provided by the regulations and strategies.

Pursuant to the Senegalese Environmental Code, the project will undergo environmental evaluation so as to have a compliance certificate for its implementation in compliance with the environment. The type of environmental and social evaluation to be conducted is defined in Annex of the same Code depending on the magnitude of potential impacts. As the project includes several parts per component, several environmental studies may be necessary.

The project will also comply with other legal texts such as the Mining Code to request for instance clearance to open careers for the needs to construct infrastructures (dikes, basins, etc.). The Forest Code will support the project activities on tree planting namely with regard to implementation and evaluation techniques and standards. The project will also comply with the Fisheries Code governing the modalities for capture and resource management: the equipment used for aquaculture development shall be certified by the competent services of the Ministry of Fisheries.

At the international level, the Convention on Biodiversity will be invoked to bolster the efforts for the conservation of species on the Island while the Convention on Persistent

Organic Pollutants will be in force to monitor the possible use of and management of chemicals in aquaculture and rice cultivation.

The initial environmental and social impacts assessment will help better identify risks for biodiversity and the appropriate mitigation measures. An environmental and social management plan will be developed in this regard, when required.

If relevant, the environmental and social management plan could suggest the development of plans to manage waste and drainage waters so as to mitigate possible site contamination. At the same time, the use of herbicides in rice cultivation will not be promoted.

The population and workers will be systematically sensitized on health risks, mainly HIV/AIDS related risks.

To anticipate potential land tenure related issues, a "cadastral map" for rice-growing areas will be developed. This will help clarify the land status before any intervention and will guide the distribution of lands at the end of the realizations.

The nature of the structures to protect from coastal erosion was carefully chosen likewise for structures protecting against upwelling in Colbassy, for example, to avoid fostering erosion in other sites.

CSE's Environmental and Social Policy and the Adaptation Fund's Environmental and Social Policy will be made available to project stakeholders and promoted through training and dialogue with implementing agencies to build a common understanding of the principles and practices that have been adopted to enhance development benefits and avoid unnecessary harm to the environment and the communities.

D. Budgeted Monitoring and evaluation plan arrangements

The monitoring and evaluation of the project will be made according to the procedures established by the CSE and by the AF. The Results framework gives the performance indicators against which the project will be evaluated and specifies the baseline as well the objectives to be achieved. The M&E system proposed describes the main planned activities to be executed in the M&E, reporting and project analysis system (MERAS).

The M&E plan (MEP) is the main element for the Monitoring and evaluation activities, reporting and analysis System (MERAS) and will play a key role for the planning, the management and the implementation of project activities. The MERAS is designed to play three main roles: 1) Coordinate the M&E activities of the project; 2) Provide data collected in the appropriate formats for the various stakeholders; and, 3) Store these data / information as well as the other relevant data / information in a computerized system. The total cost of the MEP is estimated at 83,539 USD among which 30,039 USD will be financed by the CSE with its management fees.

The table below shows a list of potential products of the MERAS, with an indicative calendar for the publication of the diverse products, and corresponding budget. The project will have to produce and circulate several documents during the first months of implementation. Thereafter certain documents will be produced periodically while the others will be on demand.

Table 5: Budgeted Monitoring and Evaluation plan

OUTPUTS	MAIN RESPONSIBLE	TIMEFRAME	BUDGET ($ US)	DESTINATION
Inception workshop's report *	Project team CSE	During the fisrt month following the start of project	15,539 (9,500 + 6,039)	CSE, AF
M&P Plan	Project team CSE	During the fisrt month following the start of project	-	CSE, AF
National Steering committee meeting reports	Project team CSE	Every 6 months	6,000	CSE, AF
CSE supervision field mission reports**	CSE	Monthly in year 1 Quaterly from year 2 to completion	24,000	National Steering committee (NSC), CSE
Final M&E Plan (Including baseline)	Project team	At the beginning of the project (1st month)	-	National Steering committee (NSC) CSE, AF
Monthly progress report	Project team	The 5th of each month	-	National Steering committee (NSC)
Quarterly report	Project team Task Manager CSE	End of each quarter	-	NSC, CSE, AF
Mid-term evaluation report	Consultants	At the mid-term of the project	3,000	NSC, CSE, AF
Final evaluation report	Consultants	At project completion	7,500	NSC, CSE, AF
Audit Report	External auditors	At the end of the project	10,000	NSC, CSE, AF
Maps, posters, videos, photos, etc…	Project team	Rolling, upon availability	17,500	Diverse
TOTAL			83,539	

* This activity is cost shared between the project execution cost and the project management fees of CSE
**These activities will be financed with the management fees of the National Implementing Entity (CSE)

E. Results framework

Table 6: Results framework

Title: REDUCING VULNERABILITY AND INCREASING OF COASTAL COMMUNITIES IN THE SALOUM ISLANDS (DIONEWAR)

Project goal: Reduce the vulnerability of populations in the Saloum Islands to flooding and coastal erosion.

Specific objectives:
1. Improve the resilience of the sectors of fishing, aquaculture and forestry to natural hazards

2. Reduce the vulnerability of populations and natural habitats to hazards through the establishment of structures to better regulate flooding, control coastal erosion and fight against land salinization.

3. Enhance local development planning through integration of climate change, setting up local conventions and documenting lessons learned

RESULTS CHAIN		*PERFORMANCE INDICATORS*			*MEANS OF VERIFICATION*	*COMMENTS ON INDICATORS*
		Indicator	*Baseline*[25]	*Target*		
OBJECTIVE	Reduced vulnerability of populations in the Saloum Islands to flooding and coastal erosion	Number of risk-exposed coastal households benefiting of adaptation measures	451 households threatened by floding and coastal erosion	At least 60% households (25% at mid-term)	Progress reports, survey	

[25] Current baseline information derives from documentary review and field missions during project preparation and may need to be updated at the early stade of the project implementation as indicated in the monotoring and evalution section of this project document.

OUTCOMES	Improved resilience of the main ecosystems of Dionewar Island and sustainable livelihoods of populations	- Are (ha) of mangrove and terresterial ecosystems restorated - % of increase of income of population involved in alternative income generating activities (desagregated by gender)	0 0	5ha of mangrove (2 ha at mid-term) and 6ha of terrestrial ecosystem (2ha at mid-term) Increase of 25% at least	Fiel visit, progress reports Servey	
	Reduced vulnerability of populations and socioeconomic infrastructures in Dionewar to hazards with the construction or rehabilitation of protection structures	Number of dikes and ridges rehabilitated and built to protect households and socioeconomic infrastructures against flooding and coastal erosion	0	2 dikes, 2km of ridges	Field visit, completion report of contractors	
	Strengthened capacity of local institutions to mainstream climate change in local development planning, sustainable natural resources management strategies and to document and disseminate lessons learned.	*Number of persons (including decision makers) aware of local climate issues and adequate measures to be implemented* *Number of local development tools that integrate adaptation measures*	0 0	100 persons (50 at mid term) 2 (PLD and PLAE)	Training Workhsop reports (list of participants) Up dated PLD and PLAE documents	

OUTPUTS	**Component** 1: Enhancing resilience for productive sectors in Dionewar Island					
	1.1. Alternative Fish and oyster farming production system developed for 18 women associations, including the setup of 10 fish ponds, 200 spat collectors and 1000 growout bags (USD 81,975)	- Number and type of adaptative production system - Number of fishpond - Number of spat collector - Number of growout bags	0 0 0 0	3 10 200 1000	Progress reports, field visit	Alternative fish and oyster farming includes: fishpond, spat collector and growout bags)
	1.2. At least 6 ha of trees planted (enrichment planting with especially coconut trees and oil palms) and 5 ha of mangrove rehabilitated in Dionewar and its satellite islands in order to revitalize the main productive sectors (USD 35,200)	- Area (ha) of trees planted - Area (ha) of mangrove rehabilitated	0 0	*- 6ha of tree planted (2ha at mid-term)* - 5ha of mangrove rehabilitated (2 ha at mid-term)	Field visit, progress reports	
	1.3. At least 18 women economic interest groupings and natural resources management committee trained to improve their technical performance (USD 40,800)	- Number of women's economic groups trained - Number of member of management commitee of community based organisations trained	0 0	*18 (10 at mid term)* *30*	Training sessions reports	
	1.4. *Fish and oyster farms business plan developed (USD 15,400)*	- Number of business plan	0	2	Business plan documents	
	Component 2 : Protection against flooding, coastal erosion and salinization in Dionewar					

	2.1. The 2 dikes to protect against flooding are restaured and extended over 2 km (USD 624,000)	- Number of new dikes built	0	2	Contractor's completion report/Field visit	
	2.2. Dead palm trees are planted over 2 km in the water to serve as breakwaters and mitigate coastal erosion in Dionewar Island (USD 187,000)	- Number of linear distance	0	2 km	Contractor's completion report/ Field visit	
	2.3. Ridges are built around rice plots in Dionewar (USD 31,000)	- Area (ha) of rice plot protected by ridges	0	10 ha at least	Contractor's completion report/ Field visit	
	2.4. A maintenance plan developed, involving key stakeholders (USD 21,000)	- Number of dikes' mantenance plan developed	0	1	Maintenance plan document	
	3. Strategic planning and knowledge management					
	3.1. The Local Development Plan (PLD) and the PLAE are reviewed in order to integrate adaptation to climate changes options & costs benefits (USD 21,000)	- Number of planning documents reviewed that integrated adapatation options	0	2	Up dated PLD, updated PLAE	
	3.2. Rules governing the exploitation of timber and non-timber forest products and the biological rest updated and formalized through a Local Convention (USD 7,946)	- Number of local covention on sustainable management of natural ressources adopted	0	1	Municipality delibaration note	

	3.3. Project's lessons learned documented and shared (USD 32,150)	- Number of production of lessons learned - Number *of persons (including decision makers) informed of local climate change issues and adequate measures to be implemented*	0 0	Audio records, video, posters and publications	Audio records, video, posters and publications	Productions includes: audio, video, posters and hard paper publication
	3.4. Automatic méeteorological station implemented (USD 29,400)	- Number of meteorological station implemented	0	1	Field visit, contractor's achievement report	
	4. Project Execution (USD 118,290)	- Rate of achievement	0	100%	Progress reports, midterm and final evaluation report	
	5. Project management CSE (USD 105,839)	- Number of reports - Rate of disbursement - Rate of achievement	0 0 0	12 100% 100%	Reports Audit report Final evaluation, field visit, custumer satisfaction survey	9 quaterly reports, 2 annual reports, 1 final report

F. Project alignment with the Results Framework of the Adaptation Fund

The overall objective of the project (« to reduce the vulnerability of populations in the Saloum Islands to flooding and coastal erosion") contributes to the Adaptation Fund's Outcomes 1 ("Reduced exposure at national level to climate-related hazards and threats"), 5 ("Increased ecosystem resilience in response to climate change and variability-stress induced"), 6 ("Diversified and strengthened sources of income for vulnerable people in targeted areas livelihoods"), 4 (Increased adaptive capacity within relevant development sector services and infrastructure assets), 3 (Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level), and 7 (Improved policies and regulations that promote and enforce resilience measures). This will be achieved by enhancing the resilience of natural habitats, populations and their activities to the adverse effects of climate change and climate variability.

The first **project outcome** ("The resilience of the main productive sectors of Dionewar Island is enhanced and sustainable livelihoods of populations improved") aligns with the Adaptation Output 5 (Vulnerable ecosystem services and natural resource assets strengthened in response to climate change impacts, including variability) and Output 6: "Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability".

The **Project Outcome 2** ("The vulnerability of populations in Dionewar to hazards is reduced with the construction or rehabilitation of protection structures") aligns with the Adaptation Fund **Output 4**: "Vulnerable physical, natural, and social assets strengthened in response to climate impacts, including variability change".

The **project Outcome 3** ("Climate change is integrated in local development planning, natural resources are used in a more sustainable way and lessons learned are documented and shared ») is aligned with the Adaptation Fund **Output 3**: Targeted population groups participating in adaptation and risk reduction awareness activities and **Output 7**: "Improved integration of climate-resilience strategies into country development plans".

Table 7: Project alignment with the AF's results framework

Project Objective(s)[26]	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
Reduce vulnerability of populations in the Saloum Islands to flooding and	Number of risk-exposed coastal household of Dionewar benefiting of adaptation measures	***Outcome 1:*** *Reduced exposure to climate-related hazards and*	*1.2.1. Percentage of target population covered by adequate risk-reduction systems*	

[26] The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

coastal erosion.		*threats* ***Outcome 5**: Increased ecosystem resilience in response to climate change and variability-induced stress* ***Outcome 6:** Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas* ***Outcome 4:** Increased adaptive capacity within relevant development sector services and infrastructure assets* ***Outcome 3:** Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level* **Outcome 7:** Improved policies and regulations that promote and enforce resilience measures	***5.** Ecosystem services and natural resource assets maintained or improved under climate change and variability-induced stress* *6.2. Percentage of targeted population with sustained climate-resilient alternative livelihoods* *4.2. Physical infrastructure improved to withstand climate change and variability-induced stress* ***3.1.** Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses* *7. Climate change priorities are integrated into national development strategy*	

Project Outcome(s)	Project Outcome Indicator(s)	Fund Output	Fund Output Indicator	Grant Amount (USD)
Outcome 1 : Improved resilience of the main ecosystems of Dionewar Island is enhanced and sustainable livelihoods of populations	*1.1.* Number ha of mangrove and terresterial ecosystems restaurated 1.2. Percentage of increase of income of population involved in alternative generation income activities (desagregated by gender)	***Output 5:*** *Vulnerable ecosystem services and natural resource assets strengthened in response to climate change impacts, including variability* ***Output 6:*** *Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability*	*5.1. No. of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type and scale)* *6.2.1. Type of income sources for households generated under climate change scenario*	173,375
Outcome 2: Reduced vulnerability of populations and socioeconomics infrastructures in Dionewar to hazards with the construction or rehabilitation of protection structures	*2.1.* Number of dikes rehabilitated and built to protect household and socioeconomic infrastructures against floding and coastal erosion	***Output 4:*** *Vulnerable development sector services and infrastructure assets strengthened in response to climate change impacts, including variability*	*4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by sector and scale)*	863,000
Outcome 3: Strengthened capacity of local institutions to mainstream climate changein local development	*3.1. Number of persons (including decision makers) aware of local climate change issues and adequate measures to be implemented*	***Output 3****: Targeted population groups participating in adaptation and risk reduction awareness*	*3.1 No. of news outlets in the local press and media that have covered the topic*	90,496

planning, sustainable natural resources management strategies and to document and disseminate lessons learned.	*3.2. Number of local developement tools that integrate adaptation measures*	*activities* ***Output 7:*** *Improved integration of climate-resilience strategies into country development plans*	*7.1. No. of policies introduced or adjusted to address climate change risks (by sector)*	

G. Detailed budget

a) Summary output budget

Table 8: Output budget

Components	Output	Year-1	Year-2	Year-3	Total
Component 1: Enhancing resilience of main ecosytems in Dionewar island	1.1	81 975,00	0	0	81 975,00
	1.2	16 500,00	14 100,00	4 600,00	35 200,00
	1.3	13 600,00	13 600,00	13 600,00	40 800,00
	1.4	0	15 400,00	0	15 400,00
		112 075,00	**43 100,00**	**18 200,00**	**173 375,00**
Component 2: Protection against flooding, coastal erosion and salinization in Dionewar					
	2.1	624 000,00	0	0	624 000,00
	2.2	187 000,00	0	0	187 000,00
	2.3	31 000,00	0	0	31 000,00
	2.4	21 000,00	0	0	21 000,00
		863 000,00	**0**	**0**	**863 000,00**
Component 3: Strategic planning and knowledge management					
	3.1	10 000,00	8 000,00	3 000,00	21 000,00
	3.2	4 400,00	3 546,00	0	7 946,00
	3.3	7 050,00	20 550,00	4 550,00	32 150,00
	3.4	29 400,00	0	0	29 400,00
		50 850,00	**32 096,00**	**7 550,00**	**90 496,00**
Project execution		**43 280,00**	**30 320,00**	**44 690,00**	**118 290,00**
Total Project cost		**1 069 205,00**	**105 516,00**	**70 440,00**	**1 245 161**
Management fees		**37 239,00**	**34 200,00**	**34 400,00**	**105 839,00**
TOTAL PROJECT COST		**1 106 444,00**	**139 716,00**	**104 840,00**	**1 351 000,00**

b) Detailed budget with budget notes

Table 9: Detailed budget

COMPONENT	OUTPUTS	ACTIVITIES	Year 1	Year 2	Year 3	TOTAL	NOTES
Component 1:	Output 1.1	Fish farming					
Outcome 1	10 ponds	Construction equipment	7 418,00	-	-	7 418,00	Construction equipement for 10 ponds
	200 spats	Logistic	10 000,00	-	-	10 000,00	Motorized speedboat
	1000 bags	Labour	9 057,00	-	-	9 057,00	For pond construction
		Operating expenses	29 475,00	-	-	29 475,00	
		Oyster farming					
		Fixed asset	13 060,00	-	-	13 060,00	
		Working capital	12 965,00	-	-	12 965,00	
		Total Output 1.1	81 975,00	-	-	**81 975,00**	
	Output 1.2.	Tree Nursery					
	6ha reforestat°	Laying out	10 000,00	-	-	10 000,00	Cleaning, fencing, digging well
	5ha mangrove	Inputs	1 000,00	1 000,00	1 000,00	3 000,00	Plastic container, seed, phytosanitary products
		Equipments	1 900,00	-	-	1 900,00	Rakes, shovels, wheelbarrows, and other equipment
		Labour	1 500,00	1 500,00	1 500,00	4 500,00	10 temporary workers for watering, weeding, etc…
		Reforestation					
		Logistic	600,00	600,00	600,00	1 800,00	Cart rental for young trees transportation
		Social labor	500,00	500,00	500,00	1 500,00	Allowances, restauration for 100 persons/session
		Ecoguards training	-	5 000,00	-	5 000,00	Consultancy services for training 15 eco-guards
		Ecoguards equipments	-	4 500,00	-	4 500,00	Uniforms and other equipements
		Total Output 1.2	16 500,00	14 100,00	4 600,00	**35 200,00**	
	Ouput 1.3.	Organizational mgt					
	19 GPF trained	Consultancy services	5 000,00	5 000,00	5 000,00	15 000,00	10H/dayx 3 sessions
		Workshop	1 800,00	1 800,00	1 800,00	5 400,00	30 participants/session of 5days x 3

		Production mgt					
		Consultancy services	5 000,00	5 000,00	5 000,00	15 000,00	10 P/day x 3 sessions
		Workshop	1 800,00	1 800,00	1 800,00	5 400,00	30 participants/session of 5 days x 3 sessions
		Total Output 1.3	13 600,00	13 600,00	13 600,00	**40 800,00**	
	Output 1.4.	Fish farming					
	2 business Plan	Consultancy services	-	7 000,00	-	7 000,00	15 P/Day
		Validation workshop	-	700,00	-	700,00	One day workshop for 50 participants (Restauration)
		Oyster farming					
		Consultancy services	-	7 000,00	-	7 000,00	15 P/day
		Validation workshop	-	700,00	-	700,00	One day workshop for 50 participants (Restauration)
		Total output 1.4	-	15 400,00	-	**15 400,00**	
TOTAL COMPONENT 1:			**112 075,00**	**43 100,00**	**18 200,00**	**173 375,00**	

COMPONENTS	OUTPUTS	ACTIVITIES	Year 1	Year 2	Year 3	TOTAL	Notes
Component 2:	Output 2.1						
	2 dikes	Surveying	35 000,00	-	-	35 000,00	Complementary feasibility studies
Outcome 2		Shell storage	527 000,00	-	-	527 000,00	Supervision supervision and technical assistance
		Contract services	62 000,00	-	-	62 000,00	
		Total Output 2.1	624 000,00	-	-	**624 000,00**	
	Output 2.2.	Dead tree trunk collection	50 000,00	-	-	50 000,00	
	Dead palm	Compensatory reforestat°	20 000,00	-	-	20 000,00	
	trunk	Trunk fixation	100 000,00	-	-	100 000,00	
		Technical supervision	12 000,00	-	-	12 000,00	
		Miscelanous	5 000,00	-	-	5 000,00	
		Total Output 2.2	187 000,00	-	-	**187 000,00**	

Ouput 2.3.						
Ridges	Rice areas mapping	10 000,00	-	-	10 000,00	Cadastral map of rice-growing areas
	Purchase of equipment	10 000,00	-	-	10 000,00	
	Social mobilization actions	8 000,00	-	-	8 000,00	Construction
	Consultation producers	3 000,00	-	-	3 000,00	(use and amortization of material)
	Total Output 2.3	31 000,000	-	-	**31 000,00**	
Output 2.4.						
Mantenance	Maintenance guide	15 000,00	-	-	15 000,00	
plan	Management comitee	3 000,00	-	-	3 000,00	
	Report back session	3 000,00	-	-	3 000,00	
	Total output 2.4	21 000,00	-	-	**21 000,00**	
TOTAL COMPOSANTE 2:		**863 000,00**	**-**	**-**	**863 000,00**	

COMPONENTS	OUTPUTS	ACTIVITIES	Year 1	Year 2	Year 3	TOTAL	Notes
Component 3:	Output 3.1						
	Mainstreaming CC	Up date PLD and PLAE	7 000,00	-	-	7 000,00	Consultancy services 30 P/Day
		Training (1) local representatives	-	5 000,00	-	5 000,00	Consultancy 10 P/Day. “Climate resilient budget”
		Training (2) local representatives	2 600,00	2 600,00	2 600,00	7 800,00	Consultancy 7 P/D x 3 sessions. "CC management”
		Workshops	400,00	400,00	400,00	1 200,00	25 participants per training session
		Total Output 3.1	10 000,00	8 000,00	3 000,00	**21 000,00**	
	Output 3.2.						
	Local	Diagnostic RN natural resources	3 000,00	-	-	3 000,00	Consultancy services 15 P/day
	convention	Drafting local convention	1 400,00	-	-	1 400,00	Consultancy services 10 P/day
	(LC)	Validation workshop	-	600,00	-	600,00	
		Delibaration session	-	600,00	-	600,00	Support to municipality
		Edition duplication LC	-	2 346,00	-	2 346,00	Production of 500 copies
		Total Output 3.2	4 400,00	3 546,00	-	**7 946,00**	

	Ouput 3.3.					
	CCKnowledge	Annual reports production	2 500,00	2 500,00	2 500,00	7 500,00	Illustrated publication (Edition and impression)
	Management	Audio et television braodcasting	-	1 000,00	-	1 000,00	Media mobilization
		Posters production	2 500,00	-	-		
		Video production	-	15 000,00	-	15 000,00	
		Workshop participation	1 050,00	2 050	2 050,00	6 150,00	DSA for project's staff
		Total Output 3.3	7 050,00	20 550,00	4 550,00	**32 150,00**	
	Output 3.4					
	Meteo	Meteo station	22 000,00	-	-	22 000,00	
	Station	Identification mission	2 500,00	-	-	2 500,00	
		Installation mission	1 000,00	-	-	1 000,00	
		Securisation work	2 500,00	-	-	2 500,00	
		Maintenance	1 400,00	-	-	1 400,00	
		Total Output 3.4	29 400,00	-	-	**29 400,00**	
TOTAL COMPONENT 3:			**50 850,00**	**32 096,00**	**7 550,00**	**90 496,00**	

COMPONENTS	ACTIVITIES	Year 1	Year 2	Year 3	TOTAL	NOTES
Component:						
Project	Staff salaries and allowances					
Execution	M & E specialist salary	7 200,00	7 200,00	7 200,00	21 600,00	
	Local coordinator salary	6 000,00	6 000,00	6 000,00	18 000,00	
	Admin and fin assistant salary	3 600,00	3 600,00	3 600,00	10 800,00	
	Allowances of CADL technical staff	4 800,00	4 800,00	4 800,00	14 400,00	
	Refection and equipment of office					
	Refection former rural commuty office	3 290,00	-	-	3 290,00	
	Office furniture	900,00	-	-	900,00	
	Computing equipement	2 400,00	-	-	2 400,00	

Maintenance	-	200,00	-	200,00	
Office supplies	600,00	600,00	600,00	1 800,00	
Commodities	1 200,00	1 200,00	1 200,00	3 600,00	
Transportation	1 070,00	1 000,00	1 070,00	3 140,00	
Communication	720,00	720,00	720,00	2 160,00	Estimate. USD 60/month
Inception workshop	9 500,000	-	-	9 500,00	
Steering committee meeting	2 000,00	2 000,00	2 000,00	6 000,00	
Final audit	-	-	10 000,00	10 000,00	
Mid-term evalutaion	-	3 000,00	-	3 000,00	
Final evaluation	-	-	7 500,00	7 500,00	
Total Project Execution	43 280,00	30 320,00	44 690,00	**118 290,00**	

c) **Budget on the Implementing Entity management fee (CSE)**

Table 10: Budget on NIE fees

COMPONENT	ACTIVITIES	Year 1	Year 2	Year 3	TOTAL	Notes
Component:						
CSE Management Fees	CSE staff allowances	19 200,00	19 200,00	19 200,00	**57 600,00**	
	Field supervisions	10 000,00	8 000,00	6 000,00	**24 000,00**	
	International travels	-	5 000,00	6 000,00	**11 000,00**	
	Inception workshop	6 039,00	-	-	**6 039,00**	
		-	-			
	Financial fees	2 000,00	2 000,00	3 200,00	**7 200,00**	
	Total Project Management	**37 239,00**	**34 200,00**	**34 400,00**	**105 839,00**	

H. Disbursement schedule with time-bound milestones

Table 11: Disbursement schedule

	Upon signature of Agreement	One Year after Project Start	Year 2	Year 3	**Total**
Scheduled Date	June 2016	June 2017	June 2018	June 2019	
Project Funds	534 603	534 602	105 516	70 440	1 245 161
Implementing Entity Fees	18 620	18 619	34 200	34 400	105 839
Total	**553 223**	**553 221**	**139 716**	**104 840**	**1 351 000**

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement on behalf of the government[27]

A. Record of endorsement on behalf of the government[2] *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

Mrs. Ndeye Fatou Diaw Guene *Designated National Authority for the Adaptation Fund* *Technical Advisor* *Directorate of Environment and Classified Establishments* *Ministry of Environment and Sustainable Development*	Date: *02/03/2015* 

[6] Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

B. Implementing Entity certification

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (Senegalese National Adaptation programmes of Actions on climate change; Senegalese National Climate Change Adaptation Strategy; National Strategy for Economic and Social Development; Senegalese Five-year Agricultural Programme; Emerging Senegal Plan) and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.
Dr Assize Touré *General Manager* *Centre de Suivi Ecologique* *Implementing Entity Coordinator* 

Date: *02/03/2015*	Tel. and email: +221 338258066 assize@cse.sn
Project Contact Person: Dethie Soumare NDIAYE	
Tel. and Email: dethie@cse.sn	

ADAPTATION FUND

REPUBLIQUE DU SENEGAL N° 2 2 9 6 **MEDD/ DEEC. AND AF**

Un Peuple - Un But - Une Foi

MINISTERE DE L'ENVIRONNEMENT ET DU DEVELOPPEMENT DURABLE

Direction de l'Environnement et des Etablissements classés

12 August 2015

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement for Reducing vulnerability and increasing resilience of coastal communities in the Saloum Islands (Dionewar)

In my capacity as designated authority for the Adaptation Fund in Senegal, I confirm that the above national project proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Senegal.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by "Centre de Suivi Ecologique (CSE)" and executed by "Comité National pour l'Alphabétisation et la Formation (CONAF), Agence Nationale pour l'Aquaculture (ANA)".

Sincerely,

Direction de l'Environnement et des Etablissements Classés
D.E.E.C

Mrs. Ndèye Fatou Diaw GUENE

Designated National Autority for the Adaptation Fund
Technical Advisor
Directorate of Environment and Classified Establishments

Centre de Suivi Ecologique

Etude de la vulnérabilité au Changement Climatique du village de Dionewar

Mars 2015

Centre de Suivi Ecologique

CSE, BP : 15.532, Dakar-Fann (Sénégal)
Tél :(221) 33 825 80 66 / 33 825 80 67
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E-mail : dt@cse.sn
Site web : http://www.cse.sn

LISTE DES SIGLES

ACCA	Adaptation au Changement Climatique en Afrique
ADD	Association pour le Développement de Dionewar
AGRHYMET	Centre régional de formation et d'application en agro météorologie et en hydrologie opérationnelle
APCR	Analyse Participative des Composantes du Risque
ASC	Association Sportive et Culturelle
AVCA	Analyse de la Vulnérabilité et de la Capacité d'Adaptation
CC	Changement Climatique
CCNUCC	Convention-Cadre des Nations Unies sur les Changements Climatiques
CLPA	Conseils locaux de Pêche Artisanale
CRDI	Centre de Recherche pour le Développement International (Canada)
CRiSTAL	*Community-Based Risck Screening Tool – Adaptation and Livelihood* ***(Outil d'identification des risques au niveau communautaire - Adaptation et Moyens d'Existence)***
CSE	Centre de Suivi Ecologique
DFID	*Department for International Development* (Département pour le Développement International)
GIE	Groupement d'Intérêt Economique
GPF	Groupement de Promotion Féminine
FELOGIE	Fédération des GIE
ONG	Organisation Non Gouvernementale
PLD	Plan Local de Développement
RF	Ressources Financières
RH	Ressources Humaines
RP	Ressources Physiques
RS	Ressources Sociales
SIG	Système d'Information Géographique
UICN	Union Mondiale pour la Nature

INTRODUCTION

Le changement climatique exerce sur le globe terrestre des menaces sérieuses qui sont durement ressenties en Afrique, notamment par les communautés pauvres dont les conditions de vie reposent sur l'environnement et les ressources naturelles. Le Sénégal n'échappe pas à cette situation : le pays est perpétuellement confronté aux effets adverses du changement climatique du fait de sa façade maritime longue de 700 km qui subit l'impact de l'élévation du niveau marin avec comme corollaire, l'érosion côtière, l'intrusion saline dans les terres agricoles, la salinisation des ressources en eaux et la destruction des infrastructures (Deuxième communication nationale du Sénégal, CCNUCC, 2010).

- **Cadre conceptuel de la mission** (voir doc Déthié ou Aïssata)

- **Objectifs de l'étude**

L'objectif général de cette étude est de diagnostiquer la vulnérabilité des communautés côtières de Dionewar face au changement climatique.

Les objectifs spécifiques sont :

- identifier et analyser les risques climatiques actuels dans la commune de Dionewar et les perceptions de la population de la variabilité et du changement climatique ;
- analyser les impacts de ces risques climatiques sur les ressources et les activités ;
- identifier et évaluer les stratégies d'adaptation actuelles mises en œuvre par les acteurs (pêcheurs, mareyeurs, transformatrices, agriculteurs, transporteurs, etc.) et/ ou proposer des stratégies alternatives.

PREMIERE PARTIE : CARACTERISATION DU TERROIR VILLAGEOIS DE DIONEWAR

1.1. Situation géographique

Le village de Dionewar est situé dans la région de Fatick, département de Foundiougne. C'est le chef-lieu de la commune du même nom dans l'Arrondissement de Niodior. L'île est habitée uniquement par des Sérères Niominka. Sa population actuelle est estimée à plus de 5000 habitants, tous musulmans[1].

Dionewar fait partie de l'archipel des îles du *Saloum* dont l'espace géographique est délimité par les bras de mer du *Diombos* et du *Saloum*. Ces îles *Niominka* sont appelées historiquement *Gandoun*. Elles sont composées de dix-neuf (19) villages habités et de beaucoup d'autres qui sont inhabitées (dont certaines servent de rizières). Elles sont, pour l'essentiel, blotties dans un environnement à forte présence de mangrove riveraine de multiples vasières et bolongs».

1.2. Le milieu biophysique

Les données et informations pour la caractérisation du milieu biophysique du terroir villageois de Dionewar proviennent principalement du PLD 2011-2016 de la communauté rurale du même nom.

[1] Forum sur le développement économique et social de Dionewar, Novembre 2009

1.2.1. Les Sols

Trois (3) types de sols occupent le terroir villageois :

- les sols ***Deck-Dior*** ou ferrugineux tropicaux peu lessivés : très adaptés au maraîchage, à l'arboriculture et aux cultures pluviales ;
- les ***bas-fonds ou cuvettes*** : constituent des zones à vocation rizicole et maraîchère. Pendant la période hivernale, à cause de leur texture argileuse ou *Deck*, certains sont inondés et propices à la culture du riz. Pendant la saison sèche, les bas-fonds constituent les zones de pratique du maraichage à cause de la nappe d'eau affleurante ;
- les sols ***halomorphes*** : sont rencontrés tout le long des bolongs. Ils ne permettent aucune activité agricole. Par ailleurs, en période de haute marée, ces sols sont occupés par les eaux qui, au retrait, laissent de fines couches de sel non exploitables.

1.2.2. La végétation

La végétation est essentiellement composée de trois strates :

1.2.2.1. La strate arborée

Elle est constituée essentiellement des espèces arborées de l'écosystème de la mangrove : *Rhizophora racemosa, Rhizophora Mangle*, et *Avicennia africana*. Sur la terre ferme, elle est composée d'essences soudano-guinéennes telles que *Neocarya macrophilla* (new), *Detarium senegalensis* (ditax), *Borassus aethiopium* (rôniers), *Eleais guineensis* (palmier), *Adansonia digitata* (baobab), *Cocos nicifera* (cocotier), *Daniella oliveri (santan) et Dialium guineensis (solom).*

1.2.2.2. La strate arbustive

Elle est essentiellement composée de *Raphia sudanica (raphia).*

1.2.2.3. La strate herbacée

Pendant la période hivernale, le tapis herbacé est bien fourni et très varié. Elle constitue une source d'alimentation du bétail dont la survie est étroitement liée à son abondance.

1.2.3. La faune terrestre et aquatique

1.2.3.1. La faune terrestre

La faune, jadis très variée, est aujourd'hui quasi-inexistante. Cependant, il faut noter que cette zone, partie intégrante du parc du Delta du Saloum, constitue un important point de chute et de reproduction des oiseaux migrateurs. C'est ainsi qu'on y rencontre des colonies d'espèces tels que les flamants roses et les pélicans.

1.2.3.2. La faune aquatique

Cette faune très diversifiée et riche est constituée d'espèces évoluant en zone d'estuaire et en zone maritime comme l'indique le tableau ci-dessous (PLD Dionewar, 2011-2016).

Tableau 1 : Espèces capturées au niveau des estuaires et de la mer

ESTUAIRES	MER
Carpes rouges (yax)	Carpes rouges
Carpe noir (nawrex)	Carpe noir
Mérou (Thiof)	Mérou
Carpe grise (waas)	Carangue (saaka)
Capitaine (jum)	Carpe blanche (sompat)
Mulet (gris)	Poulpe
Mollusques (touffa, yet, pagne, yokos)	Seiche
Seiche (yeuredeu)	Langouste
Soles (sapal)	Sardinelles
Poisson chat (kong)	Poisson chat (kong)
Sardinelles (yaboy)	Requin
Ceinture (tallar)	
Ethmalose (cobo)	
Chinchard (diaï)	
Crevette (sipaax)	
Doyene (tapandar)	
Raie (rayartar)	
Barracudas (seud)	
Carangue	

1.2.4. Les ressources en eau

1.2.4.1. Les eaux de surface

L'océan Atlantique longe la partie ouest du village de Dionewar. En outre, il existe un bras de mer appelé *Bolong de Falia* qui se divise en deux branches passant entre les villages de Dionewar et de Falia avant de se réunir en une seule pour se jeter dans le fleuve Saloum. Les mares temporaires servent à l'abreuvement du bétail.

1.2.4.2. Les eaux souterraines

L'eau douce provient de la nappe du Continental Terminal qui alimente les puits. Cette eau répond à tous les usages. Toutefois, la nappe reste très sensible au déficit pluviométrique persistant.

1.3. La situation socio-économique

La pêche est l'activité dominante. Les autres activités économiques sont l'agriculture, l'élevage, le petit commerce et l'artisanat.

Corrélativement à l'essor de l'activité de pêche, est noté celui de la transformation des produits halieutiques. Cela est dû au dynamisme des femmes comme celles qui s'activent dans la Fédération du GIE «FELOGIE» de Dionewar. La transformation concerne pour l'essentiel les mollusques et crustacés par les procédés de séchage, fumage, solage et de la fermentation.

L'agriculture sous pluie intéresse essentiellement les cultures vivrières telles que le riz, le mil «*souna*», le sorgho, le « niébé » et le bissap. Le riz est la principale culture vivrière et constitue l'aliment de base. Le mil est une culture très développée actuellement grâce à l'existence de terres très propices que sont les sols Dior. Les cultures de sorgho et de niébé sont associées dans les parcelles au mil, ainsi qu'à l'oseille (bissap) dont une partie est cultivée autour des champs pour

matérialiser les limites. Il faut noter par ailleurs que les cultures vivrières, surtout céréalières, sont victimes des oiseaux granivores.

Pour le maraichage, les spéculations tournent principalement autour de la culture de la patate douce et de divers autres légumes, mais le potentiel maraicher de la localité est sous-exploité à cause de sa pratique rudimentaire. L'arboriculture concerne surtout les cocos nains.

L'élevage est marqué par une prédominance de volaille et d'ovins. La présence d'équins est très faible. La vulnérabilité du cheptel est accentuée par le manque de suivi vétérinaire qui l'expose à diverses agressions virales et microbiennes présentes dans la région. En sus de cela, il faut noter la mauvaise qualité de l'eau d'abreuvement du bétail surtout en saison sèche, période durant laquelle elle est trouble et insalubre (PLD 2011-2016).

1.4. La situation environnementale

Elle a été bien cernée dans le rapport du «Forum pour le développement économique et social de Dionewar de novembre 2009 ». Ainsi, les changements climatiques apparaissent comme le principal facteur de l'évolution environnementale. Ils sont à l'origine de la brèche de Sangomar qui a pour conséquences :

- un ensablement des différents chenaux ;
- un remodelage de la géomorphologie de la côte fortement agressée par les vagues qui engloutissent des superficies importantes de terres ;
- la formation d'une nouvelle flèche, constituant un cordon ceinturant le littoral maritime du village et qui peut être à l'origine de nouveaux risques et contraintes pour la communauté ;
- une accentuation de la salinisation des terres arables d'autant plus que la riziculture sur billon a été abandonnée ;
- une plus grande intrusion du biseau salé dans les lentilles d'eau douce ;
- une disparition importante de la mangrove ;
- une décimation des huîtres qui ont pour support les rhizophores ;
- une régression des activités pourvoyeuses de revenus aux populations : pêche, ostréiculture, apiculture.

En outre, les villageois pour les besoins domestiques, et les étrangers pour le fumage du poisson, sont à l'origine du déboisement abusif de la mangrove et de la végétation sur les terres émergées. Par ailleurs, l'extraction du sable dans le village et des amas coquilliers fragilise l'écosystème.

Enfin, le transport maritime est confronté à l'absence de débarcadère fonctionnel, surtout en marée basse et à l'insécurité liée à la dimension réduite des pirogues qui assurent la traversée entre Djiffer et le village.

Pour des raisons diverses dont la forte exploitation, les ressources halieutiques comme les coquillages ou « pagnes », les huîtres et les poissons n'atteignent pas leur développement optimum et se raréfient.

Par ailleurs, le village connaît des problèmes d'insalubrité dûs au manque de réseau d'évacuation des eaux usées et de système de collecte et de gestion des ordures ménagères. Aussi, peu de ménages disposent de latrines. La majeure partie de la population utilise les douches publiques (au nombre de 40) installées sur pilotis sur le rivage par une ONG.

1.5. L'évolution des paramètres climatiques

Le département de Foundiougne appartient au domaine climatique *nord soudanien côtier* qui est juste une variante littorale du climat nord soudanien continental avec certaines particularités telles des apports pluviométriques plus importants par rapport à la nuance continentale (Sagna, 2007), l'adoucissement des températures en fin d'après-midi par les brises marines, ainsi que l'alizé maritime.

1.5.1. Pluviométrie

L'évolution de la pluviométrie est marquée par une remarquable instabilité comme l'indique la figure 1 ci-après avec une tendance générale à la baisse à partir des années 60.

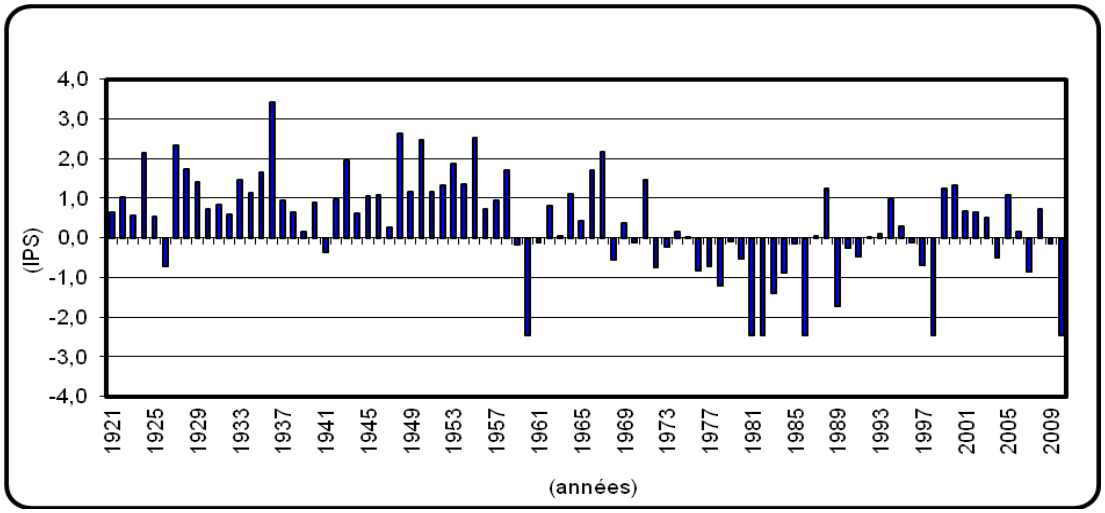

Figure 1 : Evolution interannuelle de la pluviométrie à partir de l'indice pluviométrique standardisé (IPS ; Ali et al, 2008) à Foundiougne (1921-2010)

Au cours de la décennie 2000-2010, l'hivernage 2002 a enregistré la plus faible hauteur avec 441,0 mm pour 33 jours, contre 1116,7mm pour 44 jours de pluie enregistrés en 2005. La moyenne décennale de 2001 à 2010 est de 756,94 mm pour 42 jours au niveau de l'arrondissement. Elle est légèrement supérieure à l'isohyète de la zone qui est de 400 à 600mm (PLD 2011). Le tableau ci-dessous illustre à merveille cette forte variabilité interannuelle.

Tableau 2 : Pluviométrie annuelle à Dionewar

ANNÉES	HAUTEURS (mm)	NOMBRE DE JOUR DE PLUIES
2001	578,5	39
2002	441,0	33
2003	666,9	42
2004	489,8	31
2005	1116,7	44
2006	642,2	45
2007	666,5	33
2008	967,7	57
2009	976,9	46
2010	1023,2	49

Source : PLD 2011

Les conséquences directes de cette instabilité pluviométrique sont ressenties sur les performances des secteurs de production tels que la pêche, l'agriculture, la cueillette…

1.5.2. Vents et températures

Le climat de la localité est largement sous l'influence des alizés maritimes du fait de la proximité de l'océan Atlantique et de par sa situation géographique qui lui confère un caractère de presqu'île. Il en résulte un climat relativement frais avec une température moyenne de 27°C. Les extrêmes sont de 17°C en janvier et 37°C en juin. D'après l'étude de Ba Nafaa 1012 portant sur la vulnérabilité des côtes et des estuaires du delta du Saloum et de la Gambie au changement climatique, le village de Dionewar est exposé à une inondation à partir d'une surcote d'un mètre.

En résumé, sur cette partie insulaire écologiquement vulnérable de la région de Fatick, les travaux antérieurs ont mis en évidence des manifestations dues aux changements climatiques à travers l'érosion marine symbolisée par la rupture de la flèche littorale depuis 1987, l'avancée de la langue et du biseau salés, les pertes de terres de culture, la déforestation et la perte de biodiversité marine et estuarienne, les inondations récurrentes.

DEUXIEME PARTIE : PROCESSUS D'IDENTIFICATION DES VULNERABILITES

Les méthodes et approches : les outils AVCA, CRiSTAL et APCR

Les outils utilisés pour conduire l'évaluation de la vulnérabilité climatique du terroir villageois de Dionewar ont été puisés dans la trousse développée dans le cadre d'un programme ACCA-CRDI/DFID. Ce dernier, intitulé « Approche expérimentale du renforcement des capacités et de la mise au point d'outils pour le suivi et l'évaluation des initiatives d'adaptation aux effets du changement climatique», avait pour but de promouvoir des dispositifs de suivi-évaluation intégrant les indicateurs des capacités d'adaptation au changement climatique, afin de renforcer l'effectivité des projets et programmes y afférents. La trousse à outils a été élaborée par AGRHYMET et UICN en 2011.

L'évaluation a reposé sur le cadre d'Analyse de la Vulnérabilité et de la Capacité d'Adaptation des communautés au Changement Climatique (CC), développé par *CARE International* ; elle a deux objectifs principaux :

- analyser la vulnérabilité au CC et la capacité d'adaptation au niveau communautaire ;
- combiner les connaissances communautaires et les données scientifiques pour améliorer la compréhension des impacts locaux liés au CC.

L'AVCA utilise principalement les approches participatives dont la cartographie des ressources et des aléas et la matrice de vulnérabilité. La cartographie des ressources et des aléas permet de représenter schématiquement les ressources disponibles dans le terroir villageois comme moyens d'existence et les aléas climatiques qui les impactent.

La matrice de vulnérabilité permet d'identifier les impacts des aléas climatiques et d'analyser les stratégies actuelles d'adaptation développées par les villageois, leur efficacité et durabilité ainsi que les options alternatives et leur faisabilité.

L'analyse a été affinée avec l'administration d'un outil complémentaire : l'Analyse Participative des Composantes du Risque (APCR) qui permet d'identifier le niveau d'exposition et la sensibilité des groupes sociaux, des écosystèmes et/ou des activités, aux principaux aléas.

Les outils ont été appliqués en focus group mixte au niveau du village en tenant compte de la représentativité des groupes socioprofessionnels, de l'autorité coutumière, de la collectivité locale et du genre.

Parallèlement, une collecte de données secondaires sur les paramètres climatiques a été effectuée afin d'analyser leur évolution dans le temps. Il s'agit notamment de la pluviométrie et des températures. A cela s'ajoutent d'autres données et informations relatives aux facteurs de vulnérabilité contextuelle.

III. TROISIEME PARTIE : ANALYSE DE LA VULNERABILITE

3.1. Le contexte climatique : les principaux aléas

Les principaux aléas climatiques et d'origine climatiques auxquels font face les communautés sont répertoriées comme suit :

1. le binôme Erosion côtière /Ensablement ;
2. l'inondation, phénomène devenu récurrent ;
3. la variabilité et le déficit pluviométrique observés au cours des dix dernières années ;
4. la salinisation des terres et des eaux souterraines qui se manifeste surtout en période de déficit pluviométrique ;
5. les vents forts plus fréquents que dans le passé;
6. la hausse des températures constatée de nos jours.

3.2. Le contexte des moyens d'existence

A travers un brainstorming, les informations sur les ressources importantes qui constituent les moyens d'existence des habitants du terroir ont pu être identifiées et priorisées. Ces ressources sont réparties en cinq catégories : naturelles, physiques, financières, humaines et sociales (voir tableau). Celles qui sont naturelles, physiques et sociales ont été positionnées sur une carte où les aléas sont aussi géographiquement répartis (voir carte des ressources et des aléas du terroir villageois).

Les ressources naturelles sont constituées des ressources halieutiques, aquacoles, des produits forestiers non ligneux, de la mangrove, des ressources en eau (souterraines et de surface), des parcours de bétail, des terres de culture, etc. Toutefois le binôme ressources halieutiques et aquacoles, les produits forestiers non ligneux et la mangrove sont apparues comme les trois plus importantes pour le bien-être des populations.

Parmi les ressources physiques, les pirogues, la digue construite pour freiner les eaux d'inondation et les puits servant aussi bien à l'alimentation humaine qu'à l'abreuvement du bétail constituent les plus essentielles. Cela s'explique par l'activité dominante (la pêche) et la variabilité pluviométrique. Par ailleurs l'importance des puits traditionnels s'explique par le fait qu'ils constituent la seule source d'approvisionnement en eau. Le village de Dionewar dispose aussi d'un dispensaire qui a été construit en 1947 et réhabilité en 2012 par la coopération française. Sur le plan de l'éducation, une première école primaire avait été construite en 1947 ; ensuite, une école élémentaire, un collège

d'enseignement moyen et deux écoles privées d'enseignement arabe ont été construits. Les femmes qui s'activent dans la transformation des produits halieutiques, notamment aquacoles, sont appuyées par la coopération canadienne qui les a dotées d'un centre de transformation. Les produits sont écoulés dans un central d'achat qui leur appartient. Le village est électrifié grâce à une centrale électrique. Il existe aussi un foyer des jeunes et une case des tous petits. Le campement touristique n'est plus fonctionnel. Le village artisanal permet d'écouler les produits touristiques.

Avec un taux de scolarisation de 60% et une formation des femmes en alphabétisation, les habitants de Dionewar disposent de ressources humaines avérées leur permettant d'assurer leur survie et de faire face aux aléas engendrés par les changements climatiques. Les produits du terroir sont exploités grâce à leur connaissance en transformation de produits halieutiques, ce qui génère une plus-value d'autant que la formation des femmes en hygiène et qualité a permis de rendre les produits plus compétitifs sur le marché extérieur tout en préservant la ressource à travers des techniques de reboisement de la mangrove. La durabilité de la ressource aquacole est aussi prise en compte à travers l'application de mesures telles qu'une technique de pêche rationnelle et le repos biologique. La transformation de produits forestiers (jus) permet aussi de mieux valoriser ces ressources. Dans le domaine de l'artisanat, des connaissances en maçonnerie, carrelage, menuiserie, construction de pirogues sont notées. Les connaissances en pêche durable, en reboisement de la mangrove et en transformation de produits halieutiques ont été jugées les plus utiles par les populations.

Les ressources financières sont tirées des trois activités principales (pêche, maraichage, foresterie), mais aussi d'activités génératrices de revenus comme l'embouche, l'aviculture et l'artisanat. Le village possède par ailleurs un groupement d'épargne et de crédit et bénéficie d'un Fonds d'appui à l'épargne au crédit. Les rémittences constituent aussi une source de revenus pour les familles. Les femmes, quant à elles, organisent une tontine. Les revenus issus des produis halieutiques et aquacoles, des PFNL et de la tontine sont présentés comme les plus importants.

Les ressources sociales sont constituées de l'Association des jeunes, du Dahira, du Groupement de femmes, d'un Comité de plage, d'un Comité de gestion des Ressources Naturelles, d'un Comité de gestion de la lutte, du CLPA, de l'ADD et des Conseillers municipaux. Cependant, l'association des jeunes, le GPF et l'ADD sont les plus dynamiques.

La matrice de la vulnérabilité aux aléas climatiques (tableau 3) montre que le déficit pluviométrique représente l'aléa le plus sévère, suivi de l'érosion / ensablement, puis de l'inondation. Les ressources les plus impactées par ces aléas sont :

Tableau 3 : Matrice de sensibilité aux risques climatiques à Dionewar

Aléas / Ressources	Erosion / ensablement	Inondation	Déficit et variabilité pluviométriques	Indice d'exposition
Ressources Halieutiques	3	0	2	**5**
Produits forestiers non ligneux	1	1	3	**5**
Mangrove	3	0	2	**5**
RP				
Pirogues	2	1	0	**3**
Digues	0	3	0	**3**
Puits	1	1	3	**5**
RH				
Pêche durable	1	0	0	**1**
Reboisement mangrove	2	0	0	**2**
Transformation produits halieutiques	0	0	0	**0**
RF				
Rev. halieutiques aquacoles	2	1	1	**4**
Rev. Produits forestiers non ligneux	1	1	3	**5**
Tontine	1	1	2	**4**
RS				
Association des jeunes	0	1	2	**3**
Groupements des femmes	1	1	2	**4**
ADD	1	1	1	**3**
Indice d'impact	**19**	**12**	**21**	

0= pas d'influence ; 1= influence minimale ; 2= influence moyenne ; 3= influence forte

- les ressources naturelles avec des indices d'exposition égaux montrant la sensibilité de tous les produits naturels du terroir face au CC ;

- les puits qui tendent à disparaître avec l'ensablement et dont la qualité de l'eau baisse suite au rabattement de la nappe phréatique alors qu'ils jouent un rôle fondamental dans la survie des populations, et

- les ressources financières générées par l'exploitation des PFNL dont la disponibilité est corrélée avec l'abondance de la pluie.

D'ailleurs, les aléas climatiques ont un fort impact négatif sur les revenus halieutiques et aquacoles (surtout l'érosion/ensablement), la tontine des femmes qui n'est pas alimentée quand leurs revenus baissent. Ils constituent par conséquent un frein pour les activités du GPF.

L'analyse participative des composantes du risque montre que si tout le village est exposé à l'érosion/ensablement et au déficit pluviométrique, seul 50% du terroir est concerné par les inondations. Il s'agit surtout du nord-est et de l'est du village (figure 2).

Figure 2 : Points bas inondables du terroir villageois de Dionewar

En ce qui concerne la sensibilité aux trois principaux aléas climatiques, il faut retenir que la population active est sensible à l'érosion/ensablement, notamment pour ce qui concerne la mobilité,

avec un risque accru d'accidents de pirogues en relation avec la barre qui est plus élargie. La sensibilité des femmes à cet aléa est remarquable surtout en ce qui concerne la cueillette et les produits aquacoles car ce risque a des impacts négatifs sur certaines zones boisées et sur la productivité de la mangrove dont les peuplements peuvent être emportés par l'érosion.

Les enfants constituent la frange la plus sensible à l'inondation en ce sens qu'elle a des impacts négatifs sur leur scolarité. Très souvent, en cas d'inondation, les sinistrés sont recasés dans les écoles, ce qui contribue à perturber la rentrée des classes. Aussi, les enfants sont souvent les victimes de maladies liées à l'eau comme le paludisme et les maladies diarrhéiques.

En ce qui concerne le déficit pluviométrique, les femmes (chargées de la corvée d'eau) et les agriculteurs (cultures sous pluie) sont plus sensibles à cet aléa qui n'épargne cependant aucun secteur d'activité dans le village.

3.3. Les stratégies d'adaptation

Pour faire face aux impacts du changement climatique, plusieurs stratégies sont développées par les communautés qui agissent soit seules, soit avec l'Etat ou avec des partenaires au développement. Parmi ces stratégies d'adaptation, les plus remarquables sont en général :

- ***stratégies contre l'érosion et l'ensablement***

L'érosion marine engendre la destruction de la couverture végétale, la baisse de la biodiversité au sein de la mangrove ; elle entraîne aussi la réduction de l'espace cultivable, la destruction des ressources physiques (puits, habitat). Le phénomène d'ensablement freine la mobilité des pirogues et accentue les risques en mer.

Face à ces menaces, les populations ont développé plusieurs stratégies. Certains sont efficaces et durables comme le reboisement de filaos destiné à la fixation de la mangrove ou encore l'aquaculture qui leur assure la disponibilité de produits de qualité. C'est aussi le cas de la délocalisation des infrastructures détruites par l'érosion et du contournement de la barre, seule solution pour éviter les bancs de sable en mer.

Si la colonisation de nouvelles terres permet à ces populations de continuer l'activité agricole, elle suscite beaucoup de charges car la plupart des individus ont des revenus financiers bas. Cependant, comme des réserves foncières sont disponibles au niveau des îles inhabitées, la solution alternative envisagée est de mettre en place un champ collectif pour partager les charges (eau, transport, nourriture, etc.). Les conditions favorables à ce projet sont l'existence d'une dynamique associative et du GPF qui en a eu l'idée. Cependant, l'insuffisance du matériel agricole peut en freiner l'efficacité.

Pour éviter les risques en mer, la pratique de désensablement des chenaux avec des pelles ne s'avère ni efficace ni durable ; la stratégie viable serait le dragage des chenaux qui demande de gros moyens, et donc l'intervention de l'Etat. Cependant, il tarde à se réaliser à cause d'une insuffisance de lobbying de la part des collectivités locales.

- ***stratégies contre les inondations***

Cet aléa intervient très souvent suite aux fortes précipitations. La mobilisation sociale permet de reconstruire les habitats détruits dans un court délai, et la lutte anti vectorielle de faire face aux problèmes sanitaires induits comme le paludisme et les maladies diarrhéiques. Cependant, malgré leur sens de l'entraide, les habitants du village ne parviennent pas à trouver de solution à la perturbation de l'année scolaire du fait de l'utilisation des locaux pour abriter les populations sinistrées. Les inondations bloquent les activités économiques et entraînent du coup la baisse des revenus. L'exode saisonnier des jeunes et le transfert d'argent des ressortissants constituent alors les seuls recours. Il n'existe aucune alternative durable. Devant la force des eaux, il arrive que la digue construite pour les freiner se casse, nécessitant très souvent sa réhabilitation. Une solution plus durable serait de la surélever. La main d'œuvre et le matériau (coquillage) est localement disponible ; cependant, le manque de matériels lourds tels que les camions et les tracteurs et de moyens financiers empêche la réalisation de la stratégie.

- ***Stratégies pour faire face au déficit pluviométrique***

Le déficit pluviométrique entraîne la baisse des revenus et provoque la baisse de la nappe phréatique. Pour s'approvisionner en eau, les communautés sont obligées de surcreuser l'infrastructure ou de foncer de nouveaux puits. Ces stratégies sont efficaces mais non durables. Le problème pourrait être réglé par l'adduction d'eau, mais cette stratégie demande aussi de faire du lobbying.

Le déficit pluviométrique est aussi à la base de la salinisation des terres et des eaux. Les communautés n'ont d'autre stratégie que la délocalisation des champs qui, si elle s'avère efficace, n'est pas durable, surtout dans un contexte d'amenuisement des terres agricoles. Il se pose donc la nécessité de construire une digue anti sel. Le matériau (sable, coquillage, bois), la main d'œuvre et l'expertise sont disponibles mais le matériel lourd et le financement font défaut.

Pour lutter contre la baisse de la qualité des eaux potables (salinisation), les populations creusent aussi des puits peu profonds (4m) pour capter la lentille d'eau douce. A cette stratégie efficace mais non durable, pourrait être substitué le dessalement de l'eau ; toutefois, le coût s'avère trop élevé. Cet aléa engendre aussi la baisse de la biodiversité. La stratégie développée par les communautés consiste à reboiser aussi bien la mangrove que les parcours naturels, ce qui s'avère efficace et durable.

Tableau 4 : Matrice des impacts des risques climatiques sur les ressources de subsistance

Aléas	Unités d'exposition	Impacts
Erosion et ensablement	• Ressources naturelles (mangrove, parcours naturels, champs …) • Ressources physiques	- Déboisement - Baisse de la biodiversité de la mangrove - Réduction des espaces cultivables - Réduction de la mobilité des pirogues - Accentuation des risques d'accident des pirogues - Destruction des ressources physiques (habitations, puits, écoles…)
Inondation	• Ressources physiques • Ressources financières • Ressources humaines	- Destruction des habitations et de la digue - - Baisse des revenus - Problèmes sanitaires (paludisme diarrhées) - Perturbation scolaire (réduction du temps de travail des élèves)
Déficit pluviométrique	• Ressources naturelles • Ressources financières	- Baisse de la nappe phréatique - Salinisation des terres et des eaux - Baisse de la biodiversité - Baisse de la qualité eaux potables - Baisse des revenus tirés de (champs, aquaculture, cueillette des produits forestiers non ligneux

Tableau 5 : Matrice d'adaptation

Aléas	Unités d'exposition	Impacts	Stratégies actuelles d'adaptation
Erosion et ensablement	• Ressources naturelles (mangrove, parcours naturels, champs …) • Ressources physiques	- Déboisement - Baisse de la biodiversité de la mangrove - Réduction des espaces cultivables - Réduction de la mobilité des pirogues - Accentuation des risques d'accident des pirogues - Destruction des ressources physiques (habitations, puits, écoles…)	- Reboisement de mangrove et fixation de la flèche par les filaos - Aquaculture (huitres) - Colonisation de nouvelles terres dans des îles éloignées - Désensablement des chenaux avec des pelles - Contournement de la barre - Délocalisation des infrastructures
Inondation	• Ressources physiques • Ressources financières • Ressources humaines	- Destruction des habitations et de la digue - Baisse des revenus - Problèmes sanitaires (paludisme diarrhées) - Perturbation scolaire (réduction du temps de travail des élèves)	- **Réhabilitation de la digue** - Mobilisation sociale - Exode saisonnier des jeunes et transferts d'argent des ressortissants - Lutte anti vectorielle - Mobilisation sociale
Variabilité	• Ressources naturelles • Ressources financières	- Baisse de la nappe phréatique - Salinisation des terres et des eaux - Baisse de la qualité eaux potables - Baisse de la biodiversité - Baisse des revenus tirés de (champs, aquaculture, cueillette des produits forestiers non ligneux	- Surcreusement Fonçage de nouveaux puits - Délocalisation des champs - Creusement de puits peu profonds 4m pour capter la lentille d'eau douce - Reboisement de la mangrove et dans les parcours naturels - Exode saisonnier des jeunes et transferts d'argent des ressortissants

Tableau 6 : Matrice d'évaluation de la stratégie actuelle

Stratégies actuelles (réponses)	Evaluation du fonctionnement de la stratégie actuelle		Existe-il d'autres stratégies (options)	Moyens disponibles pour adopter la nouvelle option	Facteurs empêchant l'adoption de la nouvelle option
	Efficacité	Durabilité			
Reboisement de mangrove et fixation de la flèche par les filaos	**Oui**	**Oui**			
Aquaculture (huitres)	**Oui**	**Oui**			
Désensablement des chenaux avec des pelles	**Non**	**Non**	Dragage mécanique des chenaux	Non	Insuffisance de lobbying
Colonisation de nouvelles terres	**Oui**	**Non**	Champ collectif pour partager les charges	Disponibilité terres Dynamique associative GPF	Eloignement des terres neuves Non disponibilité du matériel agricole et de transport
Délocalisation des infrastructures	**Oui**	**Oui**			Absence d'infrastructures sociales sur les sites
Contournement de la barre	**Oui**	**Oui**			
Exode saisonnier des jeunes et transferts d'argent des ressortissants	**Oui**	**Non**	X	X	X
Lutte anti vectorielle	**Oui**	**Oui**			
Mobilisation sociale	**Oui**	**Oui**			
Réhabilitation digue	**Oui**	**Non**	Surélever la digue (nouvelle digue)	Main d'œuvre, capacité de mobilisation sociale et matériaux (coquillage) disponibles	Manque de matériels lourds tels que camion et tracteur et des moyens financiers conséquents

Surcreusement et fonçage de nouveaux puits	**Oui**	**Non**	Adduction d'eau	Main d'œuvre et capacité de mobilisation des jeunes et des femmes	Insuffisance lobbying
Exode saisonnier des jeunes et transferts d'argent des ressortissants	**Oui**	**Non**	X	X	X
Délocalisation des champs	**Oui**	**Non**	Construction de digue anti sel	Matériau sable coquillage, main d'œuvre, bois et expertise disponibles	Indisponibilité matériel lourd tracteur camion manque de financement
Reboisement	**Oui**	**Oui**			
Creusement de puits peu profonds (4m) pour capter la lentille d'eau douce	**Oui**	**Non**	Dessalement des eaux	X	Cout élevé

Tableau 7 : Notation de l'importance des ressources pour les stratégies par risque (aléa)

Aléas	A1 : Erosion ensablement			A 2 : Inondation	A3 : Variabilité	
Ressources	S1 : Reboisement S2 : Aquaculture S3 : Colonisation nouvelles terres			S1 : Réhabilitation de la digue	S1 : Délocalisation champs S2 : Creusement puits peu profonds	
	S1	S2	S3	S1	S1	S2
Rn1Ressources halieutiques	0	3	0	0	0	0
Rn2 PFNL	3	0	0	0	0	0
Rn3 Mangrove	3	2	0	3	0	0
Rp1Pirogue	2	3	3	2	2	0
Rp2 Digue	2	0	2	0	1	1
Rp3 Puits	3	0	0	1	0	0
Rh1Connaissances en pêche durable	0	2	0	0	0	0
Rh2 Connaissances en reboisement mangrove	3	1	0	1	0	0
Rh3 Transformation des produits halieutiques	2	1	0	0	0	0
Rf1 Revenus halieutiques et aquacoles	2	3	2	1	2	2
Rf2 Revenus PFNL	3	0	2	1	2	2
Rf3 Tontines	0	0	0	0	0	0
Rs1 Association des jeunes	2	3	2	3	2	3
Rs2 GPF	3	2	3	2	1	2
Rs3 ADD	1	0	0	1	0	1

Tableau 8 : Matrice des moyens d'existence

	S1	S2	S3	S1	S1	S2	Importance
Rn1 Ressources halieutiques	0	3	0	0	0	0	3
Rn2 PFNL	3	0	0	0	0	0	3
Rn3 Mangrove	3	2	0	3	0	0	8
Rp1 Pirogue	2	3	3	2	2	0	12
Rp2 Digue	2	0	2	0	1	1	6
Rp3 Puits	3	0	0	1	0	0	4
Rh1 Connaissances en pêche durable	0	2	0	0	0	0	2
Rh2 Connaissances en reboisement mangrove	3	1	0	1	0	0	5
Rh3 Transformation des produits halieutiques	2	1	0	0	0	0	3
Rf1 Revenus halieutiques et aquacoles	2	3	2	1	2	2	12
Rf2 Revenus PFNL	3	0	2	1	2	2	10
Rf3 Tontines	0	0	0	0	0	0	0
Rs1 Association des jeunes	2	3	2	3	2	3	15
Rs2 GPF	**3**	**2**	**3**	**2**	**1**	**2**	**13**
Rs3 ADD	1	0	0	1	0	1	3

Tableau 9 : Analyse participative des composantes du risque (aléas)

Aléas	Conséquences observées	Exposition	Sensibilité
Erosion et ensablement	Déboisement Baisse de la biodiversité de la mangrove Mobilité pirogue Réduction espace cultivable Destruction des ressources physiques (puits ; habitat) Accentuation des risques	100% de la communauté	Population active : - hommes (mobilité transport) - Femmes (cueillette et produits aquacoles)
Inondation	Baisse des revenus Problèmes sanitaires paludisme diarrhées Destruction de l'habitat Perturbation scolaire Destruction d'infrastructure (digue)	50% du terroir villageois	Enfants
Déficit pluviométrique	Baisse de la nappe phréatique Baisse des revenus Salinisation des terres et des eaux Baisse de la biodiversité Baisse de la qualité des eaux potables	Toute la communauté	Femmes et les agriculteurs

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MINISTERE DE l'ENVIRONNEMENT ET DU DEVELOPPEMENT DURABLE

Projet de renforcement de la résilience de la communauté de Dionewar

Plan de Gestion Environnementale et Sociale (PGES)

Février 2015

Centre de Suivi Écologique
pour la Gestion des Ressources Naturelles

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Sommaire

Résumé

Le projet de renforcement de la résilience de la communauté de Dionewar vise à améliorer les conditions de vie des populations de la commune, sur le plan économique et sociale, tout en garantissant un environnement sain et sécurisé. Il constitue de ce fait et à travers ses différentes composantes, une forme d'adaptation au changement climatique.

Le projet semble interpellé par treize des quinze principes de la politique environnementale et sociale du fonds d'adaptation au changement climatique. Il satisfait aux exigences de la plupart d'entre eux comme la conservation de la biodiversité, le respect du genre, etc. tandis que pour d'autres comme l'équité dans l'accès aux bénéfices du projet, l'intégration des groupes vulnérables ou marginalisés, même si les conditions de leur satisfaction sont réunies, la vigilance doit être de mise pour leur respect effectif dans la durée.

Les impacts positifs qui peuvent découler du projet sont d'abord d'ordre social, avec l'augmentation des revenus des populations, l'optimisation des conditions de travail (augmentation des capacités d'accès à la ressource halieutique), la création d'emplois, etc. Mais, ils sont aussi d'ordre environnemental avec la perspective de restauration de la mangrove et de conservation de la biodiversité à travers le reboisement d'espèces caractéristiques du site.

Cependant, l'augmentation de l'effort de pêche à travers la mise à disposition et l'équipement de pirogues peut entraîner la surexploitation des ressources marines, risquant d'engendrer à terme une situation de précarité. Il en est de même de la construction d'ouvrages de protection contre la salinité et la remontée des eaux qui peut modifier les conditions d'écoulement naturel des eaux et porter préjudice à la vitalité de certains écosystèmes. Dans le volet « riziculture », l'utilisation de fertilisants peut contaminer le sol et les eaux tandis que dans le volet « transformation des produits halieutiques », les déchets produits peuvent être une source de pollution de ces composantes biophysiques. Sur le plan social, des conflits peuvent naître de la compétition à l'accès à la terre ou aux services et bénéfices du projet.

C'est pour cela que dans la mise en œuvre du projet, les impacts positifs doivent être optimisés au mieux en renforçant les conditions de succès tandis que les impacts négatifs doivent être atténués à travers l'adoption de certaines mesures. C'est le rôle du Plan de Gestion Environnementale et Sociale (PGES) qui préconise d'employer prioritairement la main d'œuvre locale dans la réalisation des ouvrages, de s'attacher l'expertise du service des eaux et forêts dans les activités de reboisement, d'élaborer et de mettre en œuvre des plans de gestion des déchets et des eaux de drainage, de préserver les ressources végétales de l'île dans la construction des pirogues, etc. La surveillance environnementale et sociale veillera au respect de ces mesures tandis que le suivi environnemental et social vérifiera l'efficacité des mesures à travers l'analyse de la qualité des composantes à risque par rapport aux normes édictées.

I. Objectifs du plan de gestion environnementale et sociale

Le Plan de Gestion Environnementale et Sociale vise à définir les grandes lignes et les orientations en matière de préservation de l'environnement lors de la mise en œuvre du projet. Ce plan permet dans le détail :

- d'identifier de manière claire les impacts positifs et négatifs liés à la mise en œuvre des activités du projet ;
- de proposer des mesures visant à bonifier les impacts positifs et à éviter ou atténuer les impacts négatifs ;
- de définir le plan de suivi et de surveillance environnementale et sociale et les responsables de sa mise en œuvre ;

II. Contexte et justification du projet

Le réchauffement climatique est depuis quelques années une préoccupation mondiale en raison de ces effets néfastes sur l'Homme et son Environnement. Le Sénégal est touché par les effets du changement climatique en particulier sur sa frange côtière. Et l'un des effets les plus visibles est l'érosion côtière. En effet, de Saint-Louis à Ziguinchor, les côtes sénégalaises portent les stigmates du phénomène. Selon le rapport du GIEC 2007, d'ici 2080, ce sont 20% des zones humides côtières qui seront perdues du fait de l'élévation du niveau de la mer et le risque d'extinction concernera 20 à 30% des espèces. Aujourd'hui, dans le delta du Saloum, des villages entiers sont sous les eaux et beaucoup d'autres sont menacés de disparition.

Devenue commune de plein exercice avec l'acte 3 de la décentralisation, Dionewar est situé dans la zone insulaire de la région de Fatick communément appelée les « îles du Saloum». Il est précisément localisé dans le département de Foundiougne, arrondissement de Niodior et est limité au Nord par la commune de Fimela, au sud par la commune de Toubacouta, à l'Ouest par l'océan atlantique et à l'Est par les communes de Djirnda et Bassoul (fig.1).

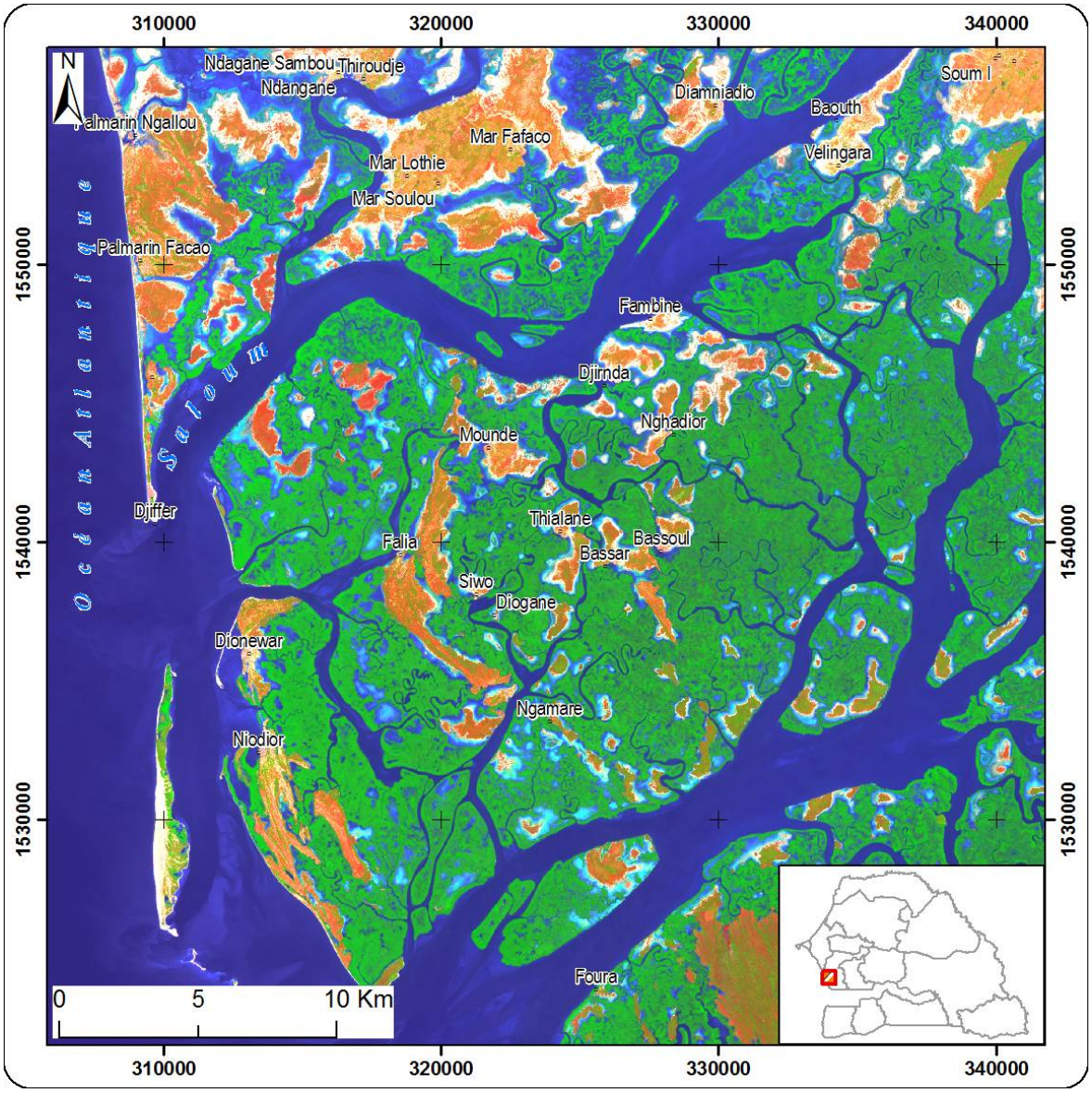

Figure 1: Localisation de la zone d'intervention du projet

En 1987, la rupture de la flèche de Sangomar (suite à une houle exceptionnelle), intervenue juste en face de l'île de Dionewar, a entrainé des modifications profondes dans l'hydrodynamisme et les phénomènes de sédimentation au niveau de l'estuaire.

La détérioration des conditions environnementales a eu des conséquences économiques néfastes. En effet, les principales activités économiques de l'île sont tournées vers l'exploitation de ressources tirées de la mer (poissons, crevettes, mollusques, etc.) et de l'estuaire (huitres, Mollusque *Arca senilis* localement appelé pagne). La pêche, activité majeure est aujourd'hui confrontée à la raréfaction des ressources et cela se traduit par une baisse des revenus de la population constituée en grande partie de pêcheurs et d'acteurs (en particulier les femmes) s'activant dans la transformation de produits issus de la mer.

Les effets néfastes du changement climatique se ressentent également au niveau du couvert végétal surtout sur la mangrove qui depuis la rupture de la brèche est confrontée à un ensablement. L'érosion côtière est également intense particulièrement dans la partie de l'île située en amont de la flèche formée au droit du village (photo 1).

Photo 1 : Aperçu du phénomène de l'érosion côtière à Dionemar (CSE, janvier 2015)

La remontée des eaux marines ainsi que le ruissellement des eaux de pluies constituent une menace pour l'habitat et les infrastructures (photo 2).

Photo 2 : Intrusion des eaux marines dans la commune de Dionewar (au niveau de Colbassy), CSE, janvier 2015

Face à ces défis, la communauté de Dionewar a tenté plusieurs initiatives allant dans le sens d'une adaptation aux modifications profondes de leur environnement. Ainsi des hectares de mangrove ont été reboisés, un comité de gestion des ressources naturelles a été mis en place pour organiser l'exploitation des fruits forestiers et favoriser le respect de la période de repos biologique des mollusques, etc. Dans cette lancée, des digues sommaires de protection du village ont été réalisées avec l'appui de bonnes volontés (photo 3).

Photo 3: Digue de protection contre la remontée des eaux marines réalisée à Colbasssy par les populations (CSE, janvier 2015)

Mais des contraintes existent telles que la faiblesse des ressources financières, l'accès limité à l'information et le défaut de maîtrise de certaines technologies.

Dans sa quête inlassable de solutions, le village de Dionewar a organisé un forum, du 30 au 31 mai 2009, pour stimuler son développement économique et social. Le forum a regroupé les natifs de Dionewar résidents ou de la diaspora vivant à Dakar, Kaolack, Mbour et Banjul (Gambie). Cette importante rencontre a été une occasion d'effectuer un diagnostic de tous les secteurs intéressant la vie des populations (santé, approvisionnement en eau, activités économiques, éducation, environnement, sport et culture), de les analyser et de proposer des solutions aux contraintes. Un des résultats du forum a été l'élaboration d'un plan d'action pour prendre en compte toutes les problématiques et planifier la mise en œuvre des activités qui concourent à leur résolution. L'Association pour le Développement de Dionewar (ADD) devenue porte flambeau des fruits de cette réflexion s'évertue à côté des acteurs (Gouvernement, collectivité locale, organisations des producteurs, acteurs culturels et les comités de gestion des ressources naturelles de la commune) à améliorer la capacité de la communauté à faire face à travers le projet prioritaire de **« renforcement de la résilience de la communauté de Dionewar ».** Il se veut être une réponse aux

difficultés économiques et environnementales auxquelles la population est confrontée.

III. Description du projet

3.1. Objectif général

L'objectif général de ce projet est de renforcer la résilience des populations de Dionewar face aux effets négatifs du changement climatique.

3.2. Objectifs spécifiques

De manière plus spécifique, le projet vise à :

- améliorer la productivité dans les activités agricoles (agriculture, pêche, foresterie) ;
- protéger et préserver les infrastructures socio-économiques, les terres de cultures et la végétation contre l'avancée de la mer, l'érosion éolienne et la déforestation de l'île et des îles satellites ;
- promouvoir les stratégies locales d'adaptation au changement climatique et de résilience de la communauté villageoise de Dionewar.

3.3. Composantes du projet

Le projet est décliné en trois composantes décrit dans le tableau 1 ci-dessous

Tableau 1 : Composantes du projet

N°	Nom de la composante	Description de la composante
1	Relance et redynamisation des activités économiques des populations	Cette composante concerne 4 activités phares : i) *développement de l'aquaculture* vue d'augmenter la production notamment des huitres et des arches au niveau de l'île de Dionewar. Le projet prévoit (i) l'installation d'un parc ostréicole (y compris matériel de production) avec les guirlandes pour le captage des naissains, des pochons et des tables pour le grossissement ; (ii) la construction de pirogues motorisées ; (iii) la dotation d'EPI ; (iv) le renforcement de capacités (techniques d'élevage, etc.). ii) *le renforcement de la pêche artisanale* : il concerne (i) l'équipement de 08 pirogues en petit matériel (gilets de sauvetage, GPS, boussole ; (ii) le renforcement de capacités des pêcheurs à travers des retours d'expériences et des sessions de formations sur les techniques de pêche, la sécurité en mer ; (iii) la mise en place d'un fond revolving issus des remboursement et destiné à l'équipement de nouveaux propriétaires de pirogues et au financement d'activités liées à la pêche. iii) *la transformation de produits halieutiques* : l'accent sera mis sur les formations pour l'amélioration de la transformation et du conditionnement et mais aussi sur des actions allant dans le sens

N°	Nom de la composante	Description de la composante
		d'une labellisation de certains produits, comme le cymbium (« yett »). *iv)* *<u>le développement</u> :* avec les fonds du projet, il sera acquis du matériel agricole pour les labours, les opérations de sarclo-binage, la récolte, le décorticage et l'ensachage. Les charges d'exploitation de la première campagne agricole seront prises en charge par le projet et les sommes recouvrées versées dans le fonds de développement intégré du village.
2	**Protection et préservation des ressources naturelles et des infrastructures socio-économiques du village**	*v)* *<u>protection et préservation des ressources naturelles et des infrastructures socio-économiques :</u>* Elle comporte deux volets : • *volet d'ouvrages de protection :* Il s'agit de (i) renforcer des digues de protection existant en les surélevant et en les massifiant davantage ; (ii) la construction d'un ouvrage de protection contre l'érosion côtière dans la partie de l'île qui fait face à l'endroit où la brèche s'est rompue ; • *volet reboisement et plantation* : il concerne (i) le reboisement d'essences caractéristiques de l'île (palmier à huile, cocotiers), de la mangrove et la mise en défens pour accompagner la régénération naturelle d'essences comme *<u>Detarium senegalensis et Parinari macrophylla</u>*.
3	**Suivi & évaluation et communication**	Elle se compose de deux volets : ✓ un volet suivi & évaluation ; ✓ un volet communication Le suivi de l'exécution se basera entre autres sur la matrice de responsabilité du projet. Les évaluations seront réalisées afin d'apprécier l'efficacité de la mise en œuvre et l'efficience de l'utilisation des ressources. Selon les résultats de ces évaluations, il sera recommandé des réorientations dans les stratégies de mise en œuvre de différents volets du projet. Les expériences et réalisations résultant de la mise en œuvre du projet seront capitalisées pour l'accompagnement d'autres communautés vivant dans d'autres îles (Saloum et basse Casamance). La communication à travers divers canaux (médias, supports d'informations, rapports d'activités, fora, débats, visites d'échanges, etc.) permettra de mobiliser les acteurs autour du projet pour une participation effective aux activités.

La figure 2 montre les sites d'intervention du projet (ouvrages de protection, rizières, zone d'aquaculture).

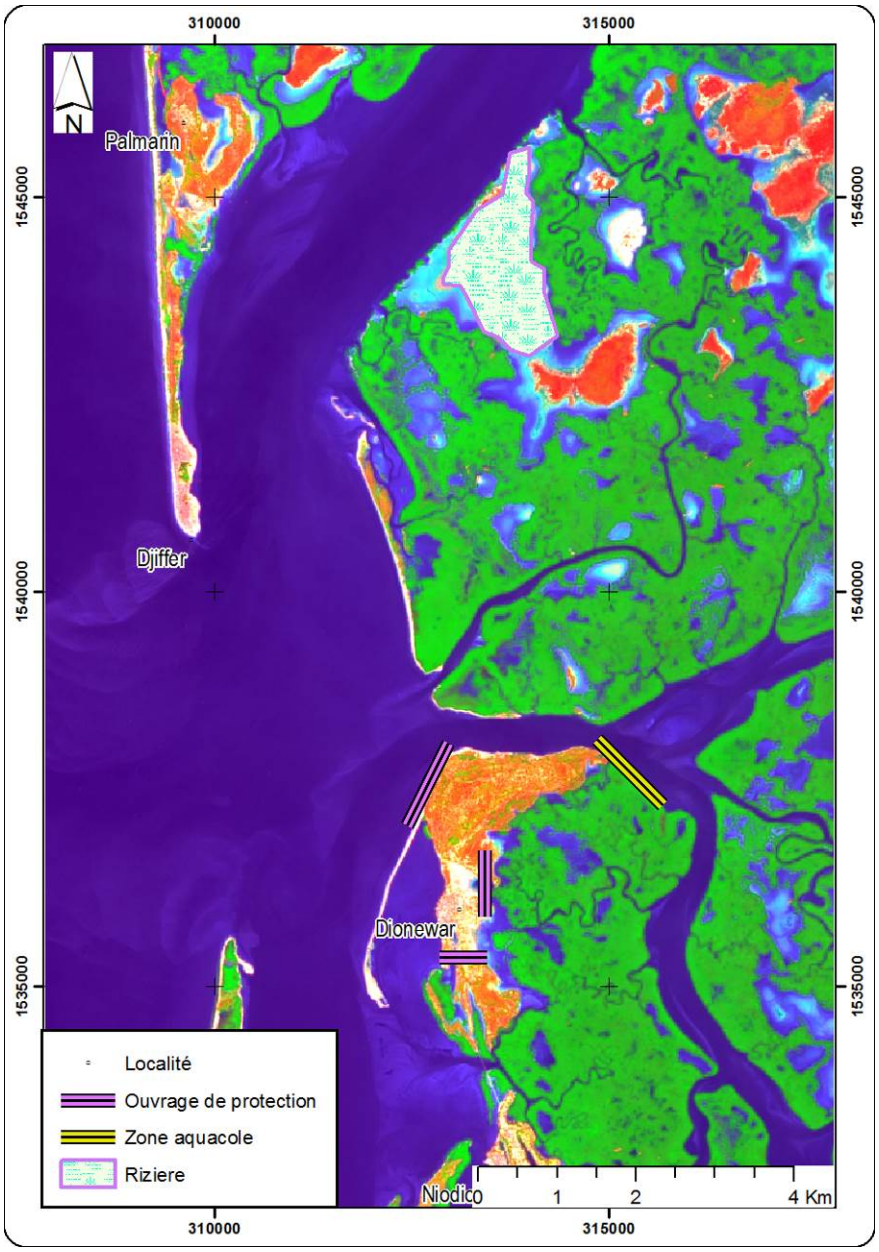

Figure 2 : Localisation des sites d'intervention du projet

3.4. Résultats attendus

Ils sont déclinés par composantes et présentés dans le tableau 2 ci-dessous.

Tableau 2 : Résultats attendus

COMPOSANTES	RESULTATS CONCRETS ATTENDUS	EXPECTED OUTCOMES
1. Relance et renforcement des activités économiques des populations de Dionewar	1.1. Les revenus tirés des activités permettent une diversification de la diète des populations. 1.2. les populations consomment davantage de protéines animales grâce à la consommation des poissons et des fruits de mer. 1.3. le riz consommé par la population est issu essentiellement de la production locale. 1.4. Le projet équipe 20 pirogues en engins de pêche et petit matériel de communication et sécurité. 1.5. Le projet permet à 180 pêcheurs d'exercer leurs activités toute l'année. 1.6. Le projet réalise des installations aquacoles pour l'ostréiculture et la pisciculture.	1. La sécurité alimentaire des ménages, notamment des plus vulnérables est assurée. 2. Les populations ont un bon état nutritionnel.

2. **Protection et préservation des ressources naturelles et des infrastructures socio-économiques du village**	2.1. Les digues de protection existantes du village sont renforcées et étendues sur 2 km. 2.2. Une digue de protection est réalisée à la devanture de l'île et renforcée par endroits avec la mangrove reboisée. 2.3. Des gabions sont réalisés à des endroits où la virulence de l'érosion côtière est la plus forte. 2.4. Les billons réalisés dans le cadre de la riziculture protègent les rizières de l'avancée de la mer. 2.5. Le reboisement de la mangrove est réalisé sur 5 hectares dans l'île. 2.6. Les populations plantent plus de 4000 arbres dans l'île et les îles satellites.	Le patrimoine physique et naturel de la communauté villageoise est sauvegardé et renforcé
3. Gestion des connaissances et communication pour une meilleure adaptation face au changement climatique et une amélioration de la résilience des communautés et des ménages	3.1. Deux (2) réalisations du projet de Dionewar sont capitalisées. 3.2. Un programme d'information, de sensibilisation et communication sur les meilleures pratiques d'exploitation des ressources naturelles dans une perspective d'adaptation au changement climatique est élaboré et mis en œuvre. 3.3. Des visites d'échanges sont organisées.	L'expérience de Dionewar en termes d'adaptation face au changement climatique et d'amélioration de la résilience serve de modèle au niveau des différentes communautés polarisées par la Réserve de la Biosphère du Saloum et au-delà de cet espace.

IV. Description des conditions environnementales et sociales de la zone du projet

4.1. Les caractéristiques biophysiques du milieu récepteur

4.1.1. Le relief

Le terroir de Dionewar est caractérisé par un relief plat. On note cependant quelques cuvettes et basfonds dans ses parties Est et Nord. A l'image de nombreuses zones

insulaires, Dionewar se situe en dessous du niveau de la mer ce qui augmente sa vulnérabilité face aux impacts du changement climatique.

4.1.2. La pluviométrie

A l'instar du reste du territoire national, on distingue une saison pluvieuse de 03 mois et une longue saison sèche de 08 mois. La pluviométrie est caractérisée par une instabilité. La moyenne décennale de 2001 à 2010 enregistrée au niveau de l'arrondissement est de 756,94 mm pour 42 jours. Cette moyenne décennale est légèrement supérieur à l'isohyète de la zone qui est de 400 à 600mm (PNDL, 2011).

4.1.3. Les sols

On trouve quatre types de sols : les sols Dior (ferrugineux tropicaux lessivés) favorables à la culture pluviale ; les sols Deck-Dior (ferrugineux tropicaux peu lessivés) qui occupent une faible partie du territoire et qui sont aptes à l'arboriculture, et au maraîchage ; les sols plus ou moins argileux des bas-fonds et les sols halomorphes qu'on rencontre le long des bolongs. Ce dernier type de sols ne permet aucune activité agricole à cause de sa forte teneur en sel.

4.1.4. La végétation

Au niveau de la frange littorale on trouve essentiellement des espèces arborées de l'écosystème de la mangrove (photo 4) notamment *Rhizophora racemosa, Rhizophora Mangle*, et *Avicenia africana.* La mangrove est le lieu de reproduction et de développement de certaines espèces de la faune.

Photo 4 : Aperçu de la forêt de mangrove (CSE janvier 2015)

Sur la partie terrestre, on trouve des essences soudano-guinéennes (photo 5) telles que *Parinari macrophylla* (« new »), *Detarium senegalensis* (« ditakh »), *Borassus aethiopium* (rôniers), *Elaeis guinensis* (Palmier à huile) ainsi qu'*Adansonia digitata* (baobab) et *Cocos nucifera* (cocotier), etc.

Photo 5 : Végétation caractéristique de l'île de Dionewar (CSE janvier 2015)

4.1.5. La faune

Le Delta du Saloum qui abrite plus de 250 espèces d'oiseaux avec plus de 70 000 limicoles et plus de 65 000 laridés est le troisième site d'importance ornithologique de l'Afrique de l'Ouest après le Banc d'Arguin (Mauritanie) et le Djoudj (Sénégal). Les vasières longeant les bolongs sont également des zones de reposoirs et de nourriture pour les colonies d'oiseaux comme les pélicans ou les flamants roses.

La réserve recense 36 espèces de mammifères sauvages dont les plus répandues sont les phacochères, le chacal (abondant), les guibs harnachés, les sylvicarpes de Grimm, les cobes des roseaux (rare), les cobes redunca, les hyènes tachetées, les sitatungas, les colobes bais, les callitriches ou singes verts, les patas ou singes rouges, les galagos du Sénégal (Galago senegalensis), les genettes, les civettes.

Dans le domaine maritime, le site abrite une faune très abondante adaptée aux formations de mangroves. La présence d'un important tapis graminéen en fait un domaine de nourrissage de nombreuses espèces dont les lamantins, les mangoustes des marais, les dauphins communs, les dauphins des rivières, les dauphins bossus, les baleines, les cachalots, les varans du Nil, les loutres à joues blanches.

4.1.6. Les ressources en eau

Les eaux de surface sont essentiellement représentées par les bras de mer ou bolongs alimentés par le fleuve Saloum. Pendant la saison pluvieuse, des mares temporaires se forment ; elles permettent l'abreuvement du bétail et sont également des sources d'eau pour le maraichage.

Les eaux souterraines sont captées à partir de la nappe du Continental Terminal. Ce système aquifère essentiellement sableux constitue une réserve assez importante. La nappe est salée du fait de l'influence de la mer.

4.2. Le milieu humain et les activités socio-économiques

4.2.1. La population

La commune de Dionewar est essentiellement peuplée par l'ethnie sérère. Sa population représente 40% de celle de l'île avec 5 395 habitants dont 2607 femmes et 2 788 hommes répartis dans 212 concessions et 451 ménages (PNDL, 2011). Elle abrite le poste de santé qui polarise la zone de Falia. Les femmes de Dionewar sont très dynamiques et s'activent dans diverses activités génératrices de revenus.
Sur le plan religieux, la population de Dionewar est entièrement composée de musulmans avec une forte implantation des confréries tidjane et mouride.

4.2.2. La pêche

La position de l'île en zone deltaïque lui confère d'importantes potentialités dans le domaine de la pêche qui de ce fait constitue la première activité des populations. C'est pourquoi d'ailleurs, l'ethnie sérère de l'île essentiellement pêcheur de profession est

appelée communément « sérère niominka » ou « sérère pieds dans l'eau ». La pêche est considérée la principale activité de rente, à la différence d'autres contrées du pays ou l'agriculture occupe la première place (PNDL, 2011).
Outre la pêche, on note un développement extraordinaire de la transformation des produits halieutiques dû surtout au dynamisme des femmes à l'image de la Fédération des GIE « FELOGIE » de Dionewar qui a reçu en 1996 et en 2003, le grand prix du chef d'Etat pour la promotion de la femme. Cette transformation concerne pour l'essentiel les mollusques et crustacés par les procédés de séchage, fumage, solage et la fermentation (PNDL, 2011).

D'importantes quantités de produits halieutiques (frais ou transformés) sont issues de l'île et commercialisés dans les centres urbains proches ou à Dakar.

L'activité est confrontée à des contraintes notamment le matériel rudimentaire (pirogues non motorisées) posant également le problème de la sécurité des embarcations, la raréfaction des ressources halieutiques. Ces contraintes sont exacerbées par les effets du changement. En effet avec la rupture de la flèche de Sangomar, le sable a envahi les principaux points de passage des pirogues gênant considérablement la navigation. Il en est de même des zones vaseuses qui sont des lieux de reproduction et de repos biologique de beaucoup d'espèces.

Le secteur est également confronté à des difficultés dans la commercialisation des produits à cause de l'enclavement de la zone ainsi qu'à l'insuffisance de l'encadrement des acteurs.

4.2.3. L'agriculture

L'agriculture est l'activité la plus importante après la pêche. Elle bénéficie d'un climat côtier très clément et de l'existence de cuvettes où la nappe est sub-affleurante. Les principales cultures vivrières sont le riz, le mil « sounas », le sorgho, le « niébé » et le bissap. Jusqu'à la fin des années 70, la culture du riz était la culture dominante dans les îles. Elle était organisée autour des concessions qui possédaient en commun des rizières mais chaque famille disposait de ses outils (SARR 2009). Elle mobilisait toute la population (hommes et femmes adultes et jeunes) et rythmait les migrations saisonnières au niveau des villages. Elle était pratiquée au niveau des villages et dans des îles de campagnes comme : Jimsaan, Fakawoul, Jisanoor, Gouk. Les récoltes permettaient de satisfaire la consommation en riz des villageois pendant une longue période de l'année. Suite à la sécheresse de ces années, la riziculture a été pratiquement abandonnée. Aujourd'hui sa reprise demeure une priorité.

L'arachide, les cultures maraichères et l'arboriculture sont les principales cultures de rente. Face aux difficultés pour sa commercialisation, la culture de l'arachide a drastiquement diminué jusqu'à devenir marginale aujourd'hui. Le maraichage quant à lui est omniprésent dans l'île. Les principales spéculations sont la patate douce, l'oignon, et divers autres légumes.

L'arboriculture est également pratiquée, surtout avec la culture de cocos nains.

Les principales contraintes de ce secteur sont : la baisse de la fertilité des sols, l'avancée de la langue salée et l'agression marine mais également la faible capacité organisationnelle des acteurs et les difficultés d'approvisionnement en intrants.

4.2.4. L'élevage

Il vient en appoint à la pêche et à l'agriculture et constitue un moyen de thésaurisation. L'élevage est de type extensif avec une sédentarisation des troupeaux qui restent confinés dans le terroir villageois. En période hivernale, les troupeaux se déplacent vers l'île de Sangomar à la recherche de pâturage. Par ailleurs, on constate l'existence d'une parfaite intégration avec l'agriculture. Le cheptel est composé de petits ruminants (moutons et chèvres), de bovins et de volaille. On note aussi l'élevage d'animaux de trait tels que l'âne et le cheval pour le transport et la pratique de la culture attelée.
Les principales contraintes du secteur sont : l'insuffisance de la prise en charge sanitaire du cheptel, les difficultés d'abreuvement et d'alimentation (en saison sèche) et le faible dynamisme des organisations d'éleveurs.

4.2.5. L'exploitation de mines et carrières

Dans la plupart des îles, la proximité de la mer fait qu'elles regorgent ressources minérales en particulier les coquillages et le sel.
Selon les témoignages des anciens, les morts étaient ensevelis sous des amas de coquillages et au fil du temps, cette pratique a occasionné la mise en place d'importants gisements de coquillages. L'exploitation de ces gisements a permis pendant longtemps de satisfaire les besoins en matériaux de construction avant d'être supplanter aujourd'hui par les matériaux modernes de construction. Cependant l'activité existe toujours et elle a un impact sur l'environnement car les baobabs qui poussent de préférence sur ces sites riches en calcite sont souvent coupés lors de l'exploitation des gisements.

Au niveau des tannes, se développe de plus en plus l'exploitation du sel. Cette exploitation plus importante au niveau de Niodior se fait à travers des « puits de sel » qui sont des trous de 5 m de diamètre moyen et 1,5 m de profondeur. Ils sont remplis lors des crues du Saloum. L'exploitation informelle fait qu'il est difficile d'évaluer les productions et la rentabilité de l'activité. Son exploitation traditionnelle et sans protection, présente ainsi d'énormes risques (affection des yeux et de la peau) sur la santé des exploitants constitués en majorité de femmes.

Les principales contraintes de ce secteur résident dans son caractère artisanal, son manque d'organisation, ses difficultés de stockage et d'écoulement mais également son manque d'instruments appropriés.

4.2.6. Le tourisme et l'artisanat

La commune de Dionewar est caractérisée par la beauté de son paysage et la clémence de son climat maritime qui en font une zone indiscutablement touristique. Les touristes y sont attirés par l'écosystème de la mangrove, les multiples bolongs où se pratique la pêche. Le village de Dionewar dispose d'un hôtel qui a malheureusement cessé ses activités en avril 2014 du fait de la rareté des clients. Quelques campements tendent tant bien que mal à assurer l'accueil de visiteurs mais dans des conditions également très difficiles. Les principales contraintes du secteur touristique sont liées à l'état défectueux de la route joal-Djiffer et la faible couverture électrique. A ces facteurs s'ajoutent la cherté de la destination « Sénégal », la réciprocité des visas qui plombent le secteur sur l'étendue du territoire.
L'artisanat (couture, menuiserie, charpenterie, etc.) est fortement lié au tourisme et connait des difficultés avec le déclin de ce dernier.

V. Convergence avec les principes de la Politique Environnementale et Sociale du Fonds d'Adaptation

La politique environnementale et sociale du fonds d'adaptation définit des principes fondamentaux allant du respect de la législation nationale et internationale en la matière, à la conservation des sols et de la capacité de production des sols en passant par l'accès équitable aux bénéfices du projet, l'intégration des groupes vulnérables et marginalisés, le respect des droits de l'homme, la prise en compte du genre et la capacitation des femmes, le respect des droits fondamentaux du travail, le respect les droits des populations autochtones, la limitation du recasement involontaire des populations, la protection des habitats naturels, la conservation de la biodiversité, la prise en compte du changement climatique, la lutte contre la pollution, la préservation de la santé publique, la protection de l'héritage physique et culturel.

Conformément à la politique du Fonds d'Adaptation au changement climatique, le projet doit être conforme à ces principes environnementaux et Sociaux. Nous passons en revue ci-dessous les principes qui peuvent s'appliquer au projet en appréciant sa conformité par rapport à ces derniers.

5.1. Conformité avec les lois nationales et internationales (Principe 1)

Conformément au code de l'environnement du Sénégal, le projet fera l'objet d'une évaluation environnementale et sociale pour disposer d'un certificat de conformité permettant sa mise en œuvre dans le respect de l'environnement. Le type d'évaluation environnementale à mener est définit en annexe de ce même code en fonction de l'ampleur des impacts potentiels. Etant donné que le projet comprend plusieurs volets par composante, il est probable que plusieurs études environnementales soient nécessaires.

Sur le plan national, le projet sera également redevable à d'autres lois comme le code minier pour solliciter par exemple l'autorisation d'ouvrir des carrières pour les besoins de la construction de certaines infrastructures (digues, bassins, etc.). Le code forestier va encadrer les activités du projet en matière de reboisement, notamment en ce qui concerne les techniques et normes de mise en œuvre et d'évaluation. Le projet va aussi se conformer au code de la pêche qui régit les modalités de capture et de gestion des ressources : le matériel de pêche qui sera remis aux acteurs devra être déclaré conforme par les services compétents du Ministère de la pêche.

Sur le plan international, la convention sur la biodiversité sera convoquée pour étayer les actions de conservation des espèces sur l'île ; tandis que la convention sur les polluants organiques persistants sera tout à fait de mise pour encadrer l'utilisation éventuelle et la gestion des produits chimiques dans l'aquaculture et la riziculture.

5.2. Accès équitable aux bénéfices du projet (Principe 2)

Les modalités de la conception du projet, qui est le fruit de la réflexion des natifs de Dionewar (au niveau national et dans la diaspora), au cours du forum tenu en mai 2009 sur le développement économique et social de l'île, créent de fait les conditions de base d'un égal accès aux bénéfices et du respect de l'équité dans sa mise en œuvre. Ceci apparaît effectivement dans le document du projet qui vise l'amélioration des conditions de vie de l'ensemble des populations de l'île et identifie clairement les bénéficiaires des résultats pour chaque volet. Les bénéficiaires intègrent l'ensemble des couches sociales (hommes, femmes, jeunes). Sur le plan foncier, un domaine généralement sensible, les familles propriétaires des terres de l'île de Ndimsane (où se pratiquera la riziculture) sont bien connues. Cela contribue à clarifier le statut des terres mais l'organisation du village même dans ce domaine semble prendre l'ascendant sur les intérêts particuliers. C'est le point de vue du chef de village qui affirme que la terre sera distribuée à tous ceux qui seront prêts à la travailler. Néanmoins, une vigilance particulière mérite d'être accordée à cet aspect surtout si la réussite est au bout.

5.3. Intégration des groupes vulnérables et marginalisés (Principe 3)

Si les femmes et les jeunes sont considérés comme des groupes vulnérables, on peut dire que le projet les intègre parfaitement dans sa démarche dans la mesure où ils sont acteurs et bénéficiaires au même titre que les autres. Certaines activités comme la cueillette des arches et des huitres ou la transformation des produits halieutiques leur sont d'ailleurs spécifiquement dédiées. En même temps, ils sont également présents au niveau des autres volets comme les plantations (bénéficiaires de quota d'exploitation) et la riziculture. Par contre, le document de projet ne semble pas suffisamment explicite par rapport aux handicapés et aux personnes vivant avec le VIH/SIDA. Les handicapés auront probablement, par exemple, plus de difficultés pour

se rendre dans les rizières situées à environ une heure de pirogue sur l'île satellite de Ndimsane. A ce niveau, une discrimination positive peut être appliquée pour les impliquer prioritairement dans des activités demandant moins d'efforts physiques. Nous n'avons pas été en mesure de savoir s'il y'avait des personnes vivant avec le VIH/SIDA. Si tel était le cas, elles devront être traitées au même titre que les autres acteurs. Ceci pourra être vérifié à travers la surveillance environnementale du projet.

5.4. Respect des droits humains (Principe 4)

Le projet est en phase avec le respect des droits humains dans sa volonté d'intégrer, non seulement l'ensemble des populations de Dionewar mais aussi, à travers sa composante « communication », de favoriser la duplication du projet partout où il en est besoin. Globalement, le pays est respectueux des droits humains et des conventions internationales qui les régissent. De ce fait, le projet n'éprouvera pas de contraintes à être déroulé dans le respect de ce principe.

5.5. Respect du genre et capacitation des femmes (Principe 5)

Le document de projet prend bien en charge la dimension « genre ». Les femmes sont impliquées dans l'ensemble des volets du projet. Mieux, plusieurs volets comme la cueillette des arches et des huîtres ou la transformation des produits halieutiques leur sont spécifiquement adressées tandis qu'elles disposent d'un quota pour l'exploitation des plantations d'espèces comme le palmier à huile ou le *Detarium senegalensis*. Dans certains volets comme la transformation de produits halieutiques, elles vont de renforcement de leurs capacités dans les techniques dédiées. Néanmoins, une action de veille est toujours nécessaire surtout dans les cas de succès notoires de l'activité, à travers la surveillance environnementale.

5.6. Droits fondamentaux du travail (principe 6)

Les modalités de mise en place du projet, rappelées ci-dessus, éliminent de fait la contrainte dans sa mise en œuvre. Les populations se sont librement organisées pour proposer le projet qu'elles jugent opportun pour le développement économique et social de leur terroir. Ceci se reflète dans le document de projet qui prône l'équité dans le partage des bénéfices engendrés par le projet.

5.7. Protection des habitats naturels (principe 9)

La composante 2 du projet axée sur la protection des ressources naturelles et des infrastructures socio-économiques répond parfaitement aux exigences de cette loi. Elle comprend le volet « reboisement de la mangrove » qui constitue un écosystème essentiel dans la reproduction et le développement de certaines espèces de poissons et de crustacées. C'est l'habitat par excellence des arches et des huîtres qui vont être exploités par le projet. L'activité de reboisement est donc primordiale au moment où

la mangrove fait face à des facteurs de dégradation comme la salinité et le déboisement à différentes fins. De même, le reboisement d'espèces caractéristiques de l'île comme le palmier à huile, le cocotier, ou le ditakh (D*etarium senegalensis*) contribuera à restaurer le couvert végétal du site.

5.8. Conservation de la biodiversité (principe 10)

La zone d'intervention du projet, le delta du Saloum, est érigée en réserve de biosphère (RBDS) en 1981 par l'UNESCO et de site d'importance internationale depuis 1984 par la convention de RAMSAR. Elle couvre une superficie de 334.000 ha. Ceci justifie l'importance de la diversité biologique dans la mise en œuvre du projet. Le Delta du Saloum compte neuf (09) forêts classées, un parc naturel (Parc National du Delta du Saloum), une Aire Marine Protégée (Bamboung) et de réserves naturelles communautaires (Mansarinko, Missira, Néma Bah, Samé Saroundia, Vallée du Ndinderling, Baria). Une deuxième AMP, celle de Sangomar est en cours de mise en place par la Direction des Aires Marines Communautaires Protégées (DAMCP). Elle englobe les communes de Dionewar et de Palmarin et couvre une superficie de 87 437 ha (fig. 3).

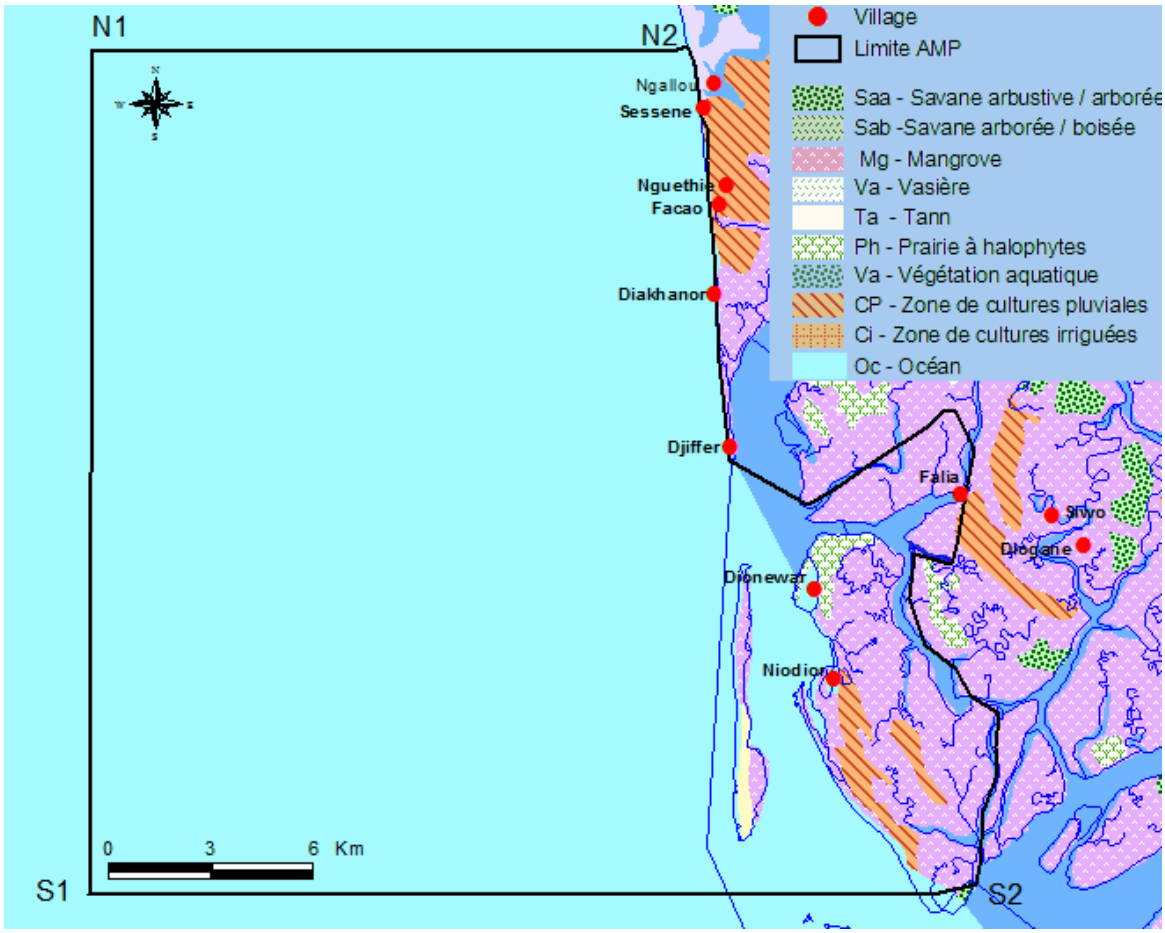

Figure 3 : Localisation de l'AMP de Sangomar d'après DAMCP, 2013.

La réserve de la biosphère du Delta du Saloum présente une flore très diversifiée avec environ 400 espèces de plantes, répartie en quatre strates dont la plus importante est la strate arborée composée, entre autres, de *Daniella oliveri*, *Cordyla pinnata*, *Parkia biglobosa*, *Khaya senegalensis* et *Sclerocarya birrea*.

Dans la partie maritime, les forêts de mangroves jouent un rôle important dans le cycle de vie de nombreuses espèces d'oiseaux, crustacés, poissons, et certains mammifères marins en leur offrant habitat et nourriture. On retrouve quatre espèces principales de mangroves dans ces forêts : *Rhizophora racemosa* et *Rhizophora harrisonii* en bordure de bolongs, *Rhizophora mangle* et *Avicennia nitida* dans les vasières irrégulièrement submergées par la marée. *Conocarpus erectus* et *Laguncularia racemosa* sont localement associés à ces espèces. La mangrove est un maillon indispensable dans l'équilibre de la zone et renferme des sites importants de reproduction pour de nombreuses espèces halieutiques.
Les prairies à halophytes, colonisent la limite supérieure de l'influence des marées. Les espèces caractéristiques de cette tanne sont le *Sesuvium portulacastrum* et le *Philoxerus vermicularis*. Les cordons et les terrasses sont dominés par *Elaeis guineensis*, *Cocos nucifera*, D*etarium senegalensis*, *Parinari macrophylla*.

A noter aussi que le paysage du Saloum est également marqué par la présence de nombreux baobabs qui ont pris racine sur les amas coquilliers.

La mise en œuvre du projet devra impérativement prendre compte de cette biodiversité et œuvrer à la conserver au mieux dans le respect des lois et conventions signées par le pays. C'est dans ce contexte qu'il convient de magnifier le volet « reboisement » du projet pour maintenir la mangrove et certaines espèces clées comme le palmier à huile.

5.9. Changement climatique (principe 11)

Le caractère insulaire de la zone d'intervention du projet le rend particulièrement exposé à l'élévation du niveau de la mer, une des principales conséquences du changement climatique (augmentation de la température). Les résultats des modèles qui prennent en compte la gamme complète des 35 scénarios prévoient une élévation moyenne de 0,09 m à 0,88 m du niveau de la mer entre 1990 et 2100 (GIECC, 2001). Dans ce contexte, le projet doit veiller à limiter au minimum les émissions de gaz à effet de serre. Ceci est reflété dans le volet « reboisement » qui peut contribuer à séquestrer le carbone. Parallèlement, l'aménagement des rizières ne va pratiquement pas engendrer de coupe d'arbres compte tenu du faible taux de recouvrement du site (photo 6).

Photo 6 : Vue des rizières au niveau de l'île de Ndimsane (CSE, janvier 2015).

Dans le même ordre d'idée, il sera indiqué de ne pas s'approvisionner dans les forêts voisines pour confectionner les pirogues destinées aux pêcheurs.

5.10. Prévention de la pollution et qualité des ressources (principe 12)

Certaines activités du projet comme la transformation de produits halieutiques ou la riziculture peuvent être source de pollution des eaux et des sols. La transformation des produits halieutiques peut engendrer des déchets solides et liquides tandis que la riziculture va utiliser des fertilisants qui seront évacués dans les eaux de drainage. Le PGES préconise d'élaborer des plans de gestion des déchets et des eaux de drainage afin de minimiser au mieux la contamination des sites. En même temps, l'utilisation d'herbicides dans la riziculture ne sera pas encouragée.

5.11. Santé publique (principe 13)

Dans le volet « réalisation de digue », la présence éventuelle et prolongée d'ouvriers peut favoriser le contact avec les populations locales et entraîner l'apparition d'infections sexuellement transmissibles y compris le VIH/SIDA. Il peut en être de même pour la construction des pirogues et des guirlandes pour l'aquaculture. De ce

fait, la population et les ouvriers doivent être systématiquement sensibilisés sur ces risques.

5.12. Héritage physique et culturel (principe 14)

Les amas coquilliers sont des héritages culturels par excellence au niveau de l'île. Ils sont souvent associés à la présence des baobabs symbolisant l'existence d'une vie ancienne sur le site. Les baobabs sont également liés aux nécropoles, fréquemment installées sur les amas coquilliers. Ces arbres majestueux marquent parfois des lieux sacrés, comme le baobab du griot que l'on retrouve à Dioron Boumak. Le baobab sépulture est une pratique funéraire qui n'est, dans l'état actuel de connaissances, signalé que dans le centre ouest du Sénégal chez les Sérères.

La mise en œuvre du projet ne doit pas porter préjudice à l'intégrité de cet héritage.

5.13. Conservation des terres et des sols (principe 15)

Globalement, la mise en œuvre du projet n'affecte pas le principe de conservation des terres et des sols. Cependant, les déchets issus de la transformation des produits halieutiques peuvent y contribuer, s'ils ne sont pas bien gérés. Il en est de même des fertilisants qui seront utilisés dans la riziculture ainsi que de la préparation des parcelles rizicoles qui peut déstructurer le sol et favoriser la remontée du sel. Le plan de gestion des déchets proposé par le PGES contribuera à limiter éventuellement la contamination du sol. Parallèlement, le volet « reboisement » contribuera à fertiliser et à stabiliser les sols.

Au niveau de la côte, l'érosion côtière est une réalité notamment en amont de la flèche littorale qui protège la commune. La mise en place d'un ouvrage de protection à ce niveau ne doit pas transférer le phénomène sur un autre compartiment. De ce fait, la nature de l'ouvrage doit être choisie avec précaution. Il en est ainsi pour les ouvrages de protection contre la remontée des eaux au niveau de Colbassy par exemple pour ne pas favoriser des ravinements dans d'autres sites.

VI. Impacts potentiels

6.1. Impacts potentiels positifs

Les résultats attendus de la mise en œuvre du projet fournissent en détail ses retombées positives dans la vie des populations. En effet, l'amélioration des conditions de la pêche artisanale et de l'agriculture (riz), favorisera l'augmentation des revenus des acteurs, comme prévu dans l'objectif spécifique 1. De même, la promotion de meilleures conditions de productions halieutique et rizicole contribuera également à assurer la sécurité alimentaire des populations telle qu'annoncé dans l'objectif spécifique 2 du projet. Il découle de cela un meilleur état nutritionnel des populations

tel qu'édicté dans l'objectif spécifique 3. Enfin, l'atteinte de l'objectif spécifique 4, à travers l'érection d'ouvrages de protection contre la remontée des eaux et du sel permettra de préserver l'intégrité du village par rapport aux inondations et favorisera le développement de la riziculture ; tandis que le reboisement contribuera à améliorer la biodiversité dans l'île en renforçant la présence d'espèces comme *Detarium senegalensis* (ditakh), *Parinari macrophylla* (new), *Elaeis guineensis* (palmier à huile) ou *Cocos nucifera* (cocotier).

Plus globalement, compte tenu des changements du climat, le projet participe à renforcer la résilience de la communauté de Dionewar par rapport aux phénomènes extrêmes (remontée des eaux, sécheresse, etc.) : c'est l'objectif général du projet qui vise le développement de la communauté de Dionewar dans la durabilité.

Les activités permettant d'atteindre ces objectifs sont essentiellement déclinées dans les composantes 1, 2 et 3 du projet (tabl. 3).

Tableau 3 : Synthèse des impacts positifs potentiels du projet

Composantes	**Volets**	**Activités**	**Impacts positifs potentiels**
Composante 1 : relance et redynamisation des activités économiques des populations	Développement de l'aquaculture	- l'installation d'un parc ostréicole avec les guirlandes pour le captage des naissains et des lanternes pour le grossissement ; - le renforcement des capacités des femmes et des hommes aux techniques d'élevage ; - la mise en place d'un plan de gestion technique du parc ; - la construction de bassins de production d'alevins et la confection d'enclos pour le grossissement du tilapia ; - le renforcement des capacités de production des arches ;	Augmentation de la ressource halieutique; Renforcement de la capacité des populations ; Augmentation des revenus des populations ; Gestion durable des ressources ; Amélioration de la qualité nutritionnelle ;

		- l'achat de matériel de production (cordes, filets, matériel d'exploitation) pour installer un parc ; - la construction de pirogues motorisées ; - la valorisation (promotion et publicité) des produits ; - la dotation d'équipements (bottes, gilets, griffes en fer) pour les femmes s'activant dans la cueillette des arches.	Amélioration des conditions de travail ; Création d'emplois ;
	Renforcement de la pêche artisanale	Equiper 8 pirogues en engins de pêches et en petit matériel (gilets de sauvetage, boussole, GPS, bottes etc.); 9 personnes/pirogue; possibilité de pêche sur toute l'année	Amélioration des conditions de travail ; Amélioration de la sécurité en mer ;
	Transformation des produits halieutiques	Renforcement de capacités ; labélisation pour le cymbium	Augmentation des revenus des populations ; renforcement de capacités techniques
	Riziculture	Culture sous pluies de plus de 300 ha	Amélioration de la sécurité alimentaire
Composante 2 : protection et préservation des ressources naturelles et des infrastructures socio-économiques du village	Réalisation des digues de protection et des gabions	Réhabilitation d'ouvrages de protection ; Réalisation de nouveaux ouvrages de protection ; Reboisement de la mangrove	Sécurisation de l'habitat, des personnes et des infrastructures ;
	Reboisement et	Plantation de cocotiers et	Augmentation de la

	plantation	de palmiers à huile ; Régénération naturelle d'essences ; Reboisement de la mangrove.	biodiversité ;
Composante 3 : Suivi évaluation et communication	Communication	Couvertures médiatiques des activités du projet; Insertions dans les journaux ; Emissions radio et télévision; Fora ; Causeries ; Débats ; Visites d'échanges;	Opportunités de stimuler d'autres communautés pour le développement de projets similaires ;

6.2. Impacts négatifs potentiels

Les composantes 1 et 2 pourront engendrer des impacts négatifs dans la mise en œuvre de leurs activités.

Composante 1 : relance et redynamisation des activités économiques des populations

Cette composante s'appuie essentiellement sur les ressources naturelles (les terres, les ressources halieutiques, etc.) pouvant engendrer une surexploitation de ces dernières ainsi que des conflits sociaux dans le partage des bénéfices.

Dans le volet ***« développement de l'aquaculture »***, les activités suivantes peuvent être sources d'impacts négatifs sur l'environnement et le milieu social :

- la construction de bassins de production d'alevins et la confection d'enclos pour le grossissement du tilapia peuvent nécessiter l'utilisation de matériaux pouvant engendrer des impacts négatifs sur les composantes biophysiques et sociales du site ;
- le renforcement de la production d'arches peut augmenter la pression sur cette ressource ;

- de même, si le bois utilisé pour la confection des pirogues est issu des ressources végétales naturelles, cela peut constituer une source de dégradation de ces dernières.

Dans le volet ***« renforcement de la pêche artisanale »***, l'équipement de huit pirogues en matériel de pêche avec la possibilité de pêcher toute l'année, va accentuer la pression sur les ressources halieutiques contribuant ainsi à leur surexploitation. Sur le plan social, l'affectation de ces pirogues et la répartition des bénéfices peuvent engendrer des conflits si elles ne sont équitables.

Dans le volet ***« transformation de produits halieutiques »***, la production de déchets solides et liquides peut impacter négativement les composantes biophysiques du site (eau, sol, air). Sur le plan social, une mauvaise répartition des bénéfices tirés de l'activité peut être une source de conflits.

Dans le volet ***« riziculture »***, la coupe d'arbres sera mineure compte tenu de la couverture du site mais l'utilisation de fertilisants chimiques, d'herbicides ainsi que les eaux de drainage peuvent affecter négativement les composantes biophysiques (sol, eau). Sur le plan social, l'affectation des parcelles, la qualité des aménagements peuvent être une source de conflits si elles ne sont pas équitables.

Composante 2 : protection et préservation des ressources naturelles et des infrastructures socio-économiques du village

Cette composante comprend essentiellement la réhabilitation et la réalisation d'ouvrages de protection du village contre la remontée des eaux et l'érosion marine. Ces activités peuvent engendrer des impacts négatifs sur le régime d'écoulement des eaux, la conservation de certains biotopes, les composantes biophysiques (sol, eau, végétation) au niveau des gîtes (carrières) où sont prélevés les matériaux de construction des ouvrages. En effet, l'ouverture de ces gîtes peut provoquer des coupes d'arbres détruisant en même temps des habitats pour la faune, tandis qu'un prélèvement en profondeur peut déstructurer le sol et constituer un facteur de risques d'accident pour les hommes et les animaux en cas de non réhabilitation.

Le tableau 4 synthétise les impacts négatifs potentiels engendrés par les activités des composantes 1 et 2 du projet.

Tableau 4 : Synthèse des impacts négatifs potentiels du projet

Composantes	**Volets**	**Activités**	**Impacts négatifs potentiels**	**Importance**	**Intensité**
Composante 1 : relance et	Développement	- l'installation d'un parc ostréicole avec			

redynamisation des activités économiques des populations	de l'aquaculture	les guirlandes pour le captage des naissains et des lanternes pour le grossissement ; - le renforcement des capacités des femmes et des hommes aux techniques d'élevage ; - la mise en place d'un plan de gestion technique du parc ; - **la construction de bassins de production d'alevins et la confection d'enclos pour le grossissement du tilapia** ; - **le renforcement des capacités de production des arches** ; - l'achat de matériel de production (cordes, filets, matériel d'exploitation) pour installer un parc ; - **la construction de pirogues motorisées ;** - la valorisation (promotion et publicité) des produits ; - la dotation d'équipements (bottes, gilets, griffes en fer) pour les femmes s'activant dans la cueillette des arches.	Contamination du site par les matériaux de construction ; Augmentation de la pression sur la ressource ; Dégradation des ressources ligneuses ; Conflits dans la répartition des pirogues	Moyenne Majeure Moyenne Moyenne	Moyenne Forte Moyenne Moyenne

	Renforcement de la pêche artisanale	**Equiper 8 pirogues en engins de pêches et en petit matériel (gilets de sauvetage, boussole, GPS, bottes etc.); 9 personnes/pirogue; possibilité de pêche sur toute l'année**	Augmentation de l'effort de pêche et risques de surexploitation de la ressource ; Risques de conflits dans l'affectation des pirogues et la distribution des bénéfices	Majeure Moyenne	Forte Moyenne
	Transformation des produits halieutiques	**Renforcement de capacités ; labélisation pour le cymbium**	Pollution par les déchets ; Risques de conflits dans la répartition des bénéfices ;	Majeure Moyenne	Forte Moyenne
	Riziculture	**Culture sous pluies de plus de 300 ha**	Pollution par les fertilisants et les herbicides ; Risques de conflits dans l'accès à la terre ;	Majeure Moyenne	Forte Moyenne
Composante 2 : protection et préservation des ressources naturelles et des infrastructures socio-économiques du village	**Réalisation des digues de protection et des gabions**	**Réhabilitation d'ouvrages de protection ;** **Réalisation de nouveaux ouvrages de protection ;**	Modification du régime d'écoulement des eaux ; Coupe d'arbres au niveau des gîtes : dégradation de l'habitat pour la faune ; Risques	Mineure Mineure	Faible Faible

		Reboisement de la mangrove	d'accident au niveau des gîtes ouverts ;	Majeure	Forte
	Reboisement et plantation	Plantation de cocotiers et de palmiers à huile ; Régénération naturelle d'essences ; Reboisement de la mangrove			

6.3. Le Plan de Gestion Environnementale et Sociale (PGES)

Les mesures visant à bonifier les impacts positifs et à atténuer les impacts négatifs du projet constituent le Plan de Gestion Environnementale et Sociale (PGES).

6.3.1. Mesures de bonification des impacts positifs du projet

Composante 1 : Relance et redynamisation des activités économiques des populations

Volet ***« développement de l'aquaculture »*** : le projet veillera à employer au maximum et de manière équitable, les ressortissants de la communauté dans la réalisation des infrastructures ; de même, le renforcement des capacités des populations peut être diversifié et concerner le plus grand nombre possible. Il doit mettre l'accent sur les pratiques de gestion durable des ressources.

Volet ***« renforcement de la pêche artisanale »*** : le projet favorisera l'utilisation systématique et adéquate du matériel de sécurité (gilets, etc.), de même les engins de pêche et le matériel utilisés doivent être conformes à la législation et respectueux d'une gestion durable des ressources.

Volet **« transformation de produits halieutiques »** : le projet veillera à créer des débouchés afin de conquérir le marché et d'assurer une bonne commercialisation des produits.

Volet **« riziculture »** : le projet favorisera un aménagement adéquat des parcelles afin d'assurer des conditions optimales de production sur l'ensemble su site.

Composante 2 : protection et préservation des ressources naturelles et des infrastructures socio-économiques du village

Volet **« Réalisation des digues de protection »** : le projet s'attèlera à réaliser des ouvrages de qualité pour assurer leur efficacité et leur durabilité et utilisera au mieux la main d'œuvre locale dans les travaux.

Volet **« reboisement et plantation »** : le service des eaux et forêts sera pleinement impliqué dans le choix des sites, l'encadrement dans les techniques de reboisement afin d'optimiser le taux de survie.

Composante 3 : Suivi évaluation et communication

Volet **« communication »** : le projet veillera à diffuser largement ses résultats afin de permettre une duplication dans les autres communautés.

Le tableau 5 synthétise les mesures de bonification des impacts positifs du projet.

Tableau 5 : Synthèse des mesures de bonification des impacts positifs du projet

Composantes	**Volets**	**Activités**	**Impacts positifs potentiels**	**Mesures de bonification**
Composante 1 : relance et redynamisation des activités économiques des populations	Développement de l'aquaculture	- l'installation d'un parc ostréicole avec les guirlandes pour le captage des naissains et des lanternes pour le grossissement ; - le renforcement des capacités des femmes et des hommes aux techniques d'élevage ; - la mise en place d'un plan de gestion technique du parc ; - la construction de bassins de production d'alevins	Augmentation de la ressource halieutique; Renforcement de la capacité des populations ; Augmentation des revenus des populations ; Gestion durable des ressources ; Amélioration de la	Utiliser autant que possible la main d'œuvre locale dans la réalisation des infrastructures ; Former un noyau diversifié et le plus élargi possible ; Intégrer au mieux les pratiques de gestion durable des ressources ;

		et la confection d'enclos pour le grossissement du tilapia ; - le renforcement des capacités de production des arches ; - l'achat de matériel de production (cordes, filets, matériel d'exploitation) pour installer un parc ; - la construction de pirogues motorisées ; - la valorisation (promotion et publicité) des produits ; - la dotation d'équipements (bottes, gilets, griffes en fer) pour les femmes s'activant dans la cueillette des arches.	qualité nutritionnelle ; Amélioration des conditions de travail ; Création d'emplois ;	
	Renforcement de la pêche artisanale	Equiper 8 pirogues en engins de pêches et en petit matériel (gilets de sauvetage, boussole, GPS, bottes etc.); 9 personnes/pirogue; possibilité de pêche sur toute l'année	Amélioration des conditions de travail ; Amélioration de la sécurité en mer ;	Veiller à une utilisation systématique du matériel de sécurité et utiliser des engins et du matériel conformes à la législation et respectueux d'une gestion durable des ressources
	Transformation des produits	Renforcement de capacités ;	Augmentation des revenus des	Création de débouchés pour une bonne

	halieutiques	labélisation pour le cymbium	populations ; renforcement de capacités techniques	commercialisation des produits
	Riziculture	Culture sous pluies de plus de 300 ha	Amélioration de la sécurité alimentaire	Aménager les parcelles de manière adéquate afin d'optimiser les conditions de culture dans l'ensemble des parcelles
Composante 2 : protection et préservation des ressources naturelles et des infrastructures socio-économiques du village	Réalisation des digues de protection et des gabions	Réhabilitation d'ouvrages de protection ; Réalisation de nouveaux ouvrages de protection ; Reboisement de la mangrove	Sécurisation de l'habitat, des personnes et des infrastructures ;	Réaliser des ouvrages de qualité et utiliser au mieux la main d'œuvre locale ; Choix de sites appropriés en relation avec le service des eaux et forêts ;
	Reboisement et plantation	Plantation de cocotiers et de palmiers à huile ; Régénération naturelle d'essences ; Reboisement de la mangrove.	Augmentation de la biodiversité ;	Impliquer le service des eaux et forêts pour optimiser les techniques de reboisement et les taux de survie
Composante 3 : Suivi évaluation et communication	Communication	Couvertures médiatiques des activités du projet; Insertions dans les journaux ; Emissions radio et télévision; Fora ;	Opportunités de stimuler d'autres communautés pour le développement de projets similaires ;	Favoriser une large diffusion des résultats du projet

		Causeries ; Débats ; Visites d'échanges;		

6.3.2. Mesures d'atténuation des impacts négatifs du projet

Composante 1 : relance et redynamisation des activités économiques des populations

Mesures d'atténuation des impacts liés au volet « développement de l'aquaculture »

La construction de bassins de production d'alevins et la confection d'enclos pour le grossissement du tilapia : le projet fera en sorte que le matériel de construction soit géré de manière efficace avant, pendant et après les travaux, à travers les orientations fournies par les clauses environnementales.

Le renforcement de la production d'arches : le projet développera une stratégie de gestion rationnelle de la ressource en sensibilisant et en renforçant les capacités des acteurs pour une gestion durable de la ressource.

La construction de pirogues motorisées et l'équipement en matériel de pêche : le projet évitera d'utiliser les ressources ligneuses de l'île pour la construction des pirogues et procédera à une répartition équitable et consensuelle des pirogues et du matériel de pêche pour éviter les conflits.

Mesures d'atténuation des impacts liés au volet « renforcement de la pêche artisanale »

L'équipement de huit pirogues en matériel de pêche avec la possibilité de pêcher toute l'année : le projet développera une vaste campagne de sensibilisation et des activités de renforcement des capacités des acteurs pour une gestion durable de la ressource ; il développera également une stratégie de gestion rationnelle de la ressource.

En vue de gérer les éventuelles conflits, le projet procéder à une répartition équitable et consensuelle des engins de pêche et des bénéfices.

Mesures d'atténuation des impacts liés au volet « transformation de produits halieutiques »

La transformation de produits halieutiques : le projet veillera à élaborer et mettre en œuvre un plan de gestion des déchets issus de la transformation des produits

halieutiques. Parallèlement, il procédera à une répartition équitable et consensuelle des bénéfices afin d'éviter les conflits.

Mesures d'atténuation des impacts liés au volet « riziculture »

La culture sous pluies sur plus de 300 ha : le projet évitera l'utilisation d'herbicides et veillera à élaborer et mettre en œuvre un plan de gestion des eaux de drainage. Sur le plan social, il sera procédé à une répartition équitable et consensuelle des terres pour éviter les conflits. De même, les aménagements seront de qualité afin d'assurer un égal accès à l'eau.

Composante 2 : protection et préservation des ressources naturelles et des infrastructures socio-économiques du village

Mesures d'atténuation des impacts liés à la réhabilitation et la réalisation d'ouvrages de protection (du village) contre la remontée des eaux et l'érosion marine : le projet veillera à assurer l'entretien des écosystèmes dont le fonctionnement est lié à la présence des eaux de ruissellement ; au niveau des gîtes d'emprunt, des actions de reboisement seront menées pour restaurer les sites éventuellement affectés par la coupe d'arbres. A la fin des travaux, il sera procédé systématiquement à la remise en état des gîtes (repli de chantier, fermeture de carrières, etc.).

Le tableau 6 synthétise les mesures d'atténuation des impacts négatifs potentiels engendrés par les activités des composantes 1 et 2 du projet.

Tableau 6 : Synthèse des mesures d'atténuation des impacts négatifs du projet

Composantes	Volets	Activités	Impacts négatifs potentiels	Importance	Intensité	Mesures d'atténuation
Composante 1 : relance et redynamisation des activités économiques des populations	Développement de l'aquaculture	- l'installation d'un parc ostréicole avec les guirlandes pour le captage des naissains et des lanternes pour le grossissement ; - le renforcement des capacités des femmes et des hommes aux techniques d'élevage ; - la mise en place d'un plan de gestion technique				

		du parc ; - **la construction de bassins de production d'alevins et la confection d'enclos pour le grossissement du tilapia** ; - **le renforcement des capacités de production des arches** ; - l'achat de matériel de production (cordes, filets, matériel d'exploitation) pour installer un parc ; - **la construction de pirogues motorisées ;** - la valorisation (promotion et publicité) des produits ; - la dotation d'équipements (bottes, gilets, griffes en fer) pour les femmes s'activant dans la cueillette des arches.	Contamination du site par les matériaux de construction ; Augmentation de la pression sur la ressource ; Dégradation des ressources ligneuses ; Conflits dans la répartition des pirogues et du matériel de pêche ;	Moyenne Majeure Moyenne Moyenne	Moyenne Forte Moyenne Moyenne	Elaborer et respecter les clauses environnementales avant, pendant et après les travaux ; Sensibiliser et renforcer les capacités des acteurs pour une gestion durable de la ressource ; développer une stratégie de gestion rationnelle de la ressource ; Eviter d'utiliser les ressources ligneuses de l'île pour la construction des pirogues ; Procéder à une répartition équitable et consensuelle des pirogues et du matériel de pêche ;
	Renforcement de la pêche artisanale	**Equiper 8 pirogues en engins de pêches et en petit matériel (gilets de sauvetage, boussole, GPS, bottes etc.); 9 personnes/pirogue; possibilité de pêche sur toute l'année**	Augmentation de l'effort de pêche et risques de surexploitation de la ressource ; Risques de conflits dans l'affectation des engins de	Majeure Moyenne	Forte Moyenne	Sensibiliser et renforcer les capacités des acteurs pour une gestion durable de la ressource ; développer une stratégie de gestion rationnelle de la ressource; Procéder à une répartition équitable et consensuelle des

			pêche et la distribution des bénéfices ;			engins de pêche et des bénéfices ;
	Transformation des produits halieutiques	**Renforcement de capacités ; labélisation pour le cymbium**	Pollution par les déchets ; Risques de conflits dans la répartition des bénéfices ;	Majeure Moyenne	Forte Moyenne	Elaborer et mettre en œuvre un plan de gestion des déchets ; Procéder à une répartition équitable et consensuelle des bénéfices ;
	Riziculture	**Culture sous pluies de plus de 300 ha**	Pollution par les fertilisants et les herbicides ; Risques de conflits pour l'accès à la terre ;	Majeure Moyenne	Forte Moyenne	Elaborer et mettre en œuvre un plan de gestion des eaux de drainage ; éviter ou réduire au mieux l'utilisation d'herbicides ; Procéder à une répartition équitable et consensuelle des terres ;
Composante 2 : protection et préservation des ressources naturelles et des infrastructures socio-économiques du village	**Réalisation des digues de protection et des gabions**	**Réhabilitation d'ouvrages de protection ;** **Réalisation de nouveaux ouvrages de protection ;** Reboisement de la mangrove	Modification du régime d'écoulement des eaux ; Coupe d'arbres au niveau des gîtes : dégradation de l'habitat pour la faune ; Risques d'accident au niveau des gîtes ouverts ;	Mineure Mineure Majeure	Faible Faible Forte	Veiller à assurer l'entretien des écosystèmes liés à cet écoulement ; Procéder à des actions de reboisement ; Procéder systématiquement à la remise en état des gîtes à la fin des travaux ;
	Reboisement et plantation	Plantation de cocotiers et de palmiers à huile ; Régénération				

		naturelle d'essences ; Reboisement de la mangrove				

6.3.3. Suivi et surveillance environnementale et sociale

En rapport avec l'autorité compétente en la matière, en l'occurrence la Direction de l'Environnement et des Etablissements Classés (DEEC) et les services techniques, membres du comité technique régional, le projet veillera au suivi des paramètres environnementaux et sociaux susceptibles d'être affectés par les activités du projet.

La surveillance environnementale portera essentiellement sur les chantiers en vue de veiller au respect des clauses environnementales. Le tableau 7 en résume les activités.

Tableau 7 : Synthèse de la surveillance environnementale et sociale

Composantes	**Volets**	**Activités**	**Surveillance environnementale**	**Responsables**
Composante 1 : relance et redynamisation des activités économiques des populations	Développement de l'aquaculture	- l'installation d'un parc ostréicole avec les guirlandes pour le captage des naissains et des lanternes pour le grossissement ; - le renforcement des capacités des femmes et des hommes aux techniques d'élevage ; - la mise en place d'un plan de gestion technique du parc ; - **la construction de bassins de production d'alevins et la confection d'enclos**	Veiller à la bonne gestion des déchets engendrés par les matériaux de construction ; Vérifier l'effectivité de la formation ; Vérifier l'effectivité du plan de gestion ; Veiller à l'application des clauses environnementales ;	DEEC, projet

		pour le grossissement du tilapia ; - **le renforcement des capacités de production des arches** ; - l'achat de matériel de production (cordes, filets, matériel d'exploitation) pour installer un parc ; - **la construction de pirogues motorisées ;** - la valorisation (promotion et publicité) des produits ; - la dotation d'équipements (bottes, gilets, griffes en fer) pour les femmes s'activant dans la cueillette des arches.	Vérifier l'origine du bois utilisé pour la construction des pirogues ; Vérifier l'effectivité de l'équipement ;	
	Renforcement de la pêche artisanale	**Equiper 8 pirogues en engins de pêches et en petit matériel (gilets de sauvetage, boussole, GPS, bottes etc.); 9 personnes/pirogue; possibilité de pêche sur toute l'année**	Vérifier l'effectivité du petit matériel ;	
	Transformation	**Renforcement de**	Vérifier l'effectivité	

	des produits halieutiques	**capacités ; labélisation pour le cymbium**	du plan de gestion des déchets ;	
	Riziculture	**Culture sous pluies de plus de 300 ha**	Vérifier l'effectivité du plan de gestion des eaux de drainage et la nature des produits chimiques utilisés ;	
Composante 2 : protection et préservation des ressources naturelles et des infrastructures socio-économiques du village	**Réalisation des digues de protection et des gabions**	**Réhabilitation d'ouvrages de protection ;** **Réalisation de nouveaux ouvrages de protection ;** Reboisement de la mangrove	Vérifier le respect des clauses environnementales avant, pendant et après les travaux ; Vérifier l'implication des services des eaux et forêts ;	
	Reboisement et plantation	Plantation de cocotiers et de palmiers à huile ; Régénération naturelle d'essences ; Reboisement de la mangrove	Vérifier l'implication des services des eaux et forêts ;	

Le suivi environnemental va mesurer la conformité des paramètres environnementaux et sociaux aux normes définies. Il est synthétisé dans le tableau 8.

Tableau 8 : Synthèse du suivi environnemental et social

Composantes	**Volets**	**Activités**	**Suivi environnemental**	**Responsables**
Composante 1 : relance et redynamisation des activités économiques	Développement de l'aquaculture	- l'installation d'un parc ostréicole avec les guirlandes pour le captage des naissains et des		DEEC, projet, comité technique régional

des populations		lanternes pour le grossissement ; - le renforcement des capacités des femmes et des hommes aux techniques d'élevage ; - la mise en place d'un plan de gestion technique du parc ; - **la construction de bassins de production d'alevins et la confection d'enclos pour le grossissement du tilapia** ; - **le renforcement des capacités de production des arches** ; - l'achat de matériel de production (cordes, filets, matériel d'exploitation) pour installer un parc ; - **la construction de pirogues motorisées ;** - la valorisation (promotion et publicité) des produits ; - la dotation d'équipements (bottes, gilets,	Suivi de la taille des arches ;	

		griffes en fer) pour les femmes s'activant dans la cueillette des arches.		
	Renforcement de la pêche artisanale	**Equiper 8 pirogues en engins de pêches et en petit matériel (gilets de sauvetage, boussole, GPS, bottes etc.); 9 personnes/pirogue; possibilité de pêche sur toute l'année**		
	Transformation des produits halieutiques	**Renforcement de capacités ; labélisation pour le cymbium**	Suivi de la qualité des eaux : analyse chimique et bactériologique ;	
	Riziculture	**Culture sous pluies de plus de 300 ha**	Suivi de la qualité des eaux et du sol : analyse chimique (nitrate, conductivité, température, pH) ;	
Composante 2 : protection et préservation des ressources naturelles et des infrastructures socio-économiques du village	**Réalisation des digues de protection et des gabions**	**Réhabilitation d'ouvrages de protection ;** **Réalisation de nouveaux ouvrages de protection ;** Reboisement de la mangrove	suivi du trait de côte ;	
	Reboisement et plantation	Plantation de cocotiers et de palmiers à huile ; Régénération naturelle	Taux de réussite ;	

		d'essences ; Reboisement de la mangrove		

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REPUBLIQUE DU SENEGAL
Ministère de l'Environnement et du Développement Durable

Centre de Suivi Ecologique

National Implementation Entity (NIE) of the Adaptation Funds (AF)

Report of the working session with the Division of the environmental and social management of environmental impact assessments of the Direction of Environment and the classified Establishments (DECC)

Unité Finances Climat

10th December 2015

Centre de Suivi Ecologique

Pour la gestion des ressources naturelles

www.cse.sn

Date: 10th December 2015

Venue: the Directorate of Environment and Classified Establishments (DECC)

Participants :(see pictures in annex):

1. Mrs Ndèye Fatou Diaw Guène, National Designated Authority (NDA)for the Adaptation Funds (DEEC)
2. Mr Mbakhane FALL, Head of the Environment Assessment Division (DEEC)
3. Mrs Marième Soda DIALLO, Environmentalist/ Project Manager (CSE)
4. Mrs Aïssata Boubou SALL, Monitoring and Evaluation Manager (CSE)

In the development of the project document entitled 'Reducing vulnerability and Increasing resilience of Coastal Communities in the Saloum Islands (Dionewar)', a working session was held with the DEEC, head of the national system in place to ensure compliance regarding procedures for environmental and social impact studies. The objective of the meeting was to exchange on appropriate measures to be taken at this stage in order to identify the potential impacts of actions planned under the project, as well as mitigation measures.

The CSE first recalled the activities of the project consisting of rehabilitating the protection dykes of the village of Dionewar, promoting aquaculture and rice cultivation, and developing reforestation in mangrove and forest areas.

After welcoming CSE's staff, the Head of the Environment Assessment Division indicated that at this stage of project development, it is not possible to carry out an environmental and social impact study (ESIA). According to the procedures in place, the Detailed Preliminary-Draft (DPD) study is a prerequisite to such a study. However, the DPD study is conducted at the first stage of project implementation.

It's has been recommended at this stage to:

check the compliance of the project with respect to environmental safeguards requirements of the Adaptation Fund and those in force at national level;

undertake a diagnostic study of the potential impacts of the project. This will aim, for the various project activities (and / or works), to carry out an analysis of alternatives or options and to identify the environmental and social impacts associated with each of them.

Remarks: At this stage, the environmental clearance is not a requirement, only a preliminary study can be performed, and this can be done by CSE itself.

In parallel, the feasibility study should be done in order to integrate environmental concerns in the choice of the implementation options of activities and/or infrastructures.

Upon completion of a feasibility study, the national procedure will thus be triggered to perform the Environmental and Social Impact Assessment (ESIA). Each physical realization of the project will be subject to further analysis. A detailed Environmental and Social

Management Plan will also be produced. The ESIA will be conducted before the actual start of the project activities.

The implementation of the ESIA and the development of the ESMP shall be entrusted to an independent consultant accredited by the DEEC.

ACRONYMS

CSE : Centre de Suivi Ecologique

DEEC : Direction de l'Environnement et des Etablissements Classés

ESIA: Environmental and Social Impact Assessment

ESMP: Environmental and Social Management Plan

NDA: National Designated Authority

ANNEX:

Participant pictures

1. Mrs Ndèye Fatou Diaw Guène, Mrs Marième Soda DIALLO, Mr Mbakhane FALL,

2. Mrs Aïssata Boubou SALL, Mrs Marième Soda DIALLO, Mr Mbakhane FALL,

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Centre de Suivi Ecologique

CSE's RESPONSES TO TECHNICAL REVIEW Of PROJECT/PROGRAMME PROPOSAL AT THE STAGE OF DEVELOPEMENT OF THE FULL PROJECT DOCUMENT

PROJECT/PROGRAMME CATEGORY: Regular-sized Project proposal

	CSE's responses to comments on 15 September
CAR1: When submitting a revised proposal, please also submit a response table that explains (a) where and how the observations made by the Board at its latest meeting that considered the proposal had been addressed by the proponent in the initial submission to the current cycle, and (b) where and how the observations of the initial technical review of the current cycle have been addressed in the revised proposal. **R**: Noted	**CAR1:** Addressed.
As noted in the previous review, the viability of the labelling scheme should be further explained, and results of any studies to this effect should be referenced. **R**: After concertation and further consideration of comments received, it has been decided to remove this activity (Activity 1.4 on labelling). Activity 1.3 has been revised to take into account some capacity building initially planned through Activity 1.4. Former Activity 1.5 (Development of Management plan for fish and oyster farms) becomes Activity 1.4.	CR1: Addressed. The labelling scheme has been omitted

The budget has been revised accordingly.	
As noted in the previous review, the proposal should specify how the distribution of assets financed by the project is equitable. **R:** See last paragraph of Section B, Page 31 **“** Equitable access to assets financed by the project is a core principle of this project. All members of the women grouping will benefit from these assets. The assets will not be allocated on an individual basis, but they will be shared and used in rotation. All of the women will be trained on feeding and maintenance techniques. Backed by the technical staff from the National Aquaculture Agency (ANA), they will undertake feeding and maintenance tasks in turns. When they harvest and market the products, part of the revenues will be used to purchase fish feed and another part will go to the grouping fund. This fund could be used through the grouping’s central purchasing in order to extend the shop or to provide loans to its members (revolving fund).”	CR2: Addressed sufficiently to the concept stage. Equitable access is achieved through women groupings, and the full proposal should elaborate on how the access to membership in such groups is equitable **R**: The Dionewar island is populated exclusively by the Niominka ethnic group. This is an egalitarian society with no discrimination based on class, caste. There are 25 women grouping which are in turn federated in an overarching organization called FELOGIE (Local Federation of Fishing Groupings). Every woman can access to membership by applying and providing copy of her ID. This why it did not deem necessary to elaborate on this issue.
The previous review noted that it was unclear whether climate change will be the main driver in the expected decrease in captures and market value of fishery products. There is still no substantiation to the claim that the depletion of fish stocks is also attributed to climate change. Please justify or remove. **R** : It was provided several scientific references demonstrating the role played by climate change on depletion of fish stocks. For reference, see Section 1.2 (with footnote references) “Drought cycles that occurred throughout the Sahel from 1968 and rainfall variability have led to increased salinity with rates above 50 ‰ in the rainy season. This phenomenon became persistent in the	CR3: Not addressed – no additional information has been provided in the proposal. **R**: It was provided several scientific references demonstrating the role played by climate change on depletion of fish stocks. For reference, see (text in blue colour) last paragraph page 15 and last paragraph page 17 (with footnote references)

1990s with surface water becoming hypersaline, especially in river upstream where the salinity level exceeds 150 ‰. This salinization influences the size of the fish at maturity[1], growth and movements[2]. Moreover, various studies[3] have associated mangroves degradation or dynamics with the persistent rainfall variability while this ecosystem plays a key role in the development of fishery resources. In the Saloum estuary also, salinity increases from downstream to upstream (120 per thousand salinity, measured upstream Saloum), which comes with certain peculiarities as to the mode of tide penetration in the river. Indeed, there is a time and flow speed higher than those of the ebb[4]. In addition, the amount of water into the estuary is larger than that coming out partly due to the inertia caused by the adjacent areas of: mangroves, salt flats and "bolons", including. This very special hydrological functioning is essentially attributed to a low slope especially in the downstream part of the river and the rainfall deficit recorded since the late 1960's leading to a virtual absence of freshwater flows during rainy season[5] and a concentration of salts by evaporation[6]. Fish catches in the Saloum Delta shrank from 30,000 to 10,000 tons between 1970 and 1990, along with declining populations' livelihoods[7]." Please scope the expected magnitude of benefits from the project to its costs **R**: Section I (Part II) has been revised accordingly "Benefits generated for direct beneficiaries include an increase in incomes for more than 500 persons (most of whom are women).	CR4: Not addressed. Information should be bolstered at the full proposal stage. **R**: Part II, See (text in blue colour) - Section B (Economic, social and environmental Benefits, page 37)

[1] Panfili and al. 2004a, 2004
[2] Diouf & Goudiaby 2006
[3] Diaw, 1990, 1999, 2000; Soumare 1992; IUCN 1998; Diop and al 2000; Moreau 2005; Dièye and al 2008; Andrieu and al 2008; Niang 2009
[4] (Barusseau and al., 1985, 1986)
[5] Dacosta, 1993
[6] MEPN, 2005
[7] Diouf, 1996, in Ndour et al., 2011

This increase in incomes will impact the living conditions of a large part of the community because women generally provide school fees, clothing and medicines.
 	
Projects resources will also help improving food security for approximately 5 600 persons through the revival of rice, fish and seafood productions. The rehabilitation of mangroves ecosystems will also contribute to an increase of seafood products while the planting of coconut and oil palm trees will contribute to diversifying and developing local productions which, in turn, will generate incomes for hundreds of people and reduce expenditures on food products.
 	
The central Government and the local Government will also draw concrete benefits from the project's investments as the construction and rehabilitation of protection facilities will limit spending for emergencies, including flooding and tidal waves. This will allow not only to securing Government's equipment investments, but also mobilizing more resources for other priority sectors.
 	
Ultimately the Adaptation Fund resources will generate significant benefits at different levels and for various actors, justifying investments made."
	- Section C (Cost effectiveness, page 40)
	- Section I
	  • *Page 48 (paragraphs 4 and 5)*
	  • *Page 50-52 (Adaptation alternative)*

As noted in the previous review, please explain lessons learned from similar projects that could allow better shaping successful activities in Dionewar. For example the GEF and World Bank project Integrated Marine and Coastal Resource Management (https://www.thegef.org/gef/project_detail?projID=1189) which focused on Saloum Delta as one focal area, and related activities **R**: Section F has been revised accordingly "The project design has also been informed by The GEF and World Bank project "Integrated Marine and Coastal Resource	CR5: Addressed sufficiently to the concept stage.

Management" which aimed at promoting a sustainable management of coastal and marine resources through: - an ecosystem approach to conservation; - involving local communities and resource users, including building on local knowledge; - strengthening local and national institutional capacity to address environmental issues; - strengthening inter-institutional, and multiple stakeholder forums; - and strengthening regional networks for conservation and sustainable use of marine biodiversity. At a smaller scale, lessons drawn from this project has served especially in designing the components 1 and 3. The territorial user rights fisheries (TURF) agreements approach has been explored for the design of Activity 1.5 (Fish and oyster farms management plan developed)"	
Please explain whether the initial environmental impact study was conducted to comply with any technical standards on environmental assessment **R**: The initial environmental impact assessment was conducted to comply with the national requirements for such activities. See report attached. The corresponding text in Section B has been revised. "To avoid or reduce potentially negative impacts of the project activities, an initial environmental impact study has already been conducted and this study identifies the potential risks and proposes mitigation measures. It is a preliminary study realized with the purpose to verify the alignment of the project activities with the AF's Environmental and Social Policy and to identify the potential negative impact that might result from these activities.	CR6: Addressed sufficiently to the concept stage. The initial environmental impact study is not something required by technical standards but was made for scoping purposes. The response sheet states that the study has been attached but it has not been provided. . **R**: An initial environmental and social impact assessment has been realized at early stage of the concept (see attachment) and should be further elaborated. However, after concertation with the Directorate of Environment which has the mandate to enforce the provisions of the Environment Code as regard ESIA, it was established that the detailed ESIA cannot be performed at this stage See attached the minutes of this meeting (UFC_Minutes_Meeting_09Dec2015.doc).

In addition, during the project implementation, environmental and social impact studies will be conducted prior to any physical achievement as required by the Senegalese Environmental Code and the environmental and social policy of the Centre de Suivi Ecologique (CSE), and in line with the requirements of the Environmental and Social Policy of the Adaptation Fund. These studies will also produce an environmental and social management plan to address potential negative impacts from the project interventions. It is the normal procedure that ESIA reports are approved by a technical committee and by the local communities. The environmental endorsement is issued only after this validation."	
As noted in the previous review, the proposal should provide more comprehensive information on other initiatives in the fisheries and reforestation sectors, and elaborate on avoidance of overlap R: See Activity 1.1 "In the implementation of this activity, the project will build on aquaculture experiences now underway in the Saloum Delta. The collection and growth of shells which are the latest activity are tested in Missirah, Sandicoly and Betenty with the support of PISA, FAO, ENDA and IRD but also WAAME-CIDEAL and the National Aquaculture Agency (ANA). The oldest experiment remains oyster farming with oyster farming GIE (economic interest groupings) in Joal and Sokone that produce, transport and market fresh oysters to Dakar." Section F has also been revised accordingly "The project design has also been informed by The GEF and World Bank project "Integrated Marine and Coastal Resource Management" which aimed at promoting a sustainable management	CR7: Addressed sufficiently for the concept stage.

of coastal and marine resources through: - an ecosystem approach to conservation; - involving local communities and resource users, including building on local knowledge; - strengthening local and national institutional capacity to address environmental issues; - strengthening inter-institutional, and multiple stakeholder forums; - and strengthening regional networks for conservation and sustainable use of marine biodiversity. At a smaller scale, lessons drawn from this project has served especially in designing the components 1 and 3. The territorial user rights fisheries (TURF) agreements approach has been explored for the design of Activity 1.4 (Fish and oyster farms management plan developed)."	
As noted in the previous review, the extent to which the local government has been consulted at that stage is still unclear, as are its role and willingness to participate in the proposed activities that require strong local government support. Please clarify **R**: Section H (Part II) has been revised accordingly "The project itself results from a forum orgnized on Dionewar island in May 2009, focusing on its economic and social development and the constraints posed by climate change and its adverse effects. This forum gathered the natives of the island, residents or coming from other cities of Senegal and even The Gambia. This forum was the place to carry out a diagnosis and analysis of key sectors (health, water supply, economic activities, education, environment, sport and culture) and to come up with solutions. An important outcome of this forum has been an action plan including major issues and possible remedial activities. These activities have been later on prioritized by the Association for the Development of Dionewar (ADD), leading to a bank of projects. Combining the	CR8: Addressed. Government role has been comprehensively explained.

“environmental management” and the “social” components, the ADD developed this project idea. The selection of the project idea was also made through a consultative process at national level. In consultation with the Designated Authority and the National Committee for Climate change (COMNACC), it was agreed to issue an open call for proposals at national level in order to identify the second proposal from Senegal to submit to the Adaptation Fund. The reasoning underlying such decision was to ensure fairness, transparency and competiveness. An evaluation committee was then set up, co-chaired by the designated authority and the Chair of the COMNACC. This committee included representatives from various sectors: agriculture, environment, livestock, fisheries, universities, etc. This process led to the selection of this project idea submitted by CONAF-ADD (National Committee for Literacy and Training and Association for the Development of Dionewar) on behalf of communities in Dionewar. After this selection, many working sessions were organized with the project initiators to further discuss the issues, objectives, outcomes, etc. Several consultations were also organized at various levels with other categories of stakeholders: project sponsors, local elected representatives, women oyster farmers and processors, women rice farmers, fishermen, the civil society, technical services, communities, customary and religious authorities, etc. These consultations have ensured that their concerns and opinions about the project are captured and taken into account in the design of the activities. This was successful in securing a strong support from these stakeholders, as shown by a letter to that effect from the Mayor of Dionewar expressing clearly its willingness to participate in the proposed activities.”	

The outcomes of the consultations are said to have been captured in the project design. Please provide details of comments, feedback and suggestions received during the consultations and explain how these have been incorporated in the project **R**: Section H (Part II) has been revised accordingly "Field missions were organized with aim to identifying aquaculture potentials in the Dionewar village with the aim of exploring the sites due to host the aquaculture infrastructures, but also to better investigate the relevancy of the protection measures considered in the project. Some of these missions included two civil engineers and a resource-person who has a great experience in coastal management. The technical design of these measures was discussed extensively, as well as cost-related aspects. The outcomes of these meetings and visits were captured in the design and planning of the project activities. For instance, the initial option as regard to tree planting (Activity 1.2) was to do it in forests areas using species like coconut tree, palm tree, etc. After discussion with the communities, it deemed more appropriate to plant trees in selected sites located directly opposite the inlet and highly exposed to coastal erosion. Setting up an "access restricted forest area" ("zone mise en défens") was the preferred option in order to foster natural regeneration in forest areas. When it comes to the rehabilitation of the dikes (Acitivty 2.1) to address flooding, the populations suggested the extension of one of the two dikes in order to ensure optimum efficiency. To take this into account the discussions between the populations and the experts (civil engineers) led to the conclusion that to make this extension feasible within the planned budget, the populations will provide the workforce while the project provides the inputs and the technical backing. The populations also suggested to consider raising the height of the dikes and to include spillways in order to allow controlling the flow of rain water and sea water. All these concerns have been taken into	CR9: Addressed sufficiently for the concept stage

account, leading to revising the budget planned initially for this activity."	
As noted in the previous review, please clarify how the project will cope with overexploitation of resources, which seems to be a major drivers of unsustainable management or resources in Dionewar **R**: Activity 3.2 was designed in this purpose (development of local Convention in order to promote environmentally appropriate, socially responsible and economically viable use of forests and fisheries resources) It has been revised to better address this comment. "The Local Particular attention will be paid to vulnerable groups. The most relevant negotiating tools will be used in this regard. In particular, participatory mapping of resources will be an important part of this activity, with separate mapping by women and men, followed by each group reporting its findings and decisions in a plenary for joint decision making. During these sessions, important efforts will be put in tackling the causes of the unsustainable practices. In order to facilitate the enforcement of the new rules, the project will seek the commitments of communities, more specifically through engaging with those whose livelihoods rely mainly on activities that could be targeted by these new rules. Community leaders, elders and administrative authorities will be involved in order to foster acceptance of new rules. In addition, those who could be affected in terms of economic survival would be given priority in the development of alternative livelihoods, for example through the setting up of surveillance committees. As members of these committees, they may be supported by the project in developing bee-keeping activities.	CR10: Addressed sufficiently to the concept stage. The full proposal should consider addressing harmful overexploitation of resources through a more comprehensive approach rather than focusing only updating and formalizing rules. . **R**: In addition to formalizing rules, the full proposal elaborates further on the promotion of alternative modes of production which maintain the potential of production of ecosystems on the island (See Part II, Section I, last paragraph (page 50))

Activity 3.2 will also include a baseline study on land tenure in order to make sure that land use and land rights issues will not arise. “	
The proposal should include the screening table on environmental and social risks **R**: Section K (Part II) has been revised accordingly, including a table summarizing major risks identified at this stage.	CR11: Addressed.
Related to Activity 1.1 (p. 22), more detailed information on the fish cultivation is needed to appreciate the environmental risks associated, such as: What is the size and shape of the fish ponds? Which species will be grown, what cultivation methods will be used? Will the fish be stocked from the wild, and the case being, is there a risk for the wild populations? What safeguards are there for manatees and other wildlife not to be harmed? Are feeds used? **R** : The Activity 1.1 has been revised accordingly. The species used is a local one. “The fish ponds will 2.5 X 2.5 X 1.6 of size, meaning a capacity of $10m^3$ each. The species chosen is a local one (Tilapia) and will not be stocked from the wild, but developed in hatchery by the National Aquaculture Agency (ANA).” Also see Section K “Solid and liquid waste generated by the processing of fishery products and fertilizers that could be used in rice cultivation may be thrown through drainage waters and be harmful to this important biodiversity. Poor management of fish and oyster farms could also lead to toxic runoff, introduction of diseased species into populations, excess of food and waste influencing population densities or stressed out fish. “	CR12: Addressed partially/sufficiently for the concept stage but more information will be required for the full project proposal to appreciate the feasibility of the activity and the associated environmental and social risks. According to environmental and social risk screening, some of these aspects will be part of the Environmental and Social Impact Assessment. **R**: A feasibility study has been realized and the report is being finalized and will then be translated into English

The feasibility study planned in the PFG phase will go further in details on this.	
Please explain, whether the ridges around the rice plots prevent salt water intrusion through the soil. Please also explain how the beneficiaries for project support in this activity will be selected **R**: The ridges are put in place to protect rice plots from seawater intrusion (See Activity 2.3) "Through activity 2.3, the project resources will be used to protect rice plots against seawater intrusion" The owners of the rice fields to be protected have always been well known.	CR13: First part addressed. Second part possibly misunderstood and not addressed: it is not clear how the rice plot owners to benefit from this activity would be chosen among all rice plot owners. **R**: In the full proposal, we have elaborated further on how rice growing lands will be distributed once restored. See Part II: - Section A, Activity 2.3. (Page 35) - Section C (page 65)
Please explain whether the initial environmental impact study, that has been stated to have identified risks and mitigation, has also included social risks and impacts, and has it covered all 15 principles of the AF Environmental and Social Policy **R**: Yes, this study did also include social risks. But it did not cover all the 15 principles. Principles like the one relating to "indigenous people" are not relevant in the context of this project	CR14: Addressed sufficiently to the concept stage. There had first been a screening of which principles were applicable, and some, e.g. on indigenous peoples, had been excluded as inapplicable. The initial study had included all risk categories deemed applicable **R**: Principle on indigenous people is not relevant in the context of Dionewar
Please reconsider comprehensiveness of the risk identification exercise and if necessary, amend. For ESP principles for which no risks are identified, that conclusion should be justified **R**: The principles on Indigenous people is not relevant in the context of this project	CR15: Not fully addressed. For example, with regard to involuntary resettlement, the screening apparently has not considered the resettlement of livelihood activities. Some of the management measures in the table on pp. 45-47 are not fully aligned with the analysis of risks on pp. 41-45. The fully developed proposal should be based on a comprehensive Risk screening. **R**: Currently, livelihoods activities are developed in specific locations

	bound to the natural vocation of land and mangrove resources. The project aims to develop alternative mode of production that will be located sometimes in different areas.
Please provide information on the location, characteristics and construction methods of the dikes. It would be very useful to show the planned construction on a map **R**: The map is already provided (Figure 10, page 16). More detailed characteristics and construction methods will be provided by the feasibility study , planned through the PFG	CR16: Not addressed. From the schematic map on p. 16 it is not clear to see how the planned activities would protect assets and would be appropriately located. The proposal suggests more specific planning would be carried out during the development of the full project proposal **R**: The planning component of this project has been enhanced through the development of an activity aiming to install a meteorological station in order to improve weather forecasts for local producers and to better inform local development strategies. Making available accurate and timely climatic data will play a key role in protection assets.
Activity 1.2 sub-activity on setting up closed forest area (p. 23) includes a risks on livelihoods Please assess risks related to setting up closer forest area in terms of the ESP principles **R**: The setting up of a "access restricted forest area" area is realized in a participatory way and it includes the development of a "simple management plan" that will define the rules in terms of using resources. So there is no risk. The approach to be used is participatory.	CR17: The response sheet states that the forest area will be set up in a participatory way and it includes the development of a "simple management plan" that will define the rules in terms of using resources, and hence, "there is no risk". This is not logically likely: even if the process is participatory, there may be risks. This could be strengthened in the context of Activity 3.2 **R**: See Part II, Section A, Activity 3.2 (Page 36-37). This activity will help manage any potential risk.
Please describe the process of selecting project beneficiaries (p. 24) to identify any risks of access and equity and for marginalised and vulnerable groups **R**: This activity targets women oyster farmers and processers. They are well known and their number is 270 (See P. 24). It also targets the members of the surveillance committee.	CR18: Please describe the process of selecting project beneficiaries (p. 24) to identify any risks of access and equity and for marginalised and vulnerable groups. **R**: This activity targets women oyster farmers and processers. They are well known and their number is 270. It also targets the members of the surveillance committee. These beneficiaries are those who had

	the original idea of this project. However, some activities are planned in order to address the issue of access and equity –cadastral mapping, land tenure study, etc.)
Please provide relevant information regarding compliance with the law (Section K, p. 40) **R**: Section K has been revised accordingly "There are a regulatory regime and development strategies relating to mitigating such risks: - Law N° 86-4 of 24 January 1984 (Hunting and Nature Protection Code) ; - Law N° 81-13 of 4 March 1981 (Water Code) which provides provide for preventing water pollution and requirements in terms of securing drinking water supply and public health, agriculture, biological life of receptor medium, fish fauna…; - Land legislation: the most relevant section with regard to the project activities are: o Land Act N° 64-46 of 17 June 1964 pertaining to the National Domain and creates spaces that are not likely to be owned ; o Law N° 76-66 of 2 July 1976 (State Domain Code) which organize the public domain and the private domain; o Law N°96-06 of 22 March 1996 (Local Government Code) and Law N°96-07 of 22 March 1996 related to transfer of powers to Local Governments, as well as the Decret N°96-1134 of 27 December 1996 deifning the powers of the Local Government for managing the environment in its territory."	CR19: Addressed sufficiently to the concept Stage .

For activity 3.2 (p. 28), please describe how the new local convention would be examined for potential social risks/impacts, particularly with respect to marginalized and vulnerable groups. **R**: Activity 3.2 has been revised accordingly "The Local Particular attention will be paid to vulnerable groups. The most relevant negotiating tools will be used in this regard. In particular, participatory mapping of resources will be an important part of this activity, with separate mapping by women and men, followed by each group reporting its findings and decisions in a plenary for joint decision making. During these sessions, important efforts will be put in tackling the causes of the unsustainable practices. In order to facilitate the enforcement of the new rules, the project will seek the commitments of communities, more specifically through engaging with those whose livelihoods rely mainly on activities that could be targeted by these new rules. Community leaders, elders and administrative authorities will be involved in order to foster acceptance of new rules. In addition, those who could be affected in terms of economic survival would be given priority in the development of alternative livelihoods, for example through the setting up of surveillance committees. As members of these committees, they may be supported by the project in developing bee-keeping activities.".	CR20: Not addressed **R**: ESIA is governed by the provisions of the Environment Code. The Directorate of environment has the mandate at national level to enforce these provisions. They should be consulted prior to undertaking any ESIA and all ESIA reports need to be approved by a committee setup within this Directorate. After concertation with the head of this Committee and the Designated Authority for the AF (who is also a staff of this Directorate), it was established that the detailed ESIA cannot be performed at this stage See attached the minutes of this meeting (UFC_Minutes_Meeting_09Dec2015.doc).
Please amend the proposal in light of the fact that environmental and social risk identification and impact assessment commensurate to the risks should be carried out and ESMP developed before the submission of the fully-developed project document **R**: Section K has been revised accordingly	CR21: Together with the proposal, a project formulation grant request has been submitted, meant to finance in part environmental and social impact assessment studies, and development of ESMP. Such studies and ESMP should be contained in the full proposal. **R**: After concertation with the head of this Committee and the Designated Authority for the AF (who is also a staff of this Directorate), it was established that the detailed ESIA cannot be performed at this stage See attached the minutes of this meeting (UFC_Minutes_Meeting_09Dec2015.doc). However, environmental

	and social risks associated with every options of the feasibility study have been analysed through a diagnosis study. According to the procedures in place at national level, the Detailed Preliminary-Draft (DPD) study is a prerequisite to any ESIA. The DPD study is conducted at the first stage of project implementation