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

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ABBREVIATIONS AND ACCRONYMS

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 Literacy
CSE	Centre de Suivi Ecologique
DADL	Direction de l'Appui au Développement Local
DAMCP	Direction des Aires Marines Communautaires Protégées
DEEC	Direction de l'Environnement et des Etablissements Classés
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	Groupement de Promotion Féminine (Women's Grouping)
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 Development Plan
PMU	Project Management Unit
PSE	Strategic Plan for Senegal's Emergence
AWB	Annual Workplan 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 Fsheries
ECOWAS	Economic Community of West African States (ECOWAS)
IUCN	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/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

PART I: PROJECT/PROGRAMME INFORMATION

Project/Programme Category:	REGULAR PROGRAMME
Country/ies:	SENEGAL
Title of Project/Programme:	Reducing vulnerability and increasing resilience of coastal communities in the Saloum Islands (Dionewar)
Type of Implementing Entity:	NIE
Implementing Entity:	Centre de Suivi Ecologique (CSE)
Executing Entity/ies:	Comité National pour l'Alphabétisation et la Formation (CONAF), Agence Nationale pour l'Aquaculture (ANA)
Amount of Financing Requested:	1,351,000 (in U.S Dollars Equivalent)

I.1. Project Background and Context

I.1.1. Summary of problem the project aims to solve

Under the combined effects of climate change and human activities, the Saloum estuary's mangrove swamp has disappeared at an estimated 38.3 %. This degradation has led to significant ecological and economic losses, one of the main consequences being the opening of a breaches along the Sangomar Arrow (a sand spit), which threatens the existence of several human settlements. The village of Dionewar counts among those most affected.

Recent studies[1] conducted along the coast and on the Saloum estuary indicate that the recent climatic variations in Senegal (from 1971 until 2010) have had multiple effects on the mangrove ecosystems in particular. The lack of rainfall is among the main drivers, and indeed the succession of dry years has pushed back the tidal limits, allowing the salinity front to move further upstream. This is how extreme cases of hypersalinity have happened in the Saloum estuary. While salinity plays an important role in the metabolic

[1] ECOWAS, IUCN, 2010: Programme de lutte contre l'érosion côtière de l'ECOWAS. "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 et al, 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

efficiency of botanical species, it reduces the productivity of the mangrove in particular. These hydrological and ecological conditions help explain why mangroves in the Saloum estuary are so small, and also why its density, floral composition and productivity have been severely affected.

In addition to the climatic causes of the mangrove's degradation, there has also been extensive exploitation by communities. In particular, they have been harvesting the plants for oysters and using the mangroves themselves for firewood and timber.

The regression of the mangrove has directly weakened the sedimentary dynamics, which ensures the stability of the Sangomar Arrow. In 1987, the acceleration of marine coastal erosion caused a breach on the sand spit causing large ecological upheavals.

This project is therefore developed to address the threats posed by the above described dual effects of climate change and marine coastal erosion on the village of Dionewar. More specifically, this project seeks to answer:

- What are the economic and ecological consequences on the mangrove due to these climatic variations? This has had considerable effects on the productivity of the estuary's ecosystem on which the populations depend for their livelihood

- What are the risks related to coastal erosion (focusing on the breach opening of Sangomar) that threatens human settlements and the estuary ecosystems?;

- What has been the effect of recurrent flooding, resulting from extreme events such as storm surges and heavy rains? What affect has this had on loss of livelihoods and safety issues?;

- How can this project help fill the gaps where there is a deficit on climatic data, which are necessary to set good policies and strategies for local development? There is a rather weak local planning framework, characterized by low integration of climate change issues to local development strategies.

This is an adaptation project based on both ecosystem and community. Proposed activities focus on strengthening the resilience of the mangrove ecosystem, protecting infrastructures against flooding, and developing local regulatory conventions for protecting the ecosystems of the estuary in general and the mangrove in particular.

I.1.2. Background information

The municipality of Dionewar is located in the country's western coastal zone. It is part of the district of Niodior, the department of Foundiougne and the region of Fatick. It further includes the villages of Dionewar, Falia and Niodior. Based on the projections (2008-2025) of the National Agency of Demography and Statistics (ANDS), the population of the village of Dionewar was 5,395 in 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 large mangrove ecosystem presence and surrounded by tidal reservoirs and bolongs.

The Saloum estuary (figure 1) is of particular interest due to its large rate of biodiversity. It is a big estuarine complex with a drainage basin of 29,720 km^2 (4,309 km^2 for the estuarine part), opening into 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 the city of Foundiougne, but after this point and up until the city of Kaolack, it is narrow (<500m) with depths less than 8 m. The Diomboss has a main width of 4 km with depths running 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 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 manatee *(Trichechus senegalensis)* and dolphin *(Sousa teuszii)* in the Saloum and its ‘‘bolongs’’ 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

I.1.2.1. The coastal zones: a key area for socioeconomic development

Senegal has 700 km of coastline which concentrate 60% of the population (estimated at 12.5 million inhabitants in 2010) and hold most of the country's urban sites and economic activities. This part of Senegal also has a high population growth rate. Prospective components from the Master Plan for the West African Coastline (SDLAO[3] in French) show a sharp increase in the coastal population, mainly in urban areas, and indeed 85% of industries and services are located here. This concentration is increasing and the coastal area will continue to play a key role in the national development process over the next decades.

The coastal zone is home to fishing, a major and strategic economic sector for Senegal, contributing 2% to the national GDP and generating 600,000 jobs, both directly and indirectly. On average, fishing comprises nearly 32% of the country's total exports.

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

Hence, coastal areas are host to important fishery related installations, such as 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). In 2003, landings reached a record of 29,290 tons. However, a depletion of fish stocks compared to the performance recorded in the 1960s and 1970s has been noted, which is largely due to climate change and over-exploitation.

The location of the Dionewar Island in the Delta area offers huge potential for fishing, which is the population's primary activity. This is why the Serer ethnic group (who live on the island) are by tradition mainly fishermen and are commonly known as "Serer Niominka" or "*Serer with feet in the water*". Fishing is considered the main income-generating activity, unlike other parts of the country where agriculture leads the way.

Women are very active in the processing (drying, smoking, salting and fermentation) of fish products. On Dionewar Island, they are grouped into more than 18 groups with around 270 members. Indeed, the collection of *Arca sinelis (*a bivalve shellfish locally known as ''*pâgne*'') and its processing and marketing are exclusively carried out by women. There is a fish processing factory at Dionewar, but there is limited access to markets. The amounts collected continue to decline, as do the number of individuals involved in this work. This is on top of the annual July to September break when all work ceases. It is also worth noting that in 1996 and 2003, the Federation of GIE (Economic Interest Groupings) "FELOGIE" Dionewar received the Presidential Award for women's empowerment. Fish products from the island (both fresh and processed) are marketed in nearby urban centres or in Dakar (PNDL, 2011, in Communauté Rurale de Dionewar, 2011[4]).

In the past, populations in Dionewar used to grow several hectares of rice on the island and uninhabited islands. But in the 1970s, drought cycles, seawater intrusion and a lack of varieties fit for the new rainfall context, meant rice cultivation was abandoned. Nevertheless, with the return of rainy periods over the last years, and thanks to support from various initiatives, 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 damages due to the combined effects of overexploitation and climate change. Vegetation on the island mainly comprises of mangroves along the submersible areas and their surroundings, while on the island 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 breaking of the land strip and its disappearance has accelerated coastal erosion on this island and neighbouring ones. Indeed, mangrove roots play a physical role in stabilizing soils and serve as a transition zone (or surge swell) to protect the

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

coast from waves, storms and typhoons. The mangroves' depletion further impacts on the wildlife that refuge here. Fish and crabs reproduce, mollusks grow, birds nest and predators come to hunt. Mangroves help fertilize the estuary, fostering the development of the phytoplankton — the first element in the food chain. They also provide the populations with seafood *(Murex sp, Anadara senilis, Crassostrea gasar, Thympanothonus sp, Cymbium sp,* etc.).

I.1.2.2. Environmental context

The environmental context in Dionewar is characterized by natural resource degradation under the combined effects of climatic variations, coastal erosion and anthropic activities. This context will be analyzed by means of the Pressure-State-Response (PSR) model by presenting the state of natural resources, the pressures they undergo (both natural and anthropic) and the developed responses to help reduce or end these pressures.

a) State of natural resources

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

- Tree stratum composed of two (02) types of forest areas: one on the littoral, constituted by the mangrove; and one on dry-land made up of Soudano-Guinean essences.

The dry-land forest is located in the continental zone, after the mangrove curtain. Approximately 8.7% of this area is dedicated to 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 normally falls between June and October. During this rainy period, the grass cover is well supplied and highly varied. This stratum is important for the municipality, because it constitutes key source of fodder for the cattle.

The mangrove is made of *Rhizophora racemosa*, *Rhizophora mangle*, and *Avicenia africana* species. This crucial ecosystem covers 17% of the municipality's area. It also serves as breeding and growing areas for certain species of both flora and fauna, which explain the population's awareness of its needed protection.

The diachronic analysis[5] of Landsat and SPOT satellite images (1972-1986, 1986-2001 and 2001-2010) shows that rainfall is the major driver of the mangrove dynamics in the Saloum estuary. It indicates that during the decade from 2001-2010, while the mangrove evolution remained weak (18.96%), there was nevertheless a decrease in its disappearance (4.36%) and an increase in its regeneration (23.31%). This general trend in the Saloum estuary however contrasts with observations made in the municipality of Dionewar, which is located directly in front of the Sangomar Arrow breach, which opened in 1987. Indeed, the salinity increase, resulting from this break, caused a progressive disappearance of the mangrove swamp to the right of the breach which is in direct contact with the sea. The breaking of this strip of land has led to deep changes in both hydrodynamics and sedimentology of the Saloum estuary and has resulted in high tides leading to a strong salinity gradient from downstream to upstream. Hence, the islands located in the Saloum Delta are facing seawater intrusion which, coupled with the decline of rainfalls, has led to land salinization. The mangrove tree may be a halophyte that thrives in salty conditions, but it has an ongoing need of freshwater to buffer the seawater (which has a salinity level of around 33,3g/l). In Dionewar, the increasing salinity gradient has resulted in significant losses of mangrove swamp, and in particular the *Rhizophora* species (*Rhizophora mangle, Rhizophora racemose*) which is known for its fragility and sensitivity to salinity variation. In the Saloum estuary's northern area, Faye and al. (2007) showed that the bushy (degraded state) indicated a low rate of stand regeneration due to a very high salinity level of the substrate (more than 50‰). This confirms Blasco's 1982 work, which said that the size of *Rhizophora* decreases with the increase of the salinity level. These losses are closely linked to the decline of fishery resources, because the mangrove ecosystem provides many diverse species of birds, mammals, Crustacea and fish. The tree is the foundation in a complex marine food chain and detrital food cycle. As mangrove leaves drop into tidal waters they are colonized within a few hours by marine bacteria that convert difficult to digest carbon compounds into nitrogen rich detritus material. The resulting pieces covered with microorganisms become food for the smallest animals, such as worms, shrimp, mollusks, mussels and oysters, among others. These detritus eaters are food for carnivores, including crabs and fish[6].

Land resources: With only a small surface area (297 km²)[7] the municipality of Dionewar does not have enough land suited for agriculture. The majority of arable land is hardly affected by saltwater intrusions and by degradation due to an intensive monoculture and absence of fallow.

In terms of soil resources, there are several types of soils in the area, including: "dior" soils (tropical ferruginous washed soils) which are favourable to agriculture and located

5 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 [on line], 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

6 Mangrove.org: Ecological importance of mangrove

7 Direction de la Prévision et de la Statistiques / Division des Enquêtes Démographiques et Sociales. Direction de l'Aménagement du Territoire (DAT)

in the centre and the north; “deck-dior” soils (ferruginous tropical few washed) located mainly in the eastern and northern parts of the island and which are highly adapted to market gardening, arboriculture and rain-fed agriculture; and halomorphic soils which are found next to bolongs, behind the tidal reservoir, but which are constantly washed away by the tidal flows. Halomorphic soils are not generally covered by vegetation because of their clay-like texture, their salinity and acidity, and their continuous expansion is a source of concern when it comes to agriculture.

Water resources: the hydrographical network consists mainly of the Atlantic Ocean, bordering the entire western part of the municipality and the Saloum River, feeding several bolongs and puddles. The main bolongs 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.

There are eighteen (18) temporary pools, which allow for market gardening and livestock watering.

Hydrology aspects relate to the harnessing of subterranean waters stemming from the groundwater. The freshwater used by the municipality comes from the Continental Terminal Aquifer caught 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.

Aside from wells, there is no drinkable water network for Dionewar and Niodior. Only the village of Falia has a water conveyance, resulting from the Mounde (Municipality of Djirnda) drilling.

There are numerous drinking water supply constraints, which can be briefly summarized as follows: brackish water; absence of functionally-equipped drillings; non-utilization of the maestrichtian water table; rapid drying up of wells; bad quality water; absence of rainwater collection system.

b) Pressures on natural resources
The pressures on natural resources have natural and anthropic origins.

The pressures of natural origins: relate to the effects of climatic variations and marine coastal erosion further to the natural opening of the breach on the Sangomar Arrow.

- Effects of climatic variations:

The global surface temperature has increased significantly, around 0.8°C, since the beginning of the 20th century[8]. The last decades have had an even more pronounced

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

warming, as shown by observation analysis affecting development sectors such as agriculture.

Recent analysis on the African continent and in particular in the West African Sahel region has shown a significant upward trend in temperatures, particularly since the 2000s. Global warming, which has been observed since the middle of the century, is characterized by climatic extremes manifested by an increase of the number of hot nights and heat waves across the sub-region[9].

The climate change projections based on 29 global models[10] indicate a significant increase, particularly from 1981 to 2010, of the surface temperatures across the sub-region. In the Sahelian regions, this surface temperature increase will exceed 2°C during the rainy season (June-September) over the mid-term (2040-2069) and weaken along the coastal regions (Figure 2). The projections on the precipitation (Figure 3) are translated by an increase estimated at around 30% along the eastern parts of the Sahelian region, from Mali, Niger and towards Chad. Whereas in the western regions the situation seems to be producing a deficit of around 20% in regards to the seasonal climatological average of 1981-2010 in Senegal, Mauritania, Guinea and the western part of Mali.

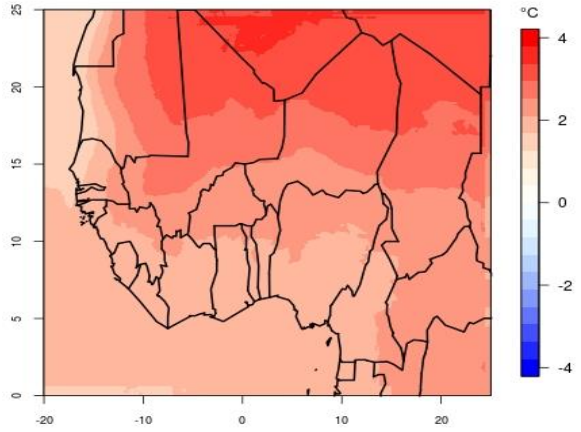

Figure 2: Median of the difference of temperature °(C) of the air on the surface of the Earth on the season JJAS between reference period 1981-2010 and the future period 2040-2069, simulated by 29 global models by considering the extreme scenario RCP8.5 for the evolution of the radiative forcing on the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

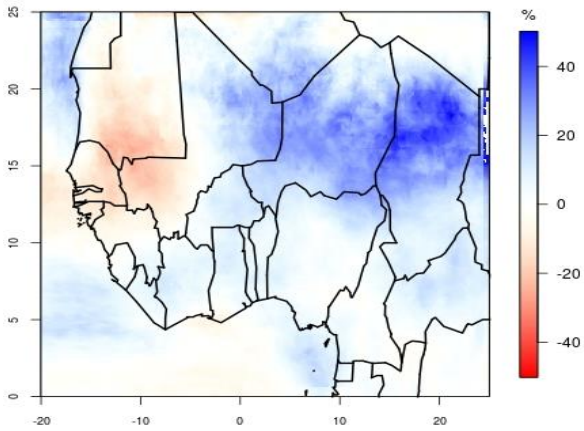

Figure 3: Median of the rate of precipitation (%) on the season JJAS between reference period 1981-2010 and the future period 2040-2069, simulated by 29 global models by considering the extreme scenario RCP8.5 for the evolution of the radiative forcing on the mid-term (2040-2069). (Source: AGRHYMET)

[9] Agali and al, 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

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

According to a World Bank-funded study in 2013, observations suggest climate change has had profound effects over the last 50 years, including a protracted dry period from 1968 to 1969. This climate deterioration manifested through erratic inter-annual rainfalls, but also decreases in rainfall volumes resulting in a significant shift of isohyets towards the south (Figure 4).

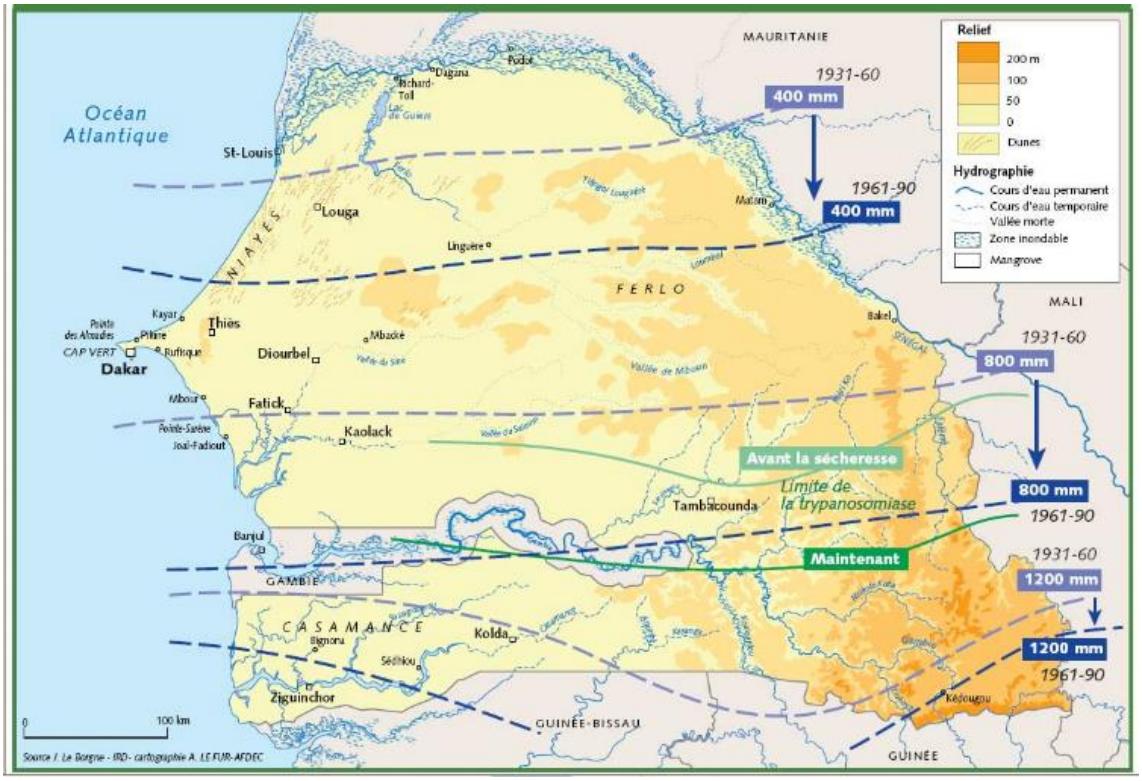

Figure 4: Isohyets in the 1931-1960 and 1961-1990 periods
Source : Institut de Recherche et Développement
(http://www.cartographie.ird.fr/SenegalFIG/secheresse.html)

With the reduction in the pluviometry observed since the 1970s, the Sahelian countries entered a period of drought resulting in considerable consequences for the vegetation in general and the mangrove in particular[11]. The supply of fresh water strongly decreased, drastically reducing the flow of rivers throwing into the Saloum estuary. 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 penetration of marine water, caused an increase in salinity.

[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.

As a result, this rainfall variability has led to increased salinity with rates above 50‰ during the rainy season. This phenomenon persisted in the 1990s with surface water becoming hypersaline, especially in rivers upstream where the salinity levels exceed 150‰. This salinization influences the size of the fish at maturity[13], their growth and movements[14]. Moreover, various studies[15] have associated mangrove degradation with the dynamics in rainfall variability, while this ecosystem plays a key role in the development of fishery resources.

In Senegal, the climate is Sahelian in the north and Sub-Guinean in the south, and is characterized by an 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, seawater intrusion in farmlands, salinization of water resources and destruction of infrastructures.

The main characteristic of the rainfall in the Saloum estuary remains its strong inter-annual variability with large deficits during the1970s and 80s (Figure 5).

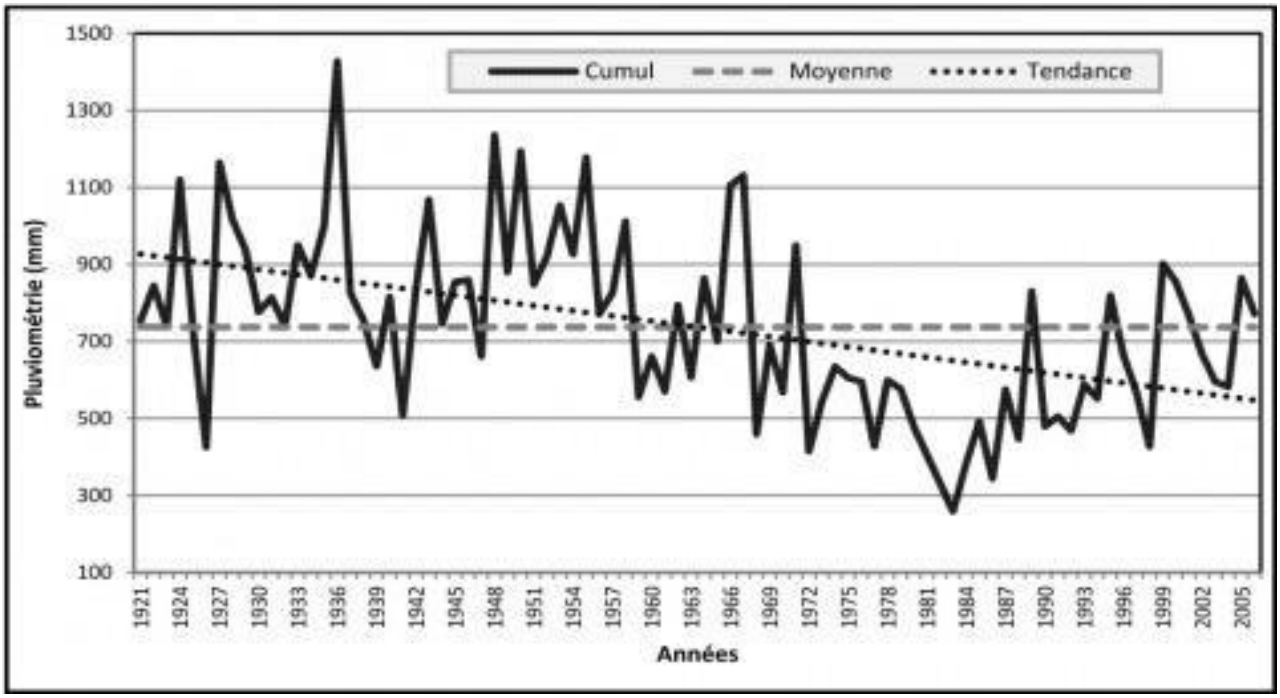

Figure 5: Annual rainfall deviation from the mean value at Foundiougne (1950-2003)

[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

Future projections for 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 by 2080 from 2.65 to 4°C in coastal areas.

As for rainfall, predicted variations in the northwest quarter of Senegal range from -4.5 to -19% by 2030 to -18% to - 55% by 2080. For the same period, and from a more pessimistic climate scenario, rainfall on the Senegalese coastlines could drop almost two-fold.

Therefore, considering the country as a whole, there is reason for deep concern. It is expected many more years of severe drought are to come and a global sea level may rise to 20 cm by 2030 and 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 of the country, there are few indications on their variations, particularly in terms of extreme events. On the one hand, global warming could reduce rainfall levels, leading to increased droughts. And yet on the other hand, increasing the holding capacity of moisture in the atmosphere due to rising temperatures could result in rainfall events of much larger intensity than expected, which would make the region even more vulnerable to flooding.

At the Foundiougne station (studied here as the closest station to Dionewar), the rainiest years were during the 1950-1970 period; and the least rainy were in 1971, with a few years with normal to surplus pluviometry in 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 about the tide's penetration into the river. Indeed, there is a time and flow speed higher than those of the ebb[16], and the amount of water flowing into the estuary is much larger than that coming out. This is partly due to the inertia caused by the adjacent areas of mangroves, salt flats and "bolongs". This very special hydrological functioning is essentially attributed to a low slope, particularly 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].

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

Predicted temperature increases, 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, there will likely be a major decrease in captures and the estimated market value of fishery products. As a result, accumulated losses could amount to as much as USD 136 million between 2020 and 2050, which represents 3.23% of the country's average GDP from 1981-2005.

This situation has created great distress among the population and especially the youth, among which many have sought desperate measures — turning to clandestine emigration in poor security conditions — often resulting in death. And finally, from a purely nutritional standpoint, the drop of fish and seafood consumption will automatically impact the amount of animal protein intake in people's diets.

- Coastal erosion:

Under the combined effect of all these changes, the Senegalese coastline shows widespread erosion (Figure 6). Parts most sensitive to this occurrence 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 6: Erosion of sandy coasts from the 1950s according to bibliographic data (source: I. FAYE)

One of the most severe signs of these effects 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 favour of littoral drifts that dump part of its sediments there, appearing as successive hooks partly from shoals bordering the tip of the arrow. From1927 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, the 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 a nearly continuous southward extension from

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

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.

There is also a sharp slowdown in the expansion rates to the south, which varied 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 onward. Between 1986 and 1987, two small hooks, surrounding a lagoon, formed successively at the Arrow's 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 each one non-exclusive to the other: 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 was marked by 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 annual rate of 229 m (Figure 7) 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].

[21] Diaw, 1997

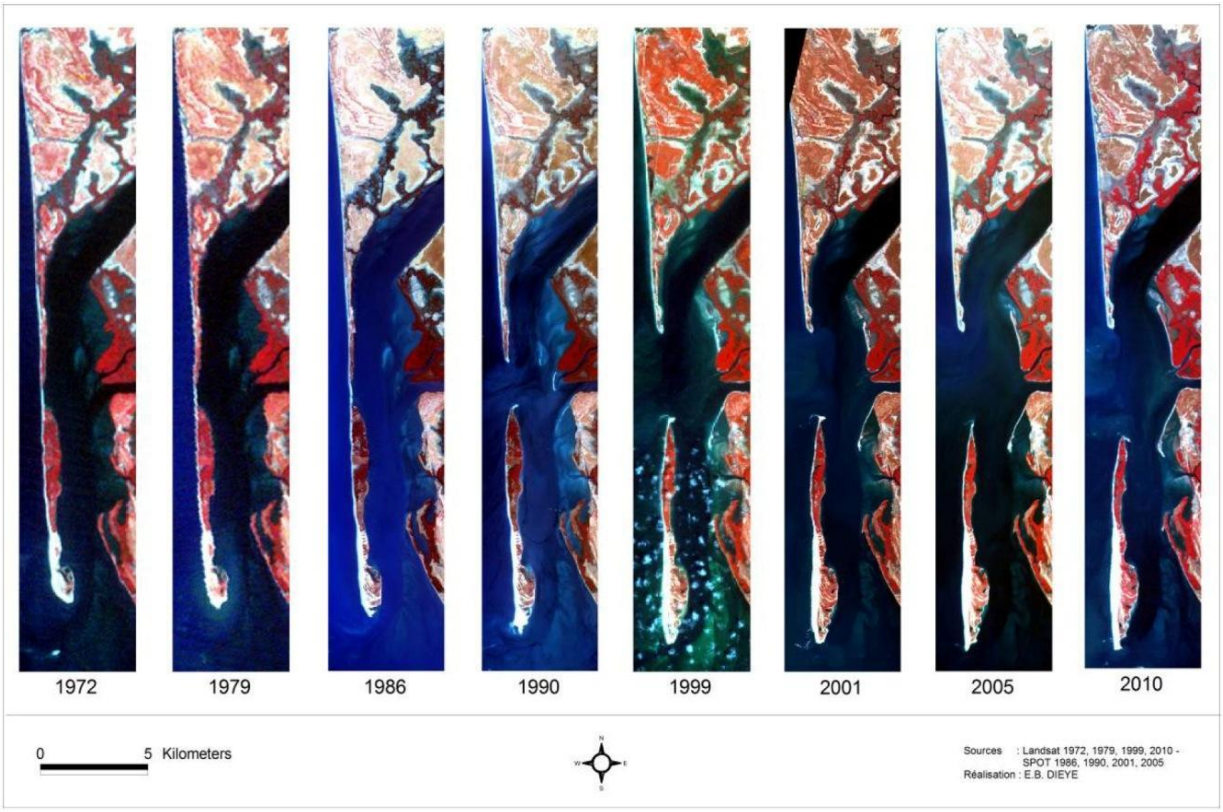

Figure 7: Dynamic of the Sangomar Arrow between 1972 and 2010 (Thomas and Diaw, 1997)

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 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 bringing about deep changes in both the estuary's hydrodynamics and sedimentology.

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 into 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 8: 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 anthropogenic 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, harvesting of oysters and using mangrove wood for the processing of fishery products and for manufacturing work or house building.

This pressure on the mangrove ecosystem is all the more disturbing as it is happening in conjunction with a growing population. In 1988, the general population and housing census estimated the population of the Municipality of Dionewar was 8,437 inhabitants, while the 2011 and 2015 projections of the population (2008-2015), given by the Statistics and Demography National Agency (ANDS), are 12,988 inhabitants and 14,525

inhabitants respectfully — a doubling over 25 years.

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

Illegal logging of the green mangrove wood also remains an important issue in some villages, particularly in Dionewar and Niodior. This phenomenon, 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 on their own, or supported by the government or development partners. Among these strategies, the most remarkable are the following:

Fighting erosion: the marine erosion causes the destruction of the vegetation cover and the mangrove ecosystem's loss of biodiversity. 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 face of these threats, the populations have developed several strategies. Some are effective and long-lasting, such as the reforestation of filaos (*Casuarina sp.*) intended for the fixation of the beaches or the fish farming which assures the availability of quality products. It is also the case for the relocation of infrastructures destroyed by the erosion and bypassing of the bar - the only solution to avoid sandbanks in the sea.

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 9: Dike protecting against rising sea water built by populations in Colbassy (CSE, January 2015)

Damaged houses are rehabilitated through social mobilization, and waterborne 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 disruptions to 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, often requiring restoration actions. The best solution would be to raise the height of these dikes, which are mainly built by local populations. However, the lack of logistic means (trucks and tractors) and financial resources make it difficult to carry out an appropriate rehabilitation.

Strategies to deal with rainfall deficit:

The rainfall deficit entails loss of productions and causes the lowering of the water table. To stock up with water, communities are obliged to dig deeper existing wells or to open new ones altogether. These strategies are effective, but not long lasting. The problem could be settled by the water conveyance, but this strategy also requires heavy investments.

The rainfall deficit further results in land salinization, forcing communities to abandon their fields and move to new cultivable lands. This is effective, but not sustainable, especially in a context of limited land availability. Salinization due to the rainfall deficit also causes a loss of biodiversity. The strategy developed by communities consists in mangrove and rangelands reforestation, which is an effective and sustainable solution.

To address the issue of quality drinking water (salinization), the populations also dig shallow wells (4m) to access the fresh water lens. This may be effective over the short term, but it is not long-lasting.

Strategies to address poor natural resource management: the most remarkable initiative in this regard is the establishment of a biological rest period, which is strictly observed. Every year, for three months, the community suspends all fishing and shell extraction activities. This allows the species to reproduce and grow. These joint local initiatives have proven fruitful, because according to the population they note a considerable increase and diversity of fishery resources as a result. In addition, over the last ten (10) years, the populations undertook a vast mangrove reforestation campaign, leading to the reforestation of five (05) hectares. Management committees of the Natural Resources (COGER) have also been established in every village to follow these experiences and replicate them.

The municipality of Dionewar has developed a Communal Development Plan (PCD), as well as a Local Action Plan for the Environment and 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 in the region are rather seriously threatened today on this island.

I.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 disturbances to mangrove ecosystems and natural habitats.

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

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

Due to the combined effects of climatic variations, coastal erosion and 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.

To address this problem, a number of activities were proposed under the ***component 1*** of the project "***Enhancing resilience for productive ecosystems in Dionewar Island***"

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

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

To address this problem, a number of activities were proposed under the ***component 2*** of the project "***Protection against flooding, coastal erosion and salinization in Dionewar***"

Issue 3: Poor knowledge of adaptation strategies for an island environment

Although Senegal has a long coast, experiences of adaptation in coastal and island zones are still not yet well 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 supports the resilience of the estuary's productive ecosystems.

The deficit of climatic data specific to Dionewar is striking. There is no meteorological station in the locality and the climatic events are neither well documented nor disseminated. In addition, this climatic data deficit reduces the reach and relevance of the diagnoses that underpin all the strategies of local development.

To address this problem, some activities are proposed under the ***component 3*** of the project "***Strategic planning and knowledge management***".

I.1.4. Selection of the project intervention area

The reasons for selecting these areas of intervention are essentially due, for the following considerations: a) the severity of these combined hazards in the Saloum Islands; b) the 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.

The project will therefore intervene on the Island of Dionewar (Figure 10), which host major economic activities for the local populations.

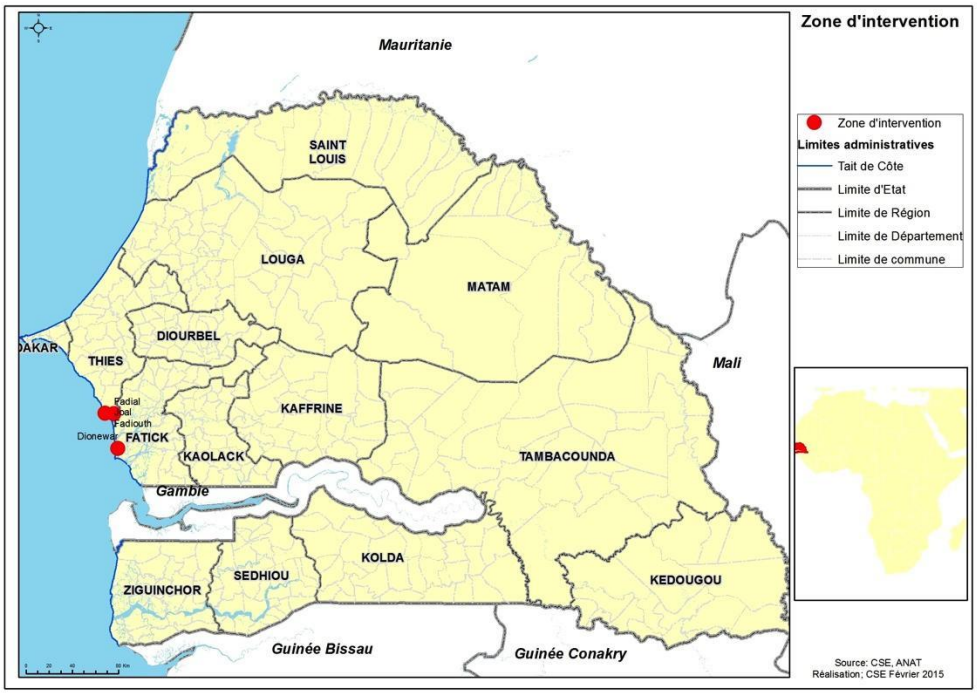

Figure 10: Location of the intervention areas

The location of planned realizations is shown in the next figure.

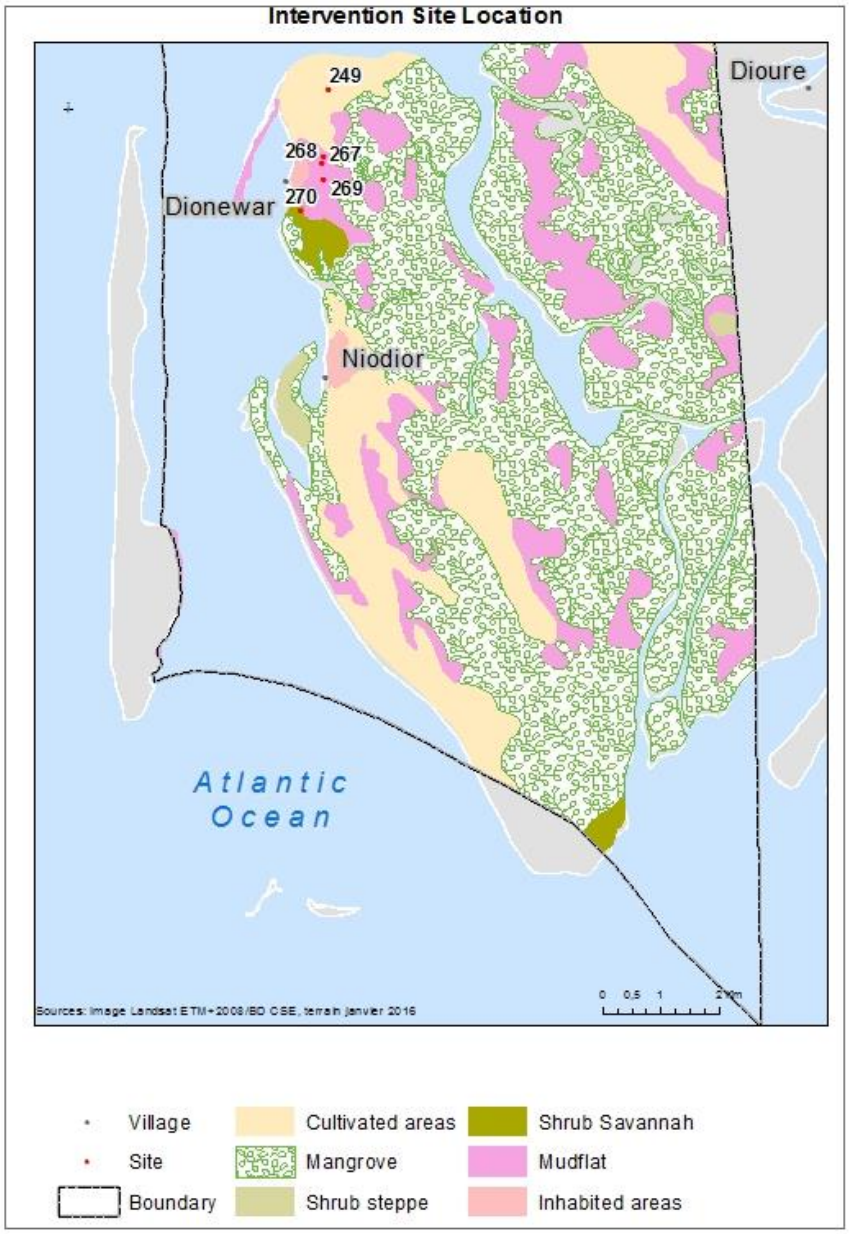

Figure 11: Location of planned realizations

249	Oil palm and coconut palm trees area
267-268	Ndiar dike
269	Ecole 2 dike
270	Ndioundiouré dike

Each location has been chosen based on logical reasoning:

- The dikes were already built through previous interventions with the aim to protect houses and other socioeconomic infrastructures from flooding. Therefore, their location is mainly based on the position of these infrastructures with relation to the

threat of flooding. With a view to enhance the functionality of these structures, this project has undertaken a feasibility study to confirm the appropriateness of their location, taking into account the opinion of the population.

- The location of the fish and oyster farming sites is also based on: the opinions of the recipients who were involved in prospections; technical considerations such as the physicochemical characteristics (pH, salinity, temperature, turbidity, etc.); the water depth (more than 2 m); the presence of mangrove swamp and the availability of spats in order to allow oyster farming; and the safety and accessibility of the sites.
- The reforestation of mangrove is an ecosystem restoration action and it takes place in areas where the natural mangrove stands are degraded. Additional selection criteria include soil texture, wind speed, water currents… Priority is given to sites which, once replanted, will contribute to the control of flooding by reducing the strength of waters that flow towards the dikes.
- Reforestation actions consist mainly in restoring degraded stands. Targeted species (coconut tree and oil palm tree) contribute significantly to the livelihoods of local communities. The choice of the sites is then determined by the level of degradation of natural stands, but also taking into account the potential to protect the village from heavy winds, the need to avoid encroachment into farmers' fields or human settlements, soils characteristics and climatic factors, and the absence of any land disputes.
- As regards the weather station, it was agreed with the ANACIM that right after the approval of the project, prospections will be made with the view to identify the better location, taking into account the WMO standards: shelters must be installed at a distance of at least twice the height of the obstacles (ideally 4 times), in a sector the sunniest possible, avoiding being too close to a wall, and at a height of at least 1.5m above a grassy soil.

I.2. Project Objectives

Overall project objective

The project's overall objective is to reduce the vulnerability of populations in Dionewar to flooding. 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.

Specific objectives

The project's specific objectives are to:

- ✓ *SO1:* Improve the resilience of the productive sectors such as fishing, oyster-farming and forestry to natural hazards.
- ✓ *SO2:* Reduce the vulnerability of populations and natural habitats to hazards through the establishment of structures to better regulate flooding and fight

against land salinization.

✓ *SO3*: Enhance Communal Development Planning through integration of climate change, setting up local conventions and documenting lessons learned.

I.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 ecosystems on Dionewar island	1.1. Alternative fish and oyster farming production system developed for 18 women associations, including the setup of 60 growing cages, 500 spat collectors and 2000 growing bags (USD 146,625). 1.2. At least 6 ha of trees planted (enrichment planting primarily with coconut and oil palms) and 5 ha of mangrove rehabilitated in Dionewar to revitalize the main productive sectors (USD 156,982). 1.3. At least 18 economic interest women's groups and natural resource management committees trained to improve their technical performance (USD 40,800). 1.4. Management plans for fish and oyster farms management developed (USD 30,400).	Outcome 1: Improved resilience of the main ecosystems on Dionewar Island and sustainable livelihoods of populations.	374,807

Project Components	Expected Concrete Outputs	Expected Outcomes	Amount (US$)
2. Protection against flooding and salinization in Dionewar	2.1. Protect, rehabilitate and extend the three (03) dikes against flooding over 1.2 km area (USD 529,442). 2.2. Develop a maintenance plan, involving key stakeholders (USD 21,000).	Outcome 2: Reduced population vulnerability and improved socioeconomics infrastructures in Dionewar in relation to climate hazards through the construction or rehabilitation of protection infrastructures.	550,442
3. Strategic planning and knowledge management	3.1. The Communal Development Plan (PCD) is reviewed in order to integrate adaptation to climate changes options & cost 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 21,700). 3.3. Project's lessons learned are documented and shared (USD 16,150). 3.4. One (01) meteorological station is installed in Dionewar (USD 41,400).	Outcome 3: Strengthened capacity of local institutions to mainstream climate change in Communal Development Planning, sustainable natural resources management strategies and to document and disseminate lessons learned.	100,250
4. Miscellanous			92,376
5. Project Execution cost			118,290

Project Components	Expected Concrete Outputs	Expected Outcomes	Amount (US$)
6. Total Project Cost			1,236,165
7. Project Cycle Management Fee charged by the Implementing Entity (CSE)			114,835
Amount of Financing Requested			**1,351,000**

I.4. Projected Calendar

Table 2: Project Calendar

Milestones	Expected Dates
Start of Project Implementation	August 2017
Mid-term Review (if planned)	February 2019
Project Closing	August 2020
Terminal Evaluation	February 2021

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Description of project components

Climate change/variability is impeding development efforts on Dionewar Island. The populations are making their earnings mainly from fishing activities, agriculture and forestry. Since the breaking of the Sangomar Arrow, contact has been established between the sea and the river. This has increased salinity and resulted in the degradation of the mangroves, a key to fishing activity but also one that plays an important role in the control of flooding. The increase of salinity has been exacerbated by rainfall decreases in the seventies and the eighties. Extreme climate events like heavy rains, combined with rising sea-levels 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 forces fishermen to go farther out to sea to fish, which also places more demands on 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 faced by 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 vegetation; (2) the establishment of protection infrastructures for Dionewar to face flooding; (3) the development of planning and local regulations activities associated with a knowledge management system that ensures equitable and sustainable use of productive assets.

The three components work in perfect synergy to achieve the project's general objective.

Component 1 aims to enhance the resilience of the main productive sectors on 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 Components 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, processing and conservation facilities against water and salinity. Protection through dike rehabilitation will help mitigate one of the village's major concerns, which is flooding. It involves heightening existing dikes and installing flood control infrastructures.

Through Component 2, a management and maintenance plan will be developed for each infrastructure and a management committee will be established to ensure sustainability. Component 2 will ensure strict compliance with the requirements of the Environmental Code, especially regarding environmental and social impact assessments (ESIA) and the development of an environmental and social management plan (ESMP). It will help secure investments made in Component 1 and generate lessons learned that will feed into Component 3.

Component 3 seeks to enhance Communal Development Planning and natural resource management, and document lessons learned. It will foster the integration of climate change in the Communal 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 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 on Dionewar Island

Activity 1.1: Development of fish and oyster farms

This activity aims to boost the fisheries sector, which is faced with a scarcity of fish stocks prompting populations to go further out to sea to get worthwhile catches (especially given the amount of time and fuel spent). The project resources will be used to set up 60 fish growing cages. The project will also install 500 spat collectors to develop oyster farming in the mangrove areas. A suspension culture system will also be put in place, above the seabed, with 2000 growing bags that will collect larvae that have reached a fairly large size. Only indigenous species will be used and there will be no introduction of exotic species. The project will also purchase production equipment (ropes, fishing nets, boots, life-jackets…).

The growing cages will have a capacity of $10m^3$ each and be composed of: a galvanized tube frame, four containers as waterline and a net pouch with a volume of $10m^3$ (2.5m x 2.5m x 1.60m). The chosen species will be a local one (Tilapia) and will not be stocked from the wild, but developed in a hatchery by the National Aquaculture Agency (ANA). ANA will provide the fish fries. These cages will enable production of around 119,646 kg of fish per year. The kilogram of fish in the market costs around USD 1.6. This activity can therefore bring in around USD 191,433 per year and an annual

profit of USD 66,112.

This activity will be built on aquaculture experiments 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, as well as WAAME-CIDEAL and ANA.

The oldest experiment remains oyster farming with the GIE (an economic interest grouping) in Joal and Sokone that produce, transport and market fresh oysters to Dakar. The oyster farms implemented will produce around 15,000 kg of mature oysters per year with a price of USD 3 per kg. The oyster farms will bring almost USD 43,120 per year and an annual profit USD 28,480.

This activity is targeted mainly at local women's association (GIE) and assets provided will be community-based. The project will foster the adoption of an agreement between the GIE, the local government unit and the executing agency. This agreement will set up a saving mechanism (fees) from revenues generated by the oyster and fish production activity. The financial resources made available will extend to the establishment of spat collectors and to the renewal of equipment, when required.

The beneficiaries already have a good organizational framework in place and ample experience in sharing such equipment. They already have the appropriate mechanisms and rules for managing and sharing the production and outcomes of the assets provided by the project.

Activities include:

- Construction and installation of 60 fish growing cages
- Making and installation of 500 spat collectors
- Putting in place a suspension culture system with 2000 growing bags
- Purchasing production equipment
- Setting up a saving mechanism (fees)
- Implementing specific environmental and social managements actions: oversight of management of waste measures and application of environmental clauses; monitoring of physicochemical and bacteriological parameters and selection of beneficiaries

Activity 1.2: At least 6 ha of trees planted (enrichment planting, particularly with coconut and oil palms) and 5 ha of mangrove rehabilitated in Dionewar 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 important sources of income for Dionewar's populations. The enrichment planting will target at least 6 ha (especially coconut and oil palms) and 5 ha of mangrove will be rehabilitated. This activity will be implemented in close collaboration with the Forestry Service and the Directorate of Community Marine Protected Areas (DAMCP). The population will contribute in terms of

human investment.

The main activities include:

- Setup of a tree nursery in close collaboration with the Forestry Service;
- Mobilization sessions to organize populations around tree planting activities;
- Planting of trees;
- Setup of committees tasked with the plantations' surveillance. These committees will be composed of existing committee for natural resources management members, who will be reinforced if required.

Activity 1.3: At least 18 economic interest women's groupings and natural resources management committees trained to improve their technical performance

Activity 1.3 will make it possible to train women oyster farmers and processors 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 ANA, who has a national mandate to support the development of aquaculture nationwide. They will provide technical support in the selection of performing species, quality of fish larva, biological monitoring and trainings.

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

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 component and it concerns the arch (*Anadara senilis*), "yet" (*Cymbium sp.*) and "touffa" (*Murex sp.*). Oyster and shellfish parks will be created around the village to help isolate juveniles until maturity. These parks will operate according to a plan that enables the species to renew.

Activity 1.3 is also designed to build committee capacities for those entrusted with natural resources surveillance and particularly women transformers on the value of non-timber forest products (*Detarium senegalensis*, *Parinari macrophylla,Cocos nucifera and mango tree*). This will help strengthen the achievements already made with the establishment of a natural resource management committee.

The main activities include:

- Identification of trainees, taking into account gender considerations
- Preparation of training materials
- Elaboration of a training programme
- Organization of training sessions, including exchange visits in neighboring areas in the Saloum islands where similar programmes took place in the past
- Implementing specific oversight on environmental and social management actions: integration of gender principles during the setting up of committees, application of environmental clauses - waste and water management - during training sessions, etc.

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

Intensive fish farming requires constant maintenance and watchfulness. If the management is poor or the funding inadequate, things can go wrong: toxic runoff, introduction of diseased species into populations, food and waste excess affecting population densities and stressed fish stocks. This activity is designed to allow the recipients to benefit from the advantages resulting from the oyster farms without jeopardizing objectives for sustainable and environmental safeguards. In partnership with ANA, DAMCP and target communities, a management plan will be developed and implemented.

Component 2: Protection against flooding and salinization in Dionewar

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

Activity 2.1 seeks the rehabilitation of three dikes and their extension over 1.2 km to ensure better protection for housing, infrastructures and agricultural lands. With this activity, the project resources will help reduce the vulnerability of Dionewar against rising waters, especially during the rainy season with the start of high tides and storms. Activity 2.1 will be implemented in close collaboration with researchers who focus on coastal management, civil engineers, local extensions, the local government unit and the communities themselves.

The main activities will consist of:

- Social mobilization actions to ensure a fruitful involvement of the population through human investment sessions
- Heightening of dikes where it seems necessary
- Extension of dikes
- Implementation of specific environmental and social management actions: implementation of mitigation measures (anti-contamination plan, waste management, etc.); oversight and monitoring activity (respect of labor rights, etc.).

Activity 2.2: A maintenance plan of coastal infrastructures developed, including key stakeholders

This activity is geared towards 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, the Directorate of Community Marine Protected Areas and the Directorate of Civil Defense.

The main activities will be:

- Preparing a maintenance guide for each category of infrastructure;
- Setting up and training a management committee, including the Local Government Unit, the extensions, the main community-based organizations (including women) and the Sub-Prefect;
- Organizing a report back session to present the guide's outlines to members of the management committee.

Component 3: Strategic planning and knowledge management

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

Dionewar *Communal Development Plan (PCD)* 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 Communal 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 of existing rules on the 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 social groups whose livelihoods may be affected by the application of such local regulations. On Dionewar Island, young people and women are the most involved in the use of forest products and fishing in areas targeted for the biological rest. Women usually collect from forest areas firewood and above all forest fruits that they consume or sell. These products help improve food security and the income they generate contribute immensely to the livelihoods of households (clothing, health and schooling expenditures, etc.). Furthermore, women and unemployed young people are involved in fishing and this activity also strengthens food security and provides them an income. These two social groups will then be given particular attention when implementing this activity, with regard to access and equity considerations. This will be done through the Implementation of environmental and social management

actions: oversight and monitoring activities (effective application of alternatives measures proposed to these groups, e.g. inclusion in management committees, development of alternative income-generating activities like beekeeping, etc.).

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 meeting for joint decision making. During these sessions, efforts will be made towards 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 who rely mainly on activities that could be targeted by these new rules. The Municipality of Dionewar has already expressed its commitment to accompany the sustainability of the project in the surveillance of each implemented activity. Community leaders, elders and administrative authorities will be involved to help 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 beekeeping activities.

Activity 3.3: Project's lessons learned documented and shared

Through Activity 3.3, collaborative planning approaches 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 three general reports on lessons learnt will be produced — one every year which is shared regionally and nationally. 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. Particular emphasis will be put on strategies that led to improved adaptive capacities and considering gender specificities.

Activity 3.4: Installation of a meteorological station at Dionewar

A standard weather station will be installed in Dionewar in association with ANACIM[22] to collect climatic data on wind speed, temperature, pluviometry and hygrometry.

Development efforts in the municipality of Dionewar heavily depend on the primary sector, the different components of which (farming, breeding, fishing) are strongly

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

exposed to climatic hazards. The installation of a weather station will thus allow providing producers with accurate and timely information, allowing them to better planning their activities with the view to reduce the negative impacts of climatic, hazards. In addition, such data will help better inform the planning of local development which also relies largely on natural assets for a sustainable local development...

Furthermore, as on many islands, transportation to Dionewar is made only by sea, as well to import goods and basic commodities as for exporting local productions. This crossing of the sea exposes people and goods to hazards and recurring accidents, resulting in loss of goods and compromising the livelihoods of local communities. This is exacerbated by the lack of reliable climate information, primarily due to the absence of weather stations in the area of Dionewar. The nearest stations are located in Joal and Dioffior (25 kms from Dionewar) which are both too far away and may have different weather conditions altogether[23]. In fact, low tide crossing is impossible and many canoes find themselves grounded. The implementation of a weather station in the municipality will allow Dionewar and neighboring islands to have accurate and timely climate information and allow producers and boatmen to have more specific knowledge of the weather conditions that affect their activities.

ANACIM[24] has developed, through its involvement in climate related project[25], a strategy and an approach in order to make climate information accessible to local communities. This includes setting up local monitoring committees, training and sensitization of grassroots actors, using appropriate communication channels such as community radio... A similar strategy will be used with the same partner (ANACIM), building synergies with communication actions under Activity 3.3, organizational actions planned under Activity 1.2 and training and sensitization actions under Activities 1.3 and 3.2.

The type of station was chosen based on guidance from ANACIM and the station will be integrated to the network of this Agency, allowing it to expand its operation capacity. ANACIM will ensure the monitoring and the maintenance of the station beyond the project lifetime.

Activity 3.4 includes: i) buying a standard automatic meteorological station, ii) laying out the site where the station will be installed, iii) installing the station, iv) securing the station, and v) assuring the maintenance and the monitoring of the station.

B. Project economic, social and environmental benefits

The project will generate economic, social and environmental benefits. It will bring and promote a set of innovations to help improve the livelihoods of communities through the strengthening of sustainable production means, the use of revolving funds and the

[23] For an adequate rainfall data collection the perfect distance between meteorological stations is 5 km
[24] National Civil Aviation and Meteorology Agency
[25] Climate Smart agriculture (Province of Kaffrine)

improvement of value chains (production, distribution and access to alternative markets). This will facilitate beneficiaries' climate resilience by providing options.

Social groups who can benefit from 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 village of Dionewar has a fleet of 89 canoes, 12 of which have an average three-member crew (36 men) engaged in the oyster farming. They sell fresh fish products to women who are in charge of processing. Considering the technical innovations and training proposed, the project will involve (at the start) about one hundred men, including 75 young people.
- ***Women*** are organized under the Federation of Local GIE (FELOGIE) which counts 510 members from around 25 groups who run a mutual savings and credit fund. Among these 510 women, 408 (80%) sell cockles ("pagne" in wolof) and the remaining 102 members (20%) are oyster farmers who also manage the processing unit. Apart from women members of the FELOGIE, others (over a hundred) are engaged in the sale of cockles. New production techniques introduced by the project will enable all these actors to increase the productivity of their activities, to maintain their income and to become more resilient to climate change. Building their capacity can also help improve the quality of their productions by increasing their value.

Project's beneficiaries also include:

- ***Community-based organizations***: the training (delivered by the project) will improve natural resource-management on the island while generating more income from the exploitation of non-timber 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 will therefore reduce the level of stress, enabling them to dedicate their resources to other sectors.

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

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 in the main productive sectors - Continuous decline in populations' revenue	- Improved revenue particularly of women, - Revival of the economic activity - Securing investments
Environmental benefits	- Degradation of the mangrove - Degradation of the vegetation	- Replanting the vegetation

Table 4: Project's economic benefits

Activity	Benefit ($USD)						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Fish and oyster farming	0	94,594	94,594	94,594	94,594	94,594	94,594
Reforestation (mangrove, coconut and palm oil trees)	0	0	0	0	8,990	8,990	17,980
Dikes	-2,000	-2,000	-2,000	267,200	267,200	267,200	277,200

Equitable access to assets financed by the project is a core principle of this project. All members of the women's 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 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 of the proposed project

For the design of this project, cost-effectiveness is embedded into the Adaptation Full Cost Approach. 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 Government of Senegal 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.

The approach used helps avoid duplication, and, moreover, due to a joint use of means for cost-shared staff payment, it allows significant reduction in project management and coordination costs. There are currently several initiatives, with among other objectives, the improved resilience and improvement of sustainable livelihoods and 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. This also implicates, for example, shellfish 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 use the project resources. Oyster GIEs in Joal and Sokone produce, transport and sell fresh oysters in Dakar (Almadies), in addition to orders placed by 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. In regards to fish farming, there are still no fish farms in Dionewar, however there has been a success story in Senghor Valley in Sokone where the population showed great interest in fish farming because of their concern over declining fish stocks. 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 organizations and cooperation agencies across various areas. The project "Women's Entrepreneurship and adaptation" launched by the COLLEGIA Group, CEGEP de la Gaspésie des Iles (Quebec-Canada) supported the women from Dionewar village in fish processing by providing the processing unit, which is also serving for storage and office space. They have also organized 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.

In regards to the project's realizations, several options have been examined through feasibility studies and public consultations, allowing identifying the most appropriate ones for protecting the population against hazards and strengthening their livelihoods.

As regards the rehabilitation of dikes, three options have been considered, including an earthen dike, a work with recessed gabions, or a dike made up of reinforced concretes plates with a spillway. This latter was found to be the best solution for the three sites of Ndiar, Ndioundiouré and Ecole 2, considering the difficulties to apply other systems. Plates can be made at the local level without using a gear, in addition to the basic material (i.e. sand) that may be found on site or near the village. Carriage of other materials, such as cement, iron, etc., can be done by pirogue without much difficulty. The details of each option can be found in the feasibility study. Through interviews with beneficiaries, the choice meets their aspirations to have operational, solid, easy to maintain works that can be built using local materials and involving the populations in the implementation of the works.

With regard to tree planting, one option could be to close the forest area (called "mise en defens" in French) with the aim to allow reforestation through natural regeneration. This option would take a long time and even difficult to implement, given the state of degradation and the level of anthropisation. The second option was tree replanting combined with the setup of management committees, the development of local conventions and the implementation of awareness raising activities. This option was chosen because it is technically simple, socially acceptable and has a potential to generate incomes and food in within a shorter timeframe.

In respect of the development of fish farming, the no-project scenario is characterized by the decline of fisheries resources, the number of constraints affecting the fishery sector and the decrease of revenues. With the project's intervention, two options have been analyzed by the ANA. The first one, based on the installation of fish ponds, has many advantages, but also serious drawbacks of which its high investment cost and a more complex technology when the breeding density increases and requires artificial feeding. The second option, based on floating cages has also some disadvantages, but low implementation costs, a faster growth of fish due to better water quality, a higher fish production and it is easy to move or relocate. This option 2 has therefore been chosen.

When it comes to oyster farming, the no-project scenario is characterized by low productive techniques which in turn, contribute to the degradation of the mangrove stands because most oyster farmers cut the mangrove roots and branches. With the project intervention, the technique considered has been already used for several years in similar conditions (in Fatick and Ziguinchor) with significant results. It will allow generating approximately USD 43,120 for an initial investment estimated at USD 38,996.

As for the installation of a weather station, the no-project option would result in a lack of reliable and timely climate data that is needed by producers for their activities and by decision makers for planning purposes. With the project resources, these constraints will be addressed, allow to better informing decision making at all level of local development.

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

CSE's administrative and financial management procedures, especially those related to procurement, contribute to cost-effectiveness. Goods and services procurements 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 Communal Development Plan (PCD) 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 fighting against coastal erosion and its consequences. The PCD of Dionewar also prioritized the capacity-building of the population on dike construction techniques to address coastal erosion and saline water intrusion. In the Priority Action Programme (PAP) of this PCD, actions considered for the Axis "Environment, Natural Resources Management and Living Environment" include the realization of dikes against coastal erosion, 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 the rural economy. With respect to the second component, the project will help 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 aim (among other) to improve 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, emphasized the improvement of living environments 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, and more specifically to the programme on "agriculture, livestock farming, fish and seafood products and agrifood": targeted actions through a programme aim to implement integrated approaches 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 takes into account 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 that compel rural populations to stay. The PAQ is structured around five major pillars including ''the issue of farmlands'', which 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) affecting Senegal's coasts, which are 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", "mitigating 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".

The project intervention area is located within the marine protected area of Sangomar which is also part of the Central core of the RBDS. The management plan of this Sangomar MPA has identified following priority actions:

- the rehabilitation of at least two protection dikes;
- the reforestation of mangrove and other species;
- the implementation of oyster farms (at least two per year);
- the organization of awareness campaign for each socio-professional category;
- technical, material, organizational and financial capacity building activities for local actors;
- the implementation of fish farms.

Hence, almost all of the project's activities contribute to the implementation of this Management Plan.

E. Project alignment with relevant national technical standards

The project activities are in compliance with the spirit of the Coastal Act, particularly 'the maintenance 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 where 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 observe the provisions of the Fisheries Code, especially regulations on quality control of fish products. The production and processing of fish products are regulated by the Fisheries Code, Title 5 of which regulates the quality of fish products from installation and operation of fish processing units, to exportation and quality control of fish products. However, there is no regulatory text regarding quality and safety standards. Fish product exporters and the Fishery Department use, as reference, the European Commission regulatory framework in this regard to fill the gaps of the national legislation since nearly 60% of the fish products are exported to Europe. These include 93-48 Guidelines on the safety and quality standards of the food industry and the 178-2002 Regulation on the concept of traceability.

These texts set production techniques, conservation, packaging, storage, import of fish products produced in Senegal. The Guidelines require a health certificate certifying that the products:

1) were caught and handled on board in accordance with established rules of hygiene;
2) were landed, handled and (where appropriate) packaged, prepared, processed, frozen, thawed and stored hygienically. In regards to fish products, they must have been slaughtered under appropriate hygienic conditions. The products must not be soiled with earth, slime or feces;
3) have undergone a health check;
4) are packaged, marked, stored and transported during all stages of production, storage and transportation;
5) do not come from toxic species or contain biotoxins;
6) respect the organoleptic, parasitological, chemical (check the presence of heavy metals and organohalogen substances) and microbiological criteria.

Packaging must be carried out in conditions of hygiene, to avoid product contamination. Regarding the storage and transport conditions, fish products, thawed or cooked should be maintained at the temperature of melting ice. Processed products must be kept at the temperatures specified by the manufacturer or, if required, established under the procedure regulated in the Directive.

Component 1 under the project seeks, among other things, to help women processors comply with the standard defined under this Code and these Directives.

The installation of a weather station has to be done according to regulatory measures and directives from the World Meteorological Organization (WMO). In regards to the standards of coverage, the horizontal resolution required according to 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. Describe if there is duplication of project / programme 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 additionally 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.

The table below shows the initiatives that took place in Dionewar in past years.

Table 5: Recent initiatives in Dionewar

Sectors/Activities	Main partners
Natural resource conservation activities (reforestation, wood village, development of local convention for the sustainable management of natural resources, distribution of improved stoves)	WAAME, EVE, WULA NAFA, PRECEMA, PERACOD
Literacy	WAAME, UICN/FEM
Youth group support	EFA
Support for the certification of fishery products and the enhancement of seafood value	EFA, ADF
Construction and central purchasing unit	ADF, AFD
Sanitation: construction of latrines, provision of donkeys and carts for garbage collection, donation of incinerator)	WAAME, UICN/FEM, PNDL, ADAFYUNGAR
Support for the promotion of income generating activities (henhouse construction, processing units, oyster farming, market gardening, recycling seafood, revolving credit)	AFDS, EFA, PNDL, PAPEC, ENDA/GRAF, UICN/FEM
Support for the fisheries sector (wharf construction, endowment of life jackets, motorized pirogues)	PNDL, ENDA/GRAF, EVE, ADAFYUNGAR, UICN/FEM
Fight against floods and tides (construction of protective dikes)	AFD

Sectors/Activities	Main partners
Health (Construction and equipping dental office , salt iodization, nutrition)	PNDL, CHILDFUND
Education (Construction / rehabilitation of classrooms)	Beau bois, Mérignak, PNDL
Local Development : ((Support for the development of PLH of the CR))	PRODDEL, PNDL
Access to drinking water (well drilling)	AFDS, UICN/FEM
Agriculture (Development of anti-salt dikes for rice growing)	UICN/FEM
Capacity building in the areas of PFNL, processing, fishery products, administrative and financial management, etc.)...	EVE, PERACOD, ADF, ENDA/GRAF, EFA, UICN/FEM

IUCN/GEF and PNDL appear to be the most active partners on Dionewar islands over the past years, with a wide range of activities: rice growing, mangrove regeneration, sanitation, income generating activities, capacity building, fisheries, health, local development. AFD, EFA, WAAME and EVE have also shown a significant presence on the island, with a particular focus on capacity building, sanitation and development of income generating activities.

Initiated by the COLLEGIA Group, CEGEP de la Gaspésie des Iles (Quebec-Canada), the ‘’Women Entrepreneurship and Adaptation’’ project has been instrumental for fighting against poverty in communities affected by climate change. It was funded (CAD 3,5 million) mainly by the Canadian International development Agency (CIDA) It supported women in the villages of Dionewar, Falia and Niodior in processing fish products by providing them facilities for processing, storage and offices. Completed in 2015, its main achievements include:

- the development of fishery products processing and drying areas;
- the building of warehouses;
- the building of an office and a meeting room;
- the provision of small equipment for fishery products processing;
- training on fishery products processing techniques;
- a training on entrepreneurship and administrative and financial management;
- the development of an action plan towards the development of ecotourism;
- the creation of women’s’ cooperatives.

The project “Reducing vulnerability and increasing resilience of coastal communities in the Saloum Islands (Dionewar)” will build on these achievements, mainly with regard to oyster processing and marketing, mangrove replanting and entrepreneurship. It will also 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.

On a smaller scale, lessons drawn from this project have 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).

The French Development Agency (AFD) has been the main donor for a first rehabilitation of the dikes in order to protect the populations against flooding. The project “Reducing vulnerability and increasing resilience of coastal communities in the Saloum Islands (Dionewar)” will consolidate further this action, in response to a pressing need of the population of Dionewar. Indeed, a junction between the sea and the inlets might result in the disappearance of the village.

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 is 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.

The 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 a 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 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 and adverse effects posed by climate change. This forum gathered the natives of the island, residents and those coming from other cities of Senegal, and even 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 were later 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 to submit from Senegal to the Adaptation Fund. The rationale for such decision was to ensure fairness, transparency and competitiveness. 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 different stages, at various levels and 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 activities.

In the framework of the environmental and social impact assessment, consultation sessions were also organized with beneficiaries, administrative and local authorities and other stakeholders, in the villages of Dionewar, in the arrondissement of Niodior, but also in the Department of Foundiougne and the Region of Fatick. Thus, several meetings with beneficiaries were organized, while administrative officials (prefect), municipal councilors and devolved state services were consulted through meetings restricted to officials. The community of Dionewar has also been met as part of a forum, which brought together all social classes of the island including the project proponents. These consultations have been extended to other projects and programs whose scopes of work cover the issues addressed in the project “Reducing vulnerability and increasing resilience of coastal communities in the Saloum islands (Dionewar)”. (List of persons and institutions met in annex).

Key points raised during these consultations include:

- the vulnerability of the village to climate change: Dionewar is under threat of a junction between the inlets and the sea because of its location. The village is faced with regular floods, sea encroachment and coastal erosion. The means to tackle such hazards are out of populations' reach. Hence, local authorities see the project a godsend, mainly in its objective to rehabilitate the dikes. This is an urgent need for the whole community;
- the importance of non-wooded forest products (fruits) for the local economy: the exploitation of the *Detarium senegalensis* provide significant income for the village (up to USD 6,000 per year). *These resources allowed restoring the mosque of Dionewar with up to USD 20,000* according to one of the COGER members. *Therefore, the reforestation of coconut and oil palm trees is welcome, because currently dead trees are not replaced.*
- the dynamism of the FELOGIE female members (pointed out by the Sub-Prefect), particularly those engaged in the processing of fishery products. Women are very active in the processing of fishery products and the project will enable them to better adapt to climate change, according to the head of the fisheries Department of Foundiougne;
- Women are a good lever for this project: most of the activities planned through the project are covered by FELOGIE: the processing of fishery products and forest fruits, the reforestation of casuarinas and coconut trees in 2003 and mangrove planting almost every year in August, the farming of oyster even if their first experience was not successful.
- the decline in marine fisheries capture confirmed by the head of regional and departmental fishing services met. Fish farming and aquaculture activities planned by the project are in line with the fishing policy developed at national level to reduce the pressure on resources and to restore marine ecosystems. The potential for aquaculture in Dionewar is quite important;

The main recommendations made by the different stakeholders can be summarized as follow:

- the need for a strong involvement of community and the authorities (local and administrative) at all stages;
- the importance of having a steering committee for the monitoring and maintenance of the realizations, in order to ensure their sustainability;
- their wish to see the *Detarium senegalensis* included in the species to be used for reforestation;
- the need to have access ramps built for canoes if the dike at the village entrance is rehabilitated (ocean side);

- the importance to think about the development of alternative source of energy or promote energy efficiency (e.g. improved stoves) in order to reduce the pressure on mangrove stands. The Municipality has a population of about 15,000 inhabitants with approximately 700 households that only use mangrove wood as firewood, representing thus a strong pressure on mangroves;
- build synergies with the Directorate of Marine Protected areas, as part of the Sangomar marine protected area (MPA) also includes Dionewar. The newly created MPA of Sangomar has developed a management and action plan which activities are in line with those planned under this project. In this context, the establishment of a partnership with the MPA of Sangomar is necessary to share resources and strategies, particularly with respect to dike rehabilitation, reforestation, agroforestry development, development of income-generating activities, etc.;
- involve municipal councilors and community-based organizations (CBOs) in the training and technical capacity building component;
- establish a participatory monitoring and evaluation mechanism to ensure the project sustainability;
- the importance of monitoring reforested sites. With JAD (Active Youth of Dionewar) association, “several reforestation actions of casuarinas, coconut trees and eucalyptus have been carried out, but the problem is that there has been no follow-up, thus most of the plants are dead”;

All the information that came through these discussions has been carefully noted and the numerous questions answered. It has been explained that the project has a limited budget and could not offer a solution to all the needs expressed.

Figure 12: Meeting with the project's proponents

Figure 13: Meeting with representatives of the women’s groups

Later on, field missions were organized to firstly identify aquaculture potentials in the Dionewar village and then explore the sites expected to host the aquaculture

infrastructures. This also allowed to better investigating the relevancy of protection measures considered in the project. Some of these missions included two civil engineers and a resource-person who has a breadth of experience in coastal management. The technical design and cost-related aspects of these measures were discussed extensively.

The outcomes of such meetings and visits were captured in the design and planning of the project activities. For instance, the initial option for tree planting (Activity 1.2) was to do this is in forest areas using species such as coconut trees, palm trees, etc. For rehabilitating dikes (Activity 2.1), to help address flooding, the populations suggested an extension of one (of three dikes) to ensure optimum efficiency. Discussions on this topic took place between the populations and experts (civil engineers), which resulted in an understanding that to make this extension feasible (within the planned budget), the populations will provide the workforce, while the project provides the input and technical backing. The populations also suggested raising the height of the dikes and to include spillways, allowing for better control of the flow of rainwater and seawater. All these concerns have been taken into account, leading to revising the initial budget planned for this activity.

This was successful in securing strong support from these stakeholders, as exemplified by a letter to from the Mayor of Dionewar clearly expressing willingness to participate in the proposed activities.

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 response to the vulnerability of the productive ecosystems, the communities and infrastructures in the municipality of Dionewar. It is both a conjectural and structural approach, because aside from solving current problems, which arise with severity, the adaptation options will be mainstreamed into the planning document of Dionewar.

While the protection of Senegal’s coast is considered a priority by the current strategies of fight against climate change (Baseline scenario), it has received relatively little financial backing. What is happening in Dionewar weighs heavily on the sustainability and safety of people’s livelihoods, and is a major concern for both local and national authorities.

The cost effective use of resources solicited through the project’s various components will help reduce constraints and obstacles and build assets 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 issues.

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

Baseline (Without project)

Under the baseline scenario, the fight against climate change's 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, an estimated[26] 700 km of coast (with a total cost USD 1,596 million) were deemed in need of protection. These costs were revalued at USD 3,623 million, which is 1.72 % of the GDP's annual cost. Finally, this study estimated 20,600 ha of coastal ecosystems were at risk of becoming salty swamps; 104,100 ha of intertidal 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. 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 protection approach integrates "no adaptation" options, which means that in most zones, productivity of the surrounding marine and coastal ecosystems keeps declining.

Under the same baseline scenario, specifically in the Saloum estuary, the Government of Senegal assures the fight against coastal erosion through the management plan of the Delta of the Saloum Biosphere Reserve (RBDS in French acronym). 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 Communal Development Plan (PCD in French acronym) and the Local Environmental Action Plan (PLAE in French acronym) are respectively reference frameworks for the socioeconomic development and for the sustainable management of natural resources. In none of these strategic planning documents, the question of adaptation to climate change is considered. The social and economic development activities, as well as those of the environment's sustainable management are typically the ones proposed. This explains why the municipality's populations have difficulties understanding the

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

underlying causes of climatic variations, even though they are directly affected. Most of the time, this leads to populations seeking to adopt solutions with a limited reach.

The baseline specific scenarios of the three components of the project are pulled from the preceding analysis:

Component 1: Enhancing resilience for productive ecosystems 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 vulnerable to several hazards, such as farmland salinization and mangrove regression due to silting and salinity.

Populations have taken many 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 assisted populations several times during serious flooding that caused the breakdown of the protection dikes.

Among the initiatives implemented in the project area, we can include the financing of a fish processing unit and forest products processing unit given to the GIE. These initiatives allowed the community of Dionewar to design quality products that meet food, health and safety standards. In the development of income-generating activities, a lot of projects carried out mangrove restoration and allowed restoration of natural mangrove ecosystems, such as shellfish and other fish products.

All these interventions, however, had mixed success and were limited in time for lack of financial resources and, particularly, technical resources needed to meet the challenges.

Mangrove reforestation requires a strategic choice of suitable species that are easy to transplant, but it also requires knowledge on the techniques for transport, storage and transplanting seedlings. The most suitable choice for transplanting is also a key element to increase the rate of success of reforestation activities. In terms of 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 heavy rainfalls. These floods pose a constant threat to houses and socioeconomic infrastructures. The damage they cause weigh heavily on the already scarce financial resources of populations. In addition, in many parts the island is facing an advancing sea that is gradually encroaching onto the vegetation and farmland located on the shore, damaging the socioeconomic infrastructures and hindering mobility. Populations are powerless in

face of this situation, which requires large financial and technical resources. Financing initiatives conducted by organizations such as the Social Development Fund Agency (in French acronym: AFDS), the French Facility for Global Environment (FFEM in French) and the National Program for Local Development (PNDL) have helped fighting the recurrent floods in the village during the rainy season events that cause considerable damage and threaten the village's very existence. These initiatives have contributed to the erection of protective dikes.

Component 3: Strategic Planning and knowledge management

None of the Communal Development Plans (PCD) 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 nor the tools needed to integrate climate change concerns. Therefore, support for mainstreaming climate change within PDC is needed.

Furthermore, communities are well-organized through existing community groups, but there no local convention exists for the regulation of natural resources use. 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 or 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 building infrastructures against the floods and the salinization of lands, including measures to strengthen the resilience of the estuary's ecosystems and measures to strengthen 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 ecosystem basis and on community basis.

Ecosystem-based adaptation measures are about strengthening the resilience of the main estuary's ecosystems to improve their ecological function and 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 to strengthen the adaptation capacities of the populations (in particular the women who are most vulnerable) so they can face the

negative effects of climate change by adopting alternative modes of production that maintain the production potential of the island's ecosystems. Thus, fish growing cages and cages for oyster farming will be implemented and women will be trained on how to exploit them. These activities will increase food availability and the population's incomes. This increase in financial capacity will enhance their ability to face climate change effects, as it will heavily and positively impact on the community's living conditions, including that of women.

Project resources will also help improve food security for approximately 5,600 persons through the support of alternative modes 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 in 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.

Both the central and local governments 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 securing government investments for equipment, 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 374,807**) will be used through the revitalization of fish and oyster farming activities, the replenishment of the vegetation, stakeholders' capacity building and product development. It is intended to supplement the former projects, which implemented population support and assistance

to provide them with a better living. Indeed, people have a fish processing unit and forest products processing unit operated by women, but they are often faced with two issues: firstly, the availability of fresh fish; and secondly, access to markets for selling processed products. 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. In addition to training the beneficiaries on innovative processing techniques and compliance with international standards in the food sector, the project will also set up income-generating activities, such as fish and oyster farming. Such activities fall in perfect cohesion with existing processing activities. They will allow fresh products to be obtained near processing units and meet necessary health and hygiene standards.

In the same context, the mangrove reforestation will revitalize the ecosystem. Reforestation of coconut and palm oil trees will also develop the sale of products from these species. Populations will acquire strong knowledge on the various techniques of selection, transport, storage and seedling transplantation, but also learn how to select sites for reforestation. Ultimately, the activities implemented under component 1 will make it possible to improve the sustainable livelihoods of communities and restore natural capital on the island. They will allow higher production of better quality goods 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 550,442**) will contribute to protecting, socioeconomic infrastructures (high-school, health centre, infrastructure and housing), the vegetation cover and croplands against water and salinity.

The dike built with funding from AFDS was realized in 2005 for an average lifespan of 10 years. Today the dike is in an advanced state of deterioration that exposes people to frequent breaks in the structure. The rehabilitation and extension of dikes by the project will provide security and a better living environment for the Dionewar population.

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 simple maintenance tasks.

Component 3: Strategic planning and knowledge management

With resources (**USD 100,250**) mobilized for component 3, the project will provide support for equitable and sustainable use of the project's access and sustainable use of

natural resources. The Communal Development Plan will be updated to integrate climate changes options and cost benefits, and the local convention on the sustainable use of natural resources will be established. Lessons learned will also be shared to enable replication.

J. Sustainability of the project outcomes at the project design

The first element to ensure the sustainability of the project's results was in the selection of the project idea itself. This was made through an open and competitive call for projects launched by the CSE. The present project was selected because it answers the population's urgent needs and assures the porterage of the project through a federation of community-based organizations (under which CONAF assures leadership). The first aspect to consider when it comes to sustainability is to ensure the project addresses needs that are expressed by the community.

In the same vein, the implementation of a local project management unit (PMU), based in Dionewar and led by natives of the community, is a sign of appropriation. This will help assure the sustainability of the project beyond its planned three year duration.

Additionally, during the process of negotiating a local convention for the sustainable management of natural resources, it is planned to strengthen the management of various existing financial community mechanisms. Several protection dikes were already built or reconstructed with funds from these mechanisms.

It is also worth noting that the municipality of Dionewar committed, for its next budget, to specifically allocate money to maintain and to protect dikes built by the project.

Moreover, various specific conventions that will be signed between the CSE and certain decentralized (CADL[27]) or specialized (ANA, ANACIM) government structures, aim at assuring technical support of the government to the project, which (as a last resort) assures the project's sustainability.

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

[27] Local Development Support Center

capital will be enhanced with improved access to knowledge and practical know-how. Component 1 includes capacity-building activities for recipients.

The Federation of Women's Promotion Groups (GPF) has a lot of 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 mechanisms will be facilitated by women's experience through the management of mutual savings and a credit fund they created. In the past, these women 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 gradually able to 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 three components will ensure the sustainability of outcomes in the long run.

K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.

To avoid or reduce potentially negative impacts of the project activities, the potential risks have been identified and analyzed, in line with the AF's Environmental and Social Policy as well as CSE's environmental and social policy.

Risk analysis based on AF and CSE's requirements

Compliance with the Law

- Law N° 2001-01 of 15 January 2001 (Environment Code): in compliance with this text with regard to environmental and social safeguarding, an ESIA has been undertaken
- Law n° 2013-10 of December 28, 2013 laying down the Local Government Code: when implementing activities relating to biological rest or local Convention,

the deliberation of the municipal council will be requested, as well as the approval by the Sub-Prefect

- Law No. 97-17 of December 1st 1997 on Labor Code: the local steering committee and the CSE will ensure that the service providers abide by the relevant provisions of the Labor Code, namely Articles L145 and L146 (Title X, Chapter III) on child labor and Article 172 on individual protection measures (Title XI).

CSE and the PMU will ensure that relevant local authorities (sub-prefect, municipality) be informed in written prior to the launch of any activity.

Access and equity

Activities planned under the project are of community interest. As such, an effective participation of all actors and a fair access to the assets and benefits are important for a successful implementation.

To avoid conflicts related to the access to the project's assets and benefits (fish and oyster farms, natural resources management), the choice of beneficiaries of capacity building sessions and the selection of the members of the management committees will be done in a participatory way and in collaboration with local and traditional authorities.

Marginalized and vulnerable groups

Culturally, Dionewar is a village well known for its social cohesion. All the activities in the village are regulated and organized by local committees, based on well observed traditional rules. This social setting helps prevent any kind of exclusion or marginalization. Therefore, there is no vulnerable or marginalized group in the sense of the definition given by the Principle 3 of the Adaptation Fund's Environmental and social Policy.

Human rights

Senegal is not among countries cited in any Human Rights Council Special Procedures. Therefore, there is no relevant human rights issue to consider.

Gender Equality and Women's Empowerment

Senegal has ratified several treaties and Conventions with regard to Gender. This includes the Convention on the Elimination of all forms of Discrimination Against Women (CEDAW) in 1985, the CEDAW optional protocol in 2000, and the protocol to the African Charter on Human and Peoples' Rights (ACHPR) in 2004.

At national level several mechanisms promoting women have been established: the parity law adopted in May 14, 2010; two national action plans for Women developed respectively in 1982 and 1997; the National Strategy for Gender Equality and Equity (SNEEG) which is an operational tool to mainstream Gender in policies and programs.

Thus, the Government of Senegal expresses a clear vision on issues related to gender equality and equity outlined as follows: "*Making Senegal an emerging country, without discrimination, where men and women will have equal chances to participate in its development and enjoy the benefits of its growth*".

On Dionewar islands, this vision is already reflected through the reality at local level: women are well known for their leadership in productive activities and local development initiatives. In the view to furthering this vision and this reality, women are involved in all project components. Several activities such as the collection of arches and oyster or processing of fish products are especially dedicated to them while they will get a quota to plant trees. In some components, such as processing of fish products, they will benefit from capacity building in dedicated techniques.

However, there is a risk that women may not be well represented in decision-making bodies (management committees, local steering committee, etc.). This is due mainly to traditional rules under which it can appear as disrespectful for women to take the floor before men in public audience. Therefore, women will be given a quota in all decision-making bodies. Furthermore, specifics consultations will be organized with women for all decision making processes where they might be embarrassed to talk before men.

The environmental monitoring of the project will ensure compliance with these provisions.

Core labor rights

Modalities for the project implementation eliminate constraint in its implementation. The populations freely organized consultations among themselves in order to identify the project idea as relevant for their economic and social development. For the same reason, they voluntarily decided to contribute to the project in terms of workforce. However, there are risks of accidents and mismanagement of working conditions. The CSE and the PMU will ensure that the company will provide all relevant protection equipment (including first aid kits) and will conduct awareness campaigns about these risks, including through the incorporation of such measure in the technical specifications.

As regards child labor, it may happen that teenagers over 15 years get involved in the community efforts during holidays for the less harmful activities (collection of dead wood pieces for example). However, their participation is not based on an employment as defined in the Senegal's Labor Code (Tire X, Chapitre III, Article L145 and L146). CSE and the PMU will ensure that children will not be hired for the project's activities and this measure will be included in the convention with executing entities and service providers. The PMU will carry out regular site visits to ensure that no child is being employed. In case of breach, the contract will be immediately broken and the CSE will inform the local and administrative authorities.
For specialized tasks, employees to be hired will come mainly from outside the village. Payments to these workers will be made in strict compliance with the current national

standards (Labor Code, Title IX, Chapter II, Section 1, Articles L114 to L117). These workers will go through a medical exmination to confirm their ability to work. Their work will be based on contracts that will be registered at the department of labour. From there, the labour inspector will undertake regular site visit to check compliance with the law.

Indigenous people

The population of the Dionewar islands consists mainly of the same ethnic group (Serer Niominka) and two well-established social rules are respect and equity. Therefore, there is no risk related to indigenous people for this project.

Involuntary Resettlement

The project activities do not require any resettlement of people or goods. Indeed, the rehabilitation of the dikes will help protect houses and equipment against floods, allowing avoiding any displacement or relocation. Other activities (rice growing, reforestation, aquaculture, etc.) are planned in sites free of any occupation.

As regards the setup of local conventions (including the biological rest), livelihoods activities will be subject to temporary suspension at particular time of the year. Populations relying on such activities (young people and women) will face a momentary loss of access to targeted areas. These social groups will then be given particular attention through safeguard measures including the development of alternative income-generating activities like bee-keeping.

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 fish and shellfish species. Mangroves are also a favorite habitat for arches and oysters, which will be used in the project. The tree planting activity is therefore crucial and timely, as the mangrove is facing salinity and deforestation degradation factors. Similarly, the planting of typical trees species on the Island such as oil palm and coconut tree will further contribute to restoring the vegetation cover.

The dikes planned to be rehabilitated are preexisting ones and they are located in the surrounding of houses. There are no natural habitats closed enough to be impacted by possible changes in hydrology. Investigations undertaken during the ESIA covered all possible risks and risk of disruption habitats has not been identified.

Conservation of Biological Diversity

The project's area of intervention, the Saloum Delta, has been classified as biosphere reserve (RBDS) since 1981 by UNESCO and as a site of international importance since 1984 by the RAMSAR Convention. This biosphere reserve covers an area of 334,000 ha.

The statutory framework defines the functions of the RBDS as follows:

- conservation: contribute to the conservation of landscapes, ecosystems, species and genetic variation;
- development: encourage sustainable economic and human development in a socio-cultural and ecological way;
- logistical support: providing means for demonstration activities and environmental education and training, research and monitoring related to local, regional, national and global issues of conservation and sustainable development.

The central core of the RBDS is composed of five parts: three (03) marine protected areas, one community-managed nature reserve and one national park):

- Marine Protected Area of Bamboung;
- Marine Protected Area of Gandoul;
- Marine Protected Area of of Sangomar that covers the project intervention area;
- Community-managed nature reserve of Palmarin;
- National Park of Saloum Delta.

According to the Convention on Biological Diversity, a Marine Protected Area (MPA) is defined as: "*any defined area within or adjacent to the marine environment, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by legislation or other effective means, including custom, with the effect that its marine and/or coastal biodiversity enjoys a higher level of protection than its surroundings*".

Priority actions identified in the management plan of the Sangomar MPA (Cf. Section B in Part II) are almost the same as those planned under this project. The creation of the MPA and the development of its management plan are done in full compliance with the protection status of the RBDS. The main restrictions associated with the protection status of this MPA relate to fishing related activities, including:

- the introduction of exotic species;
- the pollution due to an non appropriate use of fish food;
- fishing activities in spawning and growing out periods;
- the use of mangrove wood and shell mounds;
- activities that could disturb the natural habitats.

Therefore, the PMU will ensure that the project's activities will comply with this status and do not present any threats for the environment. More specifically, following measures will be observed:

- only local species will be used;

- works will take place out of spawning and growing out periods;
- the populations will be trained on how to feed fishes without generating pollutions;
- the works will not require mangrove woods, neither shell mounds.

Climate Change

The insular nature of the project's area of intervention makes it particularly at risk of rising sea levels, one of the major consequences of climate change (increased temperature). Models that have taken 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 endeavour to enhance carbon sequestration through its "tree planting'' component. At the same time, the development of rice fields is unlikely to cause logging, given the low rate of recovery on the site.

Pollution Prevention and Resource Efficiency

Soil or water pollution can also be caused by accidental spill of oil used to power the concrete mixer during the rehabilitation of the dikes. These impacts are limited in time as the concrete mixer will be used only during the manufacturing of the reinforced concrete plates. To reduce the occurrence of this risk, a waterproof space will be created and a regular maintenance of the engine will be ensured. In order to avoid accidental spills during the transportation by canoes, the project will ensure the use of hermetic containers and the verification of the conformity of the loads.

Waste produced at each stage of the project may also generate pollution. Different types of waste are foreseen:

- common (plastic and iron): packaging, ropes, used materials (PVC pipes), rubble, bags, iron rods, etc.;
- organic: fish, oyster and shell remains;
- vegetal waste: piece of wood, vegetal leftovers;
- chemical: used oils.

In order to manage this type of pollution, a waste management plan will be implemented.

A poor control of the density of farm fish may result in the degradation of water quality and even water eutrophication in the long run. This could in turn lead to the depletion of wild fish populations. To mitigate this risk, regular controls will be made by ANA in order to control the fish density and to monitor the water quality.

Public health

Falls or drowning may occur during aquaculture activities (fish farming in particular) and transportation to the rice plots. To prevent this, the project will provide protective equipment (life jackets, lifelines) to the actors who will also be sensitized on such risks.

Dust emissions during the rehabilitation works (with the use of the concrete mixer) can be source of respiratory and/or eye diseases. In order to mitigate these risks, protective equipment will be provided to workers and sites will be watered regularly to prevent dust.

The presence of external workforce can be a cause of an outbreak of sexually transmitted diseases, including HIV/AIDS. During the awareness raising sessions, issues related to STD/HIV-AIDS will be covered.

Water stagnation at the rehabilitated dikes can lead to the development of diseases or vectors of water-related diseases. In order to limit this risk, awareness-raising, information and communication campaigns will be carried out among local populations (in favor of the use of impregnated mosquito nets, etc.).

Physical and cultural heritage

Fortuitous findings of objects with sacred archaeological or cultural value may appear during the excavations (rehabilitation of dikes) or the reforestation activities. In such case, relevant arrangements will be taken to protect the sites and works will be stopped immediately. The CSE will inform all local administrative authorities and ensure the implementation of procedures for such findings.

Land and soil conservation

The use of fertilizers can lead to chemical soil degradation. To manage this risk, the project will work in close collaboration with the forestry department to raise awareness and supervise operators on the rational use of fertilizers and the use of natural fertilizers will be promoted.

At the end of the works CSE will ensure that the company realizes the leveling and the rehabilitation of the soil. These measures will alleviate changes in soil structure related to site activities.

In line with CSE's Environmental and Social Policy, an Environmental and Social Impact Assessment has been conducted. It allowed:

- identifying direct, indirect, and cumulative risks and impacts (environmental and social) associated with the project's activities;
- classifying these risks or impacts according to their severity and probability of occurrence.

Table 6: Analysis of risks related to project's activities

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: - Environmental and social harms - Challenging measures aiming at a sustainable use of natural resources - Child labor and work related accidents Requirements: - Identify and implement relevant safeguard measures - Associate relevant local authorities (Municipal council and Sub-Prefect) - Provide protection equipment to avoid accident - Conduct awareness campaign for the workers about the risks of accidents - Enforce labor regulations - Prohibit any kind of child labor Management: - Undertake an ESIA and ensure a sound implementation of the associated ESMP - CSE and the PMU will ensure that relevant local authorities (sub-prefect, municipality) be informed in written prior to the launch of any activity - CSE and the PMU will ensure that the company will provide all required protection equipment and will conduct awareness campaign about the risks by including these measures in the technical specifications. - CSE and PMU will ensure that children will not be involved in works on the project sites and this measure will be included in the convention with the executing entities and the service providers
Access and Equity		Potential risk : - Conflicts during the selection of the members of committees or the beneficiaries of trainings Requirement: - Choose the beneficiaries of the capacity building sessions and the member of the management committees in a

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		participative way in collaboration with the local and traditional authorities. Management : - Setup a local committee in charge to oversee the distribution of the project's assets and the access to the project's benefits
Marginalized and Vulnerable Groups	No marginalized and vulnerable groups are noted	None
Human Rights	No violation of human rights is foreseen through the project implementation.	None
Gender Equity and Women's Empowerment		Potential risk: - Non integration of the women in the decision making bodies (infrastructure, forest products management committees, steering committee for the local convention) Requirement: - Establish a quota for women in all decision-making bodies. - Organize, women-specific consultations for all decision making processes where they might be embarrassed to talk before men Management: - Breakdown the M&E indicators based on gender. - Executing agencies will used gender based approaches during consultative processes
Core Labour Rights		Potential risks: - Accidents - Bad working conditions - Child labor Requirement: - Provide protection equipment to avoid accident - Conduct awareness campaign for the workers about the risks of accidents - Enforce relevant labor regulations - Prohibit any kind of child labor

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		Management : - CSE and the PMU will ensure that the company will provide all required protection equipment and will conduct awareness campaign about the risks by including these measures in the technical specifications. - CSE and PMU will ensure that children will not be involved in works on the project sites and this measure will be included in the convention with the executing entities and the service providers - Labour Department will undertake regular site visits to check compliance with the law. - CSE and PMU will break the contract if there is a breach
Indigenous Peoples	Not relevant for this project	None
Involuntary Resettlement		Potential risks: - Involuntary resettlement of economic activities (temporary stop of shellfish resources exploitation) due to biological rest Requirement : - Propose alternative economic alternative (beekeeping is proposed) Management : CSE and the PMU will ensure the effective implementation of beekeeping
Protection of Natural Habitats	No further assessment required	None
Conservation of Biological Diversity		Potential risks: - introduction of exotic species - pollution due to a non-appropriate use of fish food - use of mangrove wood and shell mounds; - works during spawning and growing out periods Requirement: - use only local species - organize the works out of the spawning

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		and growing out periods - train the populations on how to feed fishes without generating pollutions - prohibit the use of mangrove woods and shell mounds Management - the PMU will establish collaborations with the DAMCP in order to ensure the observance of these requirements - these requirements will be included in the agreement to be signed between CSE and ANA
Climate Change	No further assessment required	None
Pollution Prevention and Resource Efficiency		Potential risks: - Accidental spills - Increase of the organic matter (overproduction of organic waste due to uncontrolled fish density) - Waste generation Requirement: - Develop a waterproof space - Maintain regularly the concrete mixer - Avoid overloading canoes during transport of hydrocarbons - Ensure containers are airtight - Control high fish densities - Monitor water quality (regular chemical analysis) (for the fish cages) - In case of overcrowding make transfers to other cages - Develop and implement a waste management plan Management : - CSE and the PMU will ensure that the specifications of the company will include the installation of the waterproof space and that the concrete mixer will be maintain regularly - CSE will be responsible for overseeing the implementation of the ESMP and ensure that ANA and all the structures involved will provide the water quality analysis reports and will implement the necessary measures to avoid excessive fish in the cages - CSE will ensure that the waste

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		management plan is developed and implemented effectively
Public Health		Potential risks : -Outbreak of sexually transmitted infections, including HIV/AIDS - Accidents, - Waterborne diseases - Falls or drowning - Ocular or respiratory diseases Requirement: - Sensitization of workers and populations (through the environmental and social management plan) - Provide protective equipment (life jackets, lifebelts) for the operators of the aquaculture sites - Provide protective equipment to the workers (gloves, masks, glasses, helmets) (for the rehabilitation of the dikes) - Spray regularly the sites (dikes and borrowing sites) to avoid the dust takeoffs - Completely cover the top of the truck's body and the load of laterite Management : - CSE and the PMU will ensure that the specifications of the company will include awareness the workers about STDs, HIV-AIDS, the provision for the protective equipment and the spraying of the sites - CSE will validate the list of future beneficiaries and participate in the distribution of protective equipment (life jackets, lifebelts, etc.)
Physical and Cultural Heritage		Potential risks: - Fortuitous findings of sites or objects of cultural, sacred or archaeological importance Requirements: - Protect and secure these sites - Immediately cease activity on the sites concerned Management: - CSE will inform all local and administrative authorities and will ensure that the procedures are applied for this

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		type of discovery.
Lands and Soil Conservation		Potential risks: - Pollution of soil and lands - Modification of soil structure Requirement: - Sensitize operators to rational use of fertilizers -Ensure the supervision of the activity by the water and forest service Promote the use of natural fertilizers Ensure soil leveling at the end of the works Management : -CSE will include these measures in the convention signed with the forestry department - CSE and the PMU will ensure that the specifications of the company will include the soil leveling at the end of the works

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 through an ESMP.

Grievance mechanism

CSE has developed a grievance mechanism policy. That grievance mechanism is the one applicable to the project. The purpose of the policy is to make available a framework for resolving specific grievances in a manner that allows the pursuit of project/program's goals while simultaneously safeguarding the environment and the landscape in line with the expectations of communities. This is how the policy works:

Receiving and recording complaints: a complaint-resolution staff (CRS) has been created and is part of CSE's "Environmental Assessment and Risk Management" System. Complaints can be sent by electronic mail, fax, post, or hand-delivered. It can be transmitted either directly to the contact point of the CSE or through community leaders, government officials, community organizations, contractors, CSE's staffs or

Community Liaison Officers (CLO). Once a complaint has been received, it is recorded in the central register and the CRS will acknowledge receipt of the grievance and inform the complainant about the time frame in which a response can be expected. The CRS then checks the eligibility of the complaint. If the complaint is rejected, the complainant is informed within one week of the decision and the reasons for the rejection. The DEEC is also notified. If eligible, the complainant is also notified, and the grievance is processed. The CRS proceeds to an assessment.

Assessing the grievance: The assessment consists of: identifying the parties, issues, views, and options involved; gathering views of other stakeholders (including those of the project execution team or contractors); determining initial options that parties have considered and exploring various approaches for settlement; classifying the complaint depending its seriousness (high, medium, or low), in collaboration with the DEEC's provincial unit.

Formulating a response: The CRS will prepare a response considering the complainants' views about the process for settlement, and will provide a specific response. The response may suggest an approach for how to settle the issues, or it may offer a preliminary settlement. The response will be reviewed during a meeting with the CRS, the General Manager, the project coordinator and the complainant. If the proposal is a settlement offer and it is accepted, the complaint is resolved amicably. If the case is complex and a resolution time frame cannot be met, an interim response will be provided (oral or written communication) to inform the complainant of the delay, explain the reasons, and liaise with the DEEC in order to offer a revised date for next steps. The grievance is then forwarded to the Directorate of Environment for further action.

Monitoring and reporting: The focal point receives and monitors each grievance case. All complaint cases filed and holding treatments for settlement will be subject to a report, which is shared with relevant stakeholders and CSE's staff.

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PART III: IMPLEMENTATION ARRANGEMENTS

A. Arrangements for project implementation

Institutional framework for the implementation of the project activities

Several institutions are involved in fighting climate change in Senegal. For the implementation needs of this project, only the main stakeholders in this 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 Adaptation 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 with the long-term mission of contributing to the economic development of Senegal by facilitating the participative management of natural resources and the environment by gathering, treating, analyzing and disseminating 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 area management, etc. Its activities, across all these areas, are based on the use of the geomatics combined with field work. The CSE was accredited as National Implementation Entity (NIE), with the Adaptation Fund (AF) and with the Green Climate Fund (GCF). The CSE successfully led an adaptation project in Senegal's coastal zone (Adaptation to coastal erosion in vulnerable zones). It has also recently — and 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 Literacy** (**CONAF**) was created in October 1993. It was registered as a national Non-Governmental Organization (NGO) under the number 03140 / MFSAEMFMPE / DDC on April 1st, 2010. The CONAF is a NGO that works for the development and the promotion of the Senegalese people's well-being, and particularly the vulnerable ones. CONAF fights to reduce poverty and ignorance through training of vulnerable groups (women and girls), raising awareness and providing tools and economic means through functional community-based organizations. It's in this context that the CONAF, in partnership with the **Association of the Natives for the Development of Dionewar** (**ADD**), actively collaborate in research to protect the village of Dionewar against coastal erosion and floods. The synergy between both structures is visible on the field through mangrove reforestation actions and the installation of dikes that face floods and coastal erosion, which threaten 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. As its general mission, ANA seeks to contribute to the development of fish farming by closely assisting professionals in the sector, and by providing the necessary support for the sustainable development of the aqua-cultural exploitations and the realization of the National Program of Development for Fish Farming objectives. It is in charge, and in synergy, with the appropriate structures, to:

- identify and exploit sites favorable to marine and continental fish farming;
- sensitize and supervise entrepreneur project leaders in the various segments of the aqua-cultural sector;
- strengthen management capacities of fish farming professionals, in particular the technical, financial, commercial and organizational aspects;
- support the implementation of aqua-cultural productions farms;
- assure, in partnership with the specialized structures, the required quality monitoring services for the aqua-cultural companies;
- seek national and foreign investments for the aqua-cultural 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 a provincial level, ANACIM has standard meteo stations allowing it to collect data and perform the forecasting of several parameters namely: rainfall, wind, humidity, tide. These data are regularly collected and analyzed to produce weather reports that are distributed through various broadcastings channels, among which include the written press, radio, TVs and websites.

The **Directorate of Community Marine Protected Areas** (DAMCP in French acronym) was established in 2012 under the umbrella of the Ministry of environment and Sustainable Development. It is tasked to implement the Government of Senegal's policy towards a sustainable management of Marine Protected Areas (MPAs). The DAMCP has led the creation of the Sangomar MPA which covers the Dionewar Island.

Decentralized 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 level, 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 populations' participation in development actions. In this respect, he chairs the local development support centre (CADL) among which the attributions, the organization and the functioning are all fixed by order.

The **Local Development Support Centre** (**CADL**) is a decentralized body of the Local Development Support Directorate (DADL). It is charged with instigating and following up on all the development actions at the community level, within the limits of the district's territory. The CADL agents assure a support function, council and training in diverse domains such as: agriculture, environment, fishing, community-based organizations, the acts and laws on decentralization etc. In this regard, the municipality's budget 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, as such, assures the administrative and financial management of the project. Aside from the project's bookkeeping, the CSE will be in charge of: a) the implementation of a financial accounting system and management of the project's resources, including disbursements; b) drawing up expenditure forecasts for activities planned in the annual work plan and budget (AWB); c) the project account management; d) the account recording for the project operations, the preparation of the annual financial statements and the timeliness of all project documentation relating to financial and accounting management; f) the control of the effectiveness of services; f) providing technical support to the executing agencies; the reporting to the AF, both technical and financial; g) the oversight and the monitoring of the implementation of the Environmental and social management actions; and h) 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 line with the administrative, financial and accounting procedures, such as defined in the 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 project implementation will be overseen by the NSC, which will be charged with the responsibility of approving the plans, operational and annual reports of the project and for guaranteeing that the project activities are in line with those in the document approved by the AF and with the country's policy framework. The NSC will hold its first meeting during the start-up phase of the project and will meet biannually to perform the project's progress assessment, monitor 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 Adaptation Fund (ii) the Climate Change National Committee, (iii) the decentralized bodies operating in Dionewar, (iv) the community-based 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 in Dionewar. The PMU will include the following key staff: i) A local project 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 and for specific tasks. The PMU will emanate from the main proponent of the project, which is CONAF-ADD and which will provide the coordinator. The PMU will serve as a technical assistance for CONAF-ADD which will ensure CSE's execution of activities on-the-ground. An agreement will be signed between CSE and CONAF-ADD, and this latter will make the recruitment of the PMU staff using CSE's procedures. Having CONAF-ADD strongly involved in the project management will ensure ownership, strengthen local actors' capacities and, thereby, ensure sustainability.

The CSE will not be directly involved in executing project's activities, but will be supervising the project execution.

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

Coordination and implementation modalities

The **Annual Work Program and Budget** (**AWB**): The AWB will be prepared by the PMU on the basis of activities planned under the project's different components. The AWB will contain the activities' details, 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 AWB during the budgetary year and take into account the request formulated and the planned deadlines of execution.

Service providers: The Project will subcontract the execution of some activities to service providers from 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 deliverables, 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 approach 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. Local communities have already been consulted and involved in the design of the project's activities. They are the main proponents of the project through ADD which will also provide the coordinator of the PMU. Furthermore, the communities will be directly involved in the execution, monitoring and evaluation of the project's activities. In regards to the environmental and social safeguards, public consultations have been conducted in an appropriate way for communities that are directly affected by the project's activities. They will also be involved in the approval of the progress report in the implementation of the environmental and social risk management plan.

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

Institutional framework for the implementation of the ESMP

The ESMP applies to the preparation and commissioning of all activities. It concerns all actors and technical services collaborating for the implementation of the project.

All these actors, both in management and in terms of implementation, have specific responsibilities in the maintenance and implementation of procedures and measures related to the ESMP.

The final responsible for all measures is CSE. However, the implementation of the mitigation measures, in most cases, will be the responsibility of the company concerned by the work or the implementation of the activities. Contracts and agreements should clearly define these conditions. It would also be important to include in the specification the principle of responsibility. This principle will imply penalties in case a company does not comply with one or more of these conditions.

The project implementation will involve five categories of actors at local level which are:

- The CSE and the Project Management Unit;

- The local and administrative authorities;
- Population, Community and Local structures (Economic Groups, Producer groups, Associations, etc.);
- Technical Services: DEEC, ANA, Forestry Department, DAMCP, Rural Development Department, Medical Service Department, etc.; and,
- Service Providers (Enterprises, Consultants)

The roles and responsibilities of institutions involved in the implementation of the ESMP are:

- ***CSE***

Proficiency in project works will be done by the CSE as an entity accredited by the Adaptation Fund. Among other activities, the CSE will be responsible for ensuring: (i) compliance regarding the Fund's commitments (ii) the supervision of the implementation of the ESMP; (iii) the effectiveness of the inclusion of environmental clauses in tender documents (DAO) for the selection of the company or the consultant; (iv) the effective implementation of measures to mitigate the negative impacts and environmental monitoring program; (v) the consideration of the implementation status of the ESMP in the preparation of periodic reports on the implementation of the project.

The CSE, through its Environmental and Social Safeguard Unit (ESSU), will ensure compliance with its policies and standards (Grievance Mechanism, Environmental and Social Policy, Gender Policy).

- ***The Project Management Unit***

The Project Management Unit (PMU): The Project will be executed by a project team, called Project Management Unit (PMU) that will be based in Dionewar. The PMU will include the following key staff: i) A local project 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 and for specific tasks. The PMU will emanate from the main proponent of the project, which is CONAF-ADD and which will provide the coordinator. The PMU will serve as a technical assistance for CONAF-ADD which will ensure CSE's execution of activities on-the-ground. An agreement will be signed between CSE and CONAF-ADD, and this latter will make the recruitment of the PMU staff using CSE's procedures. Having CONAF-ADD strongly involved in the project management will ensure ownership, strengthen local actors' capacities and, thereby, ensure sustainability.

- ***Administrative and local authorities***

The local authority: Municipal Council

The intervention of the local council has started since the formulation of the project, and will continue during the implementation. In relation to the decentralized technical services and other partners, the City Council will have a key role:

- Advise, support, supervision and technical support especially in the transferred areas, either through the steering committee deliberation sessions or directly in the field through the implementation of the project activities;
- Support for validation and assessment of annual work plans and project budget;
- Support for the implementation of the update process of the municipal development plan with integrating climate change aspects;
- Regular participation in various sectoral meetings related to the implementation of project activities.

The administrative authority: Niodior Sub-Prefect

The municipality of Dionewar is under the administrative authority of the sub-prefecture, which is based in Niodior. As representative of the Government at local level, the sub-prefect has under his authority all government employees and civil agents in the "district". 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 populations' participation in development actions. In this respect, he chairs the local development support centre (CADL) among which the attributions, the organization and the functioning are all fixed by order.

Its role will be important to monitor and encourage technical services' actions involved in the implementation of the ESMP.

❖ ***Local organizations and associations***

The organizations, in their different components (associations, CBOs, GIE) will play an important role in the implementation of the project locally. Indeed, they will complement the action of the agencies involved in the implementation of the project. This is essentially the Natural Resource Management Committee (COGER), the Federation of Local GIE (FELOGIE) Dionewar, the Association for the Development of Dionewar (ADD), the National Committee for Functional Literacy (CONAF), Zero Plastic Association (AZP). These structures are involved so far, according to their statutes, guidelines and resources to the socioeconomic development of the village. These associations support the project in activities such as awareness and reforestation in order to better ensure the ownership of the project by the beneficiaries.

❖ ***Technical Services***

The Technical Services has a supervisory role, consulting, support and outreach to rural populations. This is why the project will use their expertise to implement the activities. The technical services include ANA, Forestry Department, Environment, Rural Development, Regional Development Agency, Rural Engineering, Fisheries, etc.

A convention which will define the role and mission of each of these structures will be made.

Directorate of Environment and Classified Establishments (DEEC)

The Directorate of Environment and Classified Establishments is responsible for the implementation of the Government's environmental policy, including the protection of nature and human against pollution and nuisances. To this end, it is responsible for:

- prevention and control of pollution and nuisances;
- monitor actions of the various services involved and organizations in the field of Environment;
- the preparation of legal texts concerning the environment.

As part of the project in relation to other services and partners, its mission will focus on environmental monitoring in particular with regard to verification of compliance with environmental clauses in the ESMP. DEEC has a regional bureau in Fatick.

National Agency for Aquaculture (ANA)

The ANA has as a mission to contribute to the development of aquaculture by providing professional guidance, and specific support necessary for sustainable development of aquaculture activities and the objectives of the National Development Program Aquaculture. Under the project, the ANA is responsible, in synergy with the appropriate structures, to:

- support the development of aquaculture farms (fish and oyster farms);
- educate and mentor the beneficiaries in the different segments of the aquaculture sector;
- strengthen the members of the management committees including the technical, financial, commercial and organizational management capacities;
- monitor the acquisition and distribution of equipment and materials for aquaculture (boots, gloves, etc.) to beneficiaries;
- ensure regular monitoring of the water quality on sites.

The ANA has a regional bureau in Fatick.

Regional Forestry Department

The main role and responsibilities of Forestry department will be to:

- Support the identification of degraded sites, evaluate the material resources (especially equipment), human and financial need, and develop an response plan;
- To evaluate the amount of planting material (propagules) necessary and identify sampling sites;
- Contribute to raising awareness and strengthening the operational capacities of reforestation;
- Ensure the effective empowerment of the people and the local community in the development of forest products;
- Evaluate at the end of each year the reforestation campaign, in collaboration with the local council, the people and the 'Project Management Unit;
- Deliver permits movement of forest products at the request of the village and prior approval of the City Council;
- The intervention the department is provided throughout the process. At the end of the project it is expected a significant role in this service business sustainability process;
- Establish a monitoring mechanism participatory evaluation and sustainability.

The Forestry Department has a bureau at the departmental level (Foundiougne) and district level (Niodior).

DAMCP

The DAMCP will be involved in the implementation of the project's activities by:

- ensuring compliance with the status of the sites as protected area
- participating in awareness raising activities
- contributing to the development of local convention and to planning activities
- taking part to the monitoring and evaluation, including for the implementation of the environmental and social management plan, mainly with regards to restrictions resulting from the status of the MPA.

The DAMCP has a district level (Niodior) representative who is the warden of the Sangomar MPA.

Regional Directorate of Rural Development (DRDR) and its Rural Engineering Section

The DRDR is responsible for putting in place a coherent framework for strategic planning, management and monitoring and evaluation of agricultural policies, strategies

and programs at regional level. It promotes agricultural diversification, identification and development of promising agricultural sectors.

Under the project, the DRDR role will be to:

- Ensure the availability of inputs, including rice seed and fertilizer;
- Ensure the establishment of standby arrangements and intervention for good plant protection;
- Contribute to the training and supervision of populations;

Through its rural engineering section, it will be responsible for monitoring and control of dike rehabilitation;

- To support the formulation of a plan of management and maintenance of the dikes;
- To train the members of the management and maintenance committees;
- To monitor the management and maintenance of the dikes.

Regional Health Department and Regional Medical Service

The medical area is dedicated to the control, technical coordination and continuous training of regional health structures.

Under the project, the expected activities of the Regional Medical Service are:

- Collection and provision of relevant information to define a strategy if necessary to prevent population from diseases, especially those related to the presence of external workforce;
- Contribute to define and implement a Communication, Information and Education Health program;
- Contribute to the establishment of a participatory monitoring and evaluation system.

The Regional Medical Service has a bureau on departmental (health district), district and communal levels.

❖ ***Services Providers***

Companies

It is essentially the companies in charge of the rehabilitation of dikes. Their responsibilities can be in terms of: (i) overall compliance with their commitments; (ii) provision of reports and other documents required integrating the management of

environmental and social measures; (iv) compliance with all the environmental and social requirements attached to the ESMP.

Consultants

The project will use consulting services for the implementation of certain activities (specific studies or review of local development plan). These interventions must consider the measures defined in the ESMP.

B. Measures for financial and project risk management

Table 7: Measures for financial and project risk management

Risks	Level	Proposed mitigation measures
Institutional and political The local elected representatives and the representatives of the State who have already been trained by the project have changed after the local 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
Climatic Extreme weather 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 sources of conflict between stakeholders or subject to embezzlement. This might compromise the financial sustainability of the project achievements.	Medium	Management committees are put in place and their members trained on transparent and fair management of the generated funds. A management plan is also developed for purposes of production efficiency.
Social The arrival of a foreign workforce and the establishment of protective infrastructure and income-generating activities in a single village in the municipality (which counts three villages) can be a source of conflicts and tension between the villagers.	Low	Conduct awareness sessions and inform the municipality. It is also important to explain early on that the project was initiated by Dionewar nationals, which is essentially why the village was chosen for these activities and infrastructure. When the building starts, it is also essential to inform foreign workers on local cultural settings to help avoid conflict with villagers.

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

In regards to compliance with the regulatory framework, the project must enforce the relevant provisions provided through regulations and strategies.

Pursuant to the Senegalese Environmental Code, the project was subject to an environmental and social assessment and an environmental and social management plan was developed.

The project will further comply with other legal texts, such as the Mining Code which requests career clearance to meet the needs to construct infrastructures (dikes, basins, etc.). The Forest Code will support the project activities on tree planting, namely in regards 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.
Land tenure can be a sensitive issue and will therefore receive particular attention. The Saloum estuary is characterized by a multitude of "bolongs" and it is not difficult to find the space to conduct oyster activities without interfering with navigation or other fishing activities. However, expanding oyster farming requires communication across all Saloum islands to identify production areas, while making sure to avoid barriers to seaworthiness. To anticipate other 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.

Oyster farming actors shall inform the Dionewar Municipality Council about the conduct and location of activities. For fish farming and planting of coconut palms, committed groups will file an allocation request to the Council. Indeed, decentralization texts give to that Council the authority to allocate land by authorization under the State-ownership.
Mangrove reforestation will also be performed on the banks of bolons on spaces under the State-ownership of land.

At the international level, the Convention on Biodiversity will be invoked to bolster efforts for species conservation on the Island, while the Convention on Persistent Organic Pollutants will be in force to monitor the use and management of chemicals in aquaculture and rice cultivation. 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 — and mainly HIV/AIDS-related risks.

Each project activity has been analyzed according to the CSE's Environmental and Social Policy requirements in order to identify potential risks and appropriate mitigation measures. As for the Environmental and Social Impact Assessment (ESIA), the

Environmental and Social Management Plan (ESMP) is also based on those requirements, with the aim to:

- assessing possible measures to avoid, minimize and / or mitigate risks identified;
- develop a monitoring plan for the E&S activities;
- promote a policy for high quality of environmental and social practices.

All costs associated with the positive impacts are included in the planned activities.

The table below shows the mitigation measures and the associated costs and the environmental monitoring plan. The environmental oversight plan is included in the separate document (*Cf. Environmental and Social Management Plan*).

Table 8: **Measures for environmental and social risk management**

Principles	Potential risk	Activities	Requirement	Management	Implementation of the requirement		
					Responsible	**Structures to involve**	**Cost (USD)**
Compliance with the Law	- Environmental and social harms - Challenging measures aiming at a sustainable use of natural resources	Dikes rehabilitation Fish and oyster farming Reforestation Local Planning	- Identify and implement relevant safeguard measures - Associate relevant local authorities (Municipal Council and Sub-Prefect)	- Undertake an ESIA and ensure a sound implementation of the associated ESMP - CSE and the PMU will ensure that relevant local authorities (sub-prefect, municipality) be informed in written prior to the launch	-Executing entities - PMU	- Local representation of the Directorate of Environment (DREEC), and the DAMCP (Warden of the Sangomar MPA)	No cost associated No cost associated
	- Child labor and work related accidents		- Provide protection equipment to avoid accident - Conduct awareness campaign for the workers about the risks of accidents - Enforce relevant labor regulations - Prohibit any kind of child labor	-CSE and the PMU will ensure that the company will provide all relevant protection equipment and will conduct awareness campaign	-Civil engineering company	- Local steering committee - Municipality	Included in the activity's budget

Principles	Potential risk	Activities	Requirement	Management	Implementation of the requirement		
					Responsible	Structures to involve	Cost (USD)
				about the risks by including that measure in the technical specifications - CSE and the PMU will ensure that children will not be employed for the project's activities and this measure will be included in the convention with the executing entities and the service providers		- Local steering committee - Municipality	No cost associated
Access and Equity	-Conflicts during the selection of the members of committees or the beneficiaries of trainings	Capacity building Establishment of the management committees	-Choose the beneficiaries of the capacity building sessions and the member of the management committees in a participative way in collaboration with the local and traditional authorities.	Set up a local committee in charge to oversee the distribution of the project's asset and the access to the project's benefits	PMU	Executing entities Local Authorities	Included in activities' budget

Principles	Potential risk	Activities	Requirement	Management	Implementation of the requirement		
					Responsible	Structures to involve	Cost (USD)
Marginalized and Vulnerable Groups	None						
Human Rights	None						
Gender Equity and Women's Empowerment	- Non integration of the women in decision making bodies (infrastructure, forest products management committees, steering committee for the local convention)	Implementation of the management committees	- Establish a quota for women in all decision-making bodies -Organize women specific consultations for all decision-making processes where they might be embarrassed to talk before men	- Breakdown the M&E indicators based on gender Executing entities will used gender based approaches during consultative processes	PMU	Local authorities Women organization	Cost included in the activity's budget
Core Labour Rights	- Accidents - Bad working conditions	Rehabilitation of the dikes Aquaculture installation Reforestation activities	- Provide protection equipment to avoid accident - Conduct awareness campaign for the workers about the risks of accidents - Enforce relevant labor regulations	-CSE and the PMU will ensure that the company will provide all relevant protection equipment and will conduct awareness campaign about the risks by including	Civil engineering company ANA	PMU	No cost associated (included in the activity's budget)

Principles	Potential risk	Activities	Requirement	Management	Implementation of the requirement		
					Responsible	Structures to involve	Cost (USD)
	- Child labor		- Prohibit any kind of child labor	that measure in the technical specifications - CSE and the PMU will ensure that children will not be employed for the project's activities and this measure will be included in the convention with the executing entities and the service providers -The Department of Labour will undertake site visits in order to check compliance with the law -CSE and PMU will break the contract if there is a	Department of Labour	PMU	No costs associated

Principles	Potential risk	Activities	Requirement	Management	Implementation of the requirement		
					Responsible	Structures to involve	Cost (USD)
				breach			
Indigenous Peoples	None						
Involuntary Resettlement	-Involuntary resettlement of economic activities (temporary stop of shellfish resources exploitation) due to biological rest	Preparation of local convention	-Propose alternative economic alternative (beekeeping is proposed)	CSE and the PMU will ensure the effective implementation of beekeeping	PMU	Management committees Forestry department DAMCP	Included in the activity's budget
Protection of Natural Habitats	None						
Conservation of Biological Diversity	- introduction of exotic species - pollution due to a non-appropriate use of fish food - use of mangrove wood and shell mounds; - works during spawning and growing out periods	Aquaculture Protection of the MPA	- use only local species - organize the works out of the spawning and growing out periods - train the populations on how to feed fishes without generating pollutions - prohibit the use of mangrove woods and shell mounds	- the PMU will establish collaborations with the DAMCP in order to ensure the observance of these requirements - these requirements will be included in the	PMU	DAMCP	No cost associated

Principles	Potential risk	Activities	Requirement	Management	Implementation of the requirement		
					Responsible	Structures to involve	Cost (USD)
				agreement to be signed between CSE and ANA			
Climate Change	None						
Pollution Prevention and Resource Efficiency	- Accidental spills	Rehabilitation of the dikes	- Develop a waterproof space - Maintain regularly the concrete mixer - Avoid overloading canoes during transport of hydrocarbons - Ensure containers are airtight	- CSE and the PMU will ensure that the specifications of the company will include the installation of the waterproof space and that the concrete mixer will be maintain regularly CSE through the control office will ensure the conformity of loads during transport	Civil engineering company	PMU	Included in the activity's budget
	- Increase of the organic matter	Aquaculture farms	- Controlling fish population density - Monitor water quality (regular chemical	- CSE will be responsible for overseeing the	ANA	Local communities	20,000 (to control the water quality

Principles	Potential risk	Activities	Requirement	Management	Implementation of the requirement		
					Responsible	Structures to involve	Cost (USD)
	(overproduction of organic waste due to uncontrolled fish density) -Waste generation	Each activity of the project	analysis) (for the fish cages) - In case of overcrowding make transfers to other cages - Develop and implement a waste management plan	implementation of the ESMP and ensure that ANA and all the structures involved will provide the water quality analysis reports and will implement the necessary measures to avoid excessive fish in the cages - CSE will ensure that the waste management plan is developed and implemented effectively			and construct new cages) 15,000 (for the waste management plan of the whole project)
Public Health	– Outbreak of sexually transmitted infections, including HIV/AIDS – Waterborne	Rehabilitation of the dikes	- Sensitization of workers and populations (through the environmental and social management plan) - Water regularly the sites (dikes and borrowing sites) to avoid	- CSE and the PMU will ensure that the specifications of the company will include	Civil engineering company	ANA PMU Health department	Included in the activity's budget

Principles	Potential risk	Activities	Requirement	Management	Implementation of the requirement		
					Responsible	Structures to involve	Cost (USD)
	diseases – Ocular or respiratory diseases		the dust takeoffs - Completely cover the top of the truck's body and the load of laterite	awareness the workers about STDs, HIV-AIDS and waterborne diseases the provision for the protective equipment and the watering of the sites			
	– Accidents – Falls or drowning	Aquaculture farms	- Provide protective equipment (life jackets, lifebelts) for the operators of the aquaculture sites - Provide protective equipment to the workers (gloves, masks, glasses, helmets) (for the rehabilitation of the dikes)	- CSE will validate the list of future beneficiaries and participate in the distribution of protective equipment (life jackets, lifebelts, etc.)	PMU		
Physical and Cultural Heritage	-Fortuitous discovery of sites or objects of cultural, sacred or archaeological importance	Dikes rehabilitation Reforestation	- Protect and secure these sites - Immediately cease activity on the sites concerned	- CSE will inform all local and administrative authorities and will ensure that the procedures are applied for this type of discovery	PMU	Local steering committee Local authorities DAMCP	2,500

Principles	Potential risk	Activities	Requirement	Management	Implementation of the requirement		
					Responsible	Structures to involve	Cost (USD)
Lands and Soil Conservation	-Pollution of soil and lands - Modification of soil structure	Reforestation (tree nursery) Rehabilitation of the dikes	-Sensitize operators to rational use of fertilizers -Ensure the supervision of the activity by the water and forest service -Promote the use of natural fertilizers -Ensure soil leveling at the end of the work	-CSE will include these measures in the convention signed with the forestry department - CSE and the PMU will ensure that the specifications of the company will include the soil leveling at the end of the works	Forestry department	PMU Management committees	5,000
TOTAL							**42,500**

Table 9: Environmental monitoring plan

COMPONENT	ACTIVITY	OUTPUT	MONITORING PARAMETERS	INDICATORS	Means of verification	Targets	TIMETABLE	PRINCIPAL RESPONSIBLE	STRUCTURES TO INVOLVE	COSTS (USD)
COMPONENT 1	Aquaculture	Implementation of an oyster farm	Monitoring of the physicochemical and bacteriological parameters of the oyster farm's site	Number of analysis report	Physicochemical (temperature, turbidity, oxygene, pH) and bacteriological analysis report	12	Before the works and every 3 months after installing	ANA	PMU RMC	6,590
		Implementation of a fish farm with floating cages	Monitoring of the physicochemical and bacteriological parameters of the fish farm's site	Number of analysis report	Physicochemical (temperature, turbidity, oxygene, pH) and bacteriological analysis report	12	Before the works and every 3 months after installing	ANA	PMU RMC	6,590
		Strengthen the actors' capacities on fish and oyster farming techniques	Monitoring the selection of beneficiaries taking into account gender aspects	Number of Economic Interest Group trained and involved in the management committees	Training session report	18	At the time of planning, and during the implementation of the capacity building plan	PMU		FTR
		Implement farm management plan	Monitoring the implementation of the farm management plan including environmental clauses	Number of management plan realized	Management plans	2	Throughout the project	ANA	PMU	2 450
		Endowment (boots, gloves, safety jacket, etc.)	Check of the technical specifications of the equipment	Quality of the equipment	Receipt	200	Upon receipt of the equipment	PMU	ANA	FTR[28]

[28] FTR : For The Record

COMPONENT	ACTIVITY	OUTPUT	MONITORING PARAMETERS	INDICATORS	Means of verification	Targets	TIMETABLE	PRINCIPAL RESPONSIBLE	STRUCTURES TO INVOLVE	COSTS (USD)
COMPONENT 2	Extension and rehabilitation of the dikes to fight against flooding in Dionewar	Rehabilitation and extension of the dikes	Monitoring the respect of labor rights especially with regard to child labor	Percentage of minor included in the works	Attendance list	0	During the activity	PMU	RMC	FTR
	Infrastructure management	Preparation of a maintenance guide	Monitoring the implementation of the maintenance guide	Number of visit	Inspection report	4	Before and after the rainy season	AGRICULTURE DEPARTMENT (SECTION RURAL ENGINEERING)	RMC PMU	FTR
		Project's activities	Monitoring of the health information and communication program's implementation	Number of realized awareness campaign	Awareness campaign report	8	Once a month during the four months of the rainy season	Health Regional Service	PMU	FTR
COMPONENT 3	Review and update of the PDC	Integrate climate change aspects into the PDC	Monitoring the implementation of the PDC with the climate change aspects	Number of monitoring field mission	Field mission report	9	Quarterly during the project lifespan	PMU	RMC ARD DAMCP	FTR
	Preparation of a local convention for natural resources management	Implement a local convention to better regulate the use of forest products and to respect the biological recovery period of the fish products	Monitoring the implementation of the local convention	Number of monitoring field mission	Field mission report	9	Quarterly during the project lifespan	PMU	RMC ARD DAMCP	FTR
			Monitoring the implementation of the alternative activities	Number of monitoring field mission	Field mission report	6	Quaterly during the last two years	PMU	RMC Forestry Department DAMCP	3,220
	Sharing the lessons learned from the project	Sharing the project's activities	Monitoring the process of sharing the project's	Effectiveness of the sharing lessons learned report	Sharing lessons learned report	2	Mid-term and at the last semester of the project	CSE	RMC DAMCP	FTR

COMPONENT	ACTIVITY	OUTPUT	MONITORING PARAMETERS	INDICATORS	Means of verification	Targets	TIMETABLE	PRINCIPAL RESPONSIBLE	STRUCTURES TO INVOLVE	COSTS (USD)
			activities	Number of workshops	Workshop report	3				
TOTAL										**18,850**

FTR: For the Record = Means that the budget of the element to monitor is either included in the activity's budget or in the whole M&E activity

At the beginning of the project, stakeholders will be informed about the risks and impacts incurred and defined protection measures; an appeals and grievance management mechanism will be made public.

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

D. Monitoring and evaluation arrangements and budgeted M&E plan

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, management and 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 this data / information as well as the other relevant data / information in a computerized system. The total cost of the MEP is estimated at 128,129 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 10: Budgeted Monitoring and Evaluation plan

Outputs	Main responsible	Timeframe	Budget ($ us)	Destination
Inception workshop's report	Project team CSE	During the first month following the startup of project	15,539 (9,500 + 6,039)	CSE, AF

Outputs	Main responsible	Timeframe	Budget ($ us)	Destination
M&E Plan[29]	Project team CSE	During the first 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 Quarterly 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 project mid-term	3,000	NSC, CSE, AF
Final evaluation report	Consultants	At project completion	7,500	NSC, CSE, AF
Audit Report	External auditors	By end of project	10,000	NSC, CSE, AF
Maps, posters, videos, photos, etc.	Project team	Rolling, upon availability	17,500	Diverse
Monitoring of the implementation of the Environmental and Social Management Plan	Technical services, PMU, Administrative and local authorities,	Periodically	18,850	Technical services, PMU, administrative and local

[29] As indicated in the table below, the detailed M&E plan will be developed during the start-up phase. It will be designed based on the logical framework and the ESMP monitoring plan. The planning of the M&E activities will be also developed with the aim to achieve the targeted results.

Outputs	Main responsible	Timeframe	Budget ($ us)	Destination
Monitoring environmental parameters	community based associations			authorities, community based association
TOTAL			**102,389**	

E. Results framework for the project proposal

Table 11: Results framework

Title: REDUCING VULNERABILITY AND INCREASING RESILIENCE 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 Communal 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*[30]	*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 flooding and coastal erosion	At least 270 households (112 at mid-term)	Progress reports, survey	

[30] Current baseline information derives from documentary review and field missions during project preparation and may need to be updated at the early stage of the project implementation as indicated in the monitoring and evaluation 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 terrestrial ecosystems restored - % of increase of income of population involved in alternative income generating activities (breakdown 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	Field visit, progress reports Survey	
	Reduced vulnerability of populations and socioeconomic infrastructures in Dionewar to hazards with the construction or rehabilitation of protection structures	Number of dikes rehabilitated and built to protect households and socioeconomic infrastructures against flooding and coastal erosion	0	three dikes	Field visit, completion report of contractors	
	Strengthened capacity of local institutions to mainstream climate change in Communal 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) (half of them women and half of them men) 2 (PCD and PLAE)	Training Workshop reports (list of participants) Updated PCD 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 60 fish growing cages, 500 spat collectors and 2000 growout bags (USD 146,625)	- Number and type of adaptive production systems - Number of fish cages - Number of spat collector - Number of growout bags - Number of analysis report for the monitoring of the physicochemical and bacteriological parameters of the oyster farm's site - Number of analysis report for the monitoring of the physicochemical and bacteriological parameters of the fish farm's site	0 0 0 0 0 0	3 60 500 2000 12 12	Progress reports, field visit Analysis Reports Analysis Reports	Alternative fish and oyster farming includes: growing cages, 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 in order to revitalize the main productive sectors (USD 156,982)	- 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 visits, 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 members of management committee and of community based organizations trained	0 0	*18 (10 at mid-term)* *30 women*	Training sessions reports	
	1.4. *Fish and oyster farms management plans developed (USD 30,400)*	- Number of management plans	0	2	Management plan documents	
	Component 2 : Protection against flooding, coastal erosion and salinization in Dionewar					
	2.1. The three dikes to protect against flooding are restored and extended over 1.2 km ((USD 529,442)	- Number of new dikes restored or extended	0	3	Contractor's completion report/Field visit	
	2.2. A maintenance plan developed, involving key stakeholders (USD 21,000)	- Number of dikes' maintenance plan developed	0	1	Maintenance plan document	
	Component 3: Strategic planning and knowledge management					
	3.1. The Communal Development Plan (PCD) 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 adaptation options	0	2	Updated PCD, 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 21,700)	- Number of local convention on sustainable management of natural resources adopted - Number of field missions for monitoring the implementation of the alternative activities (bee-Keeping, etc.)	0 0	1 6	Municipality deliberation note Field visit	
	3.3. Project's lessons learned documented and shared (USD 16,150)	- 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 410 persons (270 adult women, 120 adult men, 20 students (10 girls and 10 boys)	Audio records, video, posters and publications M&E reports, MTE report, Final evaluation Report	Productions includes: audio, video, posters and hard paper publication
	3.4. Automatic meteorological station implemented (USD 41,400)	- 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 114,835)	- Number of reports - Rate of disbursement - Rate of achievement	0 0 0	12 100% 100%	Reports Audit report Final evaluation, field visit, customer satisfaction survey	9 quaterly reports, 2 annual reports, 1 final report

F. Projects 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 are 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 Communal 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 12 : Project alignment with the AF's results framework

Project Objective(s)	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
Reduce vulnerability of populations in the Saloum Islands to flooding and coastal erosion.	Number of risk-exposed coastal household of Dionewar benefiting of adaptation measures	***Outcome 1:*** *Reduced exposure to climate-related hazards and threats*	*1.2.1. Percentage of target population covered by adequate risk-reduction systems*	
		Outcome 5*: Increased ecosystem resilience in response to climate change and variability-induced stress*	***5.*** *Ecosystem services and natural resource assets maintained or improved under climate change and variability-induced stress*	
		Outcome 6: *Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas*	*6.2. Percentage of targeted population with sustained climate-resilient alternative livelihoods*	
		Outcome 4: *Increased adaptive capacity within relevant development sector services and infrastructure assets*	*4.2. Physical infrastructure improved to withstand climate change and variability-induced stress*	
		Outcome 3: *Strengthened awareness and ownership of adaptation and*	***3.1.*** *Percentage of targeted population aware of predicted adverse impacts of climate change, and*	

		climate risk reduction processes at local level ***Outcome 7:*** *Improved policies and regulations that promote and enforce resilience measures*	*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)
<u>Outcome 1</u> : Improved resilience of the main ecosystems of Dionewar Island is enhanced and sustainable livelihoods of populations	*1.1.* Number ha of mangrove and terrestrial ecosystems restored 1.2. Percentage of increased income for populations involved in alternative generation income activities (desegregated 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*	374,807
<u>Outcome 2</u>: Reduced vulnerability of populations and socioeconomics infrastructures in Dionewar to	*2.1.* Number of dikes rehabilitated and built to protect household and socioeconomic infrastructures against flooding	***Output 4:*** *Vulnerable development sector services and infrastructure assets*	*4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability*	550,442

hazards with the construction or rehabilitation of protection structures		*strengthened in response to climate change impacts, including variability*	*and change (by sector and scale)*	
Outcome 3: Strengthened capacity of local institutions to mainstream climate change in Communal Development Planning, sustainable natural resource management strategies and to document and disseminate lessons learned.	*3.1. Number of persons (including decision makers) aware of local climate change issues and adequate measures to be implemented* *3.2. Number of local development tools that integrate adaptation measures*	***Output 3**: Targeted population groups participating in adaptation and risk reduction awareness activities* ***Output 7:** Improved integration of climate-resilience strategies into country development plans*	*3.1 No. of news outlets in the local press and media that have covered the topic* *7.1. No. of policies introduced or adjusted to address climate change risks (by sector)*	100,250

Through its 3 components, the project is in line with 4 out of the 5 Adaptation Fund core impact indicators.

Activities planned under **Components 1** (*Enhancing resilience of main ecosystems in Dionewar island*) and **2** (*Protection against flooding and salinization in Dionewar*) will contribute to measuring impacts in terms of

- "Number of Beneficiaries";
- "Assets produced, developed, improved or strengthened" with the rehabilitation of the flood management system;
- "Increased income, or avoided decrease in income": development of fisheries, and non-wooded forest products availability; and
- "Natural Assets Protected or Rehabilitated": reduction of deforestation, improvement of biodiversity, restoration of mangroves and enhancement of the integrity of ecosystem

Activities planned under **Component 3** (*Strategic planning and knowledge management*) contribute to measuring impacts in terms of "Assets Produced, developed, Improved or strengthened" by the mainstreaming of climate change in Communal Development Planning.

Table 13: Targets for AF's Core indicators of the project

Core indicators	Information on the core indicators
Number of Beneficiaries	**3 480 direct beneficiaries and 1,915 indirect beneficiaries** ***Detailed calculation of the direct beneficiaries*** - 270 households **(2970 persons)** - *Strengthened capacity of local institutions to mainstream climate change in Communal Development Planning, sustainable natural resources management strategies and to document and disseminate lessons learned of **100** persons (50 at mid-term)* (half of them women and half of them men) - *Informed of local climate change issues and adequate measures to be implemented for* **410** persons (270 adult women, 120 adult men, 20 students (10 girls and 10 boys) ***Detailed calculation of the indirect beneficiaries*** - *All project activities will have an impact on the entire population*
Assets produced, developed, improved or strengthened" with the rehabilitation of the flood management system	**Assets improved or strengthened (in short-term)** - 270 households - 1 Fish processing unit for the women - 1 cemetery - 1 High School - 2 Elementary School - 1 Health Post - 1 Post Office **Assets improved or strengthened (long-term)** – The entire village
"Increased income, or avoided decrease in income": development of fisheries, non-wooded forest products availability and agriculture;	- The average annual income from the plantations of coconut and palm trees and reforestation of mangrove is estimated at USD 8,990 from the fourth year of reforestation. - The reforestation of 6 hectares of mangrove is also planned to play an important role in the fight against flooding, reproduction, and the development of certain fish species, oyster development, construction wood production (poles) and wood fuel. After three years, the mangrove can contribute to the oyster farming development. - The development of fish and oyster farms to improve populations' incomes will allow an annual production estimated at USD 94,594 during the years of exploitation.
"**Natural Assets Protected or Rehabilitated": reduction of deforestation, improvement of biodiversity,**	- 5ha of mangrove - 6ha of tree planted

Core indicators	Information on the core indicators
restoration of mangroves and enhancement of the integrity of ecosystem	

G. Detailed budget

a) Summary output budget

Table 14: Output budget

Components	Output	Year-1	Year-2	Year-3	Total
Component 1: Enhancing resilience of main ecosystems in Dionewar island	1.1	92,040	25,790	28,795	146,625
	1.2	88,216	38,783	29,983	156,982
	1.3	13,600	13,600	13,600	40,800
	1.4	3,000	21,400	6,000	30,400
Total Component 1		196,856	99,573	78,378	374,807
Component 2: Protection against flooding, coastal erosion	2.1	529,442			529,442
	2.2			21,000	21,000
Total Component 2		529,442		21,000	550,442
Component 3: Strategic planning and knowledge management	3.1	10,000	8,000	3,000	21,000
	3.2	4,900	13,210	3,590	21,700
	3.3	3,250	6,850	6,050	16,150
	3.4	37,400	2,000	2,000	41,400
Total component 3		55,550	30,060	14,640	100,250
Miscellanous		73,185	10,963	8,228	92,376
Project execution		43,280	30,320	44,690	118,290
Total Project cost		898,313	170,916	166,936	1,236,165
Management fees		40,735	36,700	37,400	114,835
TOTAL PROJECT COST		**939,048**	**207,616**	**204,336**	**1,351,000**

b) Detailed budget with budget notes

Table 15: Detailed budget

COMPONENT	OUTPUTS	ACTIVITIES	Year 1	Year 2	Year 3	TOTAL	NOTES
Component 1:	Output 1.1	Fish farming					
		Logistic	20,000			20,000	Motorized speedboat
		Operating expenses	11,790	11,790	11,790	35,370	
		Oyster farming				-	
		Fixed asset	26,120			26,120	
		Working capital	25,930			25,930	
		Implementation of mitigation measures (control fish density, build new cages in case of overcrowding)	4,500	7,000	8,500	20,000	
		Oversight activity (waste management, application of environmental clauses, etc.)	700	1,000	1,875	3,575	
		Monitoring activity (physicochemical and bacteriological parameters, selection of beneficiaries, etc.)	3,000	6,000	6,630	15,630	
Total Output 1.1			**92,040**	**25,790**	**28,795**	**146,625**	
Component 1:	Output 1.2.	Tree Nursery					
	6ha reforestation	Laying out	10,000			10,000	Cleaning, fencing, digging well
	5ha mangrove	Inputs	2,849	2,449	2,849	8,147	Plastic container, seed, phytosanitary products
		Equipment	49,833			49,833	Rakes, shovels, wheelbarrows, and other equipment
		Labour	23,734	23,734	23,734	71,202	10 temporary workers for watering, weeding, etc.

COMPONENT	OUTPUTS	ACTIVITIES	Year 1	Year 2	Year 3	TOTAL	NOTES
		Reforestation				-	
		Logistic	600	600	600	1,800	Cart rental for young trees transportation
		Social labor	500	500	500	1,500	Allowances, restauration for 100 persons/session
		Ecoguards training		5,000		5,000	Consultancy services for training 15 eco-guards
		Ecoguards equipment		4,500		4,500	Uniforms and other equipments
		Implementation of mitigation measures (promote the use of natural fertilizers, etc.)	700	2,000	2,300	5,000	
Total Output 1.2			**88,216**	**38,783**	**29,983**	**156,982**	
Component 1:	Output 1.3.	Organizational Management					
	18 GPF trained	Consultancy services	5,000	5,000	5,000	15,000	10H/day x 3 sessions
		Workshop	1,800	1,800	1,800	5,400	30 participants/session of 5days x 3
		Production management				-	
		Consultancy services	5,000	5,000	5,000	15,000	10 P/day x 3 sessions
		Workshop	1,800	1,800	1,800	5,400	30 participants/session of 5 days x 3 sessions
Total Output 1.3			**13,600**	**13,600**	**13,600**	**40,800**	
Component 1:	Output 1.4.	Fish farming					
	2 Management Plan	Consultancy services		7,000		7,000	15 P/Day
		Validation workshop		700		700	One day workshop for 50 participants (Restauration)
		Oyster farming				-	
		Consultancy services		7,000		7,000	15 P/day

COMPONENT	OUTPUTS	ACTIVITIES	Year 1	Year 2	Year 3	TOTAL	NOTES
		Validation workshop		700		700	One day workshop for 50 participants (Restauration)
		Implementation of environmental and social measures (Waste management development)	3,000	6,000	6,000	15,000	
Total output 1.4			**3,000**	**21,400**	**6,000**	**30,400**	
TOTAL COMPONENT 1:			**196,856**	**99,573**	**78,378**	**374,807**	

COMPONENT	OUTPUTS	ACTIVITIES	Year 1	Year 2	Year 3	TOTAL	NOTES
Component 2:	Output 2.1	-					
	3 dikes	Surveying	35,000			35,000	Complementary feasibility studies
		Infrastructures building	428,892			428,892	Supervision and technical assistance
		Contract services	62,000			62,000	
		Implementation of mitigation measures (control fortuitous discoveries, etc.)	2,500			2,500	
		Oversight activity (respect of labor right, especially with regard to child labor, etc.)	1,050			1,050	
Total Output 2.1			**529,442**	**-**	**-**	**529,442**	
Component 2:	Output 2.2.						
	Maintenance plan	Maintenance guide			15,000	15,000	
		Management committee			3,000	3,000	
		Report back session			3,000	3,000	
Total Output 2.2			**-**	**-**	**21,000**	**21,000**	
TOTAL COMPONENT 2:			**529,442**	**-**	**21,000**	**550,442**	

COMPONENT	OUTPUTS	ACTIVITIES	Year 1	Year 2	Year 3	TOTAL	NOTES
Component 3:	Output 3.1						
	Mainstreaming CC	Updating the PCD and PLAE	7,000			7,000	Consultancy services 30 P/Day
		Training (1) local representatives		5,000		5,000	Consultancy 10 P/Day. “Climate resilient budget”
		Training (2) local representatives	2,600	2,600	2,600	7,800	Consultancy 7 P/D x 3 sessions. "CC management”
		Workshops	400	400	400	1,200	25 participants per training session
Total Output 3.1			**10,000**	**8,000**	**3,000**	**21,000**	
	Output 3.2.						
	Local	Diagnostic natural resources	3,000			3,000	Consultancy services 15 P/day
	convention	Drafting local convention	1,400			1,400	Consultancy services 10 P/day
	(LC)	Validation workshop		5,000		5,000	Venue, catering and transportation
		Deliberation session		600		600	Support to municipality
		Edition duplication LC		4,000		4,000	Production of 1500 copies
		Oversight activity (application of alternatives measures proposed to social groups whose livelihoods activities may be affected by the new local regulations; e.g. development of bee-keeping activities, etc.)	500	2,000	1,980	4,480	
		Monitoring the effectiveness of the application of the mitigation measures proposed to social groups whose livelihoods activities may be affected by the new local regulations		1,610	1,610	3,220	
Total Output 3.2			**4,900**	**13,210**	**3,590**	**21,700**	

	Output 3.3.						
	CC Knowledge	Annual reports production	2,500	2,500	2,500	7,500	Illustrated publication (Edition and impression)
	Management	Audio and television broadcasting		1,000		1,000	Media mobilization
		Posters production		1,000	1,500	2,500	
		Workshops	750	2,350	2,050	5,150	DSA for project's staff
Total Output 3.3			**3,250**	**6,850**	**6,050**	**16,150**	
	Output 3.4						
	Weather Station	Weather station and sphere censors	30,000			30,000	
		Identification mission	2,500			2,500	
		Installation mission	1,000			1,000	
		Securisation work	2,500			2,500	
		Maintenance	1,400	2,000	2,000	5,400	
Total Output 3.4			**37,400**	**2,000**	**2,000**	**41,400**	
TOTAL COMPONENT 3:			**55,550**	**30,060**	**14,640**	**100,250**	

COMPONENT	OUTPUTS	ACTIVITIES	Year 1	Year 2	Year 3	TOTAL	NOTES
Miscellanous			**73,185**	**10,963**	**8,228**	**92,376**	
Project execution							
		Staff salaries and allowances					
		M & E specialist salary	7,200	7,200	7,200	21,600	
		Local coordinator salary	6,000	6,000	6,000	18,000	
		Admin and fin assistant salary	3,600	3,600	3,600	10,800	
		Allowances of CADL technical staff	4,800	4,800	4,800	14,400	
		Refection and equipment of office					
		Refection former rural community office	3,290			3,290	
		Office furniture	900			900	
		Computing equipment	2,400			2,400	
		Maintenance		200		200	
		Office supplies	600	600	600	1,800	
		Commodities	1,200	1,200	1,200	3,600	
		Transportation	1,070	1,000	1,070	3,140	
		Communication	720	720	720	2,160	Estimate. USD 60/month
		Inception workshop	9,500			9,500	
		Steering committee meeting	2,000	2,000	2,000	6,000	
		Final audit			10,000	10,000	
		Mid-term evaluation		3,000		3,000	
		Final evaluation			7,500	7,500	
Total Project Execution			**43,280**	**30,320**	**44,690**	**118,290**	

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

Table 16: Output budget

COMPONENT	OUTPUTS	ACTIVITIES	Year 1	Year 2	Year 3	TOTAL	NOTES
Management fees							
		CSE staff allowances	15,200	20,200	21,200	56,600	
		Field supervisions (contribution to M&E)	10,000	8,000	6,000	24,000	
		Control of works	5,000	5,000	5,000	15,000	
		Inception workshop (Contribution to execution resources)	7,035			7,035	
		Financial fees	3,500	3,500	5,200	12,200	
Total Project Management fees			**40,735**	**36,700**	**37,400**	**114,835**	

H. Disbursement schedule

Table 17: Disbursement schedule

	Upon signature of Agreement	One Year after Project Start	Year 2	Year 3	Total
Scheduled Date	August 2017	August 2018	August 2019	August 2020	
Project Funds	500,000	398,313	170,916	166,936	1,236,165
Implementing Entity Fees	20,368	20,367	36,700	37,400	114,835
Total	**520,368**	**418,680**	**207,616**	**204,336**	**1,351,000**

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

B. Implementing Entity certification *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

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

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ANNEXES

LIST OF PERSONS AND INSTITUTIONS CONSULTED

N°	Name	Position	Contact
Niodior Prefecture, January 15 2016			
1	Amadou Lamine SY	Sub-prefect	77 529 06 73
Municipal Council of Dionewar, January 15 2016			
2	Ansoumana SARR	Mayor	77 318 01 84
3	Abdoulaye NDIAYE	Secretary	77 525 99 35
4	Lamine THIARE	Mayor's 1st assistant	77 412 43 37
5	Abdou FAYE	Municipal Councillor	77 113 55 10
6	Mata DIENE	Municipal Councillor	77 604 37 61
7	Fatou BAKHOUM	Municipal Councillor	77 329 61 20
8	Aminata NDONG	Municipal Councillor	77 268 77 13
9	El H Ismaïla SARR	Municipal Councillor	77 921 66 62
10	Sophie SARR	Municipal Councillor	77 893 47 39
11	Lamine SARR	Municipal Councillor	77 316 22 64
12	Ibrahima NDIAYE	Municipal Councillor	77 507 11 08
13	Ibrahima DIOP	Municipal Councillor	77 518 90 32
14	Marie SARR	Municipal Councillor	77 316 23 92
15	Faback SALL	Municipal Councillor	77 415 84 96
Local federation of the Economic Interested Groups (FELOGIE) de Dionewar, January 16 2016			
16	Moussa SARR	Association for the Development of Dionewar (ADD)	77 566 21 85
17	Mariama THIOR	FELOGIE	77 521 61 38
18	Fatou NDONG	FELOGIE	
19	Fatou SARR	FELOGIE	77 449 35 42
20	Assane SARR	ADD	77 563 64 88
21	Djibril DIOP	ADD	77 552 33 95
22	Mahamadou Lamine NDONG	Village Chairman	77 521 54 28
Public consultation of Dionewar, January 17 2016			
23	Lamine THIARE	Mayor's 1st assistant	77 412 43 37
24	Arfang NDOUR	Fisherman	77 202 02 00
25	Adama NDIAYE	Fisherman	77 358 23 01
26	Mamadou DIOUF	Fisherman	77 320 83 23
27	Djibril SARR	Teacher	77 457 17 60
28	Aïcha DIOP	Housewife	77 903 29 72
29	Assane SARR	Health Committee President	77 309 47 22
30	Fatou SARR	GIE President	77 449 35 42
31	Salimata SARR	Midewife	77 375 28 37
32	Fatou NDONG	Housewife	
33	Gnima DIOUF	Housewife	

34	Mary SARR	Municipal Councillor	77 316 23 92
35	Ndèye Doko SENGHOR	Housewife	77 876 02 50
36	Mariama THIOR	GPF President	77 522 62 38
37	Mariama SARR	Housewife	77 191 64 47
38	Idrissa DIOP	Fisherman	77 734 48 94
39	Mouhamadou S SARR	Student	77 066 44 51
40	Bakary SARR	Student	78 315 88 79
41	Astou NDIAYE	Student	77 737 04 41
42	Khady NDIAYE	Student	78 397 04 96
43	Fodé SARR	Fisherman	77 784 29 68
44	Boubacar DIENG	Fisherman	77 520 99 15
45	Sékou NDIAYE	Fisherman	77 453 57 23
46	Faback SARR	Retiree Sailor/Fisherman	77 363 61 55
47	El H NDIAYE	Retiree Sailor/Fisherman	77 433 36 99
48	Birama NDONG	Fisherman	77 045 36 83
49	Abdou DIOUF	Fisherman	77 179 21 90
50	Ousmane NDONG	Retiree Sailor/Fisherman	
51	Babacar SARR	Carpenter	77 255 53 05
52	Omar NDONG	Fisherman	77 785 48 77
53	Moustapha NDOUR	Retiree	77 127 02 11
54	Mamadou SOW	Student	78 230 66 73
55	Mbagnick NGOM	Student	77 994 33 25
56	Abdou SENGHOR	Student	78 215 50 08
57	Abdou DIOUF	Teacher	77 443 11 58
58	Lamine DIOP	Fisherman	77 425 65 06
59	Assane DIOP	Fisherman	77 798 47 41
60	Mamadou NDOUR	Fisherman	77 229 82 94
61	Abdou NDIAYE	Fisherman	77 666 27 17
62	Yamaty MANE	Housewife	77 609 92 44
63	Sophie SARR	Municipal Councillor	77 893 47 39
64	Aminata NDONG	Municipal Councillor	77 268 77 13
65	Seynabou DIENE	Teacher	77 237 12 46
66	Sophie DIOUF	Post officer	77 428 52 43
67	Rokhy DIOUF	Housewife	77 030 79 86
68	Abdou SARR	Mason	77 316 24 46
69	Mama Lamine NDIAYE	Eco tour guide	77 370 55 09
70	Mamadou NDIAYE	Student	78 358 14 16
71	Bakary NDONG	Student	77 378 51 30
72	Abdoulaye DIOP	Teacher	77 378 51 30
73	Ansou DIOUF	Teacher	77 456 61 87
74	Soumaïla NDIAYE	Carpenter	77 367 09 46

75	Mady SARR	Teacher	77 532 17 34
76	Ibrahima NDIAYE	Municipal Councillor	77 507 11 08
77	El H Faby DIOUF	Teacher	77 435 87 85
78	Mamadou THIAW	Merchant	77 906 94 28
79	Lamine Séla FAYE	Fisherman	77 989 78 29
80	Ibrahima DIOP	Municipal Councillor	77 518 90 32
81	Mamady DIOUF	Fisherman	77 438 78 99
82	Djibril Passy NDONG	Teacher	77 451 71 58
83	Lamine DIOUF	Local development agent	77 406 31 82
84	Ousmane THIOR	Carpenter	77 105 56 67
85	Assane NDIAYE	Retiree	77 534 47 10
86	Haby NDONG	Housewife	
87	Babacar NDIAYE	Carpenter	77 646 75 47
88	Aliou NDIAYE	Fishmonger	77 605 76 37
89	Ousmane SARR	Carpenter	77 916 90 27
90	Mouhamadou Lamine NDONG	Chef de village	77 521 54 18
91	Diatou DIOUF	Housewife	
92	Maïmouna DIAME	Housewife	
93	Bakary SARR	Carpenter	77 570 97 50
94	Dioba SARR	Maçon	77 986 88 00
95	Lamine TOURE	Maçon	77 230 18 98
96	Adama NDIAYE	Fisherman	77 678 53 97
97	Bineta DIOUF	Housewife	77 820 21 51
98	Djibril DIOP	ADD	77 566 21 85
99	Birama SARR	ADD	77 649 21 49
100	Souleymane DIOUF	Fisherman	77 175 57 92
101	Adama Sy SARR	Teacher	77 241 21 24
Technical services, January 18 and 19 2016			
102	Mamadou WADE	Foundiougne fishery department, Head of office	77 737 59 51
103	Victor Toupane	Foundiougne Rural development, Head of office	77 572 20 74
104	Papa Diogomaye DIOUF	APIL Coordinator	77 362 53 98
105	Ousseynou DIOUF	APIL leader	77 573 21 79
106	Adama DIALLO	Foundiougne Forestry Department Assistant Director	77 209 03 35
107	Abdallah L. CAMARA	Fatick Environment and Classified Establishments Department Head of Office	77 671 82 97
108	Omar BADIANE	Fatick Environment and Classified Establishments Department Head of Office's Assistant	77 441 51 70
109	Ousmane FALL	Fatick Forestry Department Head of Office	77 630 75 43
110	Mamadou Hamdiatou BA	Regional development Agency of Fatick's M&E Officer	77 657 77 33
111	Boubacar DIALLO	Fatick Rural Development Director	77 363 67 45
112	Ibrahima LO	Fatick Fishery Department Head of Office	77 649 01 45

INTERVIEW GUIDE

Actors categories	Topics covered
Technical Services	*Point of view on the project for" Reducing vulnerability and increasing resilience of coastal communities in the Saloum Island".*
	Roles and missions of the structure in the implementation of this type of project.
	Fears and concerns about the project.
	Past experiences in the implementation of such projects.
	Constraints identified in the implementation of such projects.
	Point on the capacity of technical services to support the CSE, the ANA, the CONAF (technical, human and material resources).
	Identification of capacity building needs.
	Expectations and recommendations.
Populations/Municipalities	*Point of view on the project.*
	Fears and concerns about the project.
	Existence of similar project in the area.
	Land tenure situation in the locality.
	Identification of capacity building needs (training, etc.)
	Expectations and recommendations.