Building Regional Resilience through Strengthened Meteorological, Hydrological and Climate Services in the Indian Ocean Commission Member Countries (Hydromet Project)

Environmental and Social Management Framework

January 2021

This technical assistance operation is financed by the Agence Française de Développement (AFD) as part of the Adapt'Action Facility. This Facility, launched in May 2017, supports African countries, LDCs and SIDS in the implementation of their commitments under the Paris Climate Agreement, through the financing of studies, capacity-building and technical assistance, particularly in the adaptation sector. The authors assume full responsibility for the content of this document. The opinions expressed do not necessarily reflect those of AFD or its partners.

Cover photo: new technology weather measuring and monitoring equipment at Mahé International Airport Seychelles (2019)

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ACRONYMS AND ABBREVIATIONS

AFD	Agence Française de Développement
DRR	Disaster Risk Reduction
EE	Executing Entity
E(S)IA	Environmental (and Social) Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESRM	Environmental and Social Risk Management
ESS	Environmental and Social System
EU	European Union
GCF	Green Climate Fund
GFDRC	Global Facility for Disaster Reduction and Recovery
IFC	International Finance Corporation
IOC	Indian Ocean Commission
ONE	Organisation Nationale de l'Environnement (Madagascar)
PS	Performance Standard (of IFC)
SS	Safeguards Specialist (of IOC Technical Team)
SWIO	South West Indian Ocean
UNISDR	United Nations International Strategy for Disaster Reduction
UNDRR	UN Office of Disaster Risk Reduction
WMO	World Meteorological Organisation

EXECUTIVE SUMMARY

Project purpose

The proposal "Building Regional Resilience through Strengthened Meteorological, Hydrological and Climate Services in the Indian Ocean Commission Member Countries" has as its goal to strengthen the resilience and adaptive capacity of communities to climate change impacts. To achieve this, it will develop and transform national hydro-meteorological services in participant countries and foster regional cooperation and climate knowledge sharing. The proposal – otherwise known as the "Hydromet Project" – will improve and scale up climate services delivery including critical early warning systems (EWS) to reduce climate and socio-economic vulnerabilities in target countries.

The proposal is predominantly one of capacity building and institutional strengthening for these improved climate services. However, there will be an associated provision of new meteorological equipment for monitoring, measurement and data storage and sharing systems. These are specified in relation to both the needs of each country and regional requirements for coordinated regional climate services provision. An essential component of the project is the establishment of a limited number of strategically placed weather equipment facilities or stations newly equipped with state of the art technology for recording meteorological data. The collected weather data will be disseminated to government services and end users, including the general public.

Environmental and social risks

Safeguards risks are limited and are primarily associated with the installation of new meteorological equipment mounted on masts, or in the case of the Doppler radar units on small tower structures (also supplied will be work stations, computers, wiring, etc), and refurbishment of existing buildings alongside the new or rehabilitated weather stations. Modification and extension of existing buildings associated with offices and weather station facilities is possible.

A very limited area is required for each weather station – some 50-100m^2 at sites of semi-natural habitat such as airfields or government research institutes. The stations will in many cases be sited at or close to existing stations, some of which have fallen into disuse. In each of the countries it is anticipated that one Doppler Radar unit will be installed in addition to the weather monitoring facilities, and these will be mounted on a base or tower (up to some 8 metres in height). There will also be in selected locations a number of wave-monitoring buoys.

The project is classified as a Category B in the AFD system. In its Environment and Social Policy AFD classifies risks as High (A), Substantial (B+), Moderate (B) and Low (C). The project is classified as B because of the facility construction works included under Component 2. The small scale of facilities construction works for the project is such that its potential impact is likely to be limited. The new physical infrastructure element at any one location will be very modest in size (at maximum the size of a tennis court) and dispersed in siting so cumulative issues are not a relevant consideration.

Environmental Management

The process of site selection for weather station facilities to mitigate risks of minor possible direct impacts are to be addressed together with environmental management and health and safety guidance for construction safeguards. Planning requirements for the more limited number of Doppler Radar installations and the wave height monitoring buoys will also meet GCF standards and national ESIA compliance expectations. The construction safeguards are not only relevant to site

installation works but also any protection fencing to guard against third party damage. A “fit-for-purpose” approach[1] is adopted in line with the GCF risk-based approach so that the environmental and social requirements with appropriate diligence can be readily applied and by reference inform the project proponents in their specifications and monitoring of sub-contractors.

The proposed approach requires that the logic for facilities site selection be made explicit and where there are alternative options available the proponent will seek the optimal location subject to approval of the national environmental authorities. A monitoring and reporting component to the overall project will audit the implementation of the programme including setting up of new and rehabilitated weather stations to verify that safeguards are implemented.

In conclusion, negligible impacts are predicted to arise from the project and, when effectively implemented, it will provide reliable climate data of important potential advantage for climate risk adaptation and enhancing the management of natural resources, mitigating vulnerability of exposed populations and assets to climate change.

The ESMF presents actions to assure sound environmental and social implementation to meet constraints and capacity gaps, manage risks to achieve compliance with national and GCF requirements, and therefore realise the significant benefits of the project while avoiding or mitigating any adverse effects.

[1] Guiding Principle (d), GCF Environmental and Social Policy, page 5. To be understood as “adapted to the nature and scale of the operation and proportional to the levels of these risks and impacts”

1 INTRODUCTION

The present document establishes the Environmental and Social Framework of the AFD and GCF 'Hydromet' regional project to cover Comoros, Madagascar, Mauritius and Seychelles. It describes the principles, rules, guidelines and procedures to assess and manage environmental and social (E&S) risks. It contains measures and plans to avoid and mitigate safeguards risks, and recommends implementation and reporting responsibilities at appropriate levels.

1.1 Background and justification of the project

Changes in the earth's atmosphere have been observed to be causing noted changes in climate systems affecting local weather patterns and therefore prevailing conditions for the successful pursuit of human economic activities. These are predominantly seen to be negative and associated with increasing risks to, for example, agricultural productivity in tropical countries and biodiversity.

The increased severity of storms and cyclone events, and also droughts, makes livelihood systems of some of the most marginal and vulnerable groups in tropical countries increasingly precarious. Greater unpredictability of seasonal weather patterns presents special challenges for agriculture and water management, along with associated flash floods and landslides. Increasing exposure to severe cyclones and sea surges is an important threat for island countries which will be exacerbated in the future by rising sea levels.

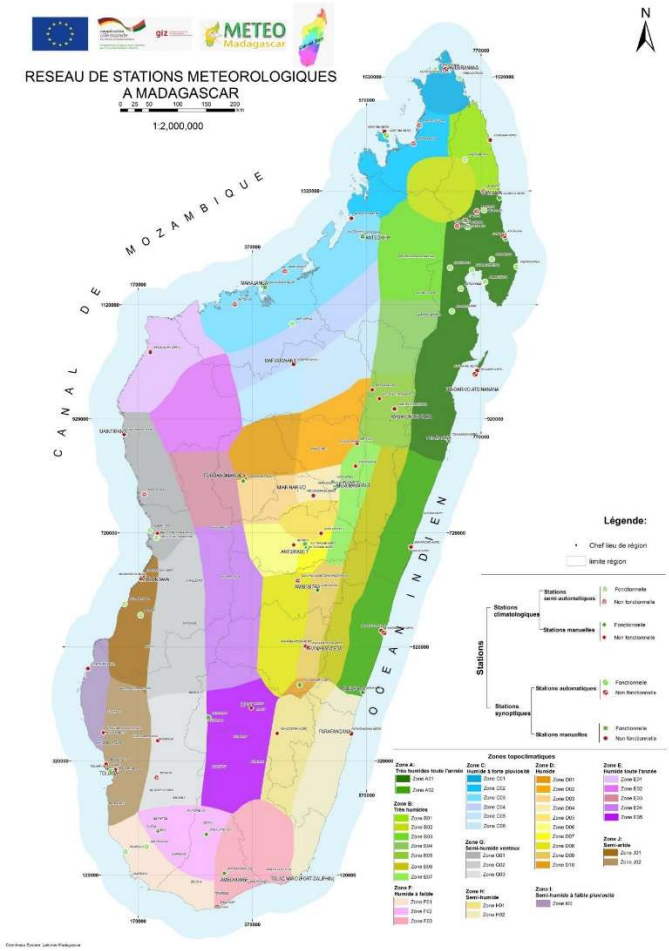
Despite these anticipated changes, climate information in the Indian Ocean Commission (IOC) countries is not readily available at the local level. Weather stations are too often defunct and not maintained even in regional airport locations. Likewise, they have fallen into disuse at agricultural research stations. IOC countries have not been immune to such challenges. It is suggested that the need for improved and fully functional climate services is particularly pronounced for the Member States of the IOC, not least because of the exposure to cyclone events.

As illustration of the problem faced from inadequate budgets and maintenance of existing facilities, three Doppler Radar units in Madagascar are reported as not functional[2]. GIZ has been equipping schools and hospitals with meteorological equipment. As of November 2017, 11 of 40 'synoptic stations' were not fully functional, nor 50% of 'climatological stations', while only 2 of 500 pluviometric stations/rain gauges were reported as functional (see Figure 1 below).[3]

[2] As reported to preparation team, June/July 2019

[3] Accompagnement de la Direction Générale de la Météorologie pour l'état des lieux du réseau des stations météorologiques et climatologique, Mai 2018.

Figure 1: Status of Meteorological Stations in Madagascar



Despite increasing recognition of the importance of these services, the region as a whole "has the least developed weather, climate and hydrology observation network, with only 1/8 of the required density and less than 300 weather stations that meet the World Meteorological Organisation (WMO) observation standards."[4] The current project is designed in a strategic context where it is recognised that quality meteorological data has not been systematically collected nor is readily available across the IOC region.

Without good meteorological and hydrological data, monitoring weather patterns and trends, and planning appropriate recommendations for sustainable development, is compromised. Sensitive and affected sectors are above all in agriculture, tourism, infrastructure and building, urban water supplies, disaster risk management, and anticipatory response.[5] There would be manifest benefits for more relevant and improved economic planning among the regional member countries, notably in their capacity to develop adaptation measures across affected sectors.

The proposed project is in concordance with Nationally Determined Contribution (NDC) documents committed to by Comoros, Madagascar, Mauritius and Seychelles. It will directly contribute to the implementation of Comoros' and Madagascar's priorities spelled out in their National Adaptation Programmes of Action (NAPA) and the national adaptation to climate change strategies and policies of all the target countries.

[5] See Feasibility Report for more detailed vulnerability analysis.

At the regional level the project is fully coherent with the IOC programme for disaster risk reduction (2016-2020) presented at the third conference of the UNISDR in Sendai and the IOC third strategic priority focusing on sustainable development and climate change, aiming at strengthening Disaster Risk Reduction and Management and Adaptation to Climate Change challenges.[6]

1.2 Baseline environmental and social features of the four countries

The IOC member states are exposed to a number of climate-related natural hazards impacting directly their populations and crucial sectors of their economies such as tourism, agriculture and fisheries. Sustaining economic growth in this region of the Indian Ocean and protecting those populations requires addressing climate risk and vulnerability through a combined approach of strengthening of hydro-meteorological data and services and impact-based early warning systems with investments in preventive measures against floods, drought and landslides.

A study conducted by the World Bank in 2017[7] confirms the increasing trend in the frequency and the intensity of extreme weather-related events across the South West Indian Ocean (SWIO) region and the exacerbating effects of climate change. During the 1964–2014 period, Comoros, Madagascar, Mauritius, and Seychelles have been affected by more than 100 disasters of which 94 (74 storms, 11 floods and 8 droughts) are related to hydro-meteorological phenomena.

The population affected by these hazards has been estimated at 14.4 million people and the physical damages resulting from climate-related events have been estimated at USD 13.1 billion.[8] The effects of climate change are already discernible in the Indian Ocean Commission region and climate scenarios indicate an increase in air and sea temperatures, as well as in the variability of precipitation, in sea level and in the intensity of extreme climatic events.

It is expected that the frequency and intensity of extreme hydro-meteorological events, as well as climate variability, will increase over time in relation with climate change. As a result of this, climate-related damages in the SWIO islands are expected to increase in the coming years with an average annual loss estimated at USD 224 million.[9]

Relevant country baseline information and vulnerability to key climate-related hazards and their impacts in Comoros, Madagascar, Mauritius and Seychelles are briefly reviewed below (Box 1).

Box 1: Regional Climate Change Hazards

- More frequent cyclone events of greater magnitude, with associated sea surge and flood potential affecting exposed assets and local populations.
- Greater occurrence of storms and extreme precipitation events (bringing increased potential damage to infrastructure (e.g. through landslides and flash floods) and to natural resource productivity, through damage to crops and enhanced exposure of soils to erosion.
- Increased prevailing temperatures which in terrestrial contexts create challenges for agriculture, especially where there is less rainfall predictability, and for forestry and biodiversity management where there is increased vulnerability to forest fires.
- Warmer seas with bleaching risks for coral reefs, affecting fisheries.

[6] Project Concept Note 2017
[7] South West Indian Ocean – Risk Assessment and Financing Initiative, 2017
[8] Concept Note Section B.2
[9] Concept Note Section B.2

- Sea level rise, which implies greater coastal erosion potential, especially when combined with the effects of storms; loss of coastline; and greater coastal inundation.
- Changes in temperatures and rainfall patterns which affect health impacts.

Associated hazards (not directly related to climate change):

- Tsunami occurrence from tectonic instability.
- Serious oil spillage from maritime transport accidents.

1.2.1 Madagascar overview

Geography, Land Use and Social Development

Madagascar is a 587,041-square kilometre island in the southwest Indian Ocean, located 400km off the southeast coast of the African continent (across the Mozambique Channel).[10] Madagascar be divided into five geographical regions: the east coast, the Tsaratanana Massif, the central highlands, the west coast, and the southwest. The highest elevations parallel the east coast, whereas the land slopes more gradually to the west coast.

Approximately 71.1% of the land area is used as agricultural land (of which 64.1% is permanent pasture, 6% is arable land, and 1% is permanent crops), 21.5% is forest, and 7.4% is other uses (including residential, transport, and other land uses).[11] The country was once covered almost completely by forests, but the practice of burning the woods to clear the land for dry rice cultivation has denuded most of the landscape, especially in the central highlands. Rain forests are concentrated on the steep hillsides along a slender north-south axis bordering the east coast, from the Tsaratamana Massif in the north to Tolagnaro in the south.

Secondary growth along the east coast and in the north has replaced the original forest and vegetation, and consists to a large extent of traveller's trees, raffia, and baobabs. The central highlands and the west coast is for the most part savanna or steppe, and coarse prairie grass predominates where erosion has not exposed the orange-red lateritic soil. In the southwest, the vegetation is adapted to desert conditions. The remaining rain forest contains a great number of unique plant species.[12]

Agriculture is the basis of subsistence for 75% of the population, and recent droughts have therefore been a major issue especially in the southern region of the country. Important agricultural products include coffee, vanilla, sugarcane, cloves, cocoa, rice, cassava, beans, bananas, peanuts, and livestock products. However, in recent years the agricultural sector's performance has slowed, contracting by 6.6% in 2017.[13]

Wood and charcoal from the forests are used to meet 80% of domestic fuel needs. As a result, fuel wood has become scarce. The World Bank in 1990 launched an environmental programme that has increased the planting of pine and eucalyptus to satisfy fuel needs.[14]

[10] Encyclopaedia Britannica, Madagascar: Land.
[11] CIA World Factbook, Madagascar: Geography.
[12] Geography of Madagascar - excerpt from US Army Country Studies: https://www.wildmadagascar.org/overview/geography.html
[13] World Bank, Madagascar Economic Update (June 2018), at pages 2-3.
[14] Geography of Madagascar - excerpt from US Army Country Studies (as above)

Vulnerability, Biodiversity and Climate Change

The country has unique and very significant biodiversity resources under constant pressure from a rapidly increasing population.

The Republic of Madagascar is an island nation with an estimated population of 27 million (as at 2019)[15] and is classified as a low-income country by the World Bank. Malnutrition is a significant problem: in 2013, 32.9% of children under 5 were underweight, placing Madagascar at 6th in the world for this metric.[16] The country currently ranks 161st out of 189 countries in the Human Development Index (HDI), which is derived from indices related to life expectancy, education, and standard of living.

The majority of Madagascar's 27 million people live on the eastern side of the island, which is cyclone prone. Only 51.5% of the population in Madagascar has access to an improved drinking water source (81.6% in urban areas and 35.5% in rural areas), and only 12% have access to improved sanitation facilities (18% in urban areas and 8.7% in rural areas). It is estimated that 63.5% of the population lives in rural areas, but only 17.3% of this rural population has access to electricity.[17] More than 60% of Madagascar's population is under 25 and the fertility rate is 4.1 children per woman.[18]

Madagascar is the most exposed of the Indian Ocean Region countries to cyclones by the fact of its location and size. Coastal livelihoods are vulnerable to climate change-related hazards while agricultural development across the country will be severely compromised by more capricious rainfall patterns. Poverty makes Madagascar especially vulnerable. Outside the main urban centres few live in masonry house constructions, which make its inhabitants particularly vulnerable to adverse impacts from cyclones.

Tropical cyclones, a key hazard in Madagascar, approach the island from the East, particularly from December to March. Two cyclones hit Madagascar in 2000 and again in February and March 2004, thousands were made homeless by tropical cyclones Elita (2004) and Gafilo (2004). In 2008, Cyclones Fame, Ivan, and Jokwe affected 342,000 people and caused an estimated USD 333 million in disaster-related damages and losses, equal to 4% of GDP.[19]

In 20 years Madagascar has suffered 35 cyclones, 8 floods and 5 periods of severe drought (three times worse than in the preceding 20 years). The cost has been estimated at USD 1 billion, affecting food security, drinking water and irrigation, health systems, environmental management and quality of life.[20]

Agriculture is negatively impacted by poor practices and degradation of soil productivity coupled with increasingly less predictable rainfall regimes, droughts and floods. Forest fires may increase due to changes in temperature and more frequent droughts. Likewise, landslides may be precipitated through extreme precipitation events. Traditional slash and burn agriculture and uncontrolled deforestation is continuing to expose increasingly large areas of land to soil erosion from torrential storms.

There are further sustainability challenges in the fisheries sector. The vast majority of individuals in the fishing sector are dependent on traditional artisanal fishing practised from small boats and outrigger canoes. Such persons may live in very isolated communities, and individuals and households may be very dependent for their subsistence on their catch. Hence artisanal fisherfolk will go out in stormy conditions. Livelihoods can be severely damaged in major unexpected cyclone events. Options are limited and many are not linked

[15] IMF, Republic of Madagascar: At a Glance.
[16] CIA World Factbook, Madagascar: People and Society.
[17] UNDP, Human Development Index 2018 Data Bank.
[18] World Bank DataBank, Madagascar Country Profile
[19] GFDRR, Madagascar.
[20] Climate Change Risk Profile of Madagascar, USAID 2016

into early warning systems. Better early warning systems in vernacular languages could at least allow basic precautionary steps to be taken on the announcement of a cyclone event or severe storm.

It is reported that a survival strategy, some who have lost their subsistence base in agriculture – following forced selling of cattle and other assets because of drought – have taken to fishing without having the traditional knowledge of coastal fishing communities who have long experience of handling outrigger canoes, the sea (tides, seasonal fishing grounds, local currents, etc) and local weather systems.[21] If climate change brings greater severity of storms this will make such vulnerable persons more exposed. Communicating weather information to them could be especially critical.

Intense rainfall events caused by strong storms and tropical cyclones, coupled with poor land use practices and increasing deforestation, can lead to significant and damaging floods across the country. Floods cause damage to roads, bridges, houses, and crops, while also threatening the lives of hundreds of people that live in the affected areas.[22]

Currently road access for buses used by the vast majority of the country is difficult already in large areas of the country. The few strategic routes may be exposed to landslides and become impassable due to erosion and downslope road undercutting, affecting both surfaced and unsurfaced roads.

Major population centres and ports exist around the coast and these are evidently exposed to storm surge events, cyclones, and local flooding. These are also locations for tourism in the form of beach holidays, natural ecotourism, marine sports, snorkelling, scuba, etc. associated with the quality of reefs. The latter are affected by sea warming and bleaching of coral will damage fisheries (breeding) potential, as well as the biodiversity and tourist interest for scuba diving and snorkelling.

1.2.2 Comoros overview

Geography, Land Use and Social Development

The Union of Comoros is composed of three main volcanic islands and has a climate characterised by a hot rainy season marked by heavy precipitation and occasional cyclones with average temperatures of around 27°C, and a cool dry season with average temperatures of 23-24°C. Significant variation exists between local microclimates due to the influence of geographic relief and morphology on the different islands.

Comoros has 340km of coastline, and its highest point at 2,360m above sea level is the active volcano, Mount Karthala. Grande Comore is the largest island, with a generally rocky surface, shallow soils, and no permanent streams. The island of Anjouan is dominated by the central volcanic Mount Ntingui. Its otherwise good soil cover is being depleted due to erosion.[23]

According to 2011 estimates 84% of the land area is used as agricultural land of which 47% is arable land, 30% is permanent crops, and 8.1% is permanent pasture, 1.4% is forest, and 14% other uses. Agriculture employs 80% of the Comorian population, contributes nearly 44.7% to GDP,[24] and provides almost all export earnings (95%). Agricultural exports are vanilla (6% of the global market), ylang-ylang (70-80% of global market) and cloves. However, 80% of crops are grown for subsistence and for limited sale in local markets; women are responsible for 70-80% of household food production.

Two agricultural zones are defined: the coastal area, which ranges in elevation from sea level to 400m and which supports cash crops such as vanilla, ylang-ylang, and cloves; and the highlands, which support

[21] Pers comm. Hazen, J (USAID/CRS), July 2019
[22] Climate Risk and Adaptation Profile, GFDRR
[23] CIA World Factbook, Comoros: Geography; Encyclopaedia Britannica, Comoros: Relief, Drainage, and Soils.
[24] Comoros Economic Outlook, 2012

cultivation of crops for domestic consumption and local sale, such as cassava, bananas and sweet potatoes. There is also a small amount of livestock farming.

The three official languages are Comorian, Arabic, and French, with French as the language of administration. 97% of the population define their ethnicity as "Comorian", which is an ethnic grouping reflecting their diverse origins: a mix of Malay immigrants, Arab and Persian traders, with groups from Madagascar and other parts of Africa.[25]

Vulnerability, Biodiversity and Climate Change

Important environment and development sustainability issues revolve around agricultural subsistence, tree crops and artisanal fisheries. For example, related to climate change, forest cover that provides an important carbon sink is being lost. The islands also have serious waste management issues and nature conservation and special biodiversity values are under pressure of human encroachment. There is a small tourism sector based around coastal tourism. However, communities at Itsamia and Niomachoua (marine national park) on Moheli provide useful models for local ecotourism potential.

Cyclones are a rarer occurrence than in other islands because the Comoros are located towards the north of the cyclone belt, and are protected by being in the leeward side of the island of Madagascar. However, Cyclone Kenneth recently (April 2019) impacted the north of Grande Comore, tracking across the top of Madagascar. It strengthened locally and was severest some 45 km off the north coast of Grande Comore. It was also felt in Moheli and Anjouan, though at much weaker wind speeds. Storms and surge are related hazards.

Extreme precipitation is a hazard for the islands. Grand Comore has limited river valleys and a dome-like relief, but exposed villages experience flash flooding. Generally there is rapid runoff to the sea on Grande Comore, and the dominant population centre of Moroni is itself mostly protected from ocean surge by natural rock. Villages are normally accessible in emergencies through the road network. However, electricity and mobile communications availability is not assured so messages are not necessarily received quickly from the risk and disaster management authority (COSEP).

Populations in villages, especially on Grande Comore, have access to masonry or concrete built structures – this can reduce loss of life, given adequate warnings. These structures are usually family investments made through family members living abroad, in Mayotte or France in particular. The islands benefit from significant remittances from populations living outside the country (principally in France and Mayotte). In terms of adaptation and coping strategies for extreme events, many families in Grande Comore have financial recourses available through these remittances. In contrast, the percentage of masonry structures is much lower in Anjouan and Mohéli.

Anjouan is more densely populated and has greater agricultural dependency for subsistence. It is particularly exposed to flash floods down short rivers to the sea. There is also significant danger of landslides due to the extent of cultivation on very steep slopes. Extended dry periods are already a particular hazard. Greater insolation and sparser water availability will put further stress on sustainable land management resistant to erosion and landslides.

Forest fires are also not adequately controlled and could become more prevalent due to climate change. This is a particular problem for the dry east side of Mohéli. There is also a danger that climate change will alter the natural fauna to the disadvantage of species that have adapted to the unique features of the islands, in

[25] Encyclopaedia Britannica, Comoros: People.

particular in the mountain areas of Anjouan. Overall, tsunamis are considered the most significant hazard, followed by tropical cyclones.[26] Volcanic eruption from Karthala which dominates Grande Comore, though like tsunamis not related to climate change, is also a significant hazard.

The Hydromet project will enable confirmation or otherwise of such trends and opportunities to adapt crops and cropping systems more closely to actual climatic regimes and influence planting dates with more accurate rainfall predictions.

In the same way the design and management of small dams for irrigation will benefit from better climate data and dissemination services. It is possible that agriculturalists can benefit from project data to manage irrigations from small retention dams in a cost-effective manner where knowledge of rainfall can be more precisely anticipated and forecast for different locations/microclimates in the islands.

The project will allow the better realisation of other initiatives to enhance the productivity and adaptive capacity of agriculture. There has been notable planning work undertaken by UNDP in particular through the "Enhancing adaptive capacity for increased resilience to climate change in the agriculture sector in the Union of the Comoros (CRCCA)" project.

Mitigating the impact of extreme events on livelihoods and enabling responses to increasingly less predictable weather will have benefits in resilience building. This information will be particularly valuable for artisanal fishermen, who can plan their outings around reliable early warning systems.

1.2.3 Mauritius overview

Geography, Land Use and Social Development

Mauritius is a 2,040 km^2 small island developing state in the southwest Indian Ocean. The main island (Mauritius) is approximately 800 km east of Madagascar. Mauritius has 177km of coastline, and at its highest, it is only 828m above sea level at Mont Piton in the southwest. The main island is volcanic and surrounded by coral reefs.

The northern part is a plain that rises to a central plateau, varying in elevation from 270-730m above sea level. The plateau is bordered by small mountains that may have formed the rim of an ancient volcano. The two major rivers, the Grand River South East and the Black River, are the primary sources for hydroelectric power generation. Lake Vacoas is the chief source of reservoir water.

The climate is maritime subtropical, with fairly uniform temperature throughout the year. Mean temperatures vary from the low to mid-20s C at sea level to the upper 10s C on the high plateau. Two seasons are recognised: hot (December to April) and cool (June to September). Annual rainfall varies from around 900 mm on the west coast to 1,525 mm on the southeast coast and about 5,080 mm on the central plateau.

The principal associated island is Rodrigues (550km to the east) which is also volcanic in origin with an encircling reef. The Agaléga Islands are just over 900km north of the main island. Agaléga is composed of two low coral islands (the North and South islands), which are covered in mangrove swamps, and likewise surrounded by coral reefs.[27] The Cargados Carajos Shoals (or St. Brandon) are a group of 28 islets to the

[26] Inform Index for Risk Management, Mid-2019.

[27] Portal of The Republic of Mauritius, Ministry of Local Government and Outer Islands: Agaléga; UNEP Islands Directory, Islands of Mauritius.

northeast, made up of a main reef and sandy cays. Ile Raphael is the main islet and hosts the National Coast Guard and the Meteorological Services.[28]

According to the most recent (2011) estimates available, 43.8% of Mauritius' land area is used as agricultural land (of which 38.4% is arable land, 2% is permanent crops, and 3.4% is permanent pasture), 17.3% is forest, and 38.9% is other uses (including residential, transport, and other land uses).[29] Sugar was the principle crop and source of revenue for the island but tourism, fisheries and financial services are now of more importance.

Vulnerability Biodiversity and Climate Change

Mauritius is in the cyclone belt. Climate records from 1951-2018 show a significant warming trend and a decreasing trend in rainfall. Average temperature at all stations is rising 0.2°C per decade and has risen between 0.86-1.2°C when compared to the 1961-1990 long term mean.[30]

Flooding is one of the major risks identified in Mauritius, due to heavy precipitation from cyclones or local storm conditions. Flash flood occurrence has increased in the last ten years and some areas of Mauritius, like Port Louis, are particularly exposed during the rainy and hot season. Recent events recorded independently of cyclones are those in 2013, 2018, and 2019, and these can impact tourism and local residents.

The observed sea level in Mauritius based on the analysis of tide data from Port Louis tide gauge show a mean rise of 4.9 mm/yr for the period 1987 to 2019 (Mauritius Meteorological Services, 2020). A higher value of 6.4 mm/yr for Rodrigues is obtained from the analysis of observed tide data from Port Mathurin for the period 1988 to 2019 (Mauritius Meteorological Services, 2020). From a global perspective, the mean sea level has risen by a rate of about 1.7 mm/yr between 1901 to 2010 and of about 3.2 mm for period 1993 to 2010 (Stocker et al, 2013). The variation in the observed rate of sea level rise for Mauritius and Rodrigues as compared with the global mean sea level rise is attributed to the fluctuations in ocean circulation (Stocker et al, 2013).

Atmospheric warming has also impacted the hydrologic cycle over the southwest Indian Ocean. Long-term rainfall time series from 1905-2007 show a decreasing trend in annual rainfall over Mauritius – the average rate of decrease per decade is around 57mm. The total decrease during the last ten years is about 8% when compared to the 1950s. Annual rainfall over the outer islands indicate significant variation from year to year, but long-term analyses show a decreasing rainfall trend, though lesser than the main island Mauritius.[31]

1.2.4 Seychelles overview

Geography, Land Use and Social Development

Seychelles is a 455km^2 115-island archipelago in the southwest Indian Ocean, located about 1,100km northeast of Madagascar. It is made up of two main groups of islands: "the Mahé group of more than 40 central, mountainous granitic islands and a second group of more than 70 outer, flat, coralline islands."[32] The archipelago has 491km of coastline, and at its highest it is only 905m above sea level (at Morne Seychellois, Mahé). The outer islands are largely flat, composed of elevated coral reefs, and are largely waterless.[33]

[28] Outer Islands Development Corporation, Saint Brandon.
[29] CIA World Factbook, Mauritius: Geography.
[30] Mauritius Meteorological Service http://metservice.intnet.mu/climate-services/climate-change.php
[31] Ibid.
[32] Encyclopaedia Britannica, Seychelles: Land.
[33] CIA World Factbook, Seychelles: Geography; Encyclopaedia Britannica, Seychelles: Relief and Climate.

The Seychelles' climate is tropical marine along the coast, with little variation throughout the year. Average temperatures range from 28.24°C in April to 25.66°C in July. Average monthly rainfall ranges from 267mm in January to 59mm in July, although this varies significantly between islands, and even within islands: on Mahé, annual precipitation ranges from 2,300mm at sea level to 3,560mm on the hilly interior.[34]

According to the most recent (2011) estimates available, 6.5% of Seychelles' land area is used as agricultural land (of which 2.2% is arable land and 4.3% is permanent crops), 88.5% is forest, and 5% is other uses (including residential, transport, and other land uses).[35] The heavy reliance on the importation of staple foods means that food security remains an issue, despite the country becoming mostly self-sufficient in eggs, poultry and pork.

Seychelles is classified as a high-income country and has the highest per capita GDP in Africa.[36] The capital city, Victoria, is on Mahé, the largest island. The Republic of Seychelles has an estimated population of 96,000 as at 2019.[37] The constant flux of immigrants to Seychelles, initially from continental Africa, Europe and the Indian sub-continent, and more recently from China, has created an ethnically diverse population. The diversity is increased further by temporary workers, both high skilled and manual.

Vulnerability, Biodiversity and Climate Change

The Seychelles Archipelago has an Exclusive Economic Zone which extends over 1.4 million km^2 in the Indian Ocean between 4 and 10 degrees south of the equator. The Seychelles is situated to the north of the cyclone belt but Aldabra, a nature reserve at the southern extent of the Seychelles Plateau, is in the north of the cyclone belt.

The Seychelles is vulnerable to a range of natural hazards, including tropical storms, extreme precipitation events, and coastal floods, with accentuating effects of storm surge. If true cyclones are not a concern for the inhabited areas and most tourist locations, storms can be violent and extreme precipitation events are a preoccupation of the planning and disaster management (DRGM) authorities.

In 2013, Tropical Storm Felleng brought heavy rainfall, which led to severe flooding and landslides causing damage and losses. Additionally, in April 2016, Tropical Cyclone Fantala passed near the Seychelles' Farquhar Group, causing widespread damage to nearly all buildings and significantly impacting communities and livelihoods in the archipelago.[38] Less predictable seasons are noted in recent years and an out of season storm in 2017 caused major flooding in Anse aux pains.[39] When such events occur at high tide, drainage issues are exacerbated. Storms can also affect tourists' experience when they compromise island hopping and even landing at the major airports, risking flow-on economic impacts.

Reefs are damaged by coral bleaching events (particularly in 1998), which are exacerbated by ocean warming and consequent ecological impacts killing the coral, producing adverse effects on fisheries and spawning. A 40% loss of revenue from the tuna fisheries sector was reported due to the El Nino phenomenon. A major extreme weather event associated with the El Nino phenomenon was the 1998-1999 acute shortage of freshwater, which shut down public establishments.[40]

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[34] World Bank Climate Change Knowledge Portal, Country Profile: Seychelles; Encyclopaedia Britannica, Seychelles: Relief and Climate.

[35] CIA World Factbook, Seychelles: Geography.

[36] World Bank DataBank, Seychelles GDP Statistics; UN Economic Commission for Africa, Country Profile 2017: Seychelles, at page 1.

[37] IMF, Republic of Seychelles: At a Glance.

[38] GFDRR Profile of Seychelles

[39] Reported to team by Seychelles Meteorological Office

[40] SWIOfish3 ESMF, World Bank, 2018

In addition, rising sea levels are already contributing to beach erosion. However, this is harder to substantiate as sand movements along coasts represent natural movements which respond to complicated geographical processes.

In many respects Seychelles has more limited exposure to natural hazards than other IOC countries, but it is notably exposed to tsunamis and is said to have a 5-hour potential warning for event like the 2004 Indonesian event (26 Dec). An event originating in the Comoros would give it a 2-hour warning. Inhabited islands have at least significant higher land as temporary refuge.

Red tides (natural phenomenon) are another hazard which has led to compensation to registered artisanal fishermen affected. These may last up to three weeks in any given location. An oil spill hazard could have serious effects on fisheries and tourism. Seychelles is also by its remoteness exposed to potential economic vulnerabilities.

1.3 Objectives of the Environmental and Social Assessment

The purpose of the ESA is to meet due diligence requirements, optimise the benefits of the Hydromet project, and avoid, minimise and mitigate any potential risks and negative impacts. Because the project is being rolled out in 4 countries and the exact nature of certain elements within it are as yet to be specified, the ESA presents an Environmental and Social Management Framework (ESMF) for implementation.

The ESMF therefore provides the guidance and tools to be applied in the sound implementation of the project proposal and its various micro-interventions, without the need to know the exact location of project facilities to be rehabilitated, constructed or installed. Most such observation facilities will involve rehabilitation, upgrading and redeployment of existing buildings and installation of new weather monitoring and observation equipment at existing locations with little or no net impact on the local environment or residents in the locality.

In so doing the design of the project must meet compliance requirements of the project-accredited agency taking ownership of the design and effective implementation of the project, which is the AFD. The ESA is undertaken also to meet the GCF's E&S policy and national environmental management agencies. For this reason, relevant policy and legislation are identified in this report with comment on how it might apply to the project as designed.

The project has been classified as a Category B project by AFD with moderate risks. These risks are associated with construction and the installation of equipment and the rehabilitation of buildings associated with meteorological offices and weather stations. This ESA seeks to take a pragmatic approach in line with GCF policy. The ESMF in Section 4 presents an environmental management framework (ESMF) aligned to the sequential decision-making processes on the project as it is implemented. Particular emphasis is paid to the siting of weather stations and the management of health and safety (H&S) aspects of the equipment installation, building refurbishment and construction works.

The risks are assessed in relation to the project components. E&S risks will be screened as a result of the following project interventions: the building or rehabilitation of facilities to accommodate offices and new equipment, the construction of weather observation stations and Doppler Radar equipment, and the installation of wave height monitoring buoys. Appropriate site selection will be essential to avoid potential risks and impacts linked to these installations.

The ESMF contains important guidance for siting of installations, works contract stipulations and accompanying monitoring arrangements. It proposes environmental management responsibilities and budgeting requirements and recommends actions to assure sound environmental and social implementation

to meet constraints and capacity gaps and manage risks to achieve compliance with national and International Finance Corporation (IFC) requirements.

1.4 Methodological approach

The approach adopted to carry out the environmental assessment in this study is first to understand the nature and scope of the project, then to screen for potential E&S risks in the geographical, environmental and social context in which the project will be implemented. The areas of risk and their significance can thus be assessed together with the opportunities for avoidance, minimisation, and (where necessary) mitigation of impacts.

The methodological approach also seeks first to identify the stakeholders in the project, including:

a) Those responsible for implementation;

b) Those who will be the beneficiaries of the project; and, not least

c) The neighbouring communities or those that can be indirectly affected by the project works. The latter will include those employed in construction and ongoing monitoring and maintenance of facilities.

Identification of Stakeholders:

a) Project and IOC personnel, including those benefiting from training outputs

b) Ministry officials: sector officers with responsibilities in meteorology, agriculture, environment and natural resources, social development, and local government

c) Officials with responsibilities in tourism and built environment, i.e. economic and land use planning, emergency access and disaster response

d) Private sector developers and all those engaged in tourism, agriculture and fisheries

e) NGOs and representatives of directly affected communities in the vicinity of project works

f) National and regional groups and individuals benefitting from improved climate services

Sources of information:

a) Research data and secondary sources review

b) Information requests from responsible environmental agencies

c) Interviews with i) key informants and triangulation through discussions with ii) project stakeholders and iii) beneficiaries in different sectors and in affected communities

d) Field observations and application of rapid appraisal techniques

e) Discussions with officials and NGOs on status of weather data monitoring and potential for better natural resource and disaster management in the areas of i) agriculture (cultivation and husbandry) and forestry, ii) marine ecology and fisheries, iii) tourism/commercial sectors, and iv) housing/built environment.

Specific objectives/purposes:

a) To understand different country environmental and institutional contexts and engage with those who will be implementing the project.

b) To assemble legislation requirements and potential enforcement constraints.

In the first place, a review of design proposals and background information was undertaken through shared project documents and other complementary project studies available on internet sites.

Field visits were subsequently undertaken by the project design team between June and August 2019 to engage with government officials, informed NGOs and wherever possible village communities who had experience with extreme weather events and who might be beneficiaries of improved weather data collection and dissemination, not least of early warning systems (EWS) for cyclone events in low elevation coastal villages, such as fishing communities and those hosting tourism activities.

A wide variety of stakeholder organisations have been contacted for views on climate change challenges and resilience building opportunities from improved climate services including Early warning systems (EWS). In Comoros the team visited and engaged with agricultural and fishing communities on all three of the main islands (Grande Comore, Anjouan and Mohéli). In Madagascar the team met aid agency personnel working in agriculture and in emergency response. In the Seychelles the team visited the main inhabited islands of Mahé, Praslin and La Digue, including contact with tourism and fishing industry stakeholders. For Mauritius, a desk-based review was undertaken.

Existing and new information was shared between team members while reports from international organisation projects were collected and reviewed for complementary information and to verify new findings and viewpoints presented during engagements with local communities during field visits. [Appendix A/B/C presents those individuals and organisations consulted by the project team].

2 PROJECT PURPOSE AND DESCRIPTION

2.1 Project objectives

The project development objective is to strengthen regional and national communities' resilience and adaptive capacity to climate change impacts in the South West Indian Ocean island states. The IOC states are highly vulnerable to numerous weather and climate related hazards, including floods, droughts, storms, storm surges and tropical cyclones. The region is already experiencing climate change effects, such as warming temperatures (both ocean and air temperatures), sea level rise and higher tropical cyclone frequency.

The IOC countries have different strength and weaknesses in capacity and resources to prepare and cope with the increased variability of seasons and potential changes anticipated from climate change. The project will seek to fill gaps in technical capacity and expertise through regional and national-level interventions, that are specifically adapted to each country's needs to ensure outcomes that will have national and regional added value.

The Global Framework for Climate Services (GFCS) and WMO standards provide the benchmarks for project weather data monitoring. This framework has determined the specification and provisioning of facilities and equipment and the capacity needs to be addressed in training and institutional development. Improved climate data and early warning systems are required by the island states to support better planning and adaptation to climate change events in the region.

Better availability of quality data will allow local governments to take necessary adaptation decisions in different areas, particularly in urban planning, economic sectors (tourism, agriculture, industries), and social sectors, thereby assisting highly vulnerable communities and supporting the 29 million people who are exposed in the IOC island states. The main benefits of the project include improved hydro-meteorological equipment, knowledge, and decision-making process, improved infrastructure planning, improved adaptive capacity of communities, and reduced socio-economic losses.

2.2 Components, activities and expected results

The project has been designed with three components to meet these objectives. The proposal responds to needs identified in the preparation studies and field missions undertaken during 2019.

Component 1: Capacity building, institutional development and regional cooperation

This activity will include strengthening NHMS through institutional development, adaptive capacity building, staff training and improvement of financial efficiency. To support synergy and regional integration between NHMS in the SWIO region, a Regional Climate Centre (RCC) will be established and a Regional and National Frameworks for Climate Services (RFCS) developed. This will: i) facilitate information, experience and knowledge sharing amongst Comoros, Madagascar, Mauritius and Seychelles for risk prevention/mitigation; ii) harmonize processes to monitor climate-related risks and disseminate alerts; iii) support co-development of regional climate change models and projections; and iv) support cost-efficiency by sharing facilities (i.e. a regional training center and lab for the maintenance and regular calibration of meteorological equipment instead of sending equipment overseas).

Component 2: High-quality climate-related data, and improved climate risk assessments and climate change projections

This component engages technical expertise on observations and monitoring, data management, ICT and forecasting to support the modernization of hydrometeorological data collection infrastructure, management and access to information systems for optimal utilization in Comoros, Madagascar, Mauritius and Seychelles.

While new equipment will be provided or upgraded, and staff members of NHMSs will be trained, users of the CS, key sectors and communities, will also be engaged under this component to ensure a better alignment between risk monitoring systems, forecasts and users' needs. Hazard and vulnerability maps will also be developed under this component, using the improved hydromet equipment, to enhance risk understanding among NHMS and users' community, and to support the production of relevant climate services and products.

Component 3: Enhanced use of climate services for climate change adaptation and disaster risk reduction

Under this component, short- to long-range climate products and services – including daily weather forecasts, sector-based climate change adaptation plans, early warning systems and agricultural weather advisories – will be co-developed in a participatory way with the producers and users of CS. These CS will target key priority areas of the GFCS (namely food security, disaster risk reduction, health, and water[41]) as well as tourism, a key sector driving the economy of several countries in the SWIO region. Producers and users of climate services will work together to develop these products to ensure they are packaged according to end-users' needs, understandable and use the most efficient dissemination channels.

The emphasis on dissemination of climate services is intended to ensure that weather monitoring information collected and analysed is available to end users in a format that can be useful to them. Stakeholder beneficiaries include government advisory agencies, NGOs engaged in development and emergency work, and indeed members of the public, especially those living and working in hazard prone areas. In short, the target is intermediary and/or end users in sectors where climate information can enable better planning and productivity, particularly regarding the need to adapt to climate change.

Such information, with its greater local content and accuracy in relation to currently available forecasts in the region, can allow significantly more efficient management within different economic sectors – from agriculture and fisheries to tourism. Regarding early warning systems, there is significant opportunity to improve penetration of validated messages to those living in hazard prone areas who might otherwise not receive alerts for impending hazards, such as cyclones and sea surge.

The design team have been conscious of the particular vulnerability of women, youth, the elderly, people with disabilities and other population groups of concern within the context of climate change impacts and other development challenges. Gender considerations will be integrated in the project design so that outreach and extension messages derived from improved meteorological data will engage with and be relevant to women as stakeholders as well as men. See the Gender Assessment and Action Plan (Annex 8) for further analysis of these issues, along with its recommendations for project policy and implementation in each country. These concern staffing and recruitment, choice of candidates for training and managing discrimination.

GCF objectives specifically require due consideration of vulnerable and marginalised populations, groups and individuals that are affected or potentially affected by GCF-financed activities.[42] This is also a requirement of the AFD, the accredited agency for the proposed project.

2.3 Project implementing modalities

It is intended that the project will be executed through the Secretariat of the Indian Ocean Commission (IOC) in Mauritius, who as Executing Entity (EE) will disburse funds and monitor activities in the four beneficiary member countries. The beneficiary stakeholders in the member countries include Meteorological Authorities,

[41] Energy, another key area of the GFCS, was not targeted in this project which prioritises adaptation supporting interventions.

[42] GCF Environmental and Social Policy, p3

Disaster Reduction and Response (DRR) agencies and sector ministries such as agriculture, health and water. A steering committee will provide expertise and oversight to the Project Management Unit (PMU).

The project 'promoter' for the purposes of the national legislative requirement will be the national meteorological authorities, to the extent that they will be principally involved in installing equipment and developing facilities and buildings. They will be required to obtain regulatory development permits and be responsible for compliance requirements, which could involve obtaining EIA authority approval or exemptions from formal EIA requirements. It is anticipated that project interventions may not attract any formal EIA requirement, but lesser development permitting stipulations depending on siting. Refer to Chapter 3 for further details on national regulatory requirements pertaining to the project interventions.

The IOC will be responsible for preparing and tendering works for facilities which will require appropriate due diligence as indicated in the ESMF, and for formal permitting and compliance requirements with relevant national authorities. In the event these works are tendered to contractors/sub-contractors, environmental and social clauses, disclosed as part of the ESMF, should be applied in their contracts to fully avoid or mitigate environmental or social impacts. AFD will have their own policy requirements and ad hoc safeguards monitoring oversight for implementation compliance. AFD will receive all progress reports including environmental and social reporting as to be included in such reports. IOC will implement its role through the PMU, and this will include a dedicated environmental and social officer at its project offices in Mauritius to be mobilised through the project implementation. The E&S officer will be intensively mobilized for the three years of the project while facilities are being constructed. IOC have ultimate project environmental and social safeguards compliance responsibility for safeguards implementation in each country.

The project execution partners for each member state are:

> ***Comoros***: General Directorate of Meteorology, Comoros Meteorological Services (SMC), Ministry of Production Environment Energy Industry and Handicrafts.
>
> ***Madagascar***: General Directorate of Meteorology, Ministry of Water, Ministry of Transport and Meteorology, Ministry of Environment Ecology, Sea and Forests –National Coordination of the Climate Change.
>
> ***Mauritius:*** Mauritius Meteorological Services (MMS), National Disaster Risk Reduction Management Centre (NDRRMC), Water Resources Unit (WRU), Ministry of Finance and Economic Development (MOFED).
>
> ***Seychelles***: Seychelles Meteorological Authority, Ministry of Environment and Energy – Inter-Sectoral Steering Committee.

In addition, in each country, national project coordinators will be hired by the PMU; they will be based within the national meteorological services, and work under supervision of the regional project coordinator, based within the PMU in Mauritius. The national project coordinators will be responsible for day-to-day project implementation and follow up of project activities in their respective countries, as the regional project coordinator will not be able to oversee national implementation on a daily basis. In addition to the national project coordinators, the PMU will also work with relevant national partners and the NDAs to ensure smooth implementation and the complementarity of the proposed project with other climate change-related initiatives implemented in the countries.

3 LEGAL AND INSTITUTIONAL FRAMEWORK

Following the GCF modalities, the accredited agency for the project, AFD, will be responsible for the environmental and social standards. Through the implementation of its environmental and social policy, AFD makes sure that its funded operations, at the local level, reduce the vulnerability of households, territories and ecosystems, improve people's livelihoods, and promote democratic development.

3.1 AFD Environmental and Social Standards

AFD requires environmental and social assessment procedures[43] to (i) assess the environmental and social impacts of operations, (ii) propose appropriate measures to avoid the negative impacts or, when they are unavoidable, reduce or offset them in an appropriate manner, (iii) monitor the application of such measures during the implementation phase of the operation, and (iv) conduct an ex-post evaluation of the effectiveness of the proposed measures.

AFD's due diligence approach requires analysis of the environmental and social risks and impacts during the ex-ante assessment of the operation, in a manner adapted to the nature and scale of the operation and proportional to the levels of these risks and impacts. It involves considering the environmental and social issues as early on as possible, right from the design stage and in the implementation of operations, to define appropriate measures to avoid, reduce and, where necessary, offset their significant adverse environmental and social impacts.

Under AFD's Environmental and Social Risk Management (ESRM) policy the project owners are required to comply with relevant obligations of the Environmental, Health and Safety Guidelines (EHSGs) of the World Bank Group[44]. Where existing facilities are being upgraded (restoration, rehabilitation or extension) the project owner is obliged to bring such associated facilities in line with standards for new facilities.

AFD analyses and classifies all potential projects into **High (A) – Substantial (B+) – Moderate (B) – Low (C)** environmental and social risks, depending on the extent of the potential risks borne by the operation. The classification considers the nature and scale of the operation, the location and sensitivity of the affected area, the severity of the potential environmental and social risks and impacts, and the client's capacity to manage them. This classification aims to determine:

1. The nature and depth of the environmental and social assessment required;
2. The level of environmental and social standards the project will be required to comply with;
3. The need to engage stakeholders; and
4. The level of information required.

This approach is congruent with the GCF policy for screening and assigning risk categories (ref: GCF Environmental Policy Section 6.3 para 31). GCF distinguishes three categories of project:

Category A. Activities with potentially significant adverse impacts.

Category B. Activities with limited impacts which are readily mitigated.

Category C. Minimal or no adverse impacts and/or social risks.

AFD aims to promote sustainable and equitable development in all operations funded, by ensuring that these operations effectively contribute to the objective of sustainable development (combating poverty and

[43] Refer to https://www.afd.fr/sites/afd/files/2017-10/Environmental-social-risk-management-policy-afd_0.pdf

[44] https://www.ifc.org/wps/wcm/connect/29f5137d-6e17-4660-b1f9-02bf561935e5/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES&CVID=jOWim3p

ensuring the satisfaction of human needs, strengthening solidarity between human beings and between territories, preserving biodiversity, preserving habitats and natural resources, and combating climate change).

All operations financed by AFD are required to comply with the national regulations of the country where the operation is implemented, including for environmental and social issues. However, as regulations in the countries where AFD operates are sometimes incomplete or under development, AFD uses as a reference several rules, good practices and directives produced by international standard-setting organisations (in line with the 2005 Paris Declaration on Aid Effectiveness and the 2014 Law on the Orientation and Programming Development Policy and International Solidarity).

AFD has aligned its Policy with the World Bank's environmental and social standards for projects with High or Substantial environmental and social impacts[45] and the IFC.[46] The Reference E&S Standards for the AFD-GCF Programme will be national legislation and IFC Performance Standards and related Guidance Notes. AFD financing is conditional on the implementation of an Environmental and Social Commitment Plan (ESCP). Within the context of this project, IOC, the project executing entity, will be responsible for implementing the present ESMF to comply with AFD's policy. AFD will do its own due diligence to monitor E&S performance, and will oversee the ex-post evaluation.[47]

3.2 World Bank/IFC Performance Standards

The International Finance Corporation (IFC) of the World Bank Group, whose standards are explicitly subscribed to by AFD and the Green Climate Fund, recognises 8 Performance Standards:

1. Assessment and management of environmental and social risks and impacts
2. Labour and working conditions
3. Resource efficiency and pollution prevention
4. Community health, safety and security
5. Land acquisition and involuntary resettlement
6. Biodiversity conservation and sustainable management of living natural resources
7. Indigenous people
8. Cultural heritage

Each of these Performance Standards is listed below with comment on the extent to which they would be applicable to the project.

IFC performance standards	Objectives	Applicability to the project
Performance Standard 1: Assessment and management of environmental and social risks and impacts	Concerns the requirement for a systematic approach to assessing risks, appropriate studies, and ensuring that plans are produced to mitigate and manage such risks. Stipulates stakeholder engagement and grievance mechanisms.	It is an over-arching standard well referenced in the GCF policy and in ESMF approach to risk identification and assessment, mitigation hierarchy principles and consultation modalities. The proposal is assessed as Category B because construction works will be of limited scope and spatial requirement,

[45] World Bank Safeguard Policies for public sector financing;
[46] The IFC Performance Standards.
[47] As per E&S Framework for "Transforming Financial Systems for Climate" Programme, 2018, steps 3 and 4, p.20

IFC performance standards	Objectives	Applicability to the project
		allowing for non-controversial siting options.
Performance Standard 2: Labour and working conditions	Requires that labour and working conditions meet appropriate national and international requirements. This includes aspects of occupational health, labour hours, use of protective equipment, safe working sites, and gender-sensitive and non-exploitative construction management.	This is of relevance to the project interventions, such as the facility rehabilitation and installation, minor construction and security fencing works, but also the rewiring, painting and equipping of offices (see Section 5).
Performance Standard 3: Resource efficiency, pollution prevention and reduction	Concerns avoiding and minimising pollution and wasteful use of energy and water, and reducing GHG emissions.	Limited relevance, but solar power use is strongly recommended and in many cases may be most practical and reliable for limiting maintenance requirements in remote locations. Residual waste generated during demolition/construction to be suitably reused or disposed of.
Performance Standard 4: Community health, safety and security	To anticipate and avoid adverse impacts on the health and safety of the Affected Community.	Will have limited relevance. Communities near existing and proposed weather stations will be informed and their concerns will be addressed. Facility site selection and established procedures for minimising impacts will be followed (Section 5).
Performance Standard 5: Land acquisition and involuntary settlement	Concerns displacement of people, physically and economically, and the requirement for compensation and/or Livelihood Restoration Plan.	Unlikely to be triggered. However, selection criteria will require if there is a new site that this will be on publicly owned property and/or there will be no or compromised rights/uses.
Performance Standard 6: Biodiversity conservation and sustainable management of living natural resources	Requires protection and conservation of biodiversity, natural habitats and maintenance of ecosystem services.	Facility units/stations and associated equipment will be installed on existing sites and/or sites of semi-natural habitat of very limited spatial extent (50-100m^2). Criteria for selection (Section 5.3) among feasible alternative sites will require that sites with natural vegetation cover, habitat or biodiversity value be avoided. Sites will by definition be almost exclusively on semi-natural sites being in areas of existing meteorological station activity or adjacent to government buildings.
Performance Standard 7: Indigenous Peoples		Not triggered. Indigenous people not identified. Islands are historically mixed and multi-cultural.
Performance Standard 8: Cultural heritage	Concerns valued heritage and religious sites.	ESMF will prevent triggering of this PS. Communities will be consulted and the siting of facilities near grave sites, shrines, designated monuments, or other cultural or religious sites will be prohibited.

IFC performance standards	Objectives	Applicability to the project
		Limited spatial requirement allows alternative siting options.

3.3 Green Climate Fund Guiding Principles

The key GCF reference document is the Environmental and Social Management System: Environmental and Social Policy[48]. The interim Green Climate Fund Environmental and Social Safeguards (ESS) are currently aligned with the Performance Standards of the IFC. (as presented in the above table in section 3.2 including which ESS are applicable to the project). The policy objectives are to promote a paradigm shift towards low-emission and climate-resilient development pathways in the context of sustainable development so that it will enhance equitable access to development benefits and manage environmental and social risks (Section III, 3.1 Policy Objectives).

The Guiding Principles in Section IV of the policy require that the Environmental and Social Management System (ESMS) ensures an integration of environmental and social sustainability. The proposed ESMF for the project respects these principles and in particular the specified safeguards requirement to "***do no harm***". The policy mandates a **scaled risk-based approach**[49]: The Environmental and Social Safeguards (ESS)[50] require that the project "*be implemented in a risk-based manner and not in a blunt one-size-fits-all approach*", and require that the "environmental and social requirements and processes are commensurate with the level of risk".

The GCF policy also mandates a *"**fit-for-purpose approach**"* and adherence to the impact minimisation aims of the **mitigation hierarchy**. The approach adopted for the Hydromet proposal to meet these requirements is necessarily a practical approach related directly to the nature of the project and its assessed environmental and social risks. To this end adverse impacts will be avoided where possible, and where they cannot be avoided, will be minimised and mitigated.

Ultimately the project's ESMF is developed based on the GCF Guidelines, the social and environmental frameworks available in the beneficiary countries, and relevant guidelines implemented by the AFD. GCF and AFD require compliance with applicable national laws alongside international compliance, notably with IFC performance standards and EHS guidelines (see Section 5). Key elements of national ESIA legislation and procedure are presented in the following sections. Annex A provides further information about the key legislation discussed in this section.

3.4 Madagascar Legislative and Policy Framework

The Office National de l'Environnement (ONE) is the competent agency with responsibility for promoting improved natural resource management, responding to climate change and managing the ESIA process. ONE is also the organisation under the Ministry of Environment responsible for:

1. Managing the ESIA legislation for new investment projects;
2. Approval of such projects; and
3. The coordination of monitoring activities to ensure conformity with approved environmental management plans (EMPs).

[48] Document GCF/B.19/06 adopted by the GCF Board in decision B.19/10
[49] Decision B.07/02, annex 1
[50] Available here: https://www.greenclimate.fund/sites/default/files/document/interim-ess.pdf

At the outset, ONE is the only organisation authorised to establish a risk category for investment projects that dictates the nature and detail of documentation required to be submitted for examination and approval by ONE. The brief project description to be provided is based on a succinct description of the project and reference to its categorisation policies in relation to potential risk and sensitivity of the receiving environment or geographic location.[51]

This management, decision and permitting process is conducted at national level for major projects. Capacity at the regional level is necessarily more limited. For a project with interventions of the size and type proposed in Hydromet, where there is very limited construction and rehabilitation of buildings, a formal ESIA process is not expected to be required and the responsibility for sound environmental and social management is devolved to the in country responsible 'promoter' at the meteorological or agricultural services. The Direction Générale de Météorologie (DGM) has protocols for implementing its codes of practice regarding the handling of any hazardous materials.[52]

Nevertheless, it will be incumbent on the Project Management Unit (PMU) and the regional E&S officer or Safeguards Specialist (SS) in IOC, to submit a brief project description. The most sensitive item for installation among the equipment supplied in the project will be the Doppler Radar (and possibly the wave monitoring buoy). If the radar is to be sited within the confines of an existing airport and its tower is of minimal height (i.e. 5 metres), then the environmental risk will be minimal for the natural environment and local communities.

The project ESMF must comply with the national permitting process as indicated above. There will be written plans for each new or upgraded facility (or micro-project) and these will be presented by the appointed Safeguards Specialist (SS) to the appropriate permitting/EIA authorities for national approval or further documentation. Though data collection sites are not yet determined, the project will incorporate local Ministry of Environment officers in site assessments and as appropriate in consultation processes with local communities prior to any project team decision-taking. As mentioned, if the monitoring equipment installation site is within an existing airfield or government-managed institution, local community consultation may not be a relevant consideration. This will be ascertained during the E&S assessment process.

The Safeguards Specialist based in IOC PMU will provide direct oversight for recommended practice in site selection and appropriate site maintenance as laid out in the generic ESMF for project implementation. Meteorological observation stations will not be proposed in sensitive areas. The project will at all times consult ONE and devolved jurisdictions of the Ministry of Environment as required concerning building regulations, waste management, and health and safety. This consultation will be ensured by the national project coordinator, working under the regional PMU.

The main social and environmental safeguards policy is Decree n° 99-954 of 15 December 1999 modified through decree n° 2004-167 of 3 February 2004 regarding the compatibility of investments in relation to the environment[53]**.** This decree updates ESIA legislation on eligibility and investment project approval procedures. The Interministerial Order No. 4355 of 13 May 1997, defining and delimiting sensitive areas[54] presents the criteria for determining sensitive areas based on socio-economic factors or biodiversity and conservation value.

[51] https://www.pnae.mg/evaluation/eie.html
[52] As reported by ONE
[53] Décret n° 99-954 du 15 décembre 1999 modifié par le décret n° 2004-167 du 03 février 2004 relatif à la mise en compatibilité des investissements avec l'environnement (MECIE)
[54] Arrêté interministériel n° 4355 du 13 mai 1997, portant définition et délimitation des zones sensibles

3.5 Comoros Legislative and Policy Framework

In the Union of the Comoros the administrative body with supervisory authority over the environment is the Directorate-General of the Environment and Forests (DGEF), under the supervision of MAPEATU (Ministère de l'Agriculture, de la Pêche, de l'Environnement, de l' Aménagement du Territoire et de l'Urbanisme). It has three offices covering the islands of Grande Comore, Anjouan and Mohéli.

MAPEATU is the ministry that issues authorisations for new projects and is responsible for environmental compliance. The major legislative reference is ***Law No. 94-018/AF of 22 June 1994***, laying down the ***Framework Law on the Environment***. The Law aims to:

a) Preserve the integrity of the environment of the Islamic Republic of the Comoros, whose patrimony is particularly vulnerable because of its insularity;

b) Create conditions for sustainable resource use, in quality and quantity, to benefit present and future generations; and

c) Guarantee citizens a livelihood which is balanced and healthy.[55]

Decree No. 01-052/CE of 19 April 2001 governs ESIA. ***Order No.12 – 012/VP- MPEEIA/CAB of March 2012*** establishes and sets the terms of reference of the Evaluation Committee for Environmental Impact Studies (CEEIE). The Director General for Environment (DGEF) is required to ensure compliance with environmental laws and regulations and compliance with EIA where mandated.

The Executing Entity (EE) for the project will need to take particular care in surveillance of installation and construction micro-interventions, including siting, rehabilitation and/or construction activities. Siting issues should not present any significant concerns if the project implementation team follows the proposed ESMF checklists for location decisions.

It would be appropriate to use labour from the respective islands for installations on that same island, and also to ensure project gender policy is adhered to. Waste disposal, not least building waste debris disposal, remains a special challenge on all the Comorian Islands. The EE will therefore need to intervene proactively, ensuring its own due diligence with respect to health and safety in building refurbishment and construction activities.

3.6 Mauritius Legislative and Policy Frameworks

In Mauritius the Ministry of Social Security, National Solidarity, and Environment and Sustainable Development (Environment and Sustainable Development Division) is responsible for the environmental assessment and approval process.

Project infrastructure proposals may be subject to a Preliminary Environmental Report (PER) which is a short form of an Environmental Impact Assessment (EIA), and is generally meant for assessing projects with lesser environmental impacts. This preliminary analysis is undertaken to identify impacts and the means of avoidance or mitigation and is an important tool for sound decision-making and for achieving sustainable development.[56]

The PER mechanism was introduced in the ***Environment Protection Act (EPA) 2002***. With the coming into force of the ***Business Facilitation (Miscellaneous Provisions) Act 2006***, undertakings which are less polluting have been waived from lengthy administrative procedures for application processing. In the same context, Part A

[55] Loi No 94 - 018 Article 2 regarding definitions, objectives and principles (in translation)
[56] https://environment.govmu.org/Documents/environment%20assessment/propguidePER%20011009.pdf

of the First Schedule of the EPA 2002, which pertains to the list of undertakings requiring a PER, has been reviewed.

The Hydromet project physical infrastructure interventions are excluded from detailed ESIA requirements, and likely also excluded from PER requirements (this is currently the case in the 2009 Guide to PER). Approvals will nevertheless need to be sought for any interventions in sensitive environmental sites, for example along the coast or affecting local landscape values. It is worth noting that siting criteria (presented under section 5.3) will recommend excluding these sites where feasible.

Implementation of sound environmental practice and appropriate support of government environmental and technical authorities would not be expected to present any compliance or capacity concerns. Regarding the location and sound positioning of the several wave-monitoring buoys (and mareographs) proposed for Mauritius and an understanding of potentially sensitive locations, it will be essential to consult and collaborate with the government Fisheries Research Centre at Albion.

For questions of reef sensitivity at particular locations, consultation with the Reef Conservation NGO will be of value. This organisation is a reputed NGO working with government on its Eco-Schools programme. Reef Conservation also presents a potentially appropriate outreach partner for climate services capacity building due to its experience from the Eco-Schools training. Refer to siting criteria under section 5.3 which aims to exclude locating installations including buoys in environmentally sensitive areas.

3.6 Seychelles Legislative and Policy Framework

The ***Environment Protection Act, 2016*** (Act 18 of 2016) provides for the protection, preservation and improvement of the environment and for the control of hazards to human beings, other living creatures, plants and property. The Act also provides for the coordination, implementation and enforcement of policies pursuant to the national objectives on environment protection.

Section 44(1) of the Act establishes the requirement for an Environmental Authorisation for:

a) Any development defined in the Act (e.g., land subdivisions, reclamation works, construction of new roads or sea walls, etc.);

b) Any “prescribed project or activity”; or

c) Any project or activity proposed in a protected or ecologically sensitive area.

The Environmental Authorisation is granted or denied based on the review of an Environmental Impact Assessment (EIA) Class I. Sections 45, 46 and 47 of the Act deal with EIAs.

The Ministry of Environment, Energy and Climate Change (MEECC) manages the ESIA process in the country, specifically through the Environmental Assessment and Permit Section (EAPS) within the Department of Environment. The EIA process involves meetings with the different relevant stakeholders as well as with the public, to obtain their opinions on the proposals. Based on the analysis, the promoter will be given certain conditions to abide by, and if everything goes smoothly they are given a notice of acceptance, the last step of the EIA process.

Generally, for small-scale proposals these are submitted to the planning department of the Ministry of Habitat, Lands, Infrastructure and Land Transport (MHLILT). The outline description of each proposal supplied is reviewed by planners in conjunction with the Director General of the Waste, Enforcement and Permit Division of the Ministry of Environment (MEEC) who will make any necessary determination on the requirement for an ESIA based on the scale and sensitivity of the proposal.

In the case of Seychelles, the proposals include a Doppler Radar which will likely be sited at elevation on one of the hills surrounding Mahé or otherwise distant from the Seychelles Meteorological Authority head office at the airport (or its new proposed offshore site near the airport). The proposal for Seychelles also includes a wave-measuring buoy to be anchored offshore, and for this there will need to be consultation with Seychelles Fisheries Authority and Seychelles National Parks.

4 ENVIRONMENTAL AND SOCIAL IMPACTS ASSESSMENT

4.1 Scope of Project and Construction Requirements

As indicated under Section 2, the Project aims to enhance climate services in the target countries through the supply and installation of a wide range of new weather and hydrology monitoring equipment, the provision of capacity building and trainings, and strong involvement of climate services (CS) users in the production of such services. This section provides an analysis of the project's scope and construction requirements. Refer to Appendix D for photos of equipment and offices.

Much of the project's interventions will relate to capacity building for data collection and dissemination to potential users.

The provision by the project of equipment and built facilities for existing and/or new meteorological stations will have strictly limited direct impacts on land and natural resources, visual amenity or vegetation cover. Potential environmental and social risks may include some minimal nuisance from noise/dust nuisance over a few weeks should there be any persons living adjacent to a station under rehabilitation. Very limited clearance of vegetation in the vicinity of equipment to be installed may also be necessary. The possible noise/dust impacts in drilling and digging of foundations (for protective fencing or in building works) can be anticipated to be felt mostly by construction workers rather than local residents. Mitigation can be achieved in use of protective equipment as indicated in plans proposed (Section 5); noisy drilling will be confined to daytime hours in accordance with local regulations.

There will be minor building refurbishment or rehabilitation and construction works to expand existing offices/facilities. This may be to accommodate new meteorological equipment and, for example computer data storage units in annexes or facility housing as required.

Protective fencing will also be required at locations that lack adequate security provision. Facilities or weather stations might extend at most to $10m^2$, and many will be placed where such facilities currently exist, or where they have fallen into disuse and protective fencing has been broken down.

There is also the possibility of extension to in situ station facilities with their associated construction risks, including Doppler Radar Unit installation.

Facility locations will be optimised by the implementation team following the principles of this ESMF, and the ESMF in Section 5.

Across the region there are hundreds of existing locations of agromet gauges, weather monitoring and buildings installations many of which have fallen into disuse. From these facilities the implementation team will chose some 100 sites (including approximately 60 potential agromet data collection sites for Madagascar) for adoption, upgrading and renovation. The locations chosen will be optimised and coordinated with other organisations active in supporting climate services delivery.

In the choice of sites and implementation of the programme proposed the direct impacts of the project will be negligible or with no significant impacts. Evidently on the programme benefit side the project has as its purpose – if not its specific objective - to enable a potential for better management of natural resources, directly and indirectly in the context of climate change and water conservation. Without such facilities these essential aims in sustainable development are not achievable.

4.2 Impact and Risk Assessment

As this project is supported by the AFD in its role as GCF Accredited Entity, the project has been screened against AFD's Environmental and Social Standards Procedure. AFD analyses and classifies all potential projects into **High (A) – Substantial (B+) – Moderate (B) – Low (C)** environmental and social risks, depending on the extent of the potential risks borne by the operation. The classification considers the nature and scale of the operation, the location and sensitivity of the affected area, the severity of the potential environmental and social risks and impacts, and the client's capacity to manage them.

The environmental and social risk sensitivity for identified project works is described in the table below. The ratings evaluate the extent of the risk linked to the implementation of different interventions foreseen.[57] Against each type of intervention environmental risks are distinguished from social risks. The former primarily concerns impacts on natural resources and landscape, and the latter potential impacts or risks for health and safety of employees during construction of facilities, and in equipment installation. The project installation work is expected to be completed within 1-2 years and at each site over a much shorter period where there is little or no construction work.

The table below details the issues and risks attached to each component of the project. The E&S risk category determines:

- The level of E&S management to be conducted for the Hydromet E&S management system under different components or items
- The appropriate expectation of AFD in terms of effort and focus for the project implementing unit regarding E&S management
- The significant areas for monitoring and focus in respect of E&S accountability and reporting to be implemented during the project.

In these tables presented below regarding construction impacts the following explanations applies:

	Positive column	**Negative column**
Environmental Impacts	Indicates extent of possible opportunities as a result of the project to improve status quo situation	Indicates negative risk in terms of siting and landscaping affecting environmental values (which will have potential to be avoided as a result of sound environmental management). Evidently some impacts in transportation and use of vehicles (air pollution, etc) cannot be effectively mitigated
Social (incl. H&S Impacts):	Indicates extent of potential positive impact in relation to status quo as a result of improved landscaping, quality and safety of buildings and transfer of H&S messages through training and implementing of good practice as a result of project intervention.	Indicates risks in terms of threats to safety of construction workers and possible compromised rights of local residents under poor project proponent management.

[NB. Appendix C details for each country the contract issues to be managed as opposed to this main table which summarises global potential impacts for each project component against documents required and project phases].

Table 1: Analysis of the environmental and social risks and impacts

Component and sub-components	**Description of construction works foreseen and facility/ equipment installation**	**Environmental Impact Risk** (minor, moderate, high)		**Social impacts Risk: Health & Safety** (minor, moderate, high)		**Impact/ Risk category**	**E&S Documentation required**	**Pre-identification of environmental and social impacts** (construction phase/ operational phase)
		Positive	**Negative**	**Positive**	**Negative**	(A, B+, B or C)		
Component 1: Capacity building, institutional development, and regional cooperation	Not relevant					C		Not relevant
Component 2: High-quality climate-related data, and improved climate risk assessments and climate change projections (note: only relevant sub-components have been included below, all others are not relevant)								
2.1 Enhanced Hydromet observing, monitoring and impact forecasting services: 2.1.1 Modernise/upgrade climate observation and monitoring networks 2.1.2 Modernise/upgrade information system for telecom forecast and climatology	Weather data measuring units/ stations establishment and facility equipping	Minor	Minor	Minor	Minor	C	Progress reporting which includes information on siting and permitting of equipment/ facilities at station; also verification and auditing information	<u>Pre- Construction:</u> • Carbon footprint/ GHG of equipment manufacture and transportation • Issues of siting, but almost exclusively existing locations <u>Installation/construction phase:</u> • Waste disposal of previous equipment including solid waste and hazardous waste potentially. Risks primarily related to labour and working conditions • Safety risks in handling materials and in electrical wiring • Temporary noise pollution <u>Operational phase:</u>

Component and sub-components	Description of construction works foreseen and facility/ equipment installation	Environmental Impact Risk (minor, moderate, high)		Social impacts Risk: Health & Safety (minor, moderate, high)		Impact/ Risk category	E&S Documentation required	Pre-identification of environmental and social impacts (construction phase/ operational phase)
		Positive	Negative	Positive	Negative	(A, B+, B or C)		
								• Limited relevance
	Doppler Radar unit and tower (and Upper Air Station)	Minor	Minor	Moderate	Minor	B/C	Project generated outline plans; permitting to conform to local buildings/ESIA regulations; CEMPc adopting project EMP, IFC standards; conformity to prof. industry codes of conduct	Pre- Construction: • Carbon footprint/ GHG of equipment and materials production and transportation • Issues of siting, but existing airfields Construction phase: • Safety risks in construction of tower Operational phase: • Limited relevance
	Agromet and hydrology observation stations establishment (also mini observation facilities)	Minor	Minor	Minor	Minor	C	Reference in project reporting, (but these are very minor interventions)	Construction phase: Not relevant Operational phase: Not relevant
	Wave-measuring buoy placement at sea Tidal Gauge (Mareograph)	Minor	Minor	Minor	Minor	C	Project Progress Reporting which includes information on proposed siting and permitting of	Pre- Construction: • Carbon footprint/ GHG of materials production and transportation • Issues of siting

Component and sub-components	**Description of construction works foreseen and facility/ equipment installation**	**Environmental Impact Risk** (minor, moderate, high)		**Social impacts Risk: Health & Safety** (minor, moderate, high)		**Impact/ Risk category**	**E&S Documentation required**	**Pre-identification of environmental and social impacts** (construction phase/ operational phase)
		Positive	**Negative**	**Positive**	**Negative**	(A, B+, B or C)		
	shore placement Depth sounding system (with generator)						facilities; also verification and auditing information	<u>Construction phase:</u> • Waste disposal of previous equipment. Risks primarily related to labour and working conditions • Safety risks in handling materials and in electrical wiring • Temporary noise pollution <u>Operational phase:</u> • Negligible relevance
2.2. Regional Facilities for maintenance and training established: 2.2.1 Establish a maintenance and calibration laboratory 2.2.2 Refurbish regional training center of Mauritius to train observers and forecasters	Office refurbishment and equipping; Building rehabilitation and extension works (by PNUD, not covered under this project)	Minor	Moderate	<u>Minor</u>	Minor	B/C	Project generated outline plans; permitting to conform to local buildings/ESIA regulations; CEMPc adopting project EMP, IFC standards; conformity to prof. industry codes of conduct	<u>Pre- Construction:</u> • Carbon footprint/ GHG of materials production and transportation • Issues of siting, but renovation is of existing buildings <u>Renovation/construction phase:</u> • Waste disposal of previous equipment including solid waste and hazardous waste potentially. Risks primarily related to labour and working conditions

Component and sub-components	**Description of construction works foreseen and facility/ equipment installation**	**Environmental Impact Risk** (minor, moderate, high)		**Social impacts Risk: Health & Safety** (minor, moderate, high)		**Impact/ Risk category**	**E&S Documentation required**	**Pre-identification of environmental and social impacts** (construction phase/ operational phase)
		Positive	**Negative**	**Positive**	**Negative**	(A, B+, B or C)		
								• Safety risks in handling materials and in electrical wiring • Temporary noise/dust nuisance <u>Operational phase:</u> • Negligible relevance
Component 3: Enhanced use of climate services for climate change adaptation and disaster risk reduction at regional and national levels	Not relevant					C		Not relevant

4.3 E&S Risk Classification

Following the environmental and social guidelines of the AFD, the overarching principle adopted for project assessment is one of due diligence and appropriate E&S impact mitigation. The proposed Hydromet activities are screened overall as a Category B, as detailed below .

Indeed, AFD E&S guidelines allow four categories for project classifications: A, B+, B, & C. The category C, is usually dedicated to soft activities/projects, such as technical assistance and capacity building. The IOC Project has three components. Component 1&3 are related to soft support, fitting with Category C and only Component 2 including the installation of new equipment's (Radar, Buoys, AWS) and the rehabilitation of existing buildings lead the classification as category B, or " light B", according to AFD guidelines. Therefore, a conservative approach led AFD to classify the entire project in the Category B.

The E&S assessment allows us to consider that the impacts of the works will be limited in space (impacts limited in works period) and in area (impacts limited in existing sites or very limited area), then only an ESMF was requested to be developed to justify the mitigations measures that need to be conducted to during the works phase, instead of a detailed ESIA and ESMP.

All possible impacts will be minimised and opportunities to enhance environmental and social benefits indirectly through capacity building are to be adopted. This includes training in health and safety through Component 3 in capacity building (see Diagram 2.2). The judgement that this is a moderate to low risk is determined not least by the minimal size of the potential land take for equipment installation (requiring some 10 square metres at most) and by the nature of interventions which for buildings works will in very large measure concern only renovation and refurbishment.[58] [These works are in Component 2, other components would be Category C activities.]

The buildings might for example comprise two or three small ground floor rooms. The safeguards risk for such renovation works in terms of materials supply and transportation, wastes and pollution are very limited and can be managed so that positive outcomes arise. These include better water, hygiene and waste management, with safer electrical wiring and better trained personnel – and construction workers – in managing safety on projects. In other words, positive 'global' impacts of the project can be expected, even if there are issues of risk to be manage by the designated implementation proponent.

The only direct impact on natural resources will be in implantation of new weather monitoring installation facilities and refurbishment (rewiring, painting and furnishing) of existing buildings, but also possible in situ expansion of facilities. There will therefore be minor construction works which carry risks (though limited) given the size, nature and siting of such buildings. These facilities and/or weather stations are small-scale. To ensure that mitigation is effectively conducted certain procedures are recommended in terms of a) procedure for site selection, b) minor implantation works and maintenance management, and c) any decommissioning and disposal of waste from the previous site use.

From the standpoint of AFD/GCF safeguards policy the project presents E&S risks mainly regarding building and construction work. Components in institutional strengthening, training, information dissemination and outreach would be otherwise categorised as of low/negligible or C risk. There will be a carbon footprint due to travel for project participants, implementation agents and trainees attending capacity building events, while energy use from computers and data storage is a necessary requirement. Use of solar panels for generating

[58] A new Meteorological Office building is to be financed and project managed by Seychelles government.

power is the preferred energy option and may be the only practical and reliable option in many cases of remote observation monitoring locations.

The appropriate classification of the project is deemed to be Category B for *Activities with potential limited adverse environmental and/or social risks and impacts that individually or cumulatively, are few, generally site-specific, largely reversible, and readily addressed through mitigation measures.* The complete project is therefore also classified as Category B in consideration of the very limited risks of Component 2, having moderate to negligible potential adverse impact.

5 ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK

5.1 Overview of ESMF

The purpose of the ESMF is to provide the framework, guidance and tools to be applied in the sound implementation of the project proposal. The framework therefore incorporates principles and expected E&S practice for project implementation which adheres to proposed environmental plans and guidance. The exact location of, for example, the weather stations or hydrological monitoring gauges proposed in a given country may not yet be precisely known, but the siting principles in respect of the mitigation hierarchy remain pertinent.

The ESMF also addresses aspects of health and safety (H&S) in construction and the staffing and responsibilities chain for safeguards management. The approach seeks to reinforce existing government agencies with relevant roles and environmental/social responsibilities without duplicating their functions or operating in parallel.

The table below illustrates the project activities and E&S management considerations and actions relevant to implementation and installation of the physical components which are specified in particular in Project Component 2. These involve equipment and facilities expansion and construction. The accompanying environmental and social mitigation measures and risks are assessed with actions to avoid or mitigate impacts. These measures will be circumscribed by compliance with national legislation and codes of good professional practice[59] as required in IFC's EHS guidelines.

Project and site-specific ESMPs (where applicable) will be finalised by the PMU before any works can take place.

[59] A useful set of principles and codes for good practice relevant to the implementation team's responsibilities in managing small-scale building works can be found at: https://www.sheltercluster.org/sites/default/files/docs/gsc-construction-good-practices-jan2018-dp.pdf

Table 2 :E&S Mitigation measures and resulting risk assessment	**Project ESS staff**	**Negligible**			
		Select new site	+ Identify alternative feasible sites (situated away from the influence of obstructions such as trees) + AWS to be installed on sites with 10-meter height over open terrain, as per WMO standard specification requirements. + If removal of vegetation is deemed necessary, the removal will only be limited to the minimum required number of trees. + Inform and consult local community in vicinity (re any conflict in land use) + Rapid survey of such alternative sites + Assess comparative advantages according to environmental and social criteria* + Submit 'notice of impact' for preferred and alternative sites for approval by appropriate environmental authorities (local level)	Project ESS staff	Low
	Site development, foundations and fencing (Weather stations, Doppler Radar unit and tower, agromet and hydrometry stations)	Ensure local contractor for fencing has health and safety commitments in contract**	+ Active engagement of environmental officer to ensure that relevant permitting requirements will be secured + Safe transportation of materials to site + Avoidance of damage to vegetation in accessing sites + Storage of machinery materials on site (no access by children, etc) + Safe use of machinery, vehicles, grinders e.g. for metal fencing, wire cutting, welding + Dust and noise reduction + Personal protective equipment (PPE) worn + Preference for local employment + Attention to indirect impacts on local community (noise nuisance, disease risk/abuse)	Contractor	Low [scale for each of 10-15 stations or radar post is 50-100m^2, i.e. plots 7-10m^2 with protective fencing, where not already in secure airport perimeter location]
	Site Maintenance	Ensure security and prevent emergent local	+ Subject to regular surveillance + Grievances allowed to be expressed + Monitoring	Project ESS staff	Negligeable

		community conflicts			
	Outcome Evaluation	Long term social and environmental sustainability	+ Meteorological Office to visit all sites every 6 months and file a report on soc/env aspects + Independent monitoring consultant every 2 years	NMHS	Not applicable [NB sites are of very small scale, disparate around island/country so no cumulative impact issues]
	Procurement of Equipment under Component 2	Ensure procurement specifications adopt best international standards as per WMO requirements	The project will ensure that all equipment to be purchased meets international environmental, safety and technical standards.	Project ESS staff	Low
	Installation of equipment at sea, e.g. buoys	Similar issues as above plus safe work at sea requirements (life jackets and harnessing)	As above. Special sensitivity to reef damage and consultation with conservation agencies if to be sited in marine park.	As above	Low
2.2 Establish a maintenance and calibration laboratory and refurbish regional training center	Building refurbishment /renovation	Ensure similar elements to site development [i.e. Health and safety and labour issues apply (PPE, safe working conditions, equity e.g. re work hours, pay, gender)]	+ Contractor is responsible through contract requirements and implementation performance + Supervisory responsibilities of project proponent and/or other government agencies	Contractor Project ESS staff	Low [Existing site]

* Environmental and social criteria to be applied as here indicated (see Section 5.2 and 5.3)

** Contractor requirements as indicated (see Section 5.4)

5.2 Environmental Management Planning Requirements

Environmental management plans for roll out of project facilities require responsibilities for sound E&S implementation with involvement of local environment officers in site choice, and indeed local consultation as appropriate. Section 6 describes staffing and task allocation for safeguards responsibilities. No land will be expropriated from private owners for weather station implantation. Meteorological and hydrological facilities or equipment will be sited on government (or public) land and, as indicated, airfields will be the likely location.

One of the most important aspects for project sustainability is protection of the equipment from malfeasant damage. There will therefore be strict imposition of restrictions to access by members of the public and a security fence will in most cases be required around the equipment unless, in the case of an already security-fenced airfield there is effective guarantee of denial of access to potential miscreants.

Activity 2.1 includes the provision and installation of climate observation and monitoring equipment and telecom forecasting and climatology equipment. It is noted that new equipment does not require use of dangerous substances, such as mercury as used in older technology. Decommissioning of older equipment should be undertaken through the auspices of nominated ESS staff seconded by government. Likewise, Activity 2.2 includes the refurbishment/renovation of buildings which is likely to generate solid waste from discarded equipment parts, scrap metals, wood parts and leftover construction debris. The construction waste may contain hazardous /toxic chemical materials including asbestos (pipe lagging, building material).

Project-seconded ESS staff will take responsibility in line with their existing protocols for safe disposal procedures. The project is one of climate services provision and capacity building, so the project will adopt an approach that promotes continuous improvement in sensitive, sound and responsible environmental management in line with GCF policy. The proposed E&S Project Officer will support nominated national safeguards government staff in ensuring that safe disposal procedures are followed in line with prevailing local regulations, available skills, equipment and capacity.

In accordance with the GCF Environmental and Social Policy on disclosure of subprojects, fit-for-purpose ESIA and sub-project ESMPs will be submitted to the GCF and made available via electronic links in both the AFD/IOC and the GCF's website (as well in in locations specific under Information Disclosure section 5.6).

5.3 Required Siting Criteria for New Weather Stations

The procedure for selecting locations for new facilities is here presented, alongside guidance for selection between alternative sites where a new location is to be adopted. The principles of the mitigation hierarchy provide essential guidance to mitigate and indeed wherever possible 'do no harm'.

Where a new site is to be developed the facility promoter (meteorological, water authority agricultural or other service) must take into consideration the criteria developed below and in so doing propose alternative sites which are feasible for their purposes. These sites should be surveyed and comparative advantages assessed with the involvement of the regional E&S officer as appropriate, and always with documented rationale presented to the Safeguards Specialist (SS).

The following criteria will guide the selection of acceptable locations for facilities.

Positive attributes of site options:

- Acceptable to local people following consultation
- Government or public land
- Avoids need to fell trees, or clear natural vegetation
- Does not conflict with interests of local livestock herders or other valued land uses
- On prevailing flat ground so limited erosion potential
- Non-riparian site with potential for inundation/flood
- Capable of surveillance and secure from local vandalism

Negative attributes of a site:

- On land in agricultural or other valued use
- Private land requiring negotiated acquisition
- Requiring clearing of any area of biodiversity value (e.g. unmodified habitat)
- Impacts on heritage or cultural property, graves, shrines, etc
- On hill slope vulnerable to erosion
- Close to residential populations, inquisitive children
- Impeding local accesses and pathways of local inhabitants

Facility sites or locations which could generate negative environmental and social impacts (as in list above) will be generally proscribed. In the case of a site with negative attributes and a lack of alternative location the rationale for the siting logic will be transparently documented and permitting procedure followed.

The project sites for installation of weather stations, hydrometric stations and rehabilitation of hydromet buildings/offices are expected to be at existing locations or on land owned by government, thus at a reasonable distance from critical and sensitive receptors. The AWS will be across the countries and the exact locations are not known. In general, these tend to be located on school grounds or on Ministry of Agriculture land and not be placed in ecologically sensitive areas.

If government owned land is no available, the project will explore voluntary land donations.

If government owned or voluntary land is not available, the project will as a last option consider acquisition of private land. In case of land acquisition, an Abbreviated Resettlement Action Plan will be prepared (refer to section).

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In an ecologically sensitive site this might in very special situations lead to a need for submission of an ESIA (or 'Provisional ESIA' Mauritius) whose detail will depend on procedural requirements to meet national legislation. The siting of a mareograph/tidal gauge instrument in an ecologically sensitive coastal location or a wave-measuring buoy in a marine national park are possible case examples.

As indicated, there are practical reasons why meteorological facilities such as a Doppler Radar installation needs to be sited on open ground. Such Radar installations will have more demanding requirements so that they are unimpeded by local relief.

5.4 Abbreviated Resettlement Action Plan

As described above, the land acquisition requirements for the project will be handled as per the following hierarchy:

1. For most of the project activities, no land will be required.
2. In few cases where land is required, e.g. for AWS installation or office upgrade, government land will be utilised.
3. If land is required for any activity in an area where government land is either not available or not suitable, the project will rely on voluntary land donation.
4. In very rare cases, the situation might arise where none of the above three options are available, and land acquisition or resettlement is required to a limited extent. In such cases, small parcels of land may need to be acquired from private parties.

If the situation demands option 4 above, it is envisaged that the land requirement will be very minimal. As such, *much fewer* than 200 people will be displaced, and the impacts on the entire displaced population will be are minor. An abbreviated resettlement plan will be prepared covering the following elements:

(a) A census survey of displaced persons and valuation of assets;

(b) Description of compensation and other resettlement assistance to be provided;

(c) Consultations with displaced people about acceptable alternatives;

(d) Institutional responsibility for implementation and procedures for grievance redress;

(e) Arrangements for monitoring and implementation; and

(f) A timetable and budget.

The matrix below is indicative. Compensation to the assets will be to the owner of the asset. The compensation entitlements should be commensurate to the opportunity cost of loss of asset and in keeping with international best practice[60] and social acceptability in each of the 4 states.

The nature of the impacts and assets impacted are likely to include: temporary and permanent restricted access to arable land (affecting farmers/title holders, lease holders and sharecroppers, other agricultural workers), loss of residential land, loss of crops, felling of trees, relocation of community assets.

Public consultation and participation will afford the project affected persons (PAPs) an opportunity to contribute to both the design and implementation of the program activities. In so doing, the likelihood for conflicts between and among the affected and with the management committees will be reduced.

The affected persons must be made aware of:

- Their options and rights pertaining to resettlement and compensation;
- Specific technically and economically feasible options and alternatives for resettlement sites;

[60] The following ESMF report could serve as a starting point for the abbreviated resettlement action plan and compensation entitlements: Pakistan Hydro-Meteorological and Ecosystem Restoration Project, Environmental and Social Management Framework, 2020.

- Process of, and proposed dates for, resettlement and compensation;
- Effective compensation rates at full replacement cost for loss of assets and services; and
- Proposed measures to maintain or improve their living standards.

Public consultation and participation shall take place through local meetings, request for written proposals/comments, public readings and explanations of the project interventions and requirements. Public documents shall be made available in appropriate languages at the local levels.

The abbreviated RAP preparation and implementation costs, including cost of compensation, various eligible allowances, monitoring & evaluation, grievances redress will be estimated and will be considered an integral part of Project cost (under Component 2 equipment costs).

5.5 Environmental and Social Guidelines for Contractor

The principle reference for the compliance expectations for construction and installation of facilities and project works will be the IFC Environmental and Health Guidelines,[61] national laws and regulations, including necessary permits and approvals before the work commences. The Contractor should respect applicable laws and regulations in the country on the disposal of solid and liquid wastes, noise standards, working hours, etc. The contractor will take appropriate measures to minimise environmental damage and be responsible for non-compliance.

Before starting work, the contractor must obtain all permits necessary for the implementation of works under the contract, including any authorisations from local authorities, forest services (in case of deforestation, pruning, etc.), agricultural or water authorities, etc.

The contractor and as appropriate the project proponent (representative of the Meteorological Office) will organise meetings with the authorities, representatives of the populations in the project area and the relevant technical services, to inform them in advance of the work to be performed and duration and routes and locations likely to be affected. This meeting will enable feedback from local populations, sensitisation on environmental and social issues, development of relationships with local host communities, and set expectations regarding behaviour of the contractor's workers and contractor supervisory responsibilities.

These following simple clauses are intended to help the project implementation team or agent (meteorological or agricultural service) draft contracts for micro-projects such as the weather station and refurbishment contracts. Such projects may of course be let as part of a large contract. Due diligence applies to responsibilities for sub-contractors' compliance with the standards of primary contractors to which they are committed in their Contractor EMP. In any case, all companies engaged in construction and rehabilitation of structures must conform to the environmental and social stipulations in the box below. This checklist for contractors is not exhaustive and subject to review. Reference should be made to IFC requirements in preparing terms of reference for contractors.

Environmental and Social Stipulations for Contractors

(working on small-scale interventions, facilities, etc)

Legal compliance

[61] IFC/World Bank Group Environmental, Health, and Safety General Guidelines, 2007 https://www.ifc.org/wps/wcm/connect/29f5137d-6e17-4660-b1f9-02bf561935e5/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES&CVID=jOWim3p

- Ensure necessary permits in conformity with national laws and regulations in force

Community engagement

- Perform an information and sensitisation campaign for any local resident populations before works commence
- Use local workforce and engage in non-discriminatory recruitment
- Conduct awareness campaign on STI/HIV/AIDS with workers and local populations

Working conditions

- Ensure compliance measures for hygiene and safety on site in compliance with national legislation (labour law)
- Provide protective equipment to workers (boots, gloves, etc) and ensure its appropriate use
- Ensure safe methods of working and emergency resources (e.g. First Aid kit carried in vehicles and local hospital contact details)

Local Safety and Protection

- Protect persons and properties around sites from nuisance and harm (eg minimise noise and dust)
- Ensure workers respect and engage appropriately with local communities (gender/age non-discrimination, non-abuse)

Biodiversity and Conservation

- Natural habitats and protected species of flora or fauna safeguarded from worker abuse or local trapping/hunting

Waste management

- Ensure collection and legal disposal of non-biodegradable wastes

Supervision

- Lines of responsibility clear with emergency plans
- Involve local technical services in monitoring implementation

5.6 Stakeholder Engagement Plan

Meaningful consultation and engagement processes is a strategic priority embedded in the environmental and social management system for GCF and the environmental and social safeguards, Environmental and Social Policy, Gender Policy and Indigenous Peoples Policy of GCF. This section will assist the AFD/COI improve and facilitate decision-making and create an understanding that involves affected or likely to be affected people in the project and other stakeholders in a timely manner, and that these groups are provided with sufficient opportunity to voice their opinions and concerns (should there be any) that may influence project decisions.

This section presents : an a) overview of the previous stakeholder engagement activities undertaken during project formulation; b) the types of stakeholders which will be engaged with; c) the publication channels for the project information disclosure; and d) stakeholder communication plans which are technically and culturally appropriate for the four countries.

Brief summary of previous stakeholder engagement activities

In country visits were undertaken by the project design team between June and September 2019 to engage with government officials, informed NGOs and wherever possible village communities who had experience with extreme weather events and who might be beneficiaries of improved weather

data collection and dissemination, not least of early warning systems (EWS) for cyclone events in low elevation coastal villages, such as fishing communities and those hosting tourism activities.

A wide variety of stakeholder organisations have been contacted for views on climate change challenges and resilience building opportunities from improved climate services including Early warning systems (EWS). In Comoros the team visited and engaged with agricultural and fishing communities on all three of the main islands (Grande Comore, Anjouan and Mohéli). In Madagascar the team met aid agency personnel working in agriculture and in emergency response. In the Seychelles the team visited the main inhabited islands of Mahé, Praslin and La Digue, including contact with tourism and fishing industry stakeholders. For Mauritius, a desk-based review was undertaken.

Existing and new information was shared between team members while reports from international organisation projects were collected and reviewed for complementary information and to verify new findings and viewpoints presented during engagements with local communities during field visits.

The summary of the key issues identified by stakeholders have been appended to and integrated in the Feasibility Study (see Annex 7 Summary of Stakeholders Consultations in the four countries).

Stakeholder identification and analysis

The project implementation arrangements are described in greater detail under section 2.3 above. The National Meteorological Services are lead implementing entities in each beneficiary country. They are de facto involved in the day to day implementation of the project in close partnership with the IOC and its PMU.

- Stakeholders involved in **project implementation or direct beneficiaries**: the IOC via a regional PMU, the NHMS (namely ANACM in Comores, DGM in Madagascar, MMS in Mauritius and SMA in Seychelles), a regional project steering committee and national project steering committee. We have not included these in the tables below, but rather in the communication plan further in this section.
- **Principal stakeholders** are those with whom the project will regularly engage through consultations, workshops and participation in training for example. These are DRM institutions, sectoral ministries, regional organisations and technical partners.
- **Secondary stakeholders** are those who stand to benefit from the project interventions, mainly as beneficiaries of climate products and services. The project will seek to consult with a sub-section of these secondary stakeholders (e.g. communities, farmers, private sector etc)

In the tables below we have listed the stakeholders which the project will engage with at various stages of its implementation.

Component 1

Stakeholder[62]	Engagement Strategy (and activity # reference)
NHMS : ANACM (Comores) DGM (Madagascar) MMS (Mauritius) SMA (Seychelles)	• Consultations to help develop the Regional/ National Framework for Climate Services and Regional/National workshops to validate the RFCS/NFCS (1.1.1) • Validation workshop with IOC, WMO and member states to validate RCC-Network strategy and operating plan and sign a multi-lateral agreement; Workshop to present regional business plan for the RCC-Network (1.1.2)

[62] Refer to the Feasibility Annex for details on stakeholder roles and responsibilities

	• Consulted to develop specialised training centre, maintenance and calibration lab (1.1.3) • Collaborate in the preparation of the Regional Numerical Weather and Climate Prediction strategy (1.1.4) • Collaborate in preparation of national institutional, operating and financial strategies for each NMHS (1.2.1) • Participate in workshops relating to designing capacity building plans for NHMS (1.2.2) • Participate in recruitment of staff for RCC-Network and NHMS (1.3.1) • Participate and benefit from training aligned with the WMO competency frameworks (related to climate services) (1.3.2) • Consulted for baseline studies on how CP-CS and EWS for hydro-meteorological hazards are used in each beneficiary country, and on user requirements for improving such services (1.4.1) • Consulted for detailed design on a Concept of Operations (Regional and national CONOPS) (1.4.2) • Active participation through twinning arrangements with developed NHMS on strengthening ICT systems in each country, based on WMO technical standards (1.4.3)
Regional expert team composed of selected hydro-meteorologists from the IOC member states	• Validation workshop with IOC, WMO and member states to validate RCC-Network strategy and operating plan and sign a multi-lateral agreement; Workshop to present regional business plan for the RCC-Network (1.1.2)
DRM institutions	• Consultations to help develop the Regional/National Framework for Climate Services, Regional/National workshops to validate the RFCS/NFCS (1.1.1) • Participate in workshops relating to designing capacity building plans for NHMS (1.2.2) • Participate and benefit from training aligned with the WMO competency frameworks (related to climate services) (1.3.2) • Consulted for baseline studies on how CP-CS and EWS for hydro-meteorological hazards are used in each beneficiary country, and on user requirements for improving such services (1.4.1)
Climate-sensitive sectors : Agriculture and Fisheries in Comores and Madagascar Agriculture and Tourism in Mauritius Fisheries and Tourism in Seychelles	• Consultations to help develop the Regional/National Framework for Climate Services, Regional/National workshops to validate the RFCS/NFCS (1.1.1) • Participate and benefit from training aligned with the WMO competency frameworks (related to climate services) (1.3.2) • Consulted for baseline studies on how CP-CS and EWS for hydro-meteorological hazards are used in each beneficiary country, and on user requirements for improving such services (1.4.1)
WMO	• Validation workshop with IOC, WMO and member states to validate RCC-Network strategy and operating plan and sign a multi-lateral agreement (1.1.2) • Consulted for the establishment of specialised training center as part of the WMO Global Campus and the regional instrument centre • Contribute training providers under the WMO Global Campus and support twinning with advanced NMHSs
Climate training providers in the region & Technical partners (including MétéoFrance, other	• Consulted for the establishment of the specialised training center and the maintenance and calibration lab (1.1.3) • Collaborate in the preparation of the Regional Numerical Weather and Climate Prediction strategy (1.1.4)

NHMS, Experts working on RIMES, or with the WMO Global Campus etc)	• Contribute as training providers • Contribute through twinning arrangements with NHMS staff (learning as doing capacity building) (1.4.3)
Communities, Public and Private-sector (future) users of climate services	• Consulted on institutional, operating and financial strategy for NHMS (1.2.1) • Consulted for baseline studies on how CP-CS and EWS for hydro-meteorological hazards are used in each beneficiary country, and on user requirements for improving such services (1.4.1)

Component 2:

Stakeholder[63]	**Engagement Strategy (and activity # reference)**
NHMS : ANACM (Comores) DGM (Madagascar) MMS (Mauritius) SMA (Seychelles)	• Validate and oversee upgrading of climate-related observation and monitoring networks and remote sensing equipment (2.1.1) and ICT systems (2.1.2) • Consulted for the establishment of the WMO Regional Instrument Centre (2.2.1) and upgrading of the Specialised Training Centre (2.2.2) • Participate and benefit from training on downscaling of forecasts and developing impact-based forecasts (2.3.1) • Participate in R&D and training to produce downscaled projections, sectoral models and impact assessments to anticipate climate change in each country (e.g. urban hydrology, pollution, agrometeorology, sea state, coastal erosion) (2.3.2) • Participate in training to downscale seasonal forecasts into agrometeorological products (2.3.4) • Participate in consultations for the development of hazard maps taking into account climate change impacts on return period/intensity of selected hazards in selected areas of the four target countries (2.3.5) • Participate in workshops to develop climate vulnerability/risk maps together with NMHS, local authorities of hazardous-prone areas, public and private sectors representing agriculture/fisheries, tourism, health, water sectors and at-risk communities (2.3.6)
DRM institutions	• Participate and benefit from training on downscaling of forecasts and developing impact-based forecasts (2.3.1) • Participate in R&D and training to produce downscaled projections, sectoral models and impact assessments to anticipate climate change in each country (e.g. urban hydrology, pollution, agrometeorology, sea state, coastal erosion) (2.3.2) • Participate in consultations for the development of hazard maps taking into account climate change impacts on return period/intensity of selected hazards in selected areas of the four target countries (2.3.5) • Participate in workshops to develop climate vulnerability/risk maps together with NMHS, local authorities of hazardous-prone areas, public and private sectors representing agriculture/fisheries, tourism, health, water sectors and at-risk communities (2.3.6)
National Hydrological Services Mauritius: Land Drainage Authority, NDRRMC, WRU, Ministry of Environment	• Participate in design and benefit from the training on hydrological modelling for flood forecasting (2.3.3) • Participate in consultations for the development of hazard maps taking into account climate change impacts on return period/intensity of selected hazards in selected areas of the four target countries (2.3.5)

[63] Refer to the Feasibility Annex for details on stakeholder roles and responsabilities

	• Participate in workshops to develop climate vulnerability/risk maps together with NMHS, local authorities of hazardous-prone areas, public and private sectors representing agriculture/fisheries, tourism, health, water sectors and at-risk communities (2.3.6)
Ministries of Agriculture in Madagascar and Comoros	• Participate in R&D and training to produce downscaled projections, sectoral models and impact assessments to anticipate climate change in each country (e.g. urban hydrology, pollution, agrometeorology, sea state, coastal erosion) (2.3.2) • Participate in training to downscale seasonal forecasts into agrometeorological products (2.3.4) • Participate in consultations for the development of hazard maps taking into account climate change impacts on Agriculture (2.3.5) • Participate in workshops to develop climate vulnerability/risk maps together with NMHS, local authorities of hazardous-prone areas, public and private sectors representing agriculture/fisheries, tourism, health, water sectors and at-risk communities (2.3.6)
Ministries in charge of Fisheries in Comoros, Madagascar and Seychelles	• Participate in workshops to develop climate vulnerability/risk maps together with NMHS, local authorities of hazardous-prone areas, public and private sectors representing agriculture/fisheries, tourism, health, water sectors and at-risk communities (2.3.6)
Ministries of Environment and in charge of Water resources	• Participate in R&D and training to produce downscaled projections, sectoral models and impact assessments to anticipate climate change in each country (e.g. urban hydrology, pollution, agrometeorology, sea state, coastal erosion) (2.3.2) • Participate in workshops to develop climate vulnerability/risk maps together with NMHS, local authorities of hazardous-prone areas, public and private sectors representing agriculture/fisheries, tourism, health, water sectors and at-risk communities (2.3.6)
Ministries of Urban Planning	• Participate in R&D and training to produce downscaled projections, sectoral models and impact assessments to anticipate climate change in each country (e.g. urban hydrology, pollution, agrometeorology, sea state, coastal erosion) (2.3.2) • Participate in consultations for the development of hazard maps taking into account climate change impacts for coastal erosion in Mauritius and Seychelles (2.3.5)
Ministries of Tourism in Mauritius and Seychelles	• Participate in workshops to develop climate vulnerability/risk maps together with NMHS, local authorities of hazardous-prone areas, public and private sectors representing agriculture/fisheries, tourism, health, water sectors and at-risk communities (2.3.6)
Ministries of Health	• Participate in workshops to develop climate vulnerability/risk maps together with NMHS, local authorities of hazardous-prone areas, public and private sectors representing agriculture/fisheries, tourism, health, water sectors and at-risk communities (2.3.6)
Communities, Public and Private-sector (future) users of climate services	Participate in workshops to develop climate vulnerability/risk maps together with NMHS, local authorities of hazardous-prone areas, public and private sectors representing agriculture/fisheries, tourism, health, water sectors and at-risk communities (2.3.6)

Component 3:

Stakeholder[64]	Engagement Strategy (and activity # reference)
NHMS : ANACM (Comores) DGM (Madagascar) MMS (Mauritius) SMA (Seychelles)	• Participate in the design of improved daily weather bulletins, impact-based forecasts, seasonal forecast and agrometeorological advisories and standard operating procedures (3.1.1) • Participate in the design and training of improved early warning dissemination for key sectors (agriculture, fisheries, tourism, health) and the general public (3.1.2) • Participate in workshops to facilitate discussions between producer and users of CP-CS and identify ways of packaging CP-CS so that they are understandable and useful (3.3.1) • Participate in interviews and oversee the strengthening of the User Interface Platform to facilitate access to climate products and climate services (existing Regional Climate Portal hosted by SMA since 2019) (3.3.3) • Participate in the assessment of SWIOCOF to ensure future events provide relevant action-oriented seasonal information and offer a platform for users to provide feedback on CP-CS including EWS (3.3.4)
RCC-Network	• Participate in interviews to help strengthen the User Interface Platform to facilitate access to climate products and climate services (existing Regional Climate Portal hosted by SMA since 2019) (3.3.3) • Participate in the assessment of SWIOCOF to ensure future events provide relevant action-oriented seasonal information and offer a platform for users to provide feedback on CP-CS including EWS (3.3.4)
DRM institutions	• Participate in the design of improved early warning dissemination for key sectors (agriculture, fisheries, tourism, health) and the general public (3.1.2) • Participate in consultations to review existing emergency response plans and communication processes between relevant stakeholders with a view to improve them to guide quick on-the-ground interventions to mitigate risk impacts (3.2.1) • Participation in the revision or development of National Adaptation Plans (3.2.2) • Participate in consultations to identify ways of packaging CP-CS so that they are understandable and useful (3.3.1) • Participate in the design and oversight of trainings for knowledge brokers (NGOs, red crescent/cross, local leaders and extension officers – and representatives of sectors in the GFCS areas) to strengthen the capacity to understand hazard warnings and advisories, to provide accurate advices on risk prevention and to react during/after a hazardous event (3.3.2)
Emergency Services Red Crescent/Red Cross	• Participate in consultations to review existing emergency response plans and communication processes between relevant stakeholders with a view to improve them to guide quick on-the-ground interventions to mitigate risk impacts (3.2.1) • Participate in consultations to identify ways of packaging CP-CS so that they are understandable and useful (3.3.1) • Participate in consultations and trainings to strengthen the capacity to understand hazard warnings and advisories, to provide accurate advices on risk prevention and to react during/after a hazardous event (3.3.2)
Ministries of Agriculture	• Participate in consultations and the design of improved daily weather bulletins, impact-based forecasts, seasonal forecast and agrometeorological advisories (3.1.1)

[64] Refer to the Feasibility Annex for details on stakeholder roles and responsibilities

	• Participation in the revision or development of National Adaptation Plans (3.2.2) • Participate in consultations to identify ways of packaging CP-CS so that they are understandable and useful (3.3.1)
Ministries in charge of Fisheries	• Participation in the revision or development of National Adaptation Plans (3.2.2) • Participate in consultations to identify ways of packaging CP-CS so that they are understandable and useful (3.3.1)
Ministries of Environment or Departments in charge of Climate Change policy	• Participation in the revision or development of National Adaptation Plans (3.2.2) • Participate in consultations to identify ways of packaging CP-CS so that they are understandable and useful (3.3.1)
Ministries of Urban Planning	• Participation in the revision or development of National Adaptation Plans (3.2.2) • Participate in consultations to identify ways of packaging CP-CS so that they are understandable and useful (3.3.1)
Ministries of Tourism	• Participation in the revision or development of National Adaptation Plans (3.2.2) • Participate in consultations to identify ways of packaging CP-CS so that they are understandable and useful (3.3.1)
Ministries of Health	• Participation in the revision or development of National Adaptation Plans (3.2.2) • Participate in consultations to identify ways of packaging CP-CS so that they are understandable and useful (3.3.1)
Farmers and Producer Organisations in the 4 countries	• Participate in surveys to help improve daily weather bulletins, impact-based forecasts, seasonal forecast and agrometeorological advisories (3.1.1) • Participate in surveys to help improve early warning dissemination for key sectors (agriculture, fisheries, tourism, health) and the general public (3.1.2)
Communities / General Public (as users of climate products and services)	• Participate in consultations to identify ways of packaging CP-CS so that they are understandable and useful (3.3.1) • Participate in interviews to help strengthen the User Interface Platform to facilitate access to climate products and climate services (existing Regional Climate Portal hosted by SMA since 2019) (3.3.3)
Civil society and local leaders at community level	• Participate in consultations to review existing emergency response plans and communication processes between relevant stakeholders with a view to improve them to guide quick on-the-ground interventions to mitigate risk impacts (3.2.1) • Participate in consultations and trainings to strengthen the capacity to understand hazard warnings and advisories, to provide accurate advices on risk prevention and to react during/after a hazardous event (3.3.2)
Agriculture Extension Officers	• Participate in consultations and trainings to strengthen the capacity to understand hazard warnings and advisories, to provide accurate advices on risk prevention and to react during/after a hazardous event (3.3.2)
Private sector in agriculture, fisheries, tourism, health, insurance sectors	• Participate in interviews to help strengthen the User Interface Platform to facilitate access to climate products and climate services (existing Regional Climate Portal hosted by SMA since 2019) (3.3.3)

Public consultation/Participation Framework for equipment installation (e.g. weather stations)

A continuous process of keeping the stakeholders informed and receiving their feedback at various stages of project implementation will be carried out to improve the acceptability of the project by the

stakeholders and ensuring their participation in the process of sub project preparation and development. Consultations with the potentially affected communities would be done subsequently in equipment installation design phase. Sessions will be kept informal to encourage participants to express their concerns, questions and opinions about the project activities in addition to seeking clarification regarding the project. Project team will highlight the process of project implementation and document any aspects, which need to be covered in detail during the execution stage.

Objective	Target stakeholder	Implementation stage	Responsibility
Meetings/scoping sessions/ survey/ interviews etc. to inform stakeholders about project and obtain feedback about the project design.	Potential stakeholders in the sub-project area, general public, and line departments/ agencies	Design stage	National E&S Officer
Public awareness sessions to share the ESMP with the project affected persons/ communities; and other stakeholders.	Potential stakeholders in the sub-project area, general public, and line departments/ agencies	Design/implementation stage	National E&S Officer
Setting of Grievance Redress and Community Complaint Register	Stakeholders in the subproject area.	Construction stage	National E&S Officer
Consultations with the Stakeholders during the Independent Monitoring	Stakeholders in the subproject area.	Construction stage	National E&S Officer
Consultations with the Stakeholders relating to the leftover tasks	Stakeholders in the subproject area.	Operation stage	National E&S Officer

Publication (information disclosure)

Documentation and information about project activities and results of consultations with stakeholders shall be published by the PMU on the Indian Ocean Commission website. A separate webpage will be established during project launch (www.commissionoceanindien.org).

Additional information will be shared by the RCC-Network (once the website is set-up) and through the Regional Climate Portal (http://regionalclimate-change.sc/).

Furthermore, where the preparation of (provisional) ESIA may be required along with project-specific Environmental and Social Management Plans (ESMP), these will be disclosed on the Executing Entity (IOC) website as well as on the competent national entities at least 30 days in advance of the approval decision. These safeguard reports will be available in both English and the local language (if not English).

5.7 Grievance Redress Mechanism

The project shall establish a grievance redress mechanism (GRM) to provide stakeholders and potentially affected or likely to be affected communities and households (and including women) by the financed activities, avenues to provide feedback or grievances, and receive responses, with regard to the implementation of activities.

The PMU will set out steps to disseminate details of the GRM (e.g. contact information and the appropriate modes by which these will be received, among others) and inform the communities affected and all stakeholders of, and provide access to GRMs at all three levels - the GCF's Independent Redress Mechanism (IRM), the Accredited Entity's GRM in addition to the project/activity level GRM at the earliest opportunity of the stakeholder engagement process.

The final processes and procedures for the GRM will be translated into local language, if needed and disseminated at all national project coordinator offices. The project will appoint a Grievance and Redress Committee (GRC) to hear grievances should complaints be escalated. This committee will meet ad hoc and no logged case should trail for more than 3 months. The Committee would include the IOC Safeguards Specialist, two independent non-government professionals with legal expertise, and have Union and NGO/civil society organisation representation. Members must be objective, impartial and reasonable.

A complaints register will be maintained by the PMU. All complaints and grievances will be logged in the register along with details including date of complaint, name and address of complainant, location, and description of complaint. The GRC will then fill additional details in the Register including the corrective action needed, timeframe for corrective action to be taken, and person/project entity responsible for corrective action. Once the corrective action is implemented, the GRC will document the associated details in the Register including the description of action take, date of action completion, views of the complainant regarding the corrective action, and project affected personnel any residual grievance. GRM procedures will be disseminated particularly among the local communities. GRM will be gender responsive, culturally appropriate, and readily accessible to the project affected personnel at no cost and without retribution.

Cases might arise and be escalated or approached through the following modalities:

- In the first instance an amicable settlement is sought by mediation between the aggrieved party (person or group) and, for instance, a local contractor or other actor. The negotiation process will be arbitrated by local/traditional leadership near the site giving rise to the concern. A labour or employment dispute is a possible example in relation to hours worked or even unfair dismissal or gender discrimination. A dispute over land might also be a case that can be resolved locally.
- Where such a mediated settlement fails, an official process begins. A written appeal is made to project management at national level. A complaint against a contractor for dismissal following a work accident that incapacitates him/her without offer of recompense is a possibility. Another case might be an unfair dismissal following a gender abuse incident. Such a claim will be recorded by the relevant proponent (meteorological or agricultural office) and be reported to the project Safeguards Specialist, who will ensure that each claim is logged and gets an answer within a reasonable time (say 10 days) at the village level. The logged grievance will be registered and described in progress reports, together with the status of proposed resolution. All deliberations of the Grievance Committee will be documented.

- If the conciliation process is not successful, the complainant can refer the grievance to the jurisdiction of national law courts.
    - Alternately, the complainant can lodge a case with AFD E&S Complaints Mechanism (https://www.afd.fr/en/e-s-complaints-mechanism) within 2 years of the original reason for the complaint. The Mechanism Secretariat ensures that matters are handled impartially through an E&S Compliance Review by a panel of independent experts.

For such a project the first and second instance reconciliation mechanisms might be expected to enable resolution of complaints. It would seem extremely unlikely on such a project that the last two instances could be invoked.[65] The precise modalities need to be aligned to realities in each separate country and particular social context.

5.8 Reporting and Monitoring

Record keeping on environmental aspects in siting and security maintenance will be a required subject of project reporting systems from the start of project implementation. Health and safety considerations are also key to sound safeguards implementation.

Reporting on monitoring requires that the locally appointed project coordinators participate fully in project roll out and decision-making. The national coordinator will provide implementation progress reports to the PMU and make site visits to verify that environmental and social stipulations as presented in the table in Section 5.2 above and adopted by the Contractor (and any sub-contractor) in a CEMP are being adhered to.

See reporting matrix table below. The ESS compliance monitoring reports will be prepared on a quarterly basis and shared with the Regional E&S Officer. Refer to section 5.8 for an overview of Roles and Responsibilities regarding reporting and monitoring against ESS and budget for monitoring.

The implementing agency or promoter must copy its progress and maintenance reports to the appropriate national or local office to foster local ownership for safeguards implementation performance. As this is an external financed project the relevant national environment ministry must also be informed of siting proposals and the basis on which new choices are made.

Environmental and Social Safeguards Monitoring matrix for each site of facility installation/ construction			
Generic area of reporting	**Explanation**	**Indicators**	**Means of verification**
Development permitting and approvals	Have required legal approvals from environmental agencies, electrical/water utilities, etc been obtained by contractor?	Permits obtained	Contractor enquiries and reports to be verified with assistance from SS. ESIA/project-specific ESMPs disclosed and submitted to the GCF
Local Community engagement (and prior notice) if applicable	Have introductory meetings taken place at each new facility site to inform local persons?	Evidence of meetings held	Enquiries in local communities and with local government officials and political representatives

[65] https://www.afd.fr/en/environmental-and-social-complaints-mechanism-afd

Employment rights and safe working conditions	Is contractor observing labour laws and own safety plans as expressed in risk assessments, safe working methods and commitments to national labour law (as to be required in his contract)? Has contractor given basic safety training to workers? Is there a responsible safety officer among supervisory staff on site and arrangements for relief/ replacement etc as required in line with a safety management system, including accident plans? Safety and tidiness of work sites Contractor staff have vehicles, tel. numbers of local clinics/hospital, etc for emergency situations Non-discrimination in gender opportunity.	Conformity of working hours with legal norms (ie workers not required to work excessive hours) Employees have contracts and there is due payment Availability and use of personal protective equipment (PPE) in workshops and on construction sites First Aid kits available at sites together with trained contractor personnel and/or emergency plans for accidents in place (re local medical facilities) Gender balance in staffing payrolls at all levels Gender pay equity: equal pay for equal amount of work done	Regular and impromptu field visits during construction period (weekly/fortnightly) Contractor reporting, monthly reporting Field observation and verification that safety equipment is both made available and supervisors are requiring its use on sites where there are hazardous activities and operations Verify existence of first aid kits and their contents, presence of safety officer, and basic training Logged discrimination, grievances reported and progress of resolution
Safety and protection of local populations (human rights)	Are local communities protected from construction nuisance in noise and dust? Are local communities hosting contractor staff or otherwise in contact with employed staff subject to sexual abuse or discrimination, child exploitation? Does Contractor have in place policies to discipline staff or hear and report grievances?	Incidents of dispute resolution Project grievance reporting	Informal and probing enquiries Field observation Engaged impartial discussion with local communities through informal and formal channels Logged grievances reported eg in land disputes and progress of resolution followed and updated in project reporting
Biodiversity/ Conservation	Are agreed sites being developed in line with siting policy? Is topsoil conserved, respect for local trees and vegetation? Is local workforce engaged in illegal and destructive activities?		
Waste management	Are construction wastes being properly disposed of in line with local regulations or through competent authorities? Contractor has responsibilities for waste and littering of staff in local environment	Site littering and spillages Effluents and toilet hygiene/sanitation	Field observation Informal and probing enquiries Observation of direct and indirect impact of contractor staff and site offices

Contractor supervision	Discipline and effectiveness of contractor safeguards staff in management of risks.	Inconsistent reporting Responsiveness to previously expressed concerns	Observation and reporting on performance re contractor safeguards systems (lines of responsibility, quality and integrity of reporting)

As part of its Annual Performance Reporting to the GCF, the IOC/AFD will also include reporting against the environmental and social performance of the project. There will be an independent audit of works implementation by an appointed project management agent from IOC/AFD who will report to the relevant national environment ministry on the conduct of site selection and implementation of the framework guidelines.

IOC involvement in interim internal environmental/safeguards review of the compliance and adequacy of adopted project environmental and social policy implementation is proposed for 18 months into the five-year project so that lessons may be learned for roll out of further planned works. It is suggested this might be done either by a) peer review among members of different IOC countries or b) by the environment officer at IOC headquarters or c) by an appointment by the Project Management Unit in each country of a suitably qualified environmental and social safeguards consultant.

The outcomes to be verified are:

- Environmentally and socially sound weather monitoring station site selection; and
- Construction completed with due respect to health, safety and human rights of employed workers and any local residents.

5.9 Roles and responsibilities for E&S management (including TA)

The environmental and social management plans (ESMP) indicated in the ESMF will require environmental and social management technical assistance and supervision, on a punctual basis in each country when building construction and equipment installation work are required. Details of weather observation facilities and associated buildings would be finalised for each country either through the PMU (see Annex 2, FS, Chapter 5).

It is recommended that the project executing entity, the IOC, hire a Contractor EMP to ensure the incorporation of E&S risk assessment in any service providers' work plan. A single contractor might be expected to be selected per country, other than for specialised facilities (e.g. Doppler Radar installation or the wave monitoring buoys – see ESMF). During plan development, such companies will need to liaise with the regional contractor – the Environmental and Social Officer – and ultimately obtain plan approval.

Environmental and Social Officers (E&SO – 1 regional E&SO and 4 national E&SO for each country – on a part time basis) will be appointed as part of the PMU for approval and outline permitting by the national authorities to establish the necessary documentation for national legal compliance purposes. Local site access permits, building inspection or other requirements will be the responsibility of the contractor to obtain. The E&SO will therefore be responsible initially for facilitating national authorisations, permits and where necessary ESIA at whatever level of detail is required by national authorities.

Exceptionally certain facilities such as the Radar Doppler and Met offices building/rehabilitation may be expected to require more detailed planning documentation. Where there is a national

requirement for an ESIA statement, the E&SO will seek to appoint a consultant to prepare necessary documentation to meet the country requirements. This is likely to be a national consultant, and such a person will be required to visit sites and produce the detailed documentation that may be required. The cost for such consultants will be funded under the equipment budget line under Component 2.

The E&SO will be responsible for environmental and social due diligence in implementation and will be co-opted into siting decision-making, in particular where alternative facility sites are apparent and an optimisation choice is required. During construction the E&SO will be responsible for impromptu visits to verify that implementation is in line with permit stipulations and national legislative requirements. The implementation unit or sector promoter of the given works (e.g. meteorological office) will liaise with the E&SO and together be responsible to see that codes of good engineering and environmental practice, national legislation compliance and the IFC Guidelines on Environmental Health and Safety[66] are implemented.

The E&SO will be responsible for the progress and compliance monitoring sections of monthly progress reports during works implementation, with particular reference to health and safety performance and field observations of actual practice in implementation. The E&SO will make inspections both prior to and on completion of works and/or as instructed by the IOC Programme Director for auditing requirements to AFD. It is expected that AFD E&S safeguards specialists will themselves make impromptu inspections to hold programme management to account.

A budget for E&SO and their related tasks – including travel to project sites as relevant – has been included in the budget for the project's PMU. Travel costs will be greater for Madagascar where more dispersed sites are anticipated, and be more modest in the case of Seychelles and Mauritius as most sites are accessible within an hour by vehicle unless on outlying islands.

The appointed E&SO in each country are responsible for implementation of their own (C)EMP under the oversight of the regional E&SO. The latter (see ESMF EMP) is accountable to the IOC/PMU team leader and ultimately to AFD who are accountable to GCF. The E&SO will report to IOC on progress in implementation and compliance as owner of the project and will monitor implementation of project activities. In partnership and/or as owner AFD 'oversees the ex-post evaluation'.[67]

The table below summarises roles and responsibilities for specific ESMF processes

	TA (IOC) and PMU	National Safeguards responsibility
Determination of number and location of sites	PMU, National Met Office National Project Coordinators (NPC)	National E&SO
Agreement for actual site (following plan criteria)	NPC ; E&S Officers	National E&S Officers
Documentation describing site and outline permitting	National E&SO With facilitation by NPC	Environment and/or planning ministry
Quality Assurance and permit approvals	National E&SO facilitation by NPC	Environment Ministries H&S agencies
Contract specifications to include E&S and H&S	IOC Regional TA E&SO	Met Offices and/or agriculture ministry)

[66] IFC Environmental, Health, and Safety General Guidelines, 2007 https://www.ifc.org/wps/wcm/connect/29f5137d-6e17-4660-b1f9-02bf561935e5/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES&CVID=jOWim3p

[67] E&S Framework for "Transforming Financial Systems for Climate" Programme, 2018, steps 3 and 4, p.20

Installation /construction works	NPC	National E&SO
Approval and signing off	NPC	National E&SO
Upkeep and O&M (effective outcome)	National Met Office or Agric. Services NPC	National E&SO

The IOC E&SO position is not a full-time position. The work time is estimated at an average of 2 months per year. The primary responsibility will be in the first phases of the project. He/she will establish final safeguards arrangements and work with the PMU team leader to ensure contracts for facilities renovation works and equipment installations include adequate safeguards stipulations and reporting requirements. The PMU E&SO will handover responsibilities to the PMU team leader and to the National E&SO during months when the E&SO is not at work.

The national E&SO will have a more limited travel and mobilisation requirement in the smaller islands than in Madagascar, where travel will be a significant commitment. It is seen as preferable that such persons be seconded from relevant existing civil service duties so that know-how stays within government services. During project start-up the PMU will propose MOUs with relevant entities to nominate and second national ES&O to the project. In the first two years a quarter of their time is allocated to the project while in subsequent years just 1.5 months is allocated because project works will have been largely completed.

In most islands project sites can be visited within a day, and in most cases within 3-4 hours, except in Madagascar, which is larger in size and will require longer travel time to reach the project sites. It should not be necessary for such a person to visit every river gauge or even renovation site should there be no new land take required for facilities. The meteorological and/or agricultural, water offices or services are the ultimate 'owners' of the project and as such are responsible (with the PMU) to AFD and GFC for effective and valued project outcomes. These include sound performance in safeguards implementation.

Below is an estimated budget to support the implementation of the ESMF. These amounts have been taken into account in the project budget (see Annex 4 Budget- PMU tab).

Provisional Budget allocations				
Staff and Travel	First year	Second year	Each further year	Time input
National expertise staff budgetary allowance	2 months @ USD 2,000/month per expert	2 months @ USD 2,000/month per expert	1 months @ USD 2,000/month per expert	2 months input in each country in first 2 years ; 1 months in subsequent year(7 months in total)
Travel	4 x 2,000	4 x 2,000	4 x 2,000	In-country travel as part of PMU travel allowance
Regional expertise Budget	3,5 months @ USD 2,000/month per expert	3,5 months @ USD 2,000/month per expert	1 months @ USD 2000/month per expert	7 months input Safeguards of E&S Specialist (SS) in first 2 years ; 1 months in subsequent year(10 months total)
Regional travel	2,000	2,000		
Operations contingency	10,000	10,000	10,000	
Consultants to prepare necessary documentation to meet national requirements (e.g. Radar Tower and Met office buildings)	This will be funded under the budget line for equipment installations/buildings under Component 2.			

APPENDIX A: ESIA LEGISLATION IN PARTICIPANT COUNTRIES

Mauritius

Legislation relevant to project interventions of scale anticipated by the Hydromet Project:

Section 16 of the EPA 2002 provides a general guide on a Preliminary Environmental Report (PER). According to section 16(1), a PER shall be-

(a) in conformity with such policy or environmental guidance as may be published in respect of an undertaking and in such form as may be approved by the Director;

(b) duly signed by the proponent of the undertaking or his duly appointed legal representative; and

(c) deposited at the Director's office in 10 copies or in such additional copies as the Director may request.

According to section 16(2), a preliminary environmental report shall contain a description of the undertaking with particulars of –

(a) its location and its surroundings;

(b) its process, design and size;

(c) any data or information necessary to identify and assess the effects which the undertaking is likely to have on the environment, people and society;

(d) the measures which the proponent proposes to take to avoid, reduce and, where possible, remedy any significant effect that the undertaking is likely to have on the environment; and

(e) such other aspects of the undertaking as the Director may require.

According to section 16(3), a preliminary environmental report shall be accompanied by-

(a) a site plan indicating the location of the undertaking;

(b) a non-technical summary, where the report is prepared by a consultant;

(c) a certificate issued by a notary expressing his opinion as to the ownership of

(a) the land on which the undertaking is to be executed, or where the proponent is not the owner of the land, by a written evidence of the permission of the owner, and a certificate issued by a notary expressing his opinion as to the owner's title.

Furthermore, the Director of the relevant division may request such additional information from the proponent as he thinks necessary.

Seychelles

The Ministry of Environment, Energy and Climate Change (MEECC) is responsible for administering the Environmental Protection Act, 2016 (Act 18 of 2016). The functions of the Ministry are established in Section 4 of the Act, as follows:

i) administer, implement and enforce the provisions of this Act;

ii) develop and implement policies, programmes and guidelines in pursuance of the national objectives on environment protection;

iii) co-ordinate the activities of other agencies concerned with the protection of the environment –

a) under this Act; or

b) under any other written law for the time being in force which relates to the objects of this Act;

iv) develop, evolve and where necessary adopt standards for the quality of the environment in its various aspects and for emission or discharge of environmental pollutants from any source whatsoever;

v) commission research and sponsor studies on problems relating to environmental pollution;

vi) examine such manufacturing processes, materials and substances as are likely to cause environmental pollution;

vii) identify areas in which any activity shall not be carried out or shall be carried out subject to certain safeguards;

viii) develop, evolve and where necessary adopt procedures and safeguards for the prevention of accidents which may cause environmental pollution and remedial measures for such accidents;

ix) collect and disseminate information in respect of matters relating to environmental protection;

x) co-ordinate actions required in a state of environmental emergency or any other situation which may pose a serious threat to the environment; and

xi) prepare manuals, codes or guidelines relating to environmental protection and for the prevention, control and abatement of pollution.

APPENDIX B: LIST OF PEOPLE CONSULTED

Date	City	Place	Name/Contact of person
MADAGASCAR			
12/07	Antananarivo	ONE Office Ministry of Environment	Mr. Pierre RAHAGALALA haga@pnae.mg
12/07	Antananarivo	GIZ project office Office	Mr. Jacquis TOHIZARA, Projet Adaptation des chaines de valeurs agricoles au changements Climatiques jacquis.Tohizara@afci.de Mme, Sarah FAVRICHON sarah.favrichon@giz.de
16/07	Antananarivo	AFD	Danielle RABENIRINA Chargée de projets – Secteur Environnement rabenirinad@afd.fr
	Antananarivo	Welt Hunger Hilfe	Julio Rainimananjanahary, julio.rainimananjanahary@welthungerhilfe.de
	Antananarivo	Catholic Relief Services	Jim Hazen, Chief of Party of the USAID Fararano program, james.hazen@crs.org
COMOROS			
4/07	Ndrondroni, Moheli	Ulanga NGO	Site visit in Moheli
4/07	Ndrondroni, Moheli	Ulanga NGO	Site visit in Moheli
4/07	Ouallah 1, Moheli	Ulanga NGO	Site visit in Moheli
4/07	Ndrondroni, Moheli	Ulanga NGO	Site visit in Moheli
4/07	Nioumachoua, Moheli	Ecolodge	Mr. Daniel LAILINA, Director, Park National de Moheli dalayass98@yahoo.fr Jon HILDERANDT info@lakalodge.com
5/07	Fomboni, Moheli	UNDP	Captain Said Ben OMAR, Director Mansourou Anwadhui RRC/UNDP 2 x UN volunteers Abdou Soimadou Ali MAMADI Project CRCCA abdou.soimadou@undp.org
6/07	Fomboni, Moheli	Auberge Les Abou	US Peace Corps personnel
SEYCHELLES			
22/07	Mahé	Meteo Services	Mr. Vincente AMELIE v.amelie@meteo.gov.sc
23/07	Mahé	Ministry of Environment	PS Louis Agricole (Energy/Environment, GCF NDA in Seychelles) PS Alain de COMARMON (Land Use Planning)

			Lambert J. WOODCOCK (ACII), HSI INSURANCE
23/07	Mahé, Mont Fleuri	DRDM	Mr. Paul LABALEINE, Director DRDM plabaleine@drdm.gov.sc Ms. Aisha RACHEL Planning, Intelligence, Research and Information Management Department of Risk and Disaster Management (DRDM) P.O Box 113 Victoria Mahe Global Village. Suite No. 3 Mont Fleuri, Mahe Republic of Seychelles aisha.rachel@drdm.gov.sc tel: + 248 4672200/226
24/07	Praslin, La Digue	Praslin, La Digue	Meteo services
25/07	Mahé, Victoria	SFA	Dr Nathalie Bodin Seychelles Fishing Authority (SFA) P.O. Box 449, Fishing Port, Victoria, Seychelles nbodin@sfa.sc tel: +248 467 0337 whatsapp: +248 256 9039 skype: natbod34
25/07	Mahe, Victoria	Waste Enforcement and Permit Division	Ms. Nanette LAURE, Waste Enforcement and Permit Division n.laure@env.gov.sc

APPENDIX C: PROPOSED INTERVENTIONS AND ISSUES OF CONTRACT RISK PER IOC MEMBER COUNTRY

A marginally higher sensitivity might be expected in respect to works undertaken in Madagascar and Comoros because of potentially more remote sites from the capital and less institutional capacity in government services, including more deficient H&S practice and waste management to be carefully supervised. In these two countries, particular attention will be given to social safeguards by the regional E&S Officer and the national project coordinator, especially in respect to H&S. Doppler units will be at existing airport premises so risk is assessed as medium or B for construction environmental considerations, but risk is accorded with respect to H&S in these two countries.

In the table below differentiation is made between environmental and social impact risks for each of the project sub-components in respect to contract management rather than 'at entry' risk assessment. In this context, environmental risks refer primarily to those around siting of facilities and transport of materials to optimise criteria presented in the ESMF of Section 5. Social risks are seen as those affecting occupational health and safety including accidents and discrimination in employment. Risk categorisation in respect to the below table differentiates a) basic (C), b) moderate (B) and c) high (A)

***Low or Basic** = relevant to contracts with basic Environmental and Social Health and Safety (ESHS) requirements (Level 1)*	**C**	*Typically for contracts in Projects with minor environmental and social construction related impacts and risks which do not require an Environmental and Social Impact Assessment (ESIA) and an Environmental and Social Monitoring Plan (ESMP). During the implementation of the works only limited occupational health and safety measures are required, e. g minor works and small-scale rehabilitation measures; few workers; low transport requirements; no worker camps required; no hazardous wastes; no working at heights or confined spaces; no heavy construction machinery; no external environmental risks like flooding, etc.*
***Moderate or Elevated** = Relevant to contracts with elevated ESHS requirements in addition to* basic or Level 1	**B**	*Typically for contracts in Projects with limited environmental and social impacts and risks which require a standard ESIA. During the implementation of the works standard occupational health and safety measures are required, e. g. less than 100 workers; less complex work site(s), transport of hazardous material, general OHS risks (welding, hazardous material) etc.*
***High** = relevant to contracts with high ESHS requirements in addition to Level2*	**A**	*Typically for contracts in Projects with significant or long term environmental and social impacts and risks which require a separate comprehensive ESIA and an ESMP. During the implementation of the works particular occupational health and safety measures are required, e. g. more than 100 workers, worker camp(s) required, significant risks at complex work sites(s), increased heavy load traffic, etc*

Madagascar

	Intervention type/ activity	Environmental Issues & risks		Social and H&S issues & risks	
Madagascar	Capacity building components, convening meetings/trainings	Transportation/travel impacts Contribution to climate change (GHG emissions)	C	Gender imbalance during capacity building events and in appointments	C
	Office refurbishment and equipping	Carbon footprint/ GHG of equipment production and transportation of materials Waste disposal of previous equipment	C	All risks related to labour and working conditions Safety risks in handling and in wiring	C

	Intervention type/ activity	Environmental Issues & risks		Social and H&S issues & risks	
	Building rehabilitation and extension works (by PNUD, not covered under this project)	Transport of materials Local Impacts possible in respect to: Water quality Release of pollutants (hazardous and non-hazardous waste materials, dust, etc) not significant	B	Construction worker occupational health and safety risks Noise for nearby population Population safety around construction	B
	Weather data measuring units/ stations	Siting of stations if not rehabilitated on existing site Potential removal of vegetation (trees) surrounding the stations (to avoid obstructing the equipment sensors)	C	Personal safety risks in erection of fencing Land use issues	C
	1 x Doppler Radar unit and tower (and Upper Air Station)	To be located at existing obs. site; issues of transportation of materials	C	Construction safety risks Visual impact Noise for nearby population Population safety around construction	C
	60 x Agromet and hydrologic observation stations (also mini obs. facilities) 2 x Vehicles	Local soil vegetation disturbance possible and soil erosion risk, if unlikely	C		C
	1 x Wave-measuring buoy 2 x Tidal Gauge (Mareograph) 1 x Depth sounding system (with generator)	Release of pollutants during transport (not significant)	C	Safety at sea	C

Comores

	Intervention type	Environmental Issues and risks		Social and H&S Issues and risks	
Comoros	Capacity building components convening meetings/trainings	Transportation/travel impacts Contribution to climate change (GHG emissions)	C	Gender imbalance during capacity building events and in appointments	C
	Office refurbishment and equipping (Moroni)	Carbon footprint/ GHG of equipment production and transportation of materials Waste disposal of previous equipment	C	All risks related to labour and working conditions Safety risks in handling and in wiring Temporary noise pollution	C
	Building rehabilitation and extension works (Moroni office by project; Anjouan and Mohéli by PNUD)	Siting; transport of materials. Local Impacts possible in respect to: water quality Release of pollutants (hazardous and non-hazardous waste) not significant Impacts on resource consumption increase in dust emissions	B	Construction safety Noise for nearby population Population safety around construction	B
	Weather data measuring units/ stations	Siting of stations if not rehabilitated on existing site Potential removal of vegetation (trees) surrounding the stations (to avoid obstructing the equipment sensors)	C	Personal Safety risks in erection of fencing Land use issues	C

	Intervention type	Environmental Issues and risks		Social and H&S Issues and risks	
	1 x Doppler Radar unit and tower (and Upper Air Station)	Siting in airport premises; issues of transportation of materials	C	Construction safety Visual and landscape impact Noise for nearby population Population safety around construction	C
	14 x Agromet/hydrologic stations (incl mini obs. facilities) 2/3 x Vehicles	Local soil vegetation disturbance possible, if unlikely Air pollution (not significant)	C		C
	3 x Wave-measuring buoy 2 x Tidal Gauge (Mareograph) 1 x Depth sounding system (and generator)	Release of pollutants during transport (not significant)	C	Safety at sea	C

Seychelles

	Intervention type	Environmental risks/impacts		Social and H&S risks/impacts	
Seychelles	Capacity building components	Transportation/travel impacts GHG emissions	C	Gender imbalance during capacity building events and in appointments	C
	Office refurbishment and equipping	Carbon footprint/ GHG of equipment production and transportation of materials Waste disposal of previous equipment	C	All risks related to labour and working conditions Safety risks in handling and in wiring Temporary noise pollution	C
	Building (by Seychelles gov), rehabilitation and extension works	Siting; transport of materials. Local Impacts possible in respect to: Possible impacts on water quality Release of pollutants (hazardous and non-hazardous waste) not significant increase in dust emissions	B	Construction safety Noise for nearby population Population safety around construction	B
	Weather data measuring units/ stations	Siting of stations if not rehabilitated on existing site Potential removal of vegetation (trees) surrounding the stations (to avoid obstructing the equipment sensors)	C	Personal Safety risks in erection of fencing	C
	1 x Doppler Radar Unit and tower (and Upper Air Station)	Siting at existing telecom location; Air pollution risks due to transportation of materials (not deemed significant)	C	Construction safety Visual and landscape impact (+/-) Noise for nearby population Population safety around construction	C
	16 x Hydrologic stations (also mini obs. facilities) 2 x vehicles	Soil and vegetation disturbance (minor) Air pollution (not of significance)	C		C
	3 x Wave-measuring buoy 2 x Tidal Gauge (Mareograph) 1 x Depth sounding system	Impacts on water quality (not of significance) Release of pollutants during transport (not of significance)	C	Safety at sea	C

Mauritius

	Intervention type	Environmental Issues and risks		Social and H&S Issues and risks	
Mauritius	Capacity building components	Transportation/travel impacts Contribution to climate change (GHG emissions)	C	Gender imbalance during capacity building events and in appointments	C
	Office refurbishment and equipping	Carbon footprint/ GHG of equipment production and transportation of materials Waste disposal of previous equipment (not of significance)	C	All risks related to labour and working conditions Safety risks in handling and in wiring Temporary noise pollution	C
	Building rehabilitation and extension works	Siting; transport of materials. Local Impacts possible in respect to: water quality Release of pollutants (hazardous and non-hazardous waste) not significant Impacts on resource consumption increase in dust emissions(not significant)	B	Construction safety Noise for nearby population Population safety around construction	B
	Weather data measuring units/ stations	Siting of stations when these are not rehabilitated on existing site Potential removal of vegetation surrounding the stations (to avoid obstructing the equipment sensors)	C	Personal safety risks in erection of fencing	C
	1 x Doppler Radar Unit and tower (and Upper Air Station)	Disturbance of vegetation due to siting and landscape at Rodrigues airport; air pollution due to transportation of materials	C	Construction safety Noise for nearby population Population safety around construction	C
	20 x Hydrologic stations (and mini facilities) 2 x vehicles	Possible soil and vegetation disturbance Air pollution (not of significance)	C		C
	3 x Wave-measuring buoy 4 x Tidal Gauges (Mareograph) (M, Rodrigues, Agalega, St Brandon) 3 x Depth sounding system (Rod, Ag, St Brand)	Issues in siting and care/conduct in placement of wave radar buoy and tidal gauges re sensitive seabeds Impacts on water quality Release of pollutants during transport (not significant)	C	Safety at sea	C

APPENDIX D: EXAMPLE OF EQUIPMENT AND INSTALLATIONS FORESEEN

Figure 2: Airport Meteorological Building/Office at Fomboni, Mohéli Island (Comoros), identified for refurbishment and re-equipping

Figure 3:Doppler Radar System, Mauritius

Figure 5:Old weather station with perimeter fence at Mahé Airport, Seychelles

Figure 4: New technology weather measuring and monitoring equipment at Mahé International Airport Seychelles (2019)

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DE DÉVELOPPEMENT

COMMISSION DE
L'OCÉAN INDIEN

Adapt'Action

Building Regional Resilience through Strengthened Meteorological, Hydrological and Climate Services in the Indian Ocean Commission Member Countries (Hydromet Project)

SUMMARY OF COUNTRY CONSULTATIONS

January 2021

COMOROS

MADAGASCAR

MAURITIUS

SEYCHELLES

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6 APPENDIX 1 KICK-OFF MEETING NOTES

Kick-off meeting for the Adapt'Action Hydromet Project Preparation, 10th May 2019, IOC Secretariat, Mauritius

Participants :

COI :	Ginna BONNE, Véronique ESPITALIER-NOEL, Jean-Baptiste ROUTIER, Annaelle HOAREAU
AFD :	André POUILLES-DUPLAIX (Director AFD Mauritius & Seychelles), Sadna NISTAR AMMEARALLY (Project Officer), Nadra BAUBION (Task Team Leader)
EUD :	Rajesh PARBOTEEAH (Climate Change Focal Point, EUD Mauritius & Seychelles)
DAI :	Marie-Ange BAUDOIN (Team Leader), Pascal VENZAC (Hydromet expert), Catherine WALLIS (Project Director)
WMO :	Laurent LABBE, Cyril HONORE, Dominique BEROD, Daniel SIGOHMNOU, Jean-Paul GAUDECHOUXJean-Baptiste MIGRAINE
Seychelles :	Met Authority (Vincent AMELIE CEO, Nelson LALANDE) and OPL (Ms Octavia ROSE)
Mauritius:	MMS S Dindyal, NM K. Bisseur, Water Resources Unit, MK Appasamy, Ministry of Energy and Public Utilities, Mme Rachna Ramsum, Ministry of Finance and Economic Development

Madagascar : participant from Met Directorate and OPL excused
Comores: participant from Met Agency excused

Objectives of the meeting

The aim of the meeting was to officially launch the start of the Hydromet project preparation assignment, awarded to the DAI consortium. The Hydromet project has been in design for the past 2 years by the COI and a concept note was submitted to the Green Climate Fund in September 2018 with support from the AFD Adapt'Action initiative.

During the launch event, meteorology services from Seychelles and Mauritius were asked to present the current activities of their organisation and plans for the future. AFD provided an overview of the Hydromet project preparation institutional set-up and governance structures for validation processes. The DAI consultants provided an overview of the project preparation process consisting of a Feasibility Assessment phase and draft the Full Funding Proposal and relevant annexes. The aim is to provide final FS and FP reports by early December 2019.

Summary of comments

- WMO can provide relevant expertise to support the project preparation and project implementation. Meteo France Reunion is one of the regional support institutions of the OMM and should be a resource. WMO have identified 15 internal relevant staff to support the project.
- The WMO HYCOS next incarnation for the Indian Ocean is under preparation
- The EUD has ear-marked 6m euros for this project for the Indian ocean region. The funding falls under the ACP climate services support financing programme. A PAGODA (project preparation document) will need to be prepared and signed before the end of 2019.
- BRIO project is complementary to the Hydromet project. BRIO is financed by AFD Adapt'Action (300k€), is a 2-year project aimed at training junior staff from 4 countries in climate services and climate forecasting.
- Other complementary projects to cite in the Funding Proposal are: the GCF Readiness project and the COI GCF accreditation process, as well as EU COMESA project on strengthening climate services and met agencies and EU GCCA+ initiative.

- The Adapt'Action Enhancing Resilience to Climate Change (ER2C) in Mauritius assignment is providing technical expertise on climate vulnerability assessments, hydrological assessments of drainage capacity in relation to flood risks and identification of adaptation measures in 6 priority sites on Mauritius island. Recommendations of specific interventions for resilience against floods will form part of the RAFE component of the Hydromet project.

Key decision points

- The project preparation will present 1 single project
- Request from Mauritius MoF to present a breakdown of contributions by funding source for each proposed project activity/component.
- AFD (Gestion des Fonds Delegues) will follow up with EUD to support preparation of PAGODA document to facilitate formal process for EUD funding commitment
- Need to ensure that the integration of the RAFE component (Mauritius only) is coherent with the rest of the Hydromet interventions and justifies having a separate sub-project. RAFE is likely to include both soft and hard adaptation measures for flood-risk reduction, including early warning systems and Hydromet monitoring network upgrade. AFD has already met with GCF and discussed the benefit of including RAFE as a locally applied land planning project and complementary to the other Hydromet components. Through RAFE, the Hydromet project would have more direct measurable impacts on final beneficiaries, hence providing greater leverage to the Funding Proposal. However, RAFE includes hard-infrastructure interventions that will unlikely be funded through GCF grants, under the Hydromet project. Advise to underline RAFE in the project proposal as an additional justification to fund and implement the Hydromet project.
- AFD reminded that GCF is keen on states committing complementary investments (seen as necessary for transformational impact). Mauritius may wish to consider financing some of the infrastructure under RAFE. Financial support from AFD is possible through a loan. This also would strengthen the ownership aspect of the Hydromet project preparation.
- National Focal Points (NFP) have been designated for the Hydromet Project Preparation.

Submission of official reports:

- DAI will send the deliverables to AFD (Maurice: Sadna, Adapt'Action: Alexandre, Siege: Nadra) and IOC (JBR + cc Ginna).
- To ensure coordination and transparency, the IOC will transmit the report through official channels (OPLs) to gather feedback/official validation. The OPL will provide official feedback to the IOC, who will transfer the information back to AFD/consultants. COI will manage this process.
- For technical discussions and exchanges, the consultants are authorised to communicate with relevant technical partners.
- Reunion Island is not a Hydromet project beneficiary. Meteo France Reunion through WMO is a technical partner and can contribute to formulation.
- In some countries (e.g. Mauritius) the OPL can organise meetings to discuss deliverable and compile feedback. In other countries, the NFP play that role. In any case, once deliverables are transmitted, there is an expectation that all necessary instances will be consulted and feedback compiled back to IOC.
- The Inception report will be sent for AFD validation. IOC/member states can comment but no validation required.
- The Feasibility Study and Funding Proposal are the official deliverables which require validation from IOC/member states and AFD.

Action points

- DAI to request background documents, complementary project information from COI, AFD, EUD.
- Organise a call with GCF once scope of RAFE project is better understood to check again whether the inclusion of RAFE is relevant and likely to be accepted.
- To justify including the RAFE component in the Hydromet Project, an AFD loan would need to be agreed with GoM to support hard infrastructure financing.
- AFD to look into financing the building of new Met Authority building in Seychelles. Cost estimate by Gov next week (10mill Rupees or 689k USD)
- IOC to communicate formal names of Hydromet NFP
- A Steering committee meeting should be scheduled to formally validate the FS+FP.

Presentation by Ms. Sandhya Devi DINDYAL, MMS under MoEnv, Mauritius

Overview

- ISO certified since 2008 (9001:2015) in accordance to international regulations
- Communicate forecasts to NDRRMC/Gov
- Issues forecast to marine, aviation, local fishermen, construction companies, tourism and ag sector use information
- 7-day forecast (on website), publish monthly and fortnightly issues of rainfall distribution
- Seasonal forecast and seasonal outlooks produced (summer/winter)
- MoU with universities, data free of cost to help out post doc research / dissertation
- Main station in Vacoas, aeronautical met station at plaisance
- Three sections: applied (hydromet, marine met, agro-met, climatology, publication and public awareness)
- Marine met equipment: Wave rider not operational since Oct 2018, tide gauges in place (4) via buoy data, observations on high water etc
- Provide agromet bulletins for 14 regions in the country
- 31 AWS
- Acquired Met Doppler Radar (JICA grant and RoM financed 1/5^{th,} cost 500m MUR), radius of 250km for rain quantification. In place and operational since 31st March 2019. Used for extreme event characterisation.
- 150 staff in total at MMS.
- MMS are part of the MoEnv (used to be under the OPM).
- The MMS Act has been drafted, awaits being passed.
- Their budget is separate from the MoEnv.
- They have an obligation to charge users for climate data. Cost policy is negotiated on a case by case basis.
- MMS 2018/2019 budget was 266m MUR (included funds linked to doppler acquisition), 2019/2010 budget is 109m MUR.
- Revenues generated by charging climate data are available from the MoF website.
- For donor projects, MoU are possible to provide data free of charge.

First requirements not exhaustive

- Rain recorders (10 by end of the year with financing support from GoM)
- Waverider: 2 for MRU and 1 for Rodrigues
- Storm surge modelling: upgrade with wave and swells component (to be funded by UNDP)
- Capacity building through post graduate degrees
- Local modelling capacity at MMS

Discussion

- There are several critical sites around the country however AWS are not coverins all these critical catchment areas. Need to improve density of AWS.

- No real-time data from AWS, usually data provided within 3 hours (AWS powered by solar energy and configured to optimise energy requirements). Would need range recorders for rainfall to reduce latency.

Presentation from Vincent AMELIE, CEO, Seychelles Met Authority

Overview

- MMS has become autonomous since 2016. They are not budget independent but can decide on the projects to finance.
- The structure includes a section with specialised applications (i.e. Climate change & long- term weather stations, agro-met, hydro-met, aviation met, marine met), additional to operational tasks.
- Collection of rainfall data every morning on Mahe (45 voluntary observation points).
- Want to add AWS, with a threshold to trigger a risk warning
- In the 115 Other islands AWS installed in 2018. Partnered to install low-cost AWS.
- Sea level station monitoring facility (UNESCO)
- Also installed a wave rider buoy (2016), with equipment from Thailand.
- 2nd buoy installed under PUMA project for coastal management (sea surface temp)
- Upper air station (funding from UK met office), data used for forecast preparation and climate modelling.
- Receive models from various institutions (SA, Reunion..)
- Cost recovery: they charge the aviation sector, charge is based on case by case.

Plans ahead and challenges

- Have hired a consultant to design cost recovery scheme (40kUSD), due to start July 2019. Cost recovery would be used to finance other equipment, maintenance. In Tanz, cost recovery provides 35% of met organisation budget. Funding provided by government.
- About to obtain Quality Management Systems ISO 9001: 2015 certification – mainly for aviation sector. Funding provided by government.
- Risk profile (threshold of bad weather events in areas more prone to disasters) -> funding from GCCA+ to develop this
- Strengthened obs network (where to locate the AWS stations). Partnering with regional countries, need to have compatible equipment -> would like funding support for this (GCF?)
- Calibration centre for the region (used to be one in Botswana under SADC) to ensure equipment provides proper reading. Not satisfied with service in Kenya -> would like support (GCF?)
- Upgrade of Synergie & Transmet comms system tool (provided by Meteo France) – system has reached end of life cycle. 350k€ to be upgraded. -> would like support (GCF?)
- Institutional capacity -> would like support (GCF?)

Ongoing projects

- 300K USD – readiness support by DBS to strengthen the NDA ready to vet and support projects for submission to GCF
- Water project (water catchment rehab project by AfBD)
- Seychelles has accepted to host the Regional Climate Portal (Indooceanie Climate Change portal). About to launch in June. Joint management of the portal for 2-year with IOC. Every 2 years SWIO-RCOF event organised by IOC and the data to be hosted in the portal. The interface of data hosted by the website.

7 APPENDIX 2 MISSION SCHEDULE

Acronyms : Marie- Ange Baudouin : MAB; Véronique PASCAL : VPA ; Pascal VENZAC : PVE;
Debasmita BORAL : DBO; Paul VENTON : PAV; Fady HAMADE : FHA; Lino NARANJO : LNA; Julian BERTLIN : JBE

Date	City	Place	Consultant/s	Name/Contact of person	Description
From 23/06 to 16/07	**MADAGASCAR**				
23/06/2019	Antananarivo	Colbert Hotel	MAB-VPA	Ms. Ginna RAKOTOARIMANANA, Risk Consultant in Madagascar	Overview of main actors working on alert system, NGOs involved and other ongoing projects related to climate services (UNDP, GIZ…)
24/06/2019	Antananarivo	Ministere des Affaires Etrangeres	MAB- PVE-VPA-DBO	Multi-stakeholder Meeting (see meeting minutes, Annex 1)	Brief presentation of Hydromet project and consultants' tasks; group discussions around climate services and existing initiatives to strengthen climate services in Madagascar; discussions around access and uses of climate services for climate-sensitive sectors; appointments made for the rest of the week
25/06/2019	Antananarivo	Welthungerhilfe (WHH)	PVE	Mr. Julio RAINIMANANJANAHARY julio.Rainimananjanahary@welthungerhilfe.de	Presentation of the FbF (Forecast based Finance) project developed by WHH in cooperation with DGM
25/06/2019	Antananarivo	UNDP	PVE	Ms. Sophie NYIRABAKWIYE sophie.nyirabakwiye@undp.org TTL	Presentation of the PACARC project and the on-going proposal to GCF from UNDP in cooperation with Ministry of Agriculture and DGM; identification of potential synergies with Hydromet
25/06/2019	Antananarivo	Capacity-Building for Communities (C-for C)	MAB-DBO	Ms. Sariaka NANTENAINA, Director of C-for-C Email: sariaka@c-for-c.org Tel: +261 32 05 061 79	Discussion regarding gender baseline in Madagascar, particularly focusing on livelihoods, agricultural households and fishing communities. Received C-for-C's EU funded-Sahala project's review report
27/06/2019	Antananarivo	Direction generale de la peche	MAB	Mr. M. Randriambola TIANA, Directeur de la peche trce2708@gmail.com tel: 034 05 053 18	Discussing the gaps and strengths in accessing and using climate services (weather forecasts and early warnings) for the Fisheries Department; pathways for improvements and needs to include in Hydromet
27/06/19	Antananarivo	AFD	PVE-VPA	Mme Danielle RABENIRINA, chargée de projet environnement rabenirinad@afd.fr tel : 261 20 22 200 46	Link with other ongoing projects; recommendation to enhance the regional aspect of the project because, in Madagascar, the IOC is not clearly known as it refers to Foreign affairs Data to be provided by AFD : gender data

Date	City	Place	Consultant/s	Name/Contact of person	Description
27/06	Antananarivo	BNCCC	MAB-VPA	BNCCC Mr Todisoa MANANKASINA t.manankasina@yahoo.fr Mr Lalason MARCELLIN (Chef de Division Adaptation) lalasonm@yahoo.fr	Presentation of Hydromet project and discussion about sectors' vulnerability to climate-related hazards; identification of existing vulnerability studies and ongoing climate change-related projects in Madagascar
28/06	Antananarivo	Agriculture	MAB-PVE-VPA	Mr. Rakoto MIALINIRAINY Chef de Service d'Appui au Développement des Filières Végétales d'Exportation. Direction d'Appui à la Production Végétale MAEP	Needs of climate services for agriculture and current services done in cooperation with DGM like agricultural calendars and how to support these through Hydromet. Discussing an on-going project with GIZ about vocal dissemination of agricultural advices through cell phones and potential synergies with Hydromet
28/06	Antananarivo	DGM	PVE-VPA	Mme. Nirivololona RAHOLIJAO niriraholijao@gmail.com DGM	Debriefing of the week and needs of infrastructure investment in compliance with other projects from UNDP and GIZ
28/06	Antananarivo	BGNRC CERVO	PVE-VPA	BNGRC-CERVO Mr. Lalah Christian ANDRIAMIRADO Chef de Service Etudes et Veille - CERVO-BNGRC basebngrc@gmail.com lalahchristian@gmail.com tel : 034 05 480 06	Presentation of CERVO operational platform for crisis management; discussing the link with others projects regarding hydro-meter data
28/06	Antananarivo	USAID	DBO	Dr. Eddy RASOANAIVO Food Security Programme Management Specialist USAID – Madagascar erasoanaivo@usaid.org	Discussion regarding food security and gender baseline in Madagascar, gender assessments conducted during USAID's Fararano project. Mr. RASOANAIVO introduced Fidy RANDRIANASOLO (Food Assistance Monitoring and Disaster Response Specialist), Serge RAMANANTSOA (WASH Specialist) and Corinne RAFAELL (Gender Specialist), with whom a call was organized on 19/07.
12/07	Antananarivo	ONE Office	JBE	Mr. Pierre RAHAGALALA haga@pnae.mg	Discussing the processes to conduct ESIA in Madagascar and approach to proposal; discussion around vulnerability issues in Madagascar
12/07	Antananarivo	GIZ project office Office	JBE	Mr. Jacquis TOHIZARA, Projet Adaptation des chaines de valeurs agricoles au changements Climatiques jacquis.Tohizara@afci.de Mme, Sarah FAVRICHON, sarah.favrichon@giz.de	Discussion of existing GIZ Agromet project in the South of Madagascar, designed to support poor farmers in drought area. Discussing vulnerability for agricultural production and need for climate-related information.

Date	City	Place	Consultant/s	Name/Contact of person	Description
16/07	Antananarivo	AFD	JBE	Danielle RABENIRINA rabenirinad@afd.fr	Courtesy visit and presentation of Hydromet project
From 30/06 to 08/07		**COMOROS**			
1/07	Moroni	ANACM Autorité Nationale de l'Aviation Civile et de la Météorologie	VPA-DBO-MAB-PAV PVE	Mr. Nassur BEN ALI Directeur Général ANACM Mohamed Ahmed YAHAYA Directeur Général Adjoint ANACM Ingénieur SAIFIDINE Mohibaca Baco National Focal Point	General presentation of the project to the General Director of Civil Aviation where Department of Meteorology is situated.
1/07	Moroni	CERVO protection civile	VPA-DBO-MAB-PAV PVE	Colonel Ismael Mr. Illiassa IDJABOU, Sous-Lieutenant, Représentant du COSEP, Point focal national Profil "Risques" iliassa.idjabou@yahoo.fr	Presentation of the alert system as a whole and activation of civil protection action in case of natural disaster crisis; feedback on Cyclone Kenneth for the 3 islands (impacts, responses, recovery process)
1/07	Moroni	Services des pêches	VPA-DBO-MAB-PAV PVE	Mr Kamal MOHAMED, Responsable de suivi VMS et de la Basse de données au CNCSP des Comores kamalmohamed4@gmail.com	Climate services needs analysis and presentation by the General Director of the Service des pêches of its organization.
1/07	Moroni	Service météo	VPA-DBO-MAB-PAV PVE	Ingénieur SAIFIDINE Mohibaca Baco National Focal Point	Rapid visit of the NMHS in Grande Comore and its equipment
2/07	Moroni	Service météo	PVE	Ingénieur SAIFIDINE Mohibaca Baco National Focal Point	Capacity assessment of the met department
2/07	Grand Comore	Ulanga Ngo	VPA-DBO-MAB-PAV-JBL	Site visit in North of Island	Visit of communities impacted by Cyclone Kenneth; focus group discussion to identify early warning received, responses and impacts of Kenneth; and needs to improve EWS at the local level
3/07	Grand Comore	COSEP	VPA	Colonel Ismael Mr. Illiassa IDJABOU, Sous-Lieutenant, Représentant du COSEP, Point focal national Profil "Risques" iliassa.idjabou@yahoo.fr	Cosep alert system implementation and contingence plan activation : case study on Kenneth cyclone
3/07	Grand Comore	Agriculture - CRDE	VPA-DBO-MAB-PAV		Needs of climate services – currently no access to climate services for agricultural activities, and no agromet information available.

Date	City	Place	Consultant/s	Name/Contact of person	Description
3/07	Grand Comore	Directiond e l'Environnement	MAB		Courtesy meeting with the Director, presentation of Hydromt project; document request for latest climate change policy and vulnerability assessment in Comoros
3/07	Grand Comores	AFD	MAB	Mr. Jean-Philippe BOSS, Director; Ms. Aurelie KISCH, Chargee de projets	Courtesy meeting; discussing climate hazards and climate change related problems in Comoros; document request for the last vulnerability assessment produced by AFD
4/07	Grande Comore	Ulanga NGO	VPA-PAV	Site visit in Vouvouni village	Village impacted by flooding; focus group discussion with communities affected by floods to identify needs in terms of better climate services
4/07	Ndrondroni, Moheli	Ulanga NGO	JBE	Site visit in Moheli	Village with a lot of fishermen, impacted during Kenneth by storm surge which have destroyed houses built on the coastline
4/07	Ndrondroni, Moheli	Ulanga NGO	JBE	Site visit in Moheli	Visit and discussion with women farmers working on rice field about climate-related risks and access to climate services
4/07	Ouallah 1, Moheli	Ulanga NGO	JBE	Site visit in Moheli	Discussion about early warnings and climate-related risks with ylang-ylang distillation workers (Renatie Amada)
4/07	Ndrondroni, Moheli	Ulanga NGO	JBE	Site visit in Moheli	Discussion with an intendant at Ndrondroni Irrigation Scheme, and with fishermen on livelihood mode and use of forecasting data.
4/07	Nioumachoua, Moheli	Ecolodge	JBE	Mr. Daniel LAILINA, Director, Park National de Moheli dalayass98@yahoo.fr Jon HILDERANDT info@lakalodge.com	Discussion on tourism and constraints; ecotourism and meteorological data (not collected at national park).
5/07	Grande Comores	UNDP	VPA-DBO	Mr. Mohamed LIHADJI, IT specialist. mohamed.lihadji@undp.org M Youssouf coordinator manager abderemane.mohamed@undp.org	General presentation of the GCF UNDP project being implemented in Comoros (water security) and potential links/synergies with Hydromet
5/07	Grande Comores	FAO	VPA-DBO	Mme. Alicia NGUETTA alicia.nguetta@fao.org	Presentation of projects related to food security and agriculture which might have link with Hydromet. Information on gender assessment and baseline currently being undertaken in Comoros, particularly with World Bank-GAFSP.

Date	City	Place	Consultant/s	Name/Contact of person	Description
5/07	Fomboni, Moheli	UNDP	JBE	Captain Said Ben OMAR, Director Mansourou Anwadhui RRC/UNDP 2 x UN volunteers Abdou Soimadou Ali MAMADI Project CRCCA abdou.soimadou@undp.org	Discussion with members of the Risk Reduction and Climate Change Unit on Moheli.
6/07	Fomboni, Moheli	Auberge Les Abou	JBE	US Peace Corps personnel	Moheli health and development issues.
5-6/07	Anjouan	Ulanga Ngo	MAB	Mr. Halidi Ahmed Ben ALI halidibenali@yahoo.fr	Site visits and meetings with farming communities affected by cyclone Kenneth; focus group discussions on the losses in the context of cyclones, early warnings and support (or lack of) received and needs of farmers
From 22/07 to 27/07		SEYCHELLES			
22/07	Mahé	Meteo Services	MAB-VPA-PVE-FHA-DBO-LNA-JBE	Mr. Vincente AMELIE v.amelie@meteo.gov.sc	Multi-stakeholders meeting with all concerned stakeholders (institutions) affected by climate hazards, including rep. of agriculture, fisheries, tourism, transport, disaster risk reduction, met. services Case study presentation to illustrate DRR in Seychelles, focusing on a flash flood event in Ans-aux-Pins Scheduling meetings for the week
23/07	Mahé	Ministry of Environment	MAB-VPA-PVE-FHA-DBO-LNA-JBE	PS Louis Agricole (Energy/Environment, GCF NDA in Seychelles) PS Alain de COMARMON (Land Use Planning) Lambert J. WOODCOCK (ACII), HSI INSURANCE	Courtesy visit to present Hydromet project and discuss co-financing commitment from the Government of Seychelles Introducing Hydromet to insurance sector and land use planning
23/07	Mahé, Mont Fleuri	DRDM	MAB-VPA-JBE-PVE	Mr. Paul LABALEINE, Director DRDM plabaleine@drdm.gov.sc Ms. Aisha RACHEL Planning, Intelligence, Research and Information Management Department of Risk and Disaster Management (DRDM) P.O Box 113 Victoria Mahe Global Village. Suite No. 3 Mont Fleuri, Mahe	Discussion about disaster risk management in Seychelles

Date	City	Place	Consultant/s	Name/Contact of person	Description
				Republic of Seychelles aisha.rachel@drdm.gov.sc tel: + 248 4672200/226	
24/07	Praslin, La Digue	Praslin, La Digue	MAB-VPA-PVE-FHA-DBO-LNA-JBE	Meteo services	Site visit of Praslin and La Digue to observe coastal erosion problems and measures implemented by the government/private sector to protect coastal areas
25/07	Mahé, Victoria	Ministry of Environment, Climate Change Unit	MAB-VPA-JBE	Ms. Elissa LALANDE Senior Policy Analyst for Climate Change Department of Energy & Climate Change Mins. Environment, Energy & Climate Change elalande@env.gov.sc tel: +248 4670 400	Discussion of existing climate change related projects in Seychelles; document exchange: team received Seychelles' climate change adaptation strategies (Coastal Management Plan; Wetland Management Plan)
25/07	Mahé, Victoria	Ministry of Social Affairs, Community Development and Sports	DBO	Mrs. Linda WILLIAM-MELANIE P.O. Box 190 Unity House, Block C, 2nd Floor Victoria, Republic of Seychelles lwilliam@gov.sc tel: +248 281621	Discussion of current levels of gender mainstreaming across Ministries and government priorities regarding gender inequalities. Needs identification regarding youth, gender, disaster risk reduction and climate information, along with policy-level interventions both currently in the pipeline and recently published. SADC gender and climate change protocol, and adoption of these guidelines in Seychelles.
25/07	Mahé, Victoria	SFA	VPA-PVE-MAB-JBE-LNA-FHA	Dr Nathalie Bodin Seychelles Fishing Authority (SFA) P.O. Box 449, Fishing Port, Victoria, Seychelles nbodin@sfa.sc tel: +248 467 0337 whatsapp: +248 256 9039 skype: natbod34	Discussion of climate vulnerability in the fishery sector and needs to access climate services; document request for vulnerability assessment in the fishery sector and economic data about losses related to climate change-related hazards, e.g. algal blooms (identified as key hazards for artisanal fishery in Seychelles)
25/07	Mahe, Victoria	Waste Enforcement and Permit Division	JBE	Ms. Nanette LAURE, Waste Enforcement and Permit Division n.laure@env.gov.sc	Discussion of ESIA processes in Seychelles

Date	City	Place	Consultant/s	Name/Contact of person	Description
26/07	Mahé, Ans-aux-Pins	DA (district authority)	VPA-MAB-LNA	ANSE AUX PINS, District Authority Travis CHANG PEN TIVE tchangpentive@gov.sc 2724169	Discussion about flash flood risks in the district, access to, and dissemination of early warnings at the local level, local district contingency plan and local operating system for case study
26/07	Mahé Victoria	Aviation	VPA-PVE-MAB-JBE-LNA-FHA	Meteo Services	Wrap up session with the NHMS team
26/07	Mahé Victoria	Insurance HSI	FHA	Mr. Lambert J. WOODCOCK (ACII), Chartered Insurer General Manager H. Savy Insurance Company Limited PO Box 887 | Victoria | Mahé | Seychelles l.woodcock@hsi.scl / www.hsi.sc tel: +248 4280 400 direct line :+248 4280 402 fax +248 4321 666	Insurance companies have direct interest with an EWS. Discussion about the contribution of an EWS to avoid damages and costs. Costs avoided could contribute to reduce insurance premium. .
From 29/08 to 02/08		MAURITIUS			
30/07	Port Louis	Foreign office	MAB-VPA-PVE-LNA-FHA-DBO	Multi-stakeholder meeting organized by the OPL and Foreign Affairs for Hydromet project	Multi-stakeholders meeting with all concerned stakeholders (institutions) affected by climate hazards, including rep. of disaster risk reduction, met. Services, water management, land drainage authority; brief attendance of GCF NDA (Rachna RAMSUM, Ministry of Finance) Scheduling meetings for the week
31/07	Vacoas	MMS	PVE-LNA	Mr. Renganaden VIRASAMI and Mrs. Sandhya Devi DINDYAL Mauritius Meteorological Services	Presentation of MMS activities, equipment and staff.
31/07	Rose Hill	WRU	MAB-VPA-FHA	Mr Lomush JUGGOO, Director, WRU ljuggoo@govmu.org Mr. Mahendra Kumar BISSESSUR Ministry of Energy and Public Utilities Water Resources Unit (Meeting with Director)	Presentation of Hydromet project and identification of pathways to improve access and uses of climate services at WRU
31/07	Ebene	IOC	MAB-VPA-FHA	Mr. Jean Baptiste ROUTIER jb.routier@coi-ioc.org Indian Ocean Commission	Presentation of the mission outcomes; discussion of the institutional arrangement for Hydromet and potential role of IOC as executing entity

Date	City	Place	Consultant/s	Name/Contact of person	Description
31/07	Ebene	Business Mauritius	MAB-VPA-FHA	Mr. Mickael APAYA, Head of Sustainability and Inclusive Growth m.apaya@businessmauritius.org	Presentation of Hydromet project and discussion of potential needs for climate services among business organizations in Mauritius; identification of potential beneficiaries of the met services.
31/07	3rd Floor, Ken Lee Building, Edith Cavell Street, Port Louis	Shipping Directory	PVE-LNA	Mr. Louis Alain Enrico DONAT (Director of Shipping) Ms. Varsha RAMLAUL Ministry of Ocean Economy, Marine Resources, Fisheries and Shipping (Shipping Division)	Presentation of shipping activities in Mauritius and needs of climate services
31/07	Citadelle Mall Sir Virgil Naz St, 6th Floor Port Louis	NDRRMC	PVE-LNA	Ms. Shivanee APPADOO Ms. Smreetee CYPARSADE National Disaster Risk Reduction and Management Centre	Presentation of risk reduction activities in Mauritius and needs of climate services
01/08	Reduit		FHA-LNA	Mr. V NUNDLAUL National Parks and Conservation Services (Ministry of Agro Industry and Food Security)	Discussion of how climate services could improve agriculture.
01/08	Vacoas	MMS	PVE	Mr. Renganaden VIRASAMI and Mrs. Sandhya Devi DINDYAL Mauritius Meteorological Services	Establishment of the list of activities to be supported by the project
01/08	Citadelle Mall Sir Virgil Naz St, Port Louis	LDA	MAB-PVE	Mr. Rajaram LUXIMON Land Drainage Authority	Presentation of Hydromet project and identification of needs from LDA that could be integrated into the project; document request for Mauritius maps with drainage system and flood-prone areas
01/08	Ken Lee Tower, Port Louis	Climate Change Unit, Ministry of Environment	MAB	Mr. S BUSKALAWA sbuskalawa@gov.mu.org	Presentation of Hydromet project; discussion of existing climate change-related project in Mauritius
01/08	Ministry of Tourism Level 5, Air Mauritius Centre, John Kennedy Street, Port Louis.	Tourism	FHA	Ms Lalita SANSPEUR, Principal Tourism Planer	Discussing the needs of the tourism sector for Climate Services and EWS.
01/08	Caudan, Port Louis	AFD	MAB-PVE-FHA	Mr. Andre POUILLES-DUPLAIXA, Director pouilles-duplaixa@afd.fr	Discussion of the mission outcomes and future orientation for Hydromet project development

Date	City	Place	Consultant/s	Name/Contact of person	Description
02/08	Albion	Fisheries Research Centre	PVE	Mrs Yajoshi BASANT RAI (Assistant Director), Mr Pradeep NEERMUL (Scientific Officer), Mr Sanjeev LECKRAZ (Scientific Officer), Mr Dharmendra DEGAMBUR (Scientific Officer)	Presentation of Hydromet project and identification of needs from Fisheries that could be integrated into the project
02/08	Gender Unit, 6TH Floor CSK Building, Remy Ollier Street, Port Louis.	Ministry of Gender Equality, Child Development and Family Welfare	DBO	Mrs. Ranee NUNDAH Gender Coordinator snundah@govmu.org tel: +230 52562493 Mrs. N. SEEREEKISSAN Gender Coordinator nseereekisan@govmu.org tel: +230 2063808 Mrs. Kate MAHNIEU-KOTADOO Gender Coordinator mah-nieu@govmu.org tel: +230 59020198	Brief presentation of Hydromet project and its gender equality goals (both nationally and regionally) Discussion of gender mainstreaming capacities and activities among different governmental units, particularly gender cell within the MoE. Identification of priority issues of men and women, particularly with regard to flash floods, losses incurred due to port closure, in the backdrop of scant, often inaccurate, meteo information and services.

8 APPENDIX 3 COMOROS PRE-VALIDATION WORKSHOP NOTES

Etude de faisabilité du projet régional Hydromet COI/Adapt'Action AFD
Atelier national de pré-validation des interventions
Comores, 3 Septembre, Hôtel Le Retaj, Moroni

Participants :
Bureau d'études DAI : Marie-Ange Baudoin, Pascal Venzac, Catherine Wallis
PTFs: AFD (Philippe Bosse), PNUD (Mohamed Lihadj), Croissant Rouge (Ali Petamed)
Représentants Gouvernement (20)
ANACM/Météo, SG Ministère des Transports Maritimes et Aeriens, Direction de l'Agriculture, Direction de la Pêche, DGEF, DNSAE, Garde Cotes, INRAPE, ONG Ulanga/Université des Comores, SONEDE, Juriste.
Represents Mohéli (3) : Chambre agriculture, DR tourisme et DR pêche
Représentants Anjouan (3) : Association pêcheurs, DR tourisme et DR pêche

Retours

<u>Composante 1</u>

- Quelle serait l'implication des universités des autres régions en lien avec l'ANACM ? Dans les formations prévues penser à la question de la pérennité (personnes formées doivent rester en poste)
- Commentaire Pêche : Il faudrait que les informations qui récupère l'ANACM puisse aussi arriver utilisateurs finaux. Enjeu de la transmission des informations. Mettre l'accent sur les activités à mettre en œuvre. DAI : focus sur User Interface Plateforme, On reviendra sur le développement de services pour la pêche dans la composante 3.
- Mr Ouledi, ULANGA, Resp du Master GRC : on ne doit pas cibler le choix de formation pour une structure donnée (ANACM). Ce serait répéter les erreurs du passé. Il faut former dans le cadre d'une formation initiale. Toucher un plus grand nombre d'étudiants. Prendre en compte l'existence de l'Université des Comores depuis 20 ans. DAI : bien note.
- Mention des bouées : besoin de formation sur la météo marine.
- Mention des Bénéficiaires direct

Composante 2

- Serait-ce pertinent d'utiliser des relais pour transférer les infos en temps réel auprès des utilisateurs des services climatiques. Tiendra-t-on compte de renforcer un Equipment météo en lien avec les utilisateurs.
- Le PNUD a prévu d'appuyer la ANACM sur les équipements également. Besoin de se coordonner.
- Comment se fait l'accès avec les utilisateurs de l'information ? Quelles sont les interfaces prévues ? Quelle sera la collaboration avec les organismes de télécommunications ?
- Besoin clair de relever le niveau de la qualité des prévisions de Comores et des systèmes de communication. Pour le moment nous passons via l'ASECNA pour transmettre les données synoptiques vers Madagascar.
- Question des inondations : insistance sur l'aléa inondations par rapport à la pluie. Le projet propose-t-il des mesures pour la lutte contre les inondations de déferlement ?
- Une mission d'analyse WB post Kenneth est en cours. Complémentarité des projets. Besoin claire de prévisions plus fines (à l'aide d'une bathymétrie côtière établie) pour modéliser érosion des côtes.
- Directeur Météo : remarque sur le besoin d'inclure le réseau pluvio/sonde, c'est à rediscuter. Autre priorité : question des marégraphes. Un seul marégraphe dans le port de Moroni. Il faudrait aussi équiper les iles.
- Reste à chiffrer le marégraphe, réseau foudre.
- Bouée : quid des mesures de vent, pression, vent également en plus des mesures d'hauteur de vague. Pascal : il faut en discuter car ce type de bouée coute plus cher.
- Systèmes de production TV : pourra aussi inclure d'autres canaux de coms (e.g. radio, SMS etc.), ce qui est prévu dans le système de production générique
- Descente d'échelle : objectif du radar est de localiser les pluies, important car beaucoup de microclimats.
- Demande du Directeur météo de revoir le budget pour inclure un appui sur les prévisions marines.

Composante 3

- Correction dans le schéma DRR : le COSEP n'a pas pour mission de faire des prévisions de crues, c'est aux services hydrométéo. Il y a eu 15 personnes de la météo formées justement là-dessus à Madagascar.
- Le COSEP est la composante fonctionnelle du Direction Générale de la Sécurité Civile
- AFD : penser à prévoir un fonds de roulement pour permettre le fonctionnement du NHMS. Important également de prévoir une réflexion sur le développement pérenne de l'organisation (ANACM), au-delà de la provision d'équipements et de formations. Penser à renforcer les ressources humaines et se donner le moyen de travailler sur les 3 iles (bien étudier la situation initiale pour comprendre les blocages avant de lancer des interventions)
- Important de promouvoir et d'impliquer l'Université des Comores dans les activités de formation et de jumelage éventuel avec d'autres centres universitaires de la sous-région, y compris sur Mayotte et la Réunion
- Anjouan pêche : les pêcheurs utilisent davantage les prévisions de Météo Mayotte car considérées plus fiables. Comment compte-t-on communiquer les informations qui seront produites par l'ANACM ?
- Relais possible des alertes dans les communautés : les mosquées
- Il existerait une « plateforme » regroupant l'INRAPE, COSEP etc.
- Consensus de la salle sur le besoin de renforcer le plateau technique de la météo en parallèle des liens avec les utilisateurs des services climatiques.
- Il y a eu des tentatives de transmissions de prévis météo aux pêcheurs via SMS mais cela n'a pas abouti.

- L'Alerte jaune informant de la venue du cyclone Kenneth est parvenue 24 heures après l'émission de l'alerte par la météo.
- Autre institution qui pourrait être incluse dans la chaine de valeur: l'agence du numérique
- Le Réseau National des Aires Protégées est un autre acteur important qui pourrait vouloir bénéficier de services climatiques

Autres projets :

- PNUD appuie également l'ANACM. Il est également prévu un radar a priori, penser à coordonner.
- Projet PNUD FVC sur la résilience des ressources en eau, inclut des équipements de pompage et réservoirs, budget 40m
- Bien penser à mentionner la complémentarité entre Hydromet COI et le PNUD aux Comores
- Intégrer la spécificité des Comores, un archipel d'iles proches, notamment prévoir les budgets pour améliorer la communication entre les iles et leurs institutions. Accepter que cela peut engendrer des couts supplémentaires.
- Projet BAD sur l'e-gouvernance
- Projet CRCCA sur l'agro-météo (PNUD ?)
- Project PNUD GIRE en cours
- Projet régional Mozambique, Malawi, Comores sur Résilience Urbaine, vient d'être acceptée par le FVC.
- Appuis aussi ponctuels par l'OMS dans domaine de la sante
- Project WB sur les infrastructures routières (projet de reconstruction suite à Kenneth), beaucoup de dégâts constates dus à la houle et l'érosion côtière qui s'ensuit.
- Données bathymétriques dérivées d'infos satellitaires. Plus d'équipement en mer. Collaboration avec RIMES (Bangkok) pour renforcer ces données. Formations faites en Inde. En attente de la poursuite du financement pour terminer.

9 APPENDIX 4 MADAGASCAR PRE-VALIDATION WORKSHOP NOTES

Etude de faisabilité du projet régional Hydromet COI/Adapt'Action AFD
Atelier national de pré-validation des interventions
Madagascar, 29 Aout, Ministère Affaires Etrangères, Antananarivo

Participants :
Bureau d'études DAI : Marie-Ange Baudoin, Pascal Venzac, Catherine Wallis
AFD : Alexandre Lauret, Danielle Rabenirina
GIZ/PRCCC/PAGE : Narindra Razafimalala
12 participants Gov : DGM Directrice, DGM/DEM, DGM/DRDH, SFCFE BNCCC /REDD+, CPGU, Ministère Sante, MAEP/DGDP Pêche, Agence des Transports Terrestres, Confédération tourisme, MAE.

Retours

Composante 1
AFD Madagascar : Comment est fait le lien avec la politique nationale sur les objectifs de formation, pour aller vers la pérennité des actions Hydromet ? Besoin de voir l'arrimage avec la stratégie nationale actuelle.
Réponse DAI : Les interventions seront cohérentes avec le plan de renf. institutionnel de la DGM et de la stratégie nationale. Compatible avec les ressources nationales/budget. Hydromet prévoie le renforcement du cadre de travail, compétences (notamment sur les nouveaux instruments météo/équipements).

Directrice DGM : attention aux aspects régionaux et au risque de duplication.

- Stratégie régionale de modélisation numérique.
- Par exemple SADC développe également des projets (renf de cap national, chaque pays dote d'équipements puissants/ordinateurs DTM).

- Tous les membres de la COI participent au SAR-COF et cela duplique avec SWIO-COF.
- Centre RCC : création d'un centre de formation à l'ile Maurice.

Ne pense pas que l'aspect régional doit être mentionne à cet atelier, se concentrer sur les éléments malgaches avec les secteurs représentés autour de la table. Besoin d'une coordination avec les autres projets au niveau des PTF. Projets en cours : Agromet, Association Régionale (Afrique) 1. Dans projet PACARC : projet de travail sur politique nationale de la météorologie (statut, pérennisation des infrastructures météo).

4 projets en préparation pour le GCF :
- Renf Cap pays SWIOC Implémentation Tropical suite au cyclone IDAI comite des cyclones de la COI,
- Hydromet UNDP,
- RIMES système alerte précoce[68], et
- Adapt'Action Hydromet

BNCC/NDA : Il n'y aura pas de lettre de non objection si on ne clarifie pas le non chevauchement. La cible est la DGM. Quel va être l'impact concret au sein de la DGM. Changer le nom du projet autre que Hydromet car duplication avec le projet PNUD.

Autre commentaire :
Activités transversales dans le projet (C1 : formation sur suivi évaluation). Pourquoi seulement la DGM et qq secteurs ? DAI : en effet pourrais également inclure au besoin le BNGRC

<u>Composante 2</u>
CPGU :
- Sur mise en place du radar, donner des critères sur le choix du pays.
- Renf le système pluviométrique. Est-il prévu de mettre des stations hydrométriques plutôt pour prise en compte du risque inondation ?
- Propose d'évaluer la capacité actuelle de la DGM sur système d'information et recevoir les équipements. Est-ce que la DGM est bien équipée pour accueillir les centres de calcul ? Cela va influencer les conditions de fonctionnement pour le service de données.
- Court/Moyen terme : quelles activités sont pour la DGM ou bien pour tous les membres de la COI.
- Météo France Réunion : formation prévue sur amélioration prévisions dans l'IO, comment prioriser pour Madagascar ? Comment différencier avec ce projet Adapt'Action.

DGM
- Enjeu pour projections climatiques résolution haute sur Mada, très diffèrent par rapport aux autres états COI plus petits
- Projet PRADA (EU/GIZ). TdRs élaboré. Activité prévue 2020 sur transmission de données en collab avec THAMO.
- PRADA et PRCCC : renf de la capacité de la DGM prévue (collecte et transmission de données).
- Besoin d'un atelier de coordination avec la PTFs, a l'heure actuelle pas de transmission de ces données en services climatiques.
- Besoin de données de marées. Priorité de Madagascar en matière d'observations marines, assistance portuaire. Tellement de projets de faisabilité mais peu d'action concrètes. Que le marégraphe en place.
- Veut des choses concrètes, a besoin d'être mis en œuvre le plus tôt possible en 2021.

Pêche :

[68] Regional Integrated Multi-Hazard Early Warning System for the Afro-Asian Region[68]

- Manque constaté : données marines ?
- Pluviométrie. Y-il un moyen de prévoir la grêle ? Surtout les vignobles, pour réagir à temps. Réponse DGM : Earth Networks. Lancement demain sur lancement capteurs de foudre. Refabrique une image proxy radar et reconstruire images de la pluie/grêle.

AFD :

- Besoin de délimiter les secteurs d'intervention. Idée de se concentrer sur certains secteurs ?

Réponse DAI :

- Radar Mada, rayon d'action 200-400km. Il faudrait plusieurs radars pour couvrir le pays. Proposition de le positionner autour de Tana. Prévisions sur pluie qui tombe, besoin de trouver un site haut sur Tana. Pas besoin de préciser la localisation à ce stade.
- Capacité assessment : aspects humains étudiés en partie au cours de la FS. Capacité structurelle, besoin de climatisation et sécurité électrique, pour mise aux normes, connexion télécom et internet
- Réseau hydro serait pris en charge dans le cadre du projet PNUD (cf.doc PPCR 2017)
- Projet BRIO a la COI. Résolution de 12 x 12 km. RIMES : exploitation d'autres données.
- Bouée prévue pour les observations en mer. Mesure de hauteur de vague. Données arrivent à la DGM. Bouée permet de mieux calibrer les modèles. Aspects marins pourra être considéré sur des zones de pêche importantes.
- Sur infrastructure Composante 2 : équipement assez transversal. Concentration sur secteurs va se faire sur composante 3.

<u>Composante 3</u>

DGM :

- Besoin de considérer des actions sectorielles (sante, tourisme, transport)
- Banque Mondiale : projet de sécurité routière. Approche : appli alertes pour les routiers. OMM va règlementer secteur urbain. Liste des secteurs qui vont être ajoutes : sante, énergie, urbain, transport terrestre, tourisme. Agriculture déjà règlementé, transports maritimes et aériens.
- MATHPT (infrastructure) : Atelier PRCCC le 28 aout. Politique Nationale des Investissements en Infrastructure. Formation sur mainstreaming des services climatiques. Besoin de renf. Ont bien exprime leurs besoins en services climatiques. Suite logique : création plateforme usagers climat/usagers.
- DGM va convoquer ATT et transport aérien. Fait partie du plan 2019. Projet PACARC (elab pol national climatologie et plateforme NCCS interface usagers secteurs). Déjà des avancées sur secteur sante : bulletin climat/sante. Réunion le 9 sept sur interface avec usagers secteur agricole.
- Propose de se projeter sur des activités réalistes. Focaliser sur les secteurs. Besoin de recaler avec les besoins nationaux et la DGM.
- Prévoient un déploiement des ingénieurs dans les régions. Lignes de crédit pour les régions, pour inclure les services météo dans les régions. Besoin de travailler sur mise en place interface usagers au niveau régional. Usagers régionaux presses d'avoir interlocuteurs météo. MAEP ont déjà toutes des directions régionales. 20 services regionaux de la météo créée. Il en reste 3 à créer en 2020.
- DRDH travaille pour fournir des prévisions saisonnières au niveau des districts. Infos régionales pas intéressantes pour usagers. Services regionaux auront à élaborer des prévisions saisonnières au niveau des districts. Down-scaling. Grand besoin de renforcer.

Transport routier/aérien. Majorité des compagnies aériennes sont partenaires. Déjà des stations spécifiques pour le transport terrestres. Besoin de stations sur glissements de terrain.

BNCCC : à l'écoute de tous les secteurs. Ce qui compte, la DGM bénéfice de l'appui pour que le pays soit plus resilient. Besoins doivent être manifestes par les secteurs.

Réponse DAI :

- Appropriation nationale fera que d'autres secteurs pourront être inclus. Si pour météo routière besoin de stations sur zone spécifique – on pourra transformer une station agro met en station routière.

Autres projets :

- Projet MEDER (réseau de radars, détection de foudre)
- Project IOS-NET COI, secteur Energie avec univ Réunion. Stations de rayonnement solaire a Diego Suerez et Tana. Lancement à Maurice du 4-6 sept. DGM en charge d'installer les capteurs
- Secteur tropicaux OMM qui gère
- Project CREWS, WB GDRR/UNISDR/OMM, 23 m de USD sur Mada, en cours de préparation (John Harding).
- Exemple cite du Burkina CREWS : mise à la norme des stations aérodromes une priorité.

Montage institutionnel

- Dans définition des fiches de poste, voir la fréquence des missions dans les pays pour faire le suivi.
- Recrutement externe et rattache à la Directrice. Assistant Technique qui rend des comptes au DGM. PRADA va recruter un allemand qui sera base à la DGM.
- Réunions régulières avec autres pays : pas à l'aise si fonctionnaires ne participent pas. Il faut que la personne pertinente techniquement soit impliqué.
- Aussi besoin d'un point focal a la DGM qui représenterait le projet sur Mada.

Calendrier :
Mi-octobre : session régionale cyclones, puis COP

Alexandre :

- En tant que bailleur, fait son possible pour s'harmoniser avec les PTFs. Besoin de l'appui des autorités nationales pour identifier projets à venir.
- Retour des utilisateurs : très utile pour nous de les recevoir, pour définir des activités qui correspondent bien aux besoins
- Role DGM/NDA Mada de priorizar. Il faut démontrer aux autres bailleurs que ce projet Hydromet répond aux besoins et prioriser. Autres projets pas au même stade de développement.

DGM : bien détailler les thèmes et interventions pour que la DGM puisse se prononcer.

Frais de gestion : NDA/unité de gestion de projet – sera à clarifier.

Actions

- Retour attendu du DGM sur tableau des détaillé des interventions, en précisant les priorités, autres initiatives en cours et stade d'instruction/avancement.
- DGM partage les TdRs PRADA avec THAMO
- DGM : Envoi DNQ/PNB chronogramme aviation civile
- Besoin de lancer les invitations à l'atelier régional au moins un mois à l'avance. Cas ou les fonctionnaires utilisent leurs passeports civils (visa ensuite rembourses par SADC/ OMM)

10 APPENDIX 5 MAURITIUS PRE-VALIDATION WORKSHOP NOTES

Etude de faisabilité du projet régional Hydromet COI/Adapt'Action AFD
Atelier national de pré-validation des interventions
Mauritius, 6 September, IOC Commission Offices, Ebène

Participants:

DAI: Marie-Ange Baudoin, Pascal Venzac, Veronique Pascal, Fady Hamade, Paul Venton, Rachael Steller

Mauritius Key Stakeholders: P. Sohatee-Tulloo (Shipping Division, Ministry of Ocean Economy, Marine Resources, Fisheries and Shipping); S. Cootapen (Fisheries, Ministry of Ocean Economy, Marine Resources, Fisheries and Shipping); R. Ramsurn (Ministry of Finance); A. Goung (National Parks and Conservation Service); N. Seerunden (Land Drainage Authority); S. Ragoonaden (MACOSS – NGO); S. Cypaisade (NDRRMC); D. Remeuk (Ministry of Foreign Affairs – RID); M. Rucktooa (Ministry of Foreign Affairs – RID); Y. Kato (Japanese Embassy); R. Dhurmea (Meteorological Services); Z. Jhumka (Forestry Service); A. Lauret (AFD); C. Marie (AFD); R. Virasaui (Meteorological Services); P. Ramnauth (Ministry of Tourism); S. Ramdowar (Ministry of Public Infrastructure and Land Transport); S. Ramchura (UNDP); M.K. Bissessur (Ministry of Energy and Public Utilities)

Component 1

- When purchase equipment, have a maintenance contract with supplier? But this is limited, usually to only one year. Doesn't cover ongoing calibration or issues after maintenance contract.
- Focused more on meteorological services, less on hydrological? Concern about increasing flash floods, need to capture water. Need institutional strengthening of hydrological services (WRU). Need more discussion of drought. Not visible in components.
- Which organisation needs strengthening regarding hydrology.
- Health and agriculture, as end users, need to be involved.
- But equally, GCF likes focused projects. Can expand in phase 2.
- Also end users come into Component 3.
- In selection of sectors, have to see where there are most climate-related losses, so can rationalise to GCF that project is climate related.
- Document re renewable energy to be shared.
- Already have EWS for tourism sector, not new?
- Sustainability – R&D component?
- Link to NDRRMC? In component 3.

- Water sector has data collection mandate.
- Hydrological engineering
- Matrix of which institutions will benefit, identify who want to train and for what purposes

Component 2

- Data collection system in each country but similar. Experts in each country working together to set up weather monitoring system. Will have to decide whether to have computing centre in each country or centralised.
- One tender for all equipment/infrastructure
- Land drainage master plan overlap?
- Regional maintenance *and calibration* centre
- Basis of cost analysis? Other similar projects and experience. Can use current GCF project for basis.
- Use of cloud to host data to save hardware costs? A choice available regionally, can be left open in feasibility study, and can decide during technical study at start of project.

Component 3

- If something already in place for tourism, should we focus on something else, like health? Water?
- Look to NDS 2015 for key actors
- Specific, dynamic flood model needed for each country
- Forecasting exists, but could be improved, and impact could be improved. In other countries don't have forecasting, so not all interventions will be the same across region.
- Data is collected, but not in user friendly format or analysed. Need to modernise the system.
- Showcase hydromet and climate services with water, rather than mixing early warning and climate services. EWS is short-term (hours or days) alert, whereas climate services are longer term.
- Don't know when to issue the early warning without the modelling to back it up (climate services)
- Acting on early warnings? NDRRMC working on this through Gap Analysis
- Global model to be adapted to each country. Requires accurate data at all levels – from what is in the atmosphere to what is happening below ground. Need to constantly implement new technology into model. Then each country works with the global model to make it more locally precise.
- Have to start somewhere – before producing detailed climate services, need a model to work from and refine.
- Model needs to include parks, not just built up areas. People spend their weekends in parks, and need to be evacuated as well.
- NGOs focused on climate change need to be included in the project – in implementation, through sensitisation workshops
- World Meteorological Services – need to look at the 5 priority areas, includes health
- Ecological model needed to address, for example, wetland backfilling

Related Projects

- National Environment Fund projects (see budget): Alert system, other related projects
- NDRRMC: end of March next year multi-hazard EWS project
- Land Drainage Master Plan
- Dam break analysis (national)

- MMS setting up calibration lab (JICA)
- Limited Area Model (LAM)
- Dissemination of info to fishermen – GoM
- Interest in funding of new building for MMS – unlikely through GCF, but maybe co-financing by GoM
- Project, possibly UN to get all data held in the same place?

Next steps : Health and WRU to be invited to next workshop

11 APPENDIX 6 SEYCHELLES PRE-VALIDATION WORKSHOP NOTES

Etude de faisabilité du projet régional Hydromet COI/Adapt'Action AFD
Atelier national de pré-validation des interventions
Seychelles, 9 September, Seychelles Trading Company, Victoria

Participants:

DAI: Marie-Ange Baudoin, Pascal Venzac, Veronique Pascal, Fady Hamade, Paul Venton, Rachael Steller

Seychelles Key Stakeholders: V. Amelie (Seychelles Meteorological Authority – SMA); H. Seeward (SMA); B. Andrade (SMA); M. Denis (SMA); E. Lalande (SMA); A. Lauret (AFD); T. Chang-Pentive (Local Government); D. Rosette (DRDM); V. Berlouis (DRDM); V. Kumar (SMA); G. Alexis (Public Utilities Corporation – Water Resources); S. Larue (Seychelles Agricultural Agency); L. Valentin (SMA); N. Lalande (SMA), S. Morgan (MEELC); N. Bodin (Seychelles Fishing Authority); G. Bijoux (SMA);

Component 1

- Regional climate services strategy – there is a template on strategy, don't need to reinvent the wheel. Should keep it there because need it, but because have an idea already don't need to budget USD 300,000. (Vincent)
    - Have a national CS strategy, and it is very comprehensive. Can this be used alongside regional strategy? National strategy needs update, policy is being drafted and makes room for strategy update. Yes – can do, this will be adapted to each country as others in the region don't have. (Enviro Dept)
- What capacity building does IOC need? Have a lot of difficulties with other projects. Going to have a regional centre anyway, likely technical. Don't need USD 300,000 for it, depending on the plan and what needs to be strengthened. IOC already has a process to strengthen their capacity, as discussed at their regional meeting 2-3 weeks ago. (Vincent)
- Regional Numerical Weather Prediction a good one. (Vincent)
- Already have local recruitment and training plan for SMA, can be removed. (Vincent)
- Location of maintenance workshop – want to know where will be when contributing, rather than having everything in Mauritius. Difficult to send people there. (DR)
- Small training centre in Mauritius. Can develop something here too? Name in advance that certain things will be in each country. Calibration workshop should be regional, but want to argue for it to be here. (Vincent)
- Access to credible data required for policymakers in Dept for Enviro. Seychelles hosting User Interface Platform (UIP) at the moment that will be strengthened. Departments will have

to have arrangements with SMA, goal of the project to improve the data and enable data sharing.

- Why flood on Components page? Too narrow as there will be other issues from climate change. Can amend this through discussion of ranking of key risk for different stakeholders. Better heavy rainfall, flooding and landslides. Need to also consider factors that influence this such as land drainage – need to ask what is the main issue? Here flooding and landslides, or base it on hazard, heavy rainfall, through which follows flooding and landslides in certain places with impacts on certain places and communities in a unique way. May have greater ability to predict heavy rainfall, but what are the implications for planning, early warning, etc? Regarding training, also need to define triggers – what is "flooding"?
- Sea surface temperature, coral bleaching – scope for it in project. Done globally, but could be downscaled through the project.
- Fisheries: in each box, who are the main stakeholders? Fisheries interested in floods, so can be added, and interested in training, monitoring. Want to have exchange to make sure it meets their needs, even if not as involved as SMA.
- GMES? Project for coastal erosion under IOC
- Sea Safety: forecast of sea state, EWS advising not to go to the sea based on adverse forecast.
- Agriculture sector also suffers a lot during heavy rainfall. No CCA/DRR plan for agriculture. Would be useful. Seychelles Sustainable Development Strategy (SSDS) could be used as a basis. Some have been achieved and some haven't, but haven't done an implementation stocktake.
- Stakeholder training outside SMA? Yes, depending on need. But need tools that will last, not just short-term training that everyone forgets. Looking at one year training, or Masters/PhD. Have local GIS expert – Justin.
- SFA would like to have enviro data expert, mainly for sea. Want training (Masters/PhD). DRDM also wants to be considered for training. And hydrology unit – need hydrologist. Requires FS to include commitment to recruit and retain from govt.
- Have just completed Seychelles National Integrated Emergency Management Plan (becoming official in October), and local govt is important in that. Need to consider training for them.

Component 2

- Climate related risk maps in CMP – can be very useful for this component
- Doppler radar – costs for developing access not included? No, but know where to place it on the mountain, and there could be co-financing.
- Storage of data including hydro? Open to including that with SMA. Also need to ensure software is compatible.
- Agreed met will host hydro data. (Vincent and Elissa?)
- World Bank risk mapping project in the coast?
- Already have a good climatological database mgmt. system, so can shift the funds
- End user production system – integrated into forecasting system, but still a stand-alone activity as it is about collecting data from a broader base and making it accessible.

Component 3

- Tourism products – there are different types – sustainable/ecotourism, coastal tourism, hotels on shoreline, what is the focus? Providing info to all – rather than going to google, hotels go to SMA info, but also want kitesurfers, eg, to check. Equally, want to provide long-

term products to tourism industry so they can plan long-term. All products have shorter and longer term.
    - Tourists becoming more demanding re weather expectations for planning. It is an important sector and dynamic. Fady working on it.
- Cost of app development? Don't have one but believe it's good for public. DRDM has an app in development for early warning and interaction with public. Don't have option for SMA to disseminate forecast. Each line of budget includes some that goes for the app, or can use to enhance website.
- Role of DRDM in EWS – would be using hydrological models to disseminate info to public. Difficult to share in real time as receiving data – not currently a mechanism, need to compute in house, want to build up hydrological capacity
    - Met offers to do modelling and disseminates warnings, DRDM coordinates response to modelling and actions through national emergency operating centre. DRDM decides whether to activate NEOC based on the warning. But good for DRDM to attend training to understand background to modelling.
- Data sharing – funds towards security for those networks. Concern about dissemination of inaccurate data on social media that conflicts with DRDM message. Need to strengthen DRDM voice, including through reliable data.
- Education of the pubic on their role, rather than relying on agencies exclusively (Sophie). Paul: unless results in action, EWS is a pointless action. Trying to build in engagement of different user groups in product design, determine best dissemination mech for each. In that, building of trust and recognition of agencies as a byproduct that counteracts misinformation as established as a trusted source, but takes time to build up. Developing processes in this project that engage with public – communication strategy and training for public/user groups so they are aware of their responsibilities.
- After the DRDM plan is approved, trying to get insurance coverage for private properties, improve uptake, work with insurance sector to see how they can provide info to clients on prevention, maybe through premium benefits. Also need to work with banks, who provide loans and can require risk assessment, and can be a source of info dissemination.
- Agriculture sector has insurance scheme, but has some issues that need resolving – some farmers complain about assessment. Disaster is not well defined. (Daniel agriculture) Need climate services for insurance sector to improve provision. Add to Component 1. Need to understand the thresholds for insurance – what is a disaster? How much rain is a flood in need of compensation? Budget currently doesn't last long, and those not necessarily affected get funds. Need to refine, and have a lot of education about how it works. To do that, need automatic weather stations in catchment areas.
- For fisheries, EWS needs to assist to help staff identify where/when to assess nutrient levels to allow them to test and advise fishermen ASAP.

Related Projects

- GMES – coastal marine services
- Seychelles Ocean Temperature Network – local project w/ SFA and NGOs, funded by GEF
- Indian Ocean Solar Network – regional solar energy IOSNet, 2 in each country. Here one on Mahe and one on Pra – IOC.
- CMA – govt committed SCR 5mil per year, but not enough to complete so looking for further funding
- National climate change policy
- Working on coastal setback policy to compliment CMA

- SSDS finishes in 2020
- National development strategy
- Programme coordination unit has many plans funded by other organisations, but are responsible for coordinating projects across the contry
- Third National Communication – UNFCCC – needs more modelling outputs, are doing downscaling through it, and Hydromet can operationalise it. Due to finish end of next year.
- IAEA – monitoring algae bloom and other biotoxins, mainly capacity building and materials. Currently delayed.
- Anchored FAD (Fish Aggregating Device) monitoring fisheries La Digue, want to extend (GEF funded)
- University of California Scripps collaboration coming to an end. Coming here to gather coastal data, completing SLOMO want to find partners to continue project. Physical oceanography modelling coastal areas, want to at least do EEZ Seychelles, if not regional
- Applied for grant for detailed satellite mapping for Prana, but don't have Mahe or LA Digue
- RESAT - Renewable energy satellite analytics tool w/ UK university, lack data for wave energy, ocean technology
- SEYCCAT – Seychelles Climate Change Adaptation Trust
- Project Neptune – includes component to install automatic systems for hydrology network for PUC and SMA, to be upgraded by Hydromet project.
- IAEA project – salinity of coastal areas, seawater intrusion in coastal agriculture (most ag is in the coast)