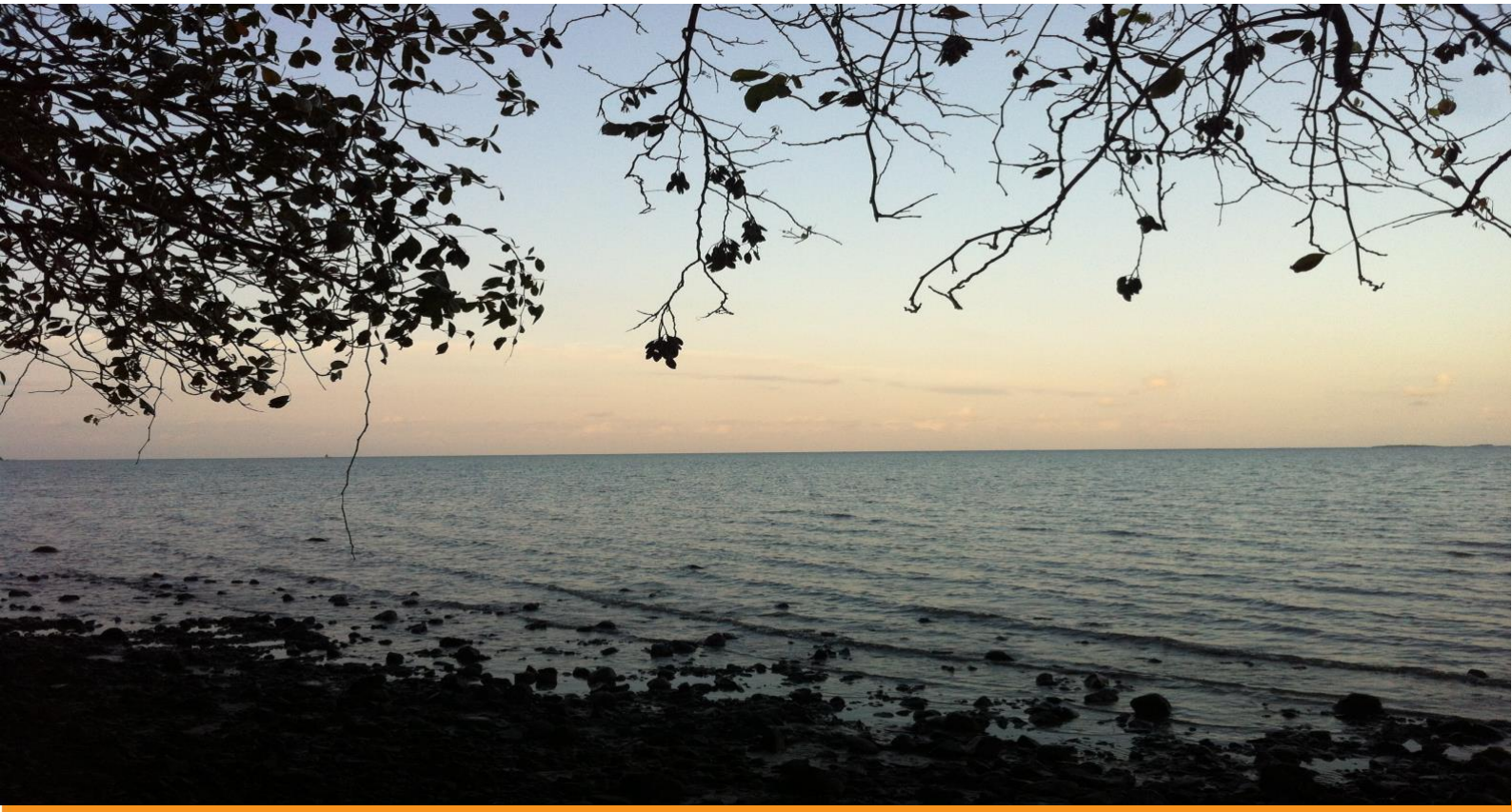
E€OFISH

Enhancing equitable economic growth by promoting sustainable fisheries in the EA-SA-IO region



CN: CLIMATE CHANGE OBSERVATORY SA 1.7

DR. S. SWEENARAIN

JULY 2021

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CLIMATE CHANGE OBSERVATORY
SA. 1.7

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CONCEPT NOTE

SETTING UP A REGIONAL NETWORK FOR ASSESSING AND PREDICTING THE POTENTIAL SOCIO ECONOMIC AND ECOLOGICAL IMPACTS OF CLIMATE CHANGE AND BIODIVERSITY DEGRADATION ON THE COASTAL MARINE FISHERIES AND ECOSYSTEMS OF THE EA-SA-IO REGION [Strategic Action 1.7]

Executive Summary

Climate change threatens the world fisheries. As temperatures are rising, fish populations are projected to decline and disappear in some regions, especially in the tropics. Fish is an essential protein source for 3.2 billion people and provide 17 per cent of the world's animal protein. It is a lifeline for many developing countries, including the EA-SA-IO region that rely on fish for 70 per cent of their nutrition.

The local fishing communities contribute the least to the global CO2 emissions but are facing existential threats. Despites the pledges of the Paris Agreement on Climate Change 2015, there has been no substantial progress in the Global Decarbonisation to-date and the world in sleepwalking into a +2°C or worst scenario with disastrous consequences for the topical coastal and island states.

To balance the pessimism of climate science and the faith of the local people about their lives and livelihoods, ECOFISH will do what it takes to promote fish sovereignty for the wellbeing and shared prosperity of the coastal fishing communities. The proposed network will provide scientific evidence to support national projects to the Green Climate Fund (GCF) and other multilateral development agencies.

Informed policymaking and management measures are critical for mainstreaming appropriate climate-smart and "no-regret" investments to build resilience of fragile fisheries resources and ecosystems for the present and future generations. Circular Economy is applicable to the coastal fisheries - from hook to plate - to ensure sustainable harvest and consumption of seafood, i.e., fish food sovereignty for the local fishing communities.

The operationalisation of a Regional Coastal Marine Fisheries-Climate-Environment Outlook Network to track the socio-economic and ecological impacts of climate change and biodiversity degradation in the ACP countries of the EA-SA-IO region is supported by Strategic Action 1.7 of the ECOFISH Marine Fisheries Work Plan. The purpose of the Concept Note is to define the objectives, theory of change, high-level log frame and implementation modalities of this intervention to trigger a multidisciplinary and multi-stakeholder consultative process for anchoring the mechanism in the regional landscape.

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1.0 Introduction

The main objective of the Ecofish Programme is to mainstream the principles of Blue Economy[1] in the sustainable management of inland and marine capture fisheries of Eastern Africa, Southern Africa, and the Indian Ocean region. It entails *a holistic and synergistic approach to embed the bio-ecological as well as the socio-economic dimensions* into coastal fisheries policies and management approaches, which is inspired by a triple bottom line, i.e. economic efficiency, Social Equity, and environmental stewardship amid the threats of climate variability and change. With the unchecked depletion of the aquatic resources and habitats besides the growing inequalities within and between countries worldwide, the main challenge of this century is to drive economic growth and shared prosperity within the limits of the planetary boundaries[2]. The sacrifices and lessons learned by the society during the COVID 19 pandemic would be waste if the momentum for a more sustainable, equitable, and more united world is dampened.

The Marine Fisheries Work Plan is one of the components of the Ecofish Programme which is focusing on the coastal fisheries of the region[3]. Though the real contribution of the marine small-scale fisheries is not fully captured in the national GDP, they are the lifeline for millions of households for their livelihoods, wellbeing, and cultural diversity mostly in the Least Developed and Vulnerable States of Sub-Saharan Africa. Nearly 90% of the global seafood harvest is realized inside the national waters of the coastal states and about 80% of marine fisheries is harnessed by the small-scale fisheries which consist primarily of subsistence and traditional artisanal fishing activities[4]. These local fishing communities are sleeping walking into irreversible socio-ecological chaos due to demographic expansion, overfishing and unsustainable fishing practices which are exacerbated by other human-induced and natural environmental stressors, including extreme weather events and climate change. There is an urgency for evidence-based policymaking and management decision to rescue the coastal fishing communities from the next human holocaust.

The operationalisation of *a Regional Coastal Marine Fisheries-Climate-Environment Outlook Network to track the socio-economic and ecological impacts of climate change and biodiversity degradation in the ACP countries of the EA-SA-IO region is supported by Strategic Action 1.7 of the ECOFISH Marine Fisheries Work Plan*. The purpose of the Concept Note is to define the scope and implementation modalities of this intervention to trigger a multidisciplinary and multi-stakeholder consultative process to anchor the initiative in the regional landscape.

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[1] *Greening the aquatic fisheries resources and environments with emphasis on the people at the bottom of the pyramid.*
[2] *The paradigm shift consists of the transformational change from "Growth Without Limits" to "Growth Within limits" instead of "Limits to Growth".*
[3] *A synopsis of the Ecofish Marine Fisheries Work Plan given in Annexe 3*
[4] *An overview of the EA-SA-IO marine fisheries is presented at Annexe 2*

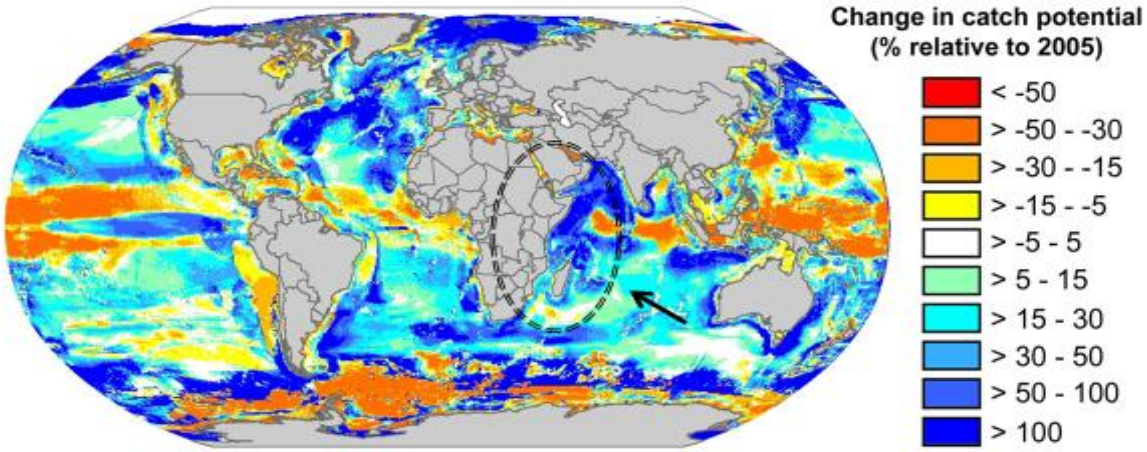
2.0 Rationale

Climate change is intensifying more rapidly than expected. The last five years have been the warmest on record; natural disasters are becoming more intense and frequent while last year witnessed unprecedented extreme weather events worldwide. Alarmingly, *global temperatures are on track to increase by at least 3°C towards the end of the century* – which is twice the limit to avoid the most severe economic, social, and environmental upends in the tropical regions of the world. The near-term impacts of climate change will intensify the planetary emergencies, including loss of life and livelihoods, extreme poverty and inequalities, and geopolitical instability. *Failure of climate change mitigation and adaption* is considered as the No 1 risk by impact and No 2 by likelihood for the next 10 years[5]. Biodiversity loss has severe implications for humanity, from the collapse of the functional services and health systems to the disruption of the entire food webs. It is essential for maintaining human wellbeing, livelihoods, and economies. The world's 7.6 billion people represent just 0.01% of all living creatures by weight, but humankind has caused the loss of 83% of all wild mammals and half of all plants. *Biodiversity loss and ecosystem collapse is one of the top five global risks*. The clearance of over 35% of the world's mangroves for human activities has exposed coastal people habitats at risk from floods and sea-level rise. If today's mangroves were lost, 18 million more people would be flooded every year (an increase of 39%) and annual damages to property would increase by 16% ($82 billion). *Protecting and restoring natural ecosystems is, therefore, vital to fighting climate change*. Nature-based solutions could provide 37% of the cost-effective CO_2 mitigation needed by 2030 to maintain global warming within 2°C[6].

Climate change threatens world fisheries. The significance of the coastal fisheries as "safety nets" for food and nutrition security and employment of last resort can hardly be underestimated in the Sub-Saharan African region. As temperatures are rising, fish populations are projected to decline and disappear in some regions, especially in the tropics. The challenges of the capture fisheries sub-sector are often underestimated or overlooked because researchers and policymakers tend to focus on agriculture as the primary source of food supply for the growing global population, yet *fish is an essential protein source for 3.2 billion people and provide 17 per cent of the world's animal protein*. It is a lifeline for many developing countries, including the Sub-Saharan African region that relies on fish for 70 per cent of their nutrition. Improved fisheries management, including policing of illegal fishing and setting aside climate-smart marine protected areas can provide refugia for nurturing fragile fish stocks. A circular economy approach, i.e. the sustainable harvest and consumption of seafood can increase the resilience of fish stocks. However, a drastic reduction of GHG emissions at the global scale must remain a top priority.

[5] *World Economic Forum – Global Risk Report 2019.*
[6] *IPCC Ocean and Cryosphere Special Report, Sept 2019. Refer to Annexe 1*

Climate Change Impacts on the World Fisheries



Predicted change in the potential of fisheries, given the distribution range shifts induced by global warming and a relationship linking distribution and potential catches. The global map shows that some countries would gain while others would lose from such changes (from Cheung et al. 2009b). Note that these predictions do not account for change in oxygen distribution in, and acidification of the oceans, and hence represent an optimistic scenario

Source: Daniel Pauly – Sea Around Us (2009)

Various pathways and impacts of ocean warming and extreme weather events (EWE) on the coastal marine fisheries ecosystems have been identified in existing scientific and peer-reviewed literature. These direct pathways include an increase in sea surface temperatures (SST), sea-level rise (SLR), change in rainfall patterns and intensification of tropical storms. The indirect drivers include ocean stratification and acidification, change in nutrient, currents, and salinity levels. *The purpose of the present intervention is to create a Coastal Fisheries-Climate Outlook Network to assess and predict the impacts of climate change and EWE on the productivity of the coastal marine ecosystems and fish production as well as the cascading socioeconomic consequences on fishing communities, fish market, trade and the national economies*. Special attention will be given to the most vulnerable or invisible groups and informal stakeholders, including children, women and elderly people who are engaged in subsistence fishing and associate activities for their livelihoods and food security.

Despite the significant progress made in advancing global climate change science research, the conduct of viable *scientific and socio-economic impact studies* at the regional and national levels is lagging. There is still some major data-gap and caveats to understand the impacts of climate change and climate variability on the local socio-ecological systems. The local impacts differ significantly from the simple averages of global and regional averages of climate change. For instance, the first Marine Protected Areas established around the world during the early 90s have focused mainly on biodiversity factors without integrating the impacts of climate change. The refugia for aquatic resources in our region needs to be identified and documented. Though there is a correlation between extreme weather events and the impacts of climate change at the local level, it is not well understood from the coast fisheries perspectives. Moreover, local communities tend to interpret extreme weather events as climate change which is not so. These shortcomings are partly responsible for the misunderstanding or scepticism of the impacts of climate change in the local socio-ecological context.

In the EA-SA-IO maritime region, there is a lack of adequate and reliable scientific knowledge and data information on the status of fish stocks and ecosystems supporting the main marine fisheries as well as the relative impacts of the pathways of climate change on the fish supply chains. There is an urgent need for downscaled modelling to assess the potential impact of climate change on the fisheries economy of the region. *"We manage what we can measure"*. This intervention intends to build a set of indicators/markers of the Fisheries-Climate nexus for driving science-based climate-smart fisheries policies, strategies, and management plans at national and regional levels.

3.0 Conceptual Framework

The proposed intervention aims to set up a regional Network for assessing and predicting potential impacts of climate change on selected coastal marine fisheries and ecosystems in EA-SA-IO region[7]. The pilot will initially focus on observing the biophysical and socio-economic factors of ocean warming and associated environmental stressors the priority fisheries in the partner countries. The concept is inspired by Integrated Coastal Management which is interrelated to other analogous approaches such as the Ecosystem-based Fisheries Management (EBFM), Integrated and Sustainable Fisheries Management Approach and the FAO Blue Growth Initiative.

Besides a lack of adequate and reliable fisheries data, the conventional fish stock assessment methods are based on a single species which is not appropriate in a multi-species and multi-gear fisheries such as the artisanal fishing. However, there is a global effort to promote EBM to embrace the biophysical and socio-economic dimensions of fisheries management in an integrative and holistic manner. So, the intervention proposes to establish a regional network of national or local in-situ observing of the ocean warming and biodiversity degradation phenomena in selected coastal marine fisheries.

The regional network of national marine research centres will collaborate to synthesize a suite of existing and in-situ observations through the dynamic models to assess the current and future trend of climate and environmental impacts on the fisheries. It will also refer to UN SDG 2030 framework, particularly SDG 14 that has six targets related to marine life, small-scale fisheries, and associated ecosystem services.

4.0 Methodology

The Regional Climate-Fisheries Outlook Network will have to select key indicators/pointers related to the impacts of ocean warming as well as overfishing and unsustainable fishing practices on the coastal marine fisheries to anticipate appropriate adaptation measures for maximisation of the socio-economic and ecological benefits to local fishers and fish workers in the partner countries. This following chart summarizes the Climate – Environment – Fisheries nexus.

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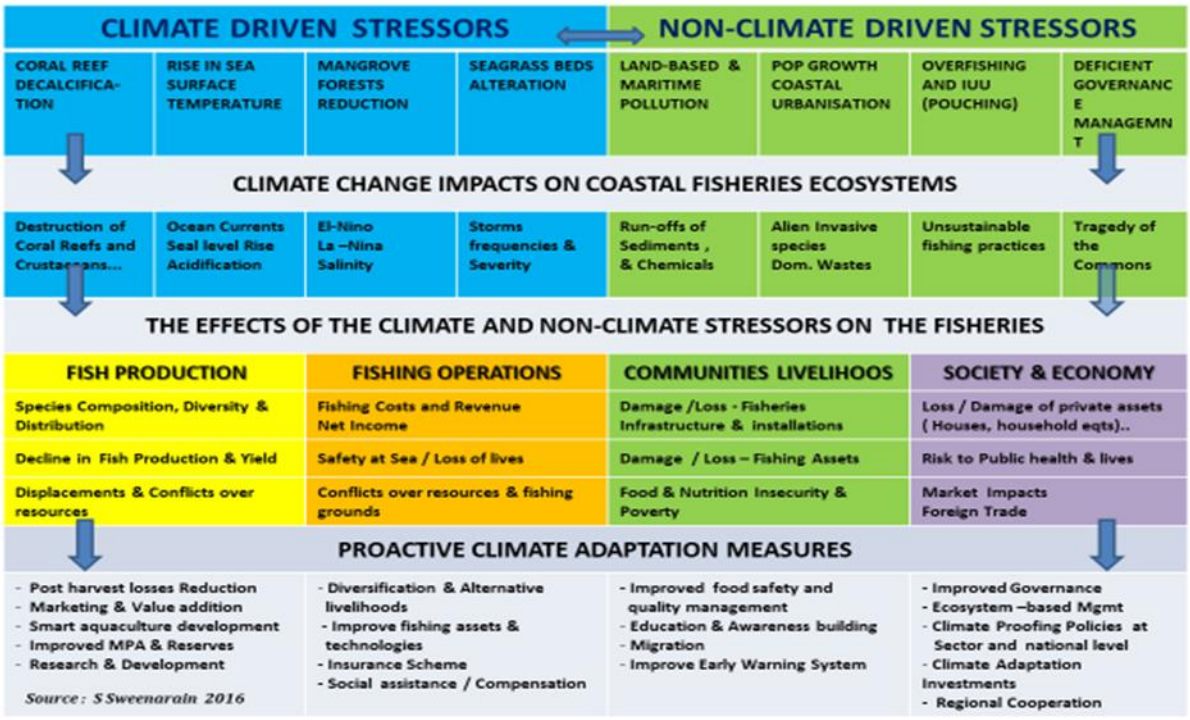
[7] *It is one of the strategic actions of ECOFISH Marine Fisheries Work Plan which is implemented by the IOC Secretariat. It covers the ACP countries of the marine façade of the EA-SA-IO region: Comoros, Madagascar, Mauritius, Seychelles, Mozambique, Tanzania, Kenya, Somalia, Eretria, Djibouti, and Sudan. La Reunion, an outer territory of France/EU is also participating this programme on its resources.*

Fig 3 - Climate & Non-Climate driven Impacts on Coast Marine Fisheries



The project implicates a multidisciplinary and a multi-stakeholder approach for defining its objectives, activities and expected outputs of the regional marine research network. It implies the selection of critical environmental and climatic drivers to be observed, means of observation, data collection, analysis, and integration as well as the use of the data and a constant review of these processes. The process will help define the sampling methods, including time, space, parameters as well and the use of available technologies.

This proposed mechanism will benefit from the existing Global Ocean Observing System (GOOS), other regional ocean observing tools and techniques for the coastal fisheries and capacity development for a realistic regional ocean and fisheries observation supply chain. The harvested quantitative and qualitative data will be processed/integrated to produce tailor-made products to the end-users. A feedback mechanism will help improve the process and expected outputs.

The Network will be designed through consultation among the key stakeholders (data users and producers) namely:

i) ***Resource users:*** *The stakeholder groups include indigenous/artisanal, commercial, and recreational fishers, fishery managers, eco-tourism operators and so on They require information on ocean conditions, resource distribution, and abundance. They generally do not require primary data, but products tailored to specific needs.*

ii) ***Scientists and Economists:*** *The network includes Climate, Ocean, Marine Environment and Fisheries Scientists as well as socio-anthropologists and economists. They collect and analyse primary observations to generate products (e.g., indicators, maps). Their goal is to advance basic and applied understanding of the climate-environment-fisheries nexus.*

iii) ***Fisheries Managers:*** *They are charged with regulating access to marine fisheries resources, ensuring their sustainable and integrated management. They can be extended to conservation managers,*

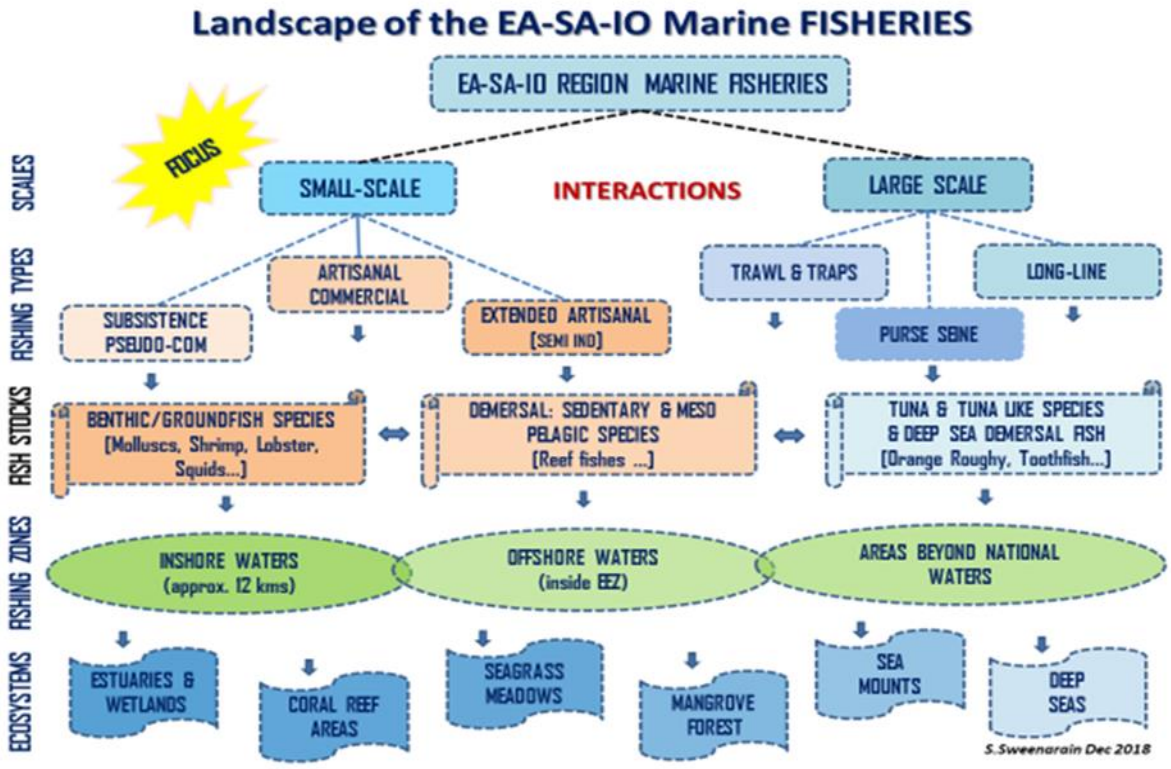
and tourism managers at no additional cost. These stakeholder groups require products that assist them in defining trade-offs between different management aims, assessment techniques, and data collection plans.

iv) ***Policymakers:*** *They require concise information about ocean observing results and indicators. Policy ultimately sets the formal rules and frameworks that regulate resource users, managers, and the operating space for scientists. The focus will be on the marine fisheries sub-sector.*

v) ***General Public, Civil Society Organisations, and the Media:*** *They often seek information on the health status and sustainability of the coastal marine resources and ecosystems, including the impacts of climate change and pollution. They need synthesized information for communications, awareness building and advocacies.*

5.0 Main Objectives

In a nutshell, policymakers need accurate and concise information to balance long-term environmental challenges with short-term societal benefits. The fisheries production and ecosystems are changing, or degrading, scientific knowledge and data are needed to assess and predict the potential impacts for driving remedial measures. Information from diverse sources is integrated and analysed for monitoring and management purposes. The landscape of the regional marine fisheries sub-sector is illustrated in the following chart.



Several existing regional scientific partners and programmes namely, GOOS, UNEP/ Nairobi Convention, Nansen Programme, and UNESCO Africa Ocean Information Hub can potentially support and add value to the initiative through technical supports and capacity development.

The main objectives of the proposed network are tentatively as follows:

i) *Link the marine fisheries forum or platform to the existing Climate - Ocean- Environment observing networks such as GOOS and GMES to enable the local and national stakeholders to work together with its set objectives for the common public good.*

ii) *Coordinate the collection of multidisciplinary fisheries and environmental information by connecting relevant organizations and actors, including Research and Science, public agencies, industry, and communities;*

iii) *Create a forum for data producers, data users, producers of intermediate products and end-users to continually reassess the monitoring objectives in the light of latest policies and user needs;*

iv) *Adopt a comprehensive data management framework, including the sustained use of specific data repositories, building linkages between these repositories, promoting the use of common data and data exchange formats for interoperability, and use of open-source tools;*

v) *Facilitate access of data and metadata for science as well as reliable and specific data products to the public agencies, industry, resource managers, policy and decision-makers;*

vi) *Improve dynamic modelling efforts for prediction, including fish species distributions, and ecosystem health to support integrated and sustainable fisheries resources and ecosystem conservation management;*

vii) *Contribute to coherent capacity development and training programs, including analysis and visualization for users of varying levels of expertise through a joint ocean observing system governance framework.*

(viii) *Promote science-based narrative and storytelling and communications for awareness-raising, social innovations, and advocacies on the topic.*

6.0 Activities

The ultimate goal of the strategic action is to mainstream climate-smart policies and investment strategies into the coastal marine fisheries of the EA-SA-IO partner countries. It is critical for tapping the development potentials of the sub-sector to contribute to wealth creation, shared prosperity, and food security in the local and national economies amid climate risks. The network will also provide scientific evidence to support national projects to the Green Climate Fund (GCF) and other multilateral development agencies. The initiative network has to go beyond a one-off exercise to ensure effective multi-stakeholder collaboration for achieving the following short, medium and long terms outcomes:

i) *Inventory of the existing knowledge, information, and capacities on the marine fisheries, climate and environment nexus to develop a realistic framework for a deeper understanding of their potential bio-ecological and socio-economic impacts on priority coastal fisheries and ecosystems of the partner countries.*

ii) *Assessment of the current and future potential socio-ecological impacts of the key drivers of ocean warming and the vulnerabilities of the coastal fisheries ecosystems and fish production besides the spill-over effects on the livelihoods and wellbeing of fishing communities and the national economy as a whole.*

iii) *Appropriate climate adaptation and resilience measures mainstreamed into the national fisheries policies and strategies, including support for cross-sectoral plans and investments to safeguard the*

livelihoods and wellbeing of fishing communities and the coastal population.

iv) *Capacity Building and Partnership, including training and sharing of lessons learned, use of innovative technologies, and good practices at the regional level.*

v) *Operationalisation of a Regional Network for ocean observation focusing on coastal fisheries - climate change and environmental health nexus to optimise the socio-economic benefits to local communities and fish supply chains.*

vi) *Domestic and external Resources and Partnership (Technical and Financial) mobilisation for rolling out public and private climate-smart investments in the fishing assets and onshore fisheries infrastructures and logistics*

vii) *Policy dialogues and advocacies, awareness-raising and sensitisation, and communications on the urgency for climate-proofing coastal fisheries.*

7.0 Operational Modalities

The proposed *Regional Coastal Marine Fisheries-Climate-Environment Outlook Network* will build on the existing body of scientific knowledge, including satellite observations[8] and in-situ data collection to improve the understanding and prediction of climate variability and biodiversity degeneration on socioeconomic and ecological vulnerabilities of selected coastal fishery value chains in the partner countries of the Ecofish Programme. The maritime façade of the EA-SA-IO region is conceived as a unified block for effective economic cooperation in fisheries sub-sector. However, the approach is rolled in a common but differentiated approach to cater for the specific needs and aspirations of each ACP partner country of the region – No country is left behind. They are 11 coastal and island economies that are supported by at least four major Duly Mandated Regional Organisations and two regional fisheries organisations for the integrated and sustainable management of their marine fisheries.

Climate Change and Biodiversity Conservation have been the top priorities of the international communities and multilateral agencies over the past three decades. Though the real progress in fixing the problems on the ground is insignificant and fragmented to-date, there are tremendous body of scientific knowledge and data, on-going global climate and environmental observation programmes, networks of multidisciplinary experts, specialised regional and national environmental conservation agencies and observatories, social and environmental non-governmental organisations, the business communities and fisher associations that have to mobilised for the setting up of the proposed mechanism. So, the critical factor for establishing this network is effective collaboration and synergistic thinking among all key players.

7.1 Stakeholders and Implementing Partners

As stated, the proposed intervention is funded by the ECOFISH Marine Fisheries Work Plan – Strategic Action 1.7 and implemented by the ECOFISH Integrated Programme Management Unit (IPMU). The

[8] *Global Monitoring of Environment for Security (GMES) Programme EU-AUC and Global Ocean Observing System (GOOS) which is UNESCO-IOC Initiative supported by the UNEP/Nairobi Convention in the WIO region. These two global earth and ocean observing systems and several networks that are monitoring the different pathways of climate variability and change on the marine biodiversity and ecosystems in the Western Indian Ocean region*

initiative is championed by the IOC[9] and designed against the backdrop of the latest peer-reviewed technical reports[10] and declarations of the UNFCCC. At the start, the project will focus on the small-scale fisheries that include a wide range of traditional subsistence and modernised artisanal fish value chains in the eleven ACP partner countries[11] plus La Reunion/France which will be self-funded. Apart from the transboundary or shared fish stocks, each partner country will select its priority coastal fisheries. It also integrates the inputs gathered by from the preliminary consultation with several regional and national organisations such as the UNEP – Nairobi Convention, UNESCO/IOC - Africa Ocean Information Hub Project, EU Global Marine Environment and Security Programme, and the IGAD Climate Change Division. The national chapter of the network will involve the parent Ministries and cross-cutting agencies (Fisheries, Environment, Climate Change Adaptation and ICZM), National Marine Research and Academic Institutes, Fishers and Fish Workers Associations, Environmental NGOs and so on. The intervention will ensure that the activities are not limited to the mainland of the archipelagos partner countries. The National Focal Points of the Ecofish Programme will assist in the facilitation and coordination of the key stakeholders at the national and sub-national levels. However, this is just the beginning of the process for an in-depth and inclusive consultation with all relevant stakeholder groups.

To facilitate the operationality of the regional network, EA-SA-IO region is sub-divided into 3 clusters:

Cluster 1 *Indian Ocean Commission [Island Economies] & Eastern Africa Coastal Countries*

Countries: Comoros, La Reunion/ France, Madagascar, Mauritius, and Seychelles. Mozambique, Tanzania, and Kenya

Lead Organisation: Mauritius Oceanography Institute.

Cluster 2 *Horn of Africa Coastal Countries*

Countries: Somalia, Eritrea, Djibouti, and Sudan.

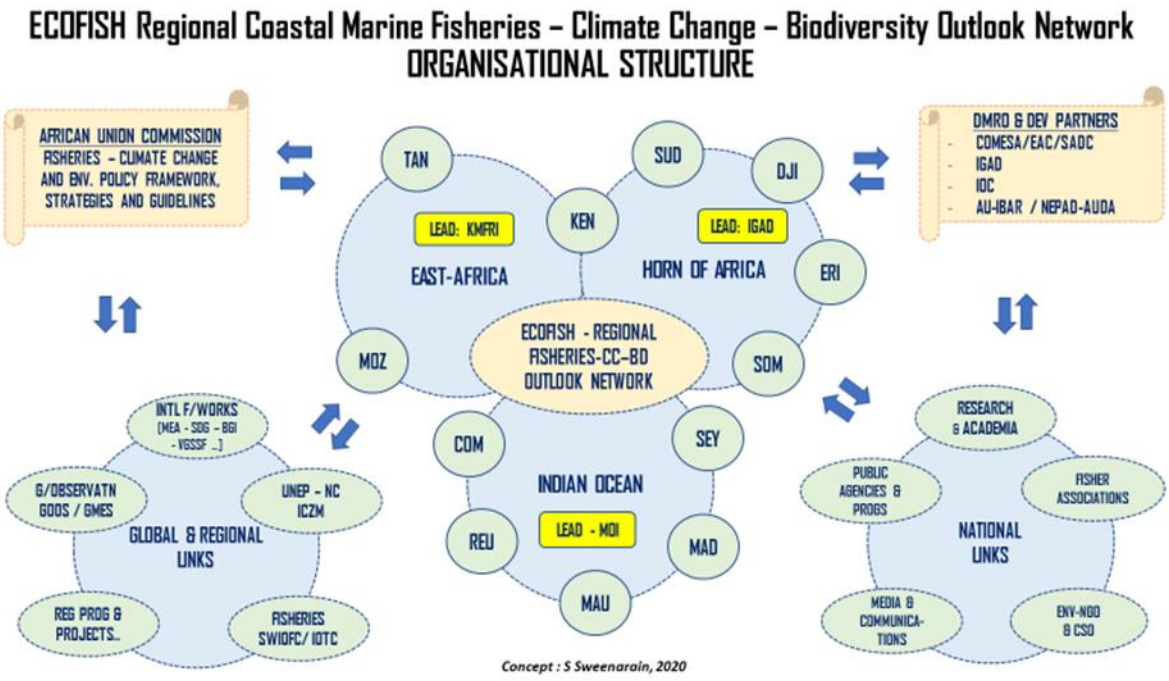
Lead Organisation: IGAD Climate Change Division

The organisational structure of the regional network is synthesized in the illustration below.

[9] Despite their political and economic diversities, the five IOC member states are island economies (three of them, Comoros, Mauritius, and Seychelles are SIDS) which are dependent on the ocean industries for their sustainable development. Beside the active support of the Charge de Mission for Marine Fisheries and Environment conservation Management, the counterpart for Climate Change at the IOC Secretariat has expressed her willingness to support the initiative [verbal communication].

[10] Cf. Sweenarain S, EU-CTA 2016, The effects of Climate Change and Variability on the Artisanal Fisheries of the Member-States of the Indian Ocean Commission

[11] Comoros, la Reunion/France, Madagascar, Mauritius, Seychelles, Mozambique, Tanzania, Kenya, Somalia, Eritrea, Djibouti, and Sudan.



8.0 Governance and Management Structure

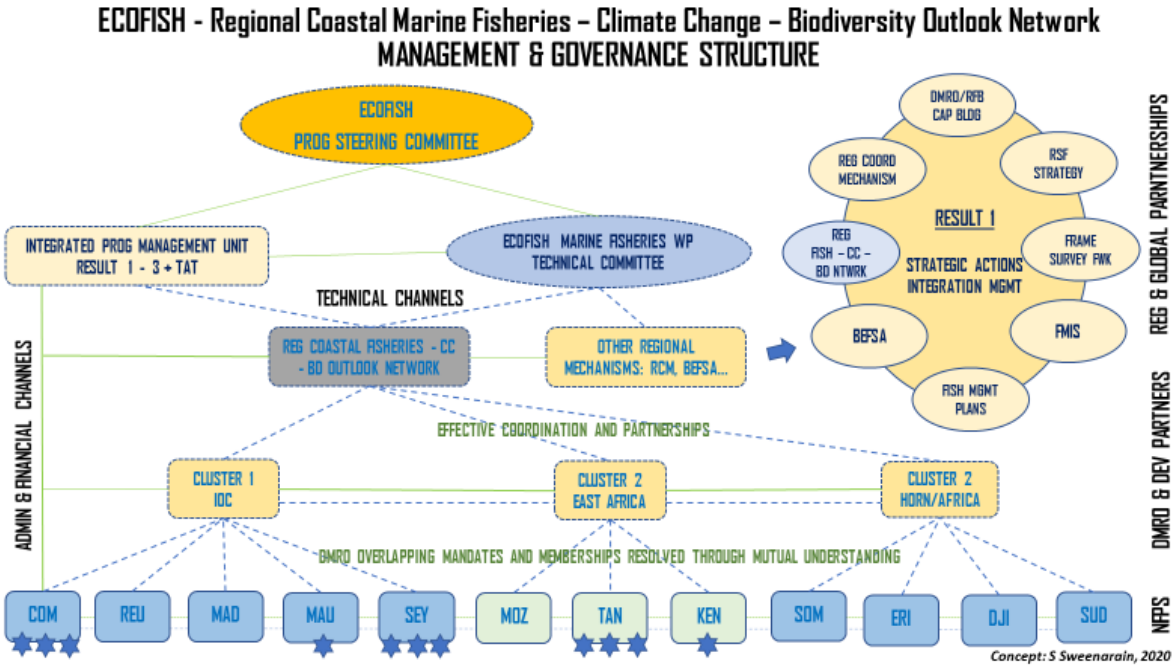
Since *project management and governance are overlapping processes*, they must be chalked out and coordinated seamlessly. Project management relates to efficient utilisation of defined resources for achieving the intended intermediate outputs or deliverables within the given schedule and quality standards (cf. Ecofish Marine Fisheries Approved Work Plan) which are internally cross checked by the Control and Monitoring processes. It consists of three (3) main components, *Administrative, Financial and Technical* alongside appropriate *Documentation, Reporting, and Communication processes*. Project Governance on the other hand is an outward procedure which is performed by the sponsors and key stakeholders to review project performance against the backdrop of the intended objectives and to provide timely strategic orientations[12].

The mandated regional organisations and partner countries are not simply beneficiaries of the programme but are motivated to engage in the implementation of these cross-sectoral activities. This is deemed necessary to enhance effective collaboration and partnerships, ownership, and leadership as well as internal capacity development. It is also a prerequisite for the institutionalisation and the long-term sustainability of the action as part of a realistic Exit Strategy. The proposed mechanism is unique in the sense it does not exist elsewhere, and it will surely attract interest on the part of the multilateral and national development agencies when it touches ground. Generally, there is no scarcity of development

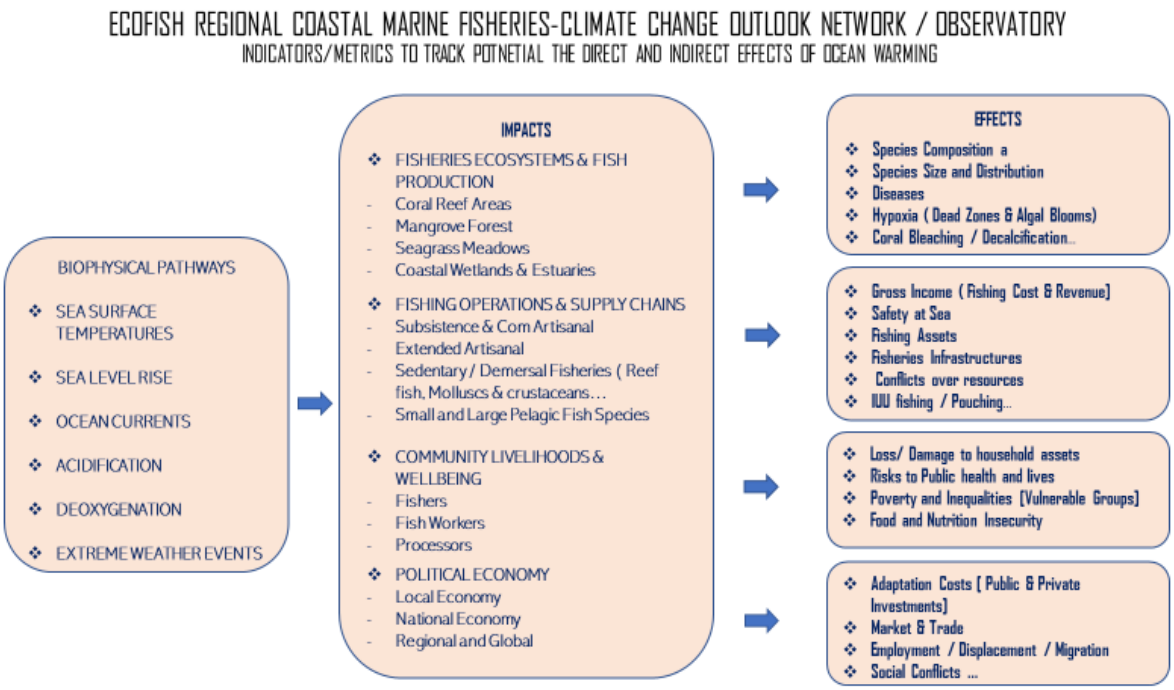
[12] *The Governance framework of the Marine Fisheries Work Plan is available at the Ecofish Background Paper and Manual date 3rd March 2020.*

grants and aids for well-documented climate change adaptation projects in the developing world. So, this intervention is planned to live its own life beyond the lifespan of ECOFISH and is, therefore, geared as a springboard to mobilise additional financial sources and partnerships for promoting smart investments in climate-resilient coastal marine fisheries.

Generally, the administrative, financial, and technical management of the activities under the Ecofish Marine Fisheries Work Plan is carried out by the IOC Secretariat through a dedicated IPMU. The needed expert advice and strategic orientation are assigned to the Fisheries Economist/Technical Coordinator of the Ecofish Programme. The following chart illustrates the management and governance frameworks of this intervention with the ECOFISH Marine Fisheries Architecture.

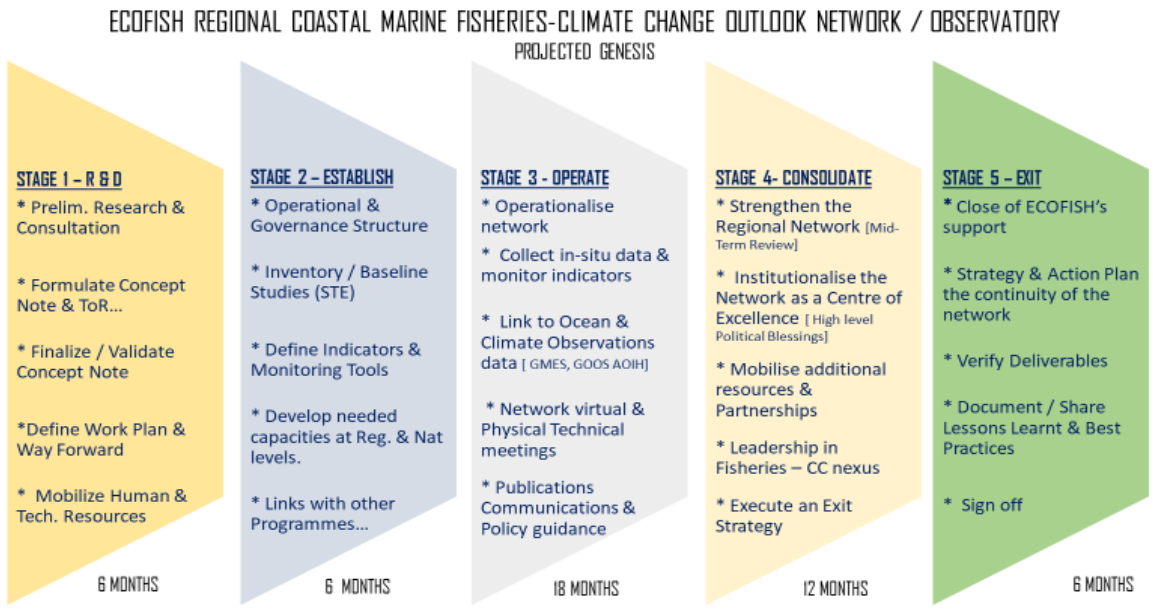


The Regional Coastal Marine Fisheries-Climate Change Outlook Network will have its governance structure within the broader framework of the *Marine Fisheries Technical Committee*. As illustrated in the above diagram, the EA-SA-IO region is subdivided into 3 clusters (cf. Section 7.1) that will be led by a *Sub-Regional Thematic Coordinator* and one of them will act as the *Lead Thematic Coordinator* on an annual basis (revolving lead). A *National Thematic Coordinator* will be nominated in each partner's country. The representatives of DMRO's and Ecofish National Focal Points will be called upon to play a prominent role in the facilitation and coordination of the activity at their respective level. An MOU will be concluded among the key stakeholders upon reaching a common understanding of the modus operandi and operational modalities of the activity either at the sub-regional or regional level depending on the readiness of the parties. The ultimate aim is to have everyone on board at the earliest to strengthen the regional block. Some potential indicators (non-exhaustive) for assessing and monitoring the impacts of the pathways of climate change on the coastal marine fisheries are presented in the following table.



8.1 Project-Cycle Management

The operationalisation of the endeavour will follow the 5 five overlapping stages of the Project-Cycle Management Approach within the lifespan of the ECOFISH Programme which is approximately 48 months as from now (Sept 2020).



The planned Fisheries-Climate Outlook Network is a unique endeavour in the sense that it has not been tried elsewhere so far. Thus, in keeping with the objectives and guidelines given in this Concept Note, it is thought to establish a small high-level Technical Committee comprising of the Sub-Regional Lead

Coordinators, including ocean, climate, fisheries and socio-economic experts for driving the inception phase. It will be assigned the responsibility for framing the organization and functional structure of mechanism, including the formulation of a realistic Action Plan and Operational Strategy, which Is a critical factor for the successful implantation of this network effective consultation and collaboration with all relevant stakeholders. It is crucial to anticipate the immediate technical and human capacity needs to kick-start the project at the earliest. The earmarked budget for the Strategic Action 1.7 can be complemented through the Communication & Visibility, and Non-Key Expert components of the ECOFISH programme. The inception phase is expected to last 3 to 6 months, depending on the response of the key partners.

8.2 Short Term Expertise

It might be necessary to recruit a fisheries-climate change expert with hands-on experience to update information on the climate-fisheries nexus and their potential impacts on the socio-economic vulnerabilities of the coastal fisher and fish worker communities in the EA-SA-IO region. The latter will collaborate with the relevant sub-regional and national entities, and ongoing programme to design the structural and operational structure of the platform, including the initial Work Plan and capacity development needs. Owing to the sanitary constraints of the COVID 19 pandemic, the assignment will primarily be home-based through extensive desktop research and virtual consultation. It is also expected to arrange for a virtual meeting for the validation of the Regional Network Chart and Action Plan. The key features of the consultant are outlined below:

i) *Education Background – Higher Degree in Marine Science, Fisheries Economics, or related fields. A PhD Degree will be an added advantage.*

ii) *Knowledge/Expertise - At least 10 years of expertise in marine fisheries resources and environment conservation management;*

iii) *Professional Experience – A minimum of 5 years integrative skills related to the impacts of climate change on the marine fisheries ecosystem and fish production, including the socio-economic vulnerabilities of the fishing communities.*

iv) *Region/Country Experience – Eastern Africa, Southern Africa, and the Indian Ocean countries*

v) *Other Experience – Project Design, ITC literate*

vi) *Language skills – English and French*

A full-fledge Terms of Reference will be formulated after consulting the frontline stakeholders.

9.0 Assumptions and Risks

i) *Everything is connected to everything on the planet and therefore, an assessment of the impacts of climate change and the vulnerabilities of the selected fisheries in their socio-ecological context has to integrate the global and regional effects and feedback loops.*

ii) *The link between the oceanography and ocean warming are scientifically not well-understood to provide accurate predictions on climate variability and change in the island and coastal states of*

the Western Indian Ocean. This is still work-in-progress whereas the natural parameters are dynamic.

iii) *There is a lack of adequate and reliable fisheries data to support evidence-based policymaking and management measures for driving sustainable, inclusive, and climate-smart fisheries. It is not possible to differentiate the contribution of anthropogenic factors such as overfishing and unsustainable fishing practices, land-based and maritime pollutions, and the impacts of climate change to the devastation of the coastal fisheries and ecosystems in a given zone. These environmental stressors can be classified as those with manageable and unmanageable risks. It is, therefore, necessary to emphasize on those manageable factors to enhance the coping capacity of the socio-ecological systems against the unmanageable risks.*

iv) *The traditional approach of MSY (Maximum Sustainable Yield) for promoting sustainable fisheries in the tropical region is misguided particularly in the small-scale fisheries which are multi-species and multi-gear. The Ecosystem-based Fisheries Management is a better option, but it is still nascent due to a lack of multi-dimensional data. The FAO's innovative fisheries management tools such as Voluntary Guidelines for Small-Scale Fisheries, Blue Growth Initiatives tends to promote an integrated and synergistic approach, but they are in an experimental phase.*

v) *There is a lack of coordination/synergies among the different multilateral conventions and agreements regarding the sustainable conservation management of the natural resources and biodiversity on a planetary scale. For instance, UNCLOS 1982 was established before the enactment of the three Multilateral Environment Agreements (UNFCCC, UNCBD and UNCDD) 1992. Subsequently, FAO has developed various mechanisms to reinforced marine resources and environment conservation management, including the Code of Conduct for Responsible Fishing 1995. Recently, UNEP revealed that there over 850 international and regional environmental mechanisms which are implemented in silos with potential overlaps and duplications.*

vi) *The development has to be sustainable and ethical. However, the concept Sustainable Development has been sub-divided into a series of thematic areas such as food security, poverty alleviation, gender equality, IUU fishing etc which are often competing with each other for funding. The limited multilateral development aids available to poor countries are distributed in a piecemeal manner to these pigeonholes making it difficult for them to undertake meaningful sustainable development.*

10.0 Way Forward

Though the impacts of climate change on the natural environment, society and economy are real and undeniable, they are still not well-understood by policymakers and local stakeholders particularly in the developing countries worldwide. There is a growing disconnect between the pessimism of the global climate scientist and the aspirations of the people at the bottom of the pyramid who are facing existential threats.

Over the past two decades, there has been an accumulation of scientific knowledge and information at the global and regional levels, and they have achieved much in terms of effective climate adaptation and

mitigation policies, institutional and governance frameworks. Most of the climate change indicators appear to be speeding on reverse gears.

In keeping with the narratives of this Concept Note the ECOFISH Programme aims at ushering a paradigm shift in the region regarding the climate change adaptation in the coastal marine fisheries in the EA-SA-IO region through science-based policymaking and management decisions. This initiative is part of an ensemble of macro-economic and technical mechanisms for unleashing the development potentials of sustainable and climate-resilient marine fisheries to contribute to shared prosperity and economic transformation of the African continent.

It should be perceived a pride for relevant stakeholders at all levels to partake their leadership and commitments for anchoring this Coastal Marine Fisheries-Climate Outlook Network in the EA-SA-IO landscape. Effective consultation and collaboration are now triggered through this Concept Note.

Annexe 1 - Potential impact of Climate Change on the SWIO Small-Scale Fisheries[13]

The small-scale marine fisheries can be differentiated into two distinct segments based on their interconnectedness to the specific coastal fisheries ecosystems; they are namely sedentary and oceanic fisheries. The sedentary fisheries include the demersal and benthic aquatic marine resources such as the reef and herbivorous fishes, molluscs and crustaceans that live in the coral reef areas, mangroves forests, sea-grass beds and shallow waters of the lagoons, estuaries, and wetlands. These coastal fisheries ecosystems are mostly over-exploited and polluted by land-based and maritime effluents in the vicinity of densely populated areas across in the countries bordering the SWIO. The coastal oceanic or the pelagic fisheries target tuna and associated large pelagic fishes in the nearshore open sea or around artificial fish aggregating devices. Some small pelagic fishes are also caught seasonally in the lagoon. The coastal tuna fisheries are not evenly developed in the region. The artisanal fisheries of Comoros and Reunion Island are overly dependent on their coastal tuna resources due to their limited extent of the lagoon and shallow continental shelves. Mauritius is also engaged in the development of artisanal tuna fisheries as an alternative to relieve its lagoon from overfishing. The Coastal Tuna fishing with the deployment of FAD was tested by several programmes in Kenya, Mozambique, and Tanzania over the past decades, but has not been promoted as a commercial fishery so far. Most of the SSF is impacted diversely by the different pathways of climate change.

As a point of reference for the SSF in the SWIO, it is acknowledged that the Paris 21st Conference of Parties on Climate Change, commonly known as the "COP 21" is committed to limit global warming at +2°C and eventually down to +1.5°C to relieve the low laying least developed countries and the Small Island Developing States (SIDS) from unavoidable collateral damages by the turn of this century. In the Indian Ocean, during 1998 - 2010, the Net Primary Productivity has decreased by 10 % and is predicted to decline further. This will impact the presence and abundance of marine living aquatic resources in the region. The average sea surface temperatures (SST) and sea-level rise (SLR) in the SWIO are within the range of global trends. However, they differ significantly across the local coastal marine ecosystems, with diverse consequences on the productivity of the artisanal fisheries. However, the effects of climate change are still

[13] *Soobaschand Sweenarain 2016, Fisheries Economist*

not understood as seasonal and inter-annual climatic variations by the coastal fishing communities. They have developed over time some adaptation strategies to cope with these changes, but these measures are not adequate to develop proactive climate change adaptations and long-term resilience in the SSF. Scientific evidence points at positive interactions and mutually reinforcing systems between ocean warming and climatic variations, including the inter-annual phenomena such as El-Nino and La Nina that would further aggravate the conditions of the marine fisheries. The fisher folks and the people dependent on the coastal fisheries for their livelihoods have to be well informed of the silent threats of climate change for fisheries ecosystems in relation to their economic activities. A bottom-up approach is necessary to document the current effects of climate change and variations in the local socio-ecological environment. The mainstreaming of climate change adaptation measures has not fully been captured by the national policy and institutional frameworks of the fisheries sector, the SSF in particular because of a lack of reliable scientific and observational information on the potential climate risks.

It is scientifically documented that the drivers of climate change undermine the food chain and prey/predator relationship that will have direct consequences on the productivity of the fisheries ecosystems and fish production. Fish stocks tend to move steadily towards cooler waters while heat tolerant/pH resistant species are driving away the endogenous fish species from their traditional habitats. The migratory pattern of tuna stocks is also changing subtly across the oceans. A peer-review study showed that the surface tuna resources in the SWIO are moving farther easterly at the rate of approximately one kilometre per decade. These climatic impacts will have severe socio-economic consequences on coastal and oceanic fisheries of the region. It is crucial to collect sufficient scientific and techno-economic information on the current and future climate threats on the fisheries sector to inform proactive policy actions at national and regional levels.

The sustainability of the socio-economic benefits derived from the coastal fisheries in the SWIO countries is seriously challenged by the poorly regulated open-access regime; lack of basic socio-economic and dedicated fisheries infrastructure; outdated fishing assets and fishing technologies; neglected fish value chains, value addition activities and market infrastructure and supply chain logistics, trained manpower as well as ineffective fisheries management and governance systems. The climate and non-climate (environmental and human-induced) factors are also culprits of the current state of affairs, but they are adequately documented so far. Under the present business-as-usual scenario, the human and environmental stresses on SSF will intensify until they reach the tipping point. This will be an ultimate catastrophe for approximately 50 million people of the region who are dependent on the coastal fisheries for the livelihoods and food/ nutrition security. In general, the direct impacts of climate change and variations on the coastal fisheries are observed by a decrease in the availability and accessibility or catchability of the fish stocks. A decline in the total catch, species mix, and spatial distribution of the marketed fish species affect the fishing costs and revenue of the fishing communities. The operating costs tend to increase as a result of a decrease in the landings and changes in the catch composition; an increase in the number of non-fishing days due to bad weather at sea, longer fishing trips as more time is required for cruising to more distant fishing areas, increase in post-harvest losses in the absence of adequate preservation practices and higher cost of repair and maintenance. The market demand for fresh/chilled fish and seafood is driven by other factors such as the quantity and quality of the landed products, the purchasing power of the consumers and the availability of cheaper substitutes, particularly from inland or farmed fish products. Though it is expected that the prices of food, including fish, would increase on the world markets, the escalating cost of fishing in the SSF coastal fisheries might not be compensated fully in the developing countries of SWIO region due to the absence of structured primary markets, the low purchasing power of the consumers, widespread subsistence fishing and open access as a social safety net against poverty and malnutrition, poorly value chains and marketing networks and direct competition with cheaper imported wet fish.

The impacts of climate change will also hit exports of fish and seafood in the SWIO countries though the involvement of the artisanal fisheries in the regional/r international trade is insignificant, if not inexistent in some of these countries. With an exception of Madagascar, the bulk of the production of the artisanal fisheries in these countries is meant for domestic consumption. It is a paradox that ocean states like Mauritius and Reunion Island are overly dependent on imported fish and seafood to satisfy their domestic

consumption. Comoros, Madagascar, and Seychelles are self-sufficient, but a different level of per-caput consumption of fish. For instance, in 2014 the per-caput fish consumption in Madagascar was 7.4 kg, which is much lower than the African average of 9.6 kg. Over 90 % of the fish production in Africa, including the Easterly countries, are harvested from the continental waters. Seychelles with the per-caput fish consumption of 64 kg is the highest rating in the SWIO. It has significant export potential for high-value reef fishes but is constrained by geo-economic factors common to the SIDS. The SSF of Comoros is overly dependent on tuna resources and is about to launch the first export-oriented vertically integrated tuna fishing and processing project. However, this development has not systematically anticipated potential climate risks. Given the SSF are the main suppliers of affordable food fish to the local population of the region, it is critical to mainstream climate change adaptation measures into the fisheries management governance system in a proactive way. If appropriate measures are not taken promptly, it is most likely that the per-caput fish consumption would follow a downward sloping curve in the future. Since locally harvested marine fish would become a scarce commodity and these coastal countries might resort to imports and/or restrict exports of fish and seafood to satisfy domestic demands.

The regional industrial tuna fishing and canning value chains which are an extended segment of the European tuna markets are under climate risks due the observed subtle, but steady change in the migratory patterns of the tuna stocks in the Indian Ocean. They are moving away from the traditional surface tuna fishing grounds of the SWIO. The multi-million-dollar canned tuna industry is a stake as these environmental changes would affect its competitiveness at this critical time when the ACP-EU Preferential Trade Agreement is being challenged by the World Trade Organisation. It is most likely that the supply of raw tuna from the region would decline in the future, and it would eventually impact the future Fisheries Partnership Agreement between the EU and the ACP countries of the SWIO. To anticipate these long-term climate-induced changes and to make their comparative advantage on export markets, some tuna packers are planning to delocalised their operations in countries closer to emerging tuna fishing grounds, such as Bangladesh and Sri-Lanka. Fish and Seafood exporters of the SWIO region might face tougher competition on their traditional markets from exporters from other regions whose fisheries are less affected by ocean warming and/or are managed more efficiently.

Over the past decades, the countries of the SWIO have participated in over 30 regional and national climate-related programmes with a focus on Research, Evaluation and Policy Formulation; Dissemination of Knowledge and Awareness building; Capacity building and Community-based adaptation. Most of them have undertaken a Vulnerability Analysis of their key economic and environmental sectors. However, the national climate policies have focused more on the land-based sectors than the marine counterparts. Generally, the social and environmental issues of the coastal and marine areas are looked after by the Ministries of Environment and/or the Integrated Coastal Zones Management. These interventions have no direct interest in the socio-economic and ecological aspects of the artisanal fisheries. To cope with this policy gap, the relevant public agencies need to integrate climate-smart strategies into the existing coastal marine fisheries policy and regulatory frameworks. It would be necessary to formulate a regional climate change adaptation strategy for the fisheries sector of the SWIO, which have two renowned large Marine ecosystems.

The combined effects of climate and non-climate stressors are wicked problems affecting the socio-ecological sustainability and long-term resilience of the coastal marine fisheries. Some of those factors are manageable while some others are unmanageable. It is therefore critical to relieve the coastal marine ecosystems from the human-induced stressors, including overfishing and unsustainable fishing practices, including IUU fishing, maritime and land-based pollution so that these environments may uphold their natural resilience to the pathway ocean warming and extreme weather events. Climate adaptation strategies can be based on a no regret or triple-win approach when they anticipated well in advance. This proactive approach is more attractive to all stakeholders and may unfold tremendous opportunities for the SWIO countries in the process of modernising their SSF. The following points have to be included any Climate Change Adaptation Strategy in the coastal marine fisheries:

i) Awareness building on the potential impacts of climate change and the possible proactive adaptation measures in the fishing communities.

ii) Mainstreaming of Climate Change Adaptation Strategy into the existing Regional Fisheries

	Policies and Management strategies at the EA-SA-IO level.
iii)	Improved communication and coordination among the various Environment, Sustainable Development and Ocean Governance policies and programmes at national, regional and international levels
iv)	Participatory ecosystem-based management and governance in the coastal fisheries, with emphasis on the integrated coastal management that incorporates various interrelated multilateral environment agreements, including climate change and biodiversity protection under the same umbrella.
v)	Smart Investments in climate-proofing fisheries infrastructure and fishing assets;
vi)	Development of smart aquaculture and fish farming projects to boost the supply of fish;
vii)	Social security and Insurance Scheme to protect the fishing communities;
viii)	Alternative/ Complementary Sustainable livelihoods for the fishing communities such as blue carbon projects and environmental stewardship etc.
ix)	Science-Technology and Innovation leads in promoting climate-resilient fishing operations;
x)	Improved safety at sea through training and sharing of real-time weather information.
xi)	Review of Marine Protected Areas and Reserves strategies to integrated climate risks;

Annexe 2 - Climate Change and Global Fisheries[14]

1.0 Introduction

Climate change is causing global warming and the scientific communities under the IPCC acknowledge with the highest level of confidence that *human-induced emissions of Green House Gas (GHG) into the atmosphere are responsible for climatic change and occurrence of more frequent extreme weather events*[15]. The changes are not spread evenly across the world and those poor economies that have contributed the least to the climate deregulation, namely the least developed and low–lying coastal countries and the Small Island Developing States, are affected the most. Therefore, *climate change is widening the existing economic inequalities* in the world[16]. According to the IPCC Global Climate Models (GCM), if the GHG emissions continue at the current rate, global temperature will increase by 2.6 – 4.8 degrees Celsius (°C) and sea levels, 0.45 - 0.82 metre (m) higher than the present status by the turn of this century. To save humankind from the predicted climatic Anthropocene, the UNFCCC recommends maintaining the average global warming since the pre-industrial times below *2°C and consider lowering it to 1.5°C soon*. However, the IPCC, AR 5 concluded that by 2011, the world had already emitted about two-

[14] *Compiled by S. Sweenarain, 2020.*

[15] *IPCC, Fifth Assessment Report – Fisheries Summary 2014.*

[16] *It is a global moral indignation that the world largest polluters have systematically avoided the debate on climate compensation at the Paris Climate Summit 2015 to relieve the sufferings of the Low-lying coastal states and Small-Island Developing States that include most of least developed and fragile states of the Sub-Saharan African region. There is sentiment among these aggrieved nations that the International Community has failed deliver on Climate Justice.*

thirds of the maximum aggregated quota of GHG that could be emitted to meet the threshold of 2°C. However, *the 2°C target is no less than a death penalty for the low-lying nations and the SIDS*, mostly located in the tropical and sub-tropical regions as they would be suffering from irreversible damages at 1.5°C. Therefore, limiting the effects of climate change would require an immediate and more stringent reduction of GHG on the part of the world largest economies/polluters. The oceans represent 70% of the surface of the planet and provide vital services to sustain humankind, including provisioning of food from fisheries and aquaculture. However, the ability to provide these services or the productivity of these marine ecosystems is affected by the cascading effects of the impacts of ocean warming.

Fisheries provide 3 billion people around the world with about 20% of their average intake of animal protein and over 500 million people living in the poorest countries in Africa and Asia are dependent on marine fisheries for food and income[17]. Global warming is affecting the ecology of the coastal and oceanic ecosystems through the change in the food webs and biophysical features of the targeted fish species. Other induced effects of sea surface temperature rise such as acidification, sea-level rise, algal blooms, and hypoxia are undermining the productivity of the marine fisheries habitats. A large number of coastal species are under threat of extinction due to the combined effects of climate change and other interconnected human and environmental stressors such as overfishing, unsustainable fishing practices and land-ocean based pollution. *Based on the +2°C scenario, the potential loss incurred by the global fisheries by 2050 is estimated in the range of US$ 17 and 41 billion per year*[18]. Coral reefs support 10–12% of all fish caught in tropical countries, and 20–25% of fish caught by developing island nations[19]. Acidification is projected to drive a decline in global reef fish and shellfish production between 2020 and 2060. Adaptation is possible in some cases, but very difficult in others. The estimated total cost of adaptation for fisheries globally from 2010 to 2050 is up to USD 30 billion per year.

2.0 Physical and chemical changes in the ocean

Oceans absorb 30% of the global CO_2 emissions and this is lowering the pH of the water and causing *ocean acidification*. Bivalve molluscs such as mussels and oysters, along with corals and plankton that form shells from calcium carbonate, are all at risk. Ocean acidification may also have direct effects on fish behaviour and physiology. Rapid changes in chemical and physical conditions in the oceans have already affected the *distribution and abundance* of marine organisms and ecosystems. Changes to the distribution of fish populations are affecting the *composition of catches*. For example, the range limits of many intertidal species in the North Pacific and North Atlantic have shifted by up to 50 km per decade. In the Indian Ocean, the migratory pattern of the tuna and tuna-like species is found to be moving Eastward. These rates of displacement are generally faster than on land species and are seriously disrupting the food webs, i.e. the prey-predator relationship.

3.0 Potential Impacts and risks

i) *Physical and chemical changes to the ocean leading to a loss of marine Biodiversity;*

ii) *Changes in the level of seafood production, with initial decreases at low latitudes and increases at high latitudes;*

iii) *Potentially increased levels of overfishing and unethical fishing practices (fishing down the web) due to a decline in the coastal fisheries resources and ecosystems.*

iv) *Degradation and loss of tropical and cold-water coral reefs owing to decalcification resulting from ocean acidification.*

v) *Increased in harmful algal blooms which threaten ecosystems and fisheries*

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[17] *FAO World Fisheries Report, 2018*

[18] *IPCC Assessment Report (AR) No 5, Fisheries Summary, Page 5*

[19] *IPCC AR 5, Fisheries Summary, Page 8*

3.1 Changes in the level of seafood production

In 1998-2010, *concentrations of chlorophyll – an indicator of net primary production* – in the tropic oceans, including the Indian Ocean decreased by about 10%. This may be due to climate change or weather variability. However, Climate change is projected to cause a further decline of 9% over the 21st century in these open ocean regions. Rising temperatures reduce the oxygen-carrying capacity of the ocean, which limits the maximum body size that large fish can achieve. As a result, *catches of smaller fish* are predicted for the future. The number of *'dead zones', depleted in oxygen*, is increasing, which is affecting coastal ecosystems and fisheries by inhibiting growth. In coastal regions, the primary cause of dead zones is the nutrient run-off from land, which is exacerbated by warming water.

As seawaters continue to warm, scientists are virtually certain that the *productivity of many fisheries will change*. Spatial shifts of marine species due to projected warming will cause high-latitude invasions and high local extinction rates in the tropics and semi-enclosed seas relative to 2005 levels and based on a global 2°C warming scenario. Species richness and fisheries catch potential is projected to increase, on average, at mid and high latitudes and decrease at tropical latitudes. *Not all fish will be able to adapt, and some stocks will potentially die out*. Such changes are very likely to increase the vulnerability of the populations of the coastal and island developing countries, who depend directly on fisheries for food and income, and who are unable to target other stocks or to extend the range of their activity due to financial or technical limitations.

3.2 The potential collapse of some coastal reef fisheries

Migration of fish stocks will also pose new challenges to governments and regional fisheries management organisations when attempting to agree on fishing opportunities. Changes in temperature, oxygen levels and food availability in the ocean are likely to alter the distribution and abundance of top predator species such as tuna in the Pacific and Indian Oceans, with stocks in both oceans predicted to shift eastwards. These subtle (real but unnoticeable) changes are undermining the fisheries economy, particularly the small-scale value chains of the island and coastal states of the tropical and sub-tropical regions.

More than half of the world's coral reefs are thought to be *at medium or high risk of degradation under most climate change scenarios*. Reefs support high levels of biological diversity and provide important habitat for fisheries. *Coral reefs support 10–12% of all fish caught in tropical countries, and 20–25% of fish caught by developing island nations*. Many of these nations are already considered to be exploiting their coral reef fisheries unsustainably.

3.3 The Economics of Fish Redistribution

Fisheries yield is projected *to increase by 30–70% in high latitudes, but to fall by 40–60% in the tropics and Antarctica, based on 2°C warming*. Large species such as tuna in the Pacific and Indian Oceans are likely to shift eastwards. *Global loss of landings is projected at USD17 to 41 billion up to 2050*. The options are:

i) Undertake vulnerability assessments

ii) Strengthen coastal zone management

iii) Reduce aquaculture dependence on fishmeal

3.4 Dead Zones are Becoming More Common

The extent of *oxygen-depleted 'dead zones'* in coastal waters is increasing. These are caused by high levels of nutrient run-off from land, exacerbated by higher water temperatures and ocean acidification. In the open ocean, the extent of 'oxygen minimum zones' (OMZs), caused by ocean warming, also appears to be increasing. These waters are oxygen-poor in the mid-layers and so are unable to support large active fish. The options are:

i) Reassess and reinforce marine protected areas;

ii) Protect mangrove forests, seagrass beds and salt marshes.

3.5 The Ocean's Chemistry is Changing at an Unprecedented Rate

Ocean acidification – the result of enhanced carbon dioxide uptake from the air – puts commercially important fish and shellfish at risk. *The ocean's pH has already fallen by 0.1 since pre-industrial times, roughly corresponding to a 30% increase in acidity*. If CO2 emissions continue to rise at the current rate, a further pH drop of 0.3 by 2100 is projected. Change in ocean surface pH by 2100 under the 'business-as-usual' scenario: 0.6 more acidic.

3.6 Negative Effects on Shellfish

Shellfish are particularly vulnerable to ocean acidification and other changes in ocean chemistry. If ocean pH continues to fall, overall global production of shellfish fisheries is likely to decrease. The main options are:

i) *Reduce non-climate change-related stressors;*

ii) *Policies aimed at reducing fossil fuel use across economies will affect the seafood industry*

3.7 Coral Reefs at Risk

Coral reef ecosystems are declining rapidly, with the risk of collapse of some coastal fisheries. If CO2 emissions continue to rise at the current rate, coral reef erosion is likely to outpace reef building during this century. Incidences of coral bleaching as a result of rising temperatures
are also likely to increase, with a consequent loss of support and habitat for fisheries and other marine creatures. Coastal protection along with food resources and income from tourism are consequently all at risk. Thus, the propagation of new habitats such as artificial reefs to act as nurseries in areas where coral destruction occurs is a must.

Annexe 3 - IPCC 51st Session Report 2020 - Ocean and Cryosphere Takeaways

1. Introduction

At the close of a four-year process to examine the impacts of climate change on the world's ocean and the cryosphere and their role in climate mitigation, the Intergovernmental Panel on Climate Change (IPCC) released its findings in *Monaco on 25 September 2019*[20]. The report, the *Ocean and the Cryosphere in a Changing Climate* (SROCC) shows that impacts are already significant and will be increasingly dangerous if the world doesn't urgently move on to the least-emissions pathway. This would entail a peak in global emissions by around 2020, with a rapid decline thereafter. According to the report, scientists are highly confident that, *"the global ocean has warmed unabated since 1970 and has taken up more than 90% of the excess heat in the climate system"*. Furthermore, they argue that "since 1993, the rate of ocean warming has more than doubled. *"Marine heatwaves have very likely doubled in frequency since 1982 and are increasing in intensity"*. The panel is "virtually certain" that *"by absorbing more CO_2, the ocean has*

[20]*Monaco was the first country to propose, in 2015 to the IPCC that it undertakes a special report on the ocean and climate change. The first Because the Ocean Declaration of November 2015 rallied support for the proposal which was also sponsored within the IPCC by the delegations from China and Spain. The plenary of the IPCC added the cryosphere within the terms of reference and endorsed the proposal in February 2016. Thereafter it has taken four years to prepare and finalize the comprehensive report.*

undergone increasing surface acidification", and *"a loss of oxygen has occurred from the surface to 1000 metres"*. At the launch of the report held at the Oceanographic Museum of Monaco, the co-authors of the report said that their work "*highlights the urgency of prioritizing timely, ambitious and coordinated action to address widespread and enduring changes in the ocean and cryosphere".*

In this report, reference made to *different emissions scenarios*, i.e. the RCP[21] and every finding is labelled with a *Degree of Confidence*, based on the strength of the science behind it, as described in this table. ***The findings are presented on the scale of scientific confidence: Medium is (about 5 out of 10 chance), High (about 8 out of 10 chance) and Very High Confidence (about 9 out of 10 change***). The report is divided into three (3) sections: i) Observed Changes and Impacts; ii) Projected Changes and Risks; and iii) Responding to Changes: Challenges, Options and Enablers. Above all, it pointed out that *policy practitioners in areas of climate and ocean policies tend to work in silos - within their respective fields in relative isolation - with little or no synergies with one another*. It is, therefore, critical to enhancing effective collaboration and interactions among climate and ocean communities[22]. Some of the key ocean-related findings of the report are summarized below.

2.0 Observed Changes and Impacts

The cryosphere is shrinking. The report includes a detailed assessment of changes in glaciers and ice sheet covers, regional changes in snowfall and degradation of permafrost.

2.1 Ocean Warming

High Confidence: The ocean has warmed unabated since 2005 and marine heatwaves are increasing in frequency and severity. Between 84% and 90% of marine heatwaves occurring during 2006-2015 is due to anthropogenic warming. The Arctic Sea ice is declining in all months of the year.

Medium confidence: Around half of observed sea ice loss can be attributed to anthropogenic temperature increase.

Very Likely: The rate of ocean warming has more than doubled since 1993 and the stratification in the upper ocean has increased since 1970, *impacting ocean oxygen, nutrient supply, and net primary production.*

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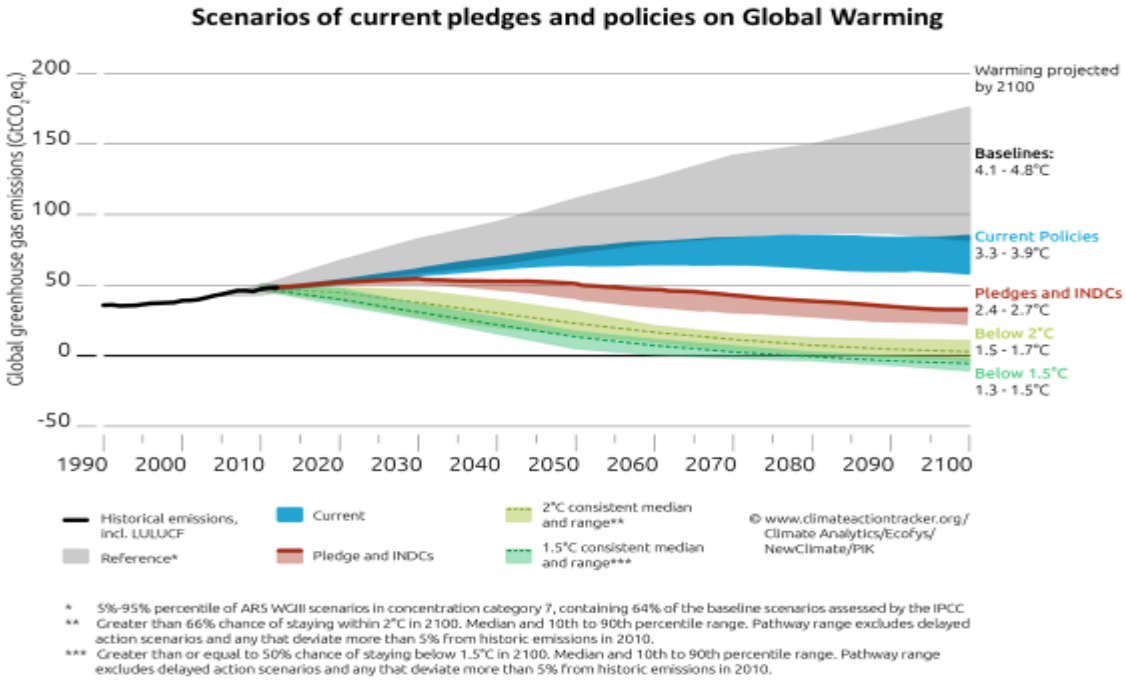
[21] RCP stands for 'Representative Concentration Pathway'. The four RCPs range from very high (RCP8. 5) through to very low (RCP2. 6) future concentrations. The numerical values of the RCPs (2.6, 4.5, 6.0 and 8.5) refer to the concentrations in 2100.

[22] . A very timely opportunity little more than three months before UNFCCC COP25 in Santiago, Chile, which the host country has pledged to make a "Blue COP", with special attention to ocean-related issues.



Source: climate Action Tracker Website – Accessed on 03 March 2016 quoted by IIESD

2.2 Acidification

Very likely: The ocean surface pH has declined in the range of 0.017- 0.027 pH units per decade since the late 1980s that has affected the natural variability for more than 95% of the ocean surface.

High confidence: The open *ocean is losing oxygen* primarily due to changing ocean stratification, ventilation, and biogeochemistry.

Medium confidence: The Atlantic Meridional Overturning Circulation (AMOC) has weakened relative to 1850-1900.

2.3 Sea Level Rise

High Confidence: Global Sea level is rising, and the rate is accelerating due to increasing rates of ice loss from Greenland and Antarctic ice sheets, and thermal expansion. Anthropogenic climate change has led to increased precipitation, winds and extreme sea-level events associated with some tropical and extra-tropical cyclones.

Very high confidence: Glacier and ice sheet contributions exceed the effective thermal expansion.
Regional differences in sea-level rise, within +/-30% result from land ice loss and variations in ocean warming and circulation. There have been geographical shifts in marine species.

Medium Confidence: This has consequences for species interactions affecting their abundance and causing cascading impacts on ecosystem structure and fisheries. In many regions, declines in fish and shellfish stocks have already reduced catches. However high confidence that abundance of some species has increased due to expansion of suitable habitat. Generally, ocean warming in the 20th century has contributed to an overall decrease in maximum catch potential. There are changes in species composition of fisheries catches since the 1970s in many shelf seas ecosystems.

2.4 Synthesis

High Confidence: Coastal ecosystems are under stress from a combination of ocean warming, intensified marine heatwaves, ocean acidification, loss of oxygen and sea-level rise, plus adverse effects from human

activities on ocean and land. The impacts are already being observed on species, biodiversity, and ecosystem functioning and services.

Nearly 50% of coastal wetlands have been lost over the 20th century as compared with preindustrial time. Ranges of seagrass meadows and underwater forests are contracting at low latitudes. Mangrove encroachment into subtropical salt marshes is leading to loss of food and habitat for dependent fauna. Marine heatwaves have negatively impacted marine organisms and ecosystems in all ocean basins over the last two decades, including critical foundation species.

The frequency of large-scale coral bleaching events has increased since 1997 causing worldwide reef degradation. Calcified organisms such molluscs are affected by extreme temperature events and acidification.

3.0 Observed Impacts on People

High Confidence: The changes in the ocean have modified or degraded marine ecosystem services leading to impacts on fisheries and food, trade and transport, challenging their governance. Harmful algal blooms are expanding in range and increasing in frequency due to both climatic (warming, acidification, and oxygen loss) and non-climatic (eutrophication and pollution) drivers. Coastal communities are exposed to climate-related hazards, including tropical cyclones, extreme sea level and flooding, marine heatwaves, sea ice loss, and permafrost thaw.

Medium confidence: Both positive and negative impacts include health and well-being, indigenous culture, tourism, and recreation.

4.0 Projected Changes and Risks

Projections differ depending on which emissions scenario is assumed. The impacts are projected to be more severe under a high emissions scenario as compared with a lower one. The scientific communities are certain that the ocean will continue to warm through the 21st century accompanied by loss of Arctic Sea ice, loss of oxygen, increased acidification, increasingly frequent marine heatwaves and further weakening of the AMOC.

High Confidence: All coastal ecosystems will be at high to very high levels of risk under RCP8.5 by 2100. Upper-ocean stratification will increase throughout the 21st Century. Globally, the frequency, duration and spatial extent of marine heatwaves will intensify. Sea level will continue to rise at an increasing rate, and (currently rare) extreme sea-level events will occur frequently by 2050, especially in tropical regions. Under all future emissions scenarios, many low-line megacities and small islands at almost all latitudes will experience extreme sea-level events (and severe flooding) annually by 2050. Salinization and hypoxia in estuaries will continue and this will lead to higher risks for benthic and mesopelagic biota. Almost all warm-water coral reefs will suffer significant losses of areas and local extinctions, even at 1.5°C.

Global fisheries catch potential will decrease in the 21st century due to warming by 20.5–24.1% by the end of the 21st century relative to 1986–2005 under RCP8.5. The rate and magnitude of decline will be highest in the tropics. Ocean acidification, oxygen loss and sea ice reduction will exacerbate these problems. There will be a decrease in deep-sea (3000-6000 m depth) seafloor biomass. 20-90% of coastal wetlands will be lost by 2100 depending on projected sea-level rise and habitat degradation.

Medium Confidence: The frequency will increase by around a factor of 50 by 2081-2100 under RCP8.5, and a factor of around 20 under RCP2.6. The Arctic Ocean and tropical oceans will experience the largest frequency increases. Continued carbon uptake by the ocean to 2100 is virtually certain to exacerbate ocean acidification. Enhanced stratification will reduce nutrient supply and lead to net primary production decline by 7-16% for RCP8.5 by 2081-2100. Net primary production will increase in the Arctic and possibly around Antarctica, but that is low confidence. The geographical range of Arctic marine species (including marine mammals, birds, and fish) will contract, while the range of some sub-Arctic fish communities is projected to expand.

The Southern Ocean, the habitat of Antarctic krill will contract southwards. There will be decreased calcification, bio-erosion, and dissolution of non-living components of cold-water coral communities. Cold-water corals will be particularly vulnerable when both temperature and oxygen conditions are outside species' tolerance range.

Very likely: Oxygen loss between 100 and 600 m depth projected to emerge over 59–80% of the ocean area by 2031–2050 under RCP8.5. Poleward shifts in species distribution are very likely. The projected time of emergence before 2100 for five primary drivers of marine ecosystem change (surface warming and acidification, oxygen loss, nitrate content and net primary production change) for over 60% of the ocean area under RCP8.5 and over 30% under RCP2.6. Extreme El Niño and La Niña events likely to occur more frequently and to intensify.

Very High Confidence: Coral reefs will be at high or very high risk even at global warming of 1.5°C. The same will be true for seagrass meadows and kelp forests.

5.0 Projected Risks for People

High confidence: Low-lying coastal communities in cities, small islands, deltas, river mouths and the Arctic will experience substantially exacerbated risks. Vulnerable communities in coral reef environments and polar regions are expected to face adaptation limits – even under a low emission scenario – well before the end of the century. Ambitious adaptation has the potential to reduce risk in many locations, which in turn could facilitate adaptation beyond 2100.

Medium confidence: Climate change will impact on fish production. *Communities with high consumption of seafood are at risk from increased exposure to toxic contaminants in marine plants and animals* (bioaccumulation of e.g. persistent organic pollutants and mercury) as well as to waterborne Vibrio pathogens and harmful algal blooms. Urban atoll islands and low-lying Arctic communities will be at moderate to high risk even under low-emission scenarios. Some island nations may become uninhabitable.

6.0 Responding to Changes

Current governance structures are not well-suited to deal with the multiple risks stemming from climate change. They are often too fragmented across administrative boundaries and sectors to address increasing and cascading risks in an integrated way.

High confidence: Options for assisting the functional integrity of marine ecosystems in the future include protection, restoration, ecosystem-based management and the reduction of pollution and other stressors. Networks of protected areas, on land and at sea, help maintain existing ecosystem services and can also facilitate the poleward and altitudinal movements of populations, species and ecosystems that are already occurring in response to warming and sea-level rise. The terrestrial and marine habitat restoration, and ecosystem management tools (assisted species relocation, coral gardening) can be locally effective in enhancing ecosystem-based adaptation.

Medium Confidence: Strengthening the responsiveness and precautionary approaches of existing fisheries management strategies will reduce negative climate change impacts on fisheries, with benefits for regional renewable resource economies. *Sustainable fisheries management practices reduce climate risks but have limited ability to address ecosystem change*. Its contribution is relatively modest at the global scale (0.5% of global current emissions annually).

7.0 Enabling factors

The impetus is on the significance of transboundary cooperation and coordination among different actors, education, climate literacy, monitoring/ forecasting, funding, and institutional support.

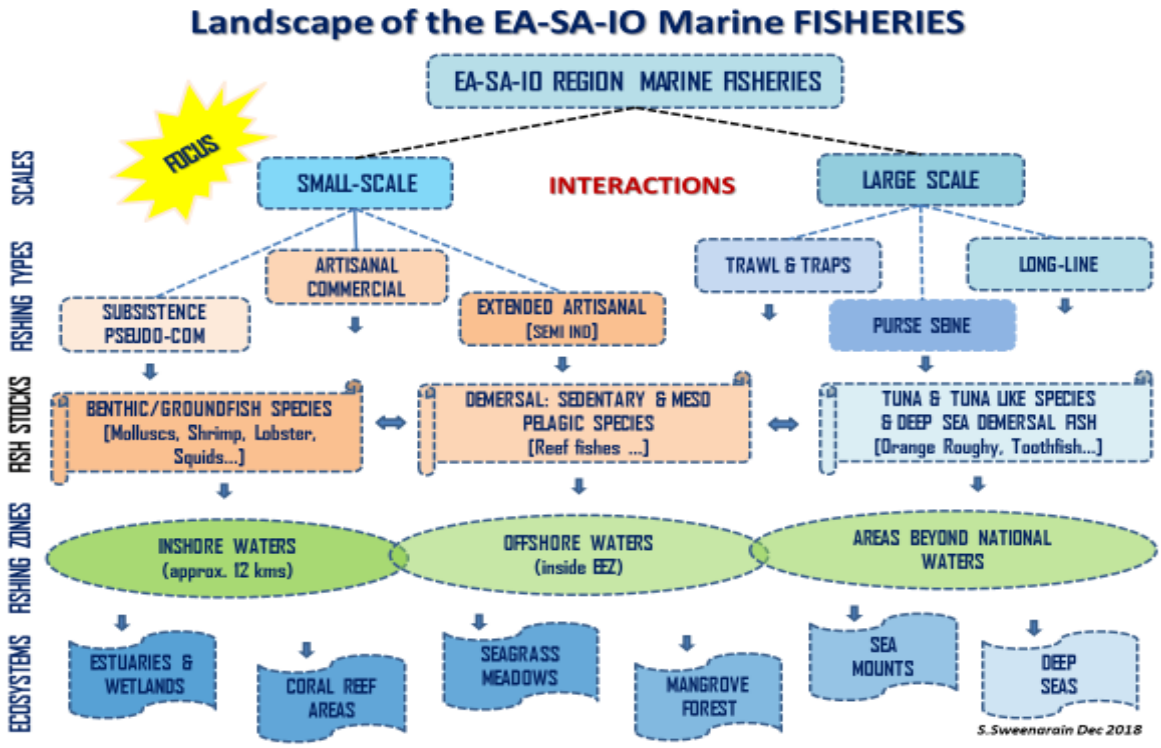
High Confidence: A key enabler in responding to sea-level rise includes taking *a long-term perspective*

when making short-term decisions, and explicitly accounting for uncertainty and risks post-2050. Climate-resilient, sustainable development requires coordinated and sustained implementation of a low emission pathway and adaptation actions. This will require profound economic and institutional transformations. The report reveals *the benefits of ambitious mitigation and effective adaptation for sustainable development* and warns of *the escalating costs and risks of delayed action*. The potential to chart *Climate Resilient Development Pathways varies within and among ocean*, high mountain, and polar land regions". "Realising this potential depends on transformative change". "This highlights the *urgency of prioritising timely, ambitious, coordinated and enduring action*".

Annexe 4 - Economics EA-SA-IO Marine Fisheries

In 2017, Africa produced nearly 12 million tonnes of fish representing 7 % of the global catch of 173 million tonnes. This figure is comprised of 3.0 million tonnes from inland fisheries, 2.2 million tonnes from aquaculture and 6.7 million tonnes from marine capture fisheries. Over the same period, the African continent contributed about 3.4 % to the total value of global fish imports of US$ 146.3 billion) and 4.6 % to the total value of global fish export of US$ 156.5 billion [23]. The marine fisheries of the EA-SA-IO region hold a contrasting landscape where 90% of the coastal fisheries resources is harvested in the inshore waters by small-scale subsistence and traditional artisanal fishing. Generally, these fisheries are mostly poorly regulated, open access and informal economy. The catch is destined for household consumption and any surplus is sold on the local markets. The average per-caput fish consumption in Africa is less than 10 kg, i.e., less than half the global average and is projected to decline to 7 kg by 2030 if appropriate measures are not expedited. In some of these coastal countries namely, Tanzania, Kenya and Sudan, inland fish production is much higher than the marine fisheries. The relatively high rate of post-harvest physical and economic losses in the subsistence and traditional artisanal fisheries represents a serious socio-economic and ecological issue which is not getting adequate policy consideration.

[23] *FAO. 2020. The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome.*



Most fishers in the commercial artisanal fisheries are in fact fish workers since the fishing assets are mostly owned by fish traders and outside investors (shadow owners) who have no direct interest in sustainable fisheries. The fishers as the front liners are often blamed for overfishing and unethical fishing practices whereas the real profiteers are officially unknown to the government agencies. The surplus profits are rarely reinvested in the industry. So, the existing business models (Business as usual) are sustainable for the local fishing communities and the health of the fisheries/ ecosystems, and the national economies are ok? The governments are unable to invest in the hard and soft infrastructures or creating a proper enabling environment for connecting the local communities to the economic mainstream. The open-access policy in the artisanal fisheries that was initially sought as a social safety net against endemic unemployment and food insecurity for the local population has failed and has become a politically sensitive issue. While the inshore and nearshore fisheries resources are dwindling. the existing fishing capabilities (assets and technologies) and supply-chain ecosystems are inadequate to venture farther offshore. Alternative sustainable livelihood opportunities are scarce in the coastal areas. The fishers and fish workers are trapped in an existential threat which is the cause of the growing disconnects between the local communities and the Governments.

The remaining 10 % of the regional fisheries catch/landings is made up of the industrial value chains that target high-value fish species such as tunas, shrimps, and lobsters mainly for the export markets. They are vertically integrated locally based foreign corporations that have obtained attractive economic and fiscal incentives from the coastal states. For instance, the landed value of the tuna fisheries in the WIO (FAO Fishing Zone 57) is approximately US$ 2 Billion annually and 34 % of it is attributed to the SWIO states (US$ 684 million) which is composed of industrial tuna fisheries (US$ 231 million) and coastal small-scale tuna fisheries (US$ 433 million)[24]. The aggregated fisheries licences revenue is estimated at US$ 21 million annually. These industrial fisheries are relatively well-managed but there is no record on their direct and indirect contribution to the national economies.

[24] *Sweenarain, S (World Bank - SWIOFish 1, 2018). Cost-Benefit Analysis and Sustainable Financing of a Regional Fisheries Framework Agreement for the shared tuna fisheries resources in the South West Indian Ocean Basin.*

The Western Indian Ocean generates approximately US$22 billions of economic benefits annually and the share of the marine fisheries is about 11%, i.e. US$ 2.4 billion[25]. Since the enactment of the UN Convention on the Law of the Sea, about 90% of fisheries resources and 55% of other natural renewable and non-renewable resources are located inside the EEZ of the coastal states[26]. It is assumed that Blue Economy would provide the impetus to these developing coastal and island states to muster the needed capacities to strengthen their marine economy amidst the environmental risks, including climate change. Sustainably managed, the economic benefits derived from the marine fisheries can be enhanced by 2 to 3 times in the longer-term. A recent study of the World Bank[27] shows that the global marine fisheries are an underperforming asset and the difference between potential and actual net economic benefits is estimated at US$ 88 billion per year which is equivalent to half of the value of global seafood trade. The share of WIO marine fisheries is about US$ 5 billion per year. If timely climate adaptation measures are not implemented urgently, the expected economic benefits from the marine fisheries in the tropical region would decline significantly.

The marine fisheries sub-sector has the economic potential to support the cost for its sustainable development and management. As a rule of thumb, the foregone ***economic rent or government revenue*** in the form of direct and indirect taxes is currently estimated at US$ 240 million per year and it can be increased progressively to US$ 480 million upon the sustainable rehabilitation and modernisation of the coastal fisheries. Instead of fuelling economic growth and shared prosperity in those underdeveloped states, the financial resources are leaked out of the economic mainstream. This a textbook example of the ***paradox of poverty amidst plenty*** that aggravates economic inequalities and multidimensional poverty in the coastal fishing communities. The root cause for the declining productivity of the coastal fisheries is attributed to population growth, overfishing and unethical fishing practices, land-based and maritime pollutions which are aggravated by the direct and indirect impacts of ocean warming. In other words, there is urgent need for science-based policymaking and management actions[28] to ensure sustainable fisheries.

The economic and social contribution of the fisheries sector is frequently underestimated in the national accounts. The outcome is both the cause and effect of a lack of disaggregated data on the different branches/segments of the sub-sector interacting with the society and economy at large. The information asymmetry may partly explain the ongoing political procrastination to manage this complex and politically sensitive sector. The Gross Domestic Product (GDP) does not reflect the potential of the sector in terms of net economic benefits or economic rents, its contribution to employment, food security and cultural diversity.

An increase in GDP may simply mean increased costs of fishing rather than increased productivity, or net benefits. All may seem fine until a complete collapse of the fisheries. Therefore, these conventional macroeconomic indicators need to be complemented by other meaningful measures, including its socioeconomic impacts and environmental sustainability such as the status of fish stocks and long-term profitability. Generally, the contribution of the fisheries sector to national and regional economies is greater than the official statistics. Commercial fishing constitutes the economic base for an extended value chain through processing, marketing, retailing, and the foodservice industry. Subsistence fisheries are important for food security and rural livelihoods. The economics of the informal sector is not fully captured by the economic measures.

A new type of thinking is required to unleash the development potential of coastal fisheries as a growth sector. There is a general understanding that capture fisheries need to be broadly reformed to optimize

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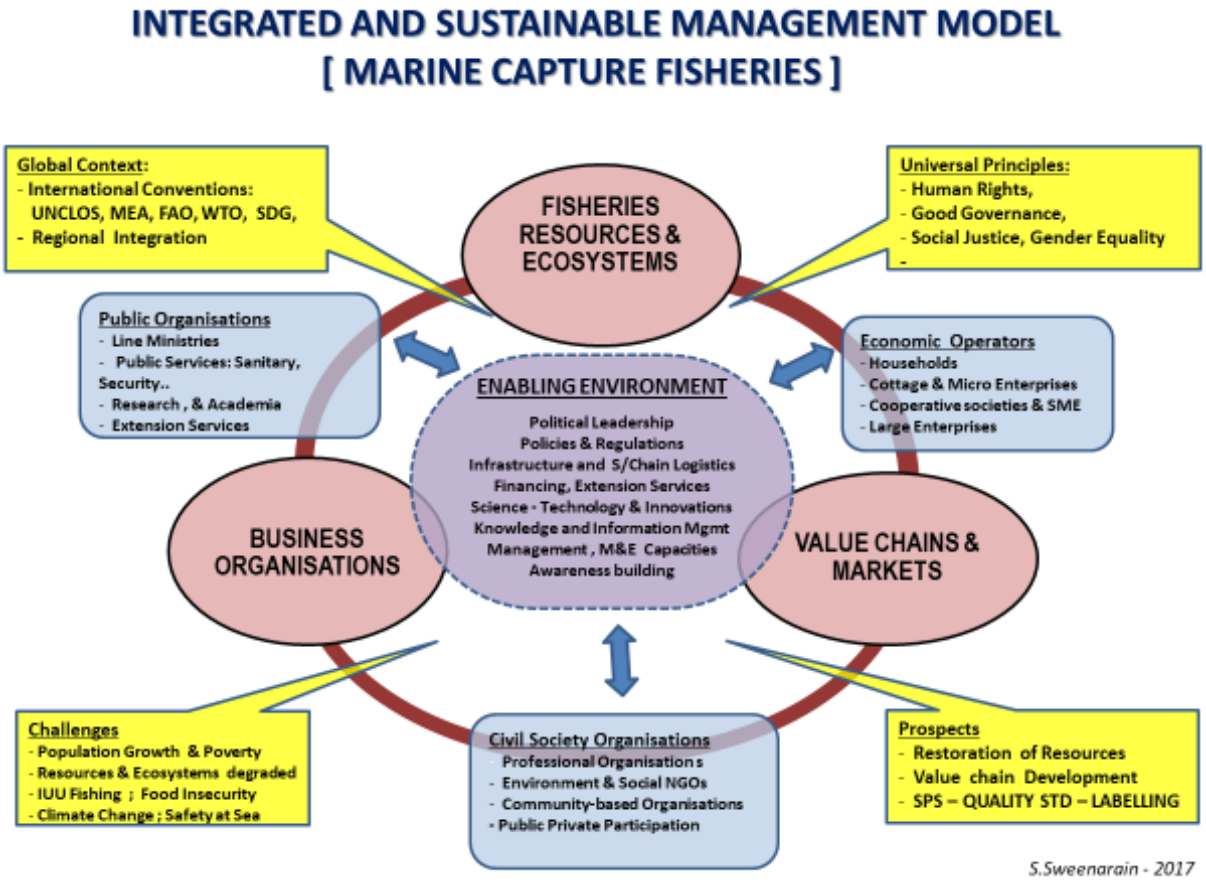
[25] *WWF 2015, Reviving the WIO Ocean Economy – Actions for Sustainability.*
[26] *Global Marine Atlas 2018.*
[27] *World Bank Group 2016, The Sunken Billions (revisited)*
[28] *Cf. FAO Fisheries Performance Analysis Toolkit, 2020*

their economic performance and environmental sustainability. The proposed intervention will be instrumental in enhancing objective policy coherence between the economic, social, environmental and governance imperatives considerations toward sustainable and inclusive fisheries. It is bound to empower the national fisheries agencies to maximise cross-sector synergies to balance divergent policies for achieving a triple-win.



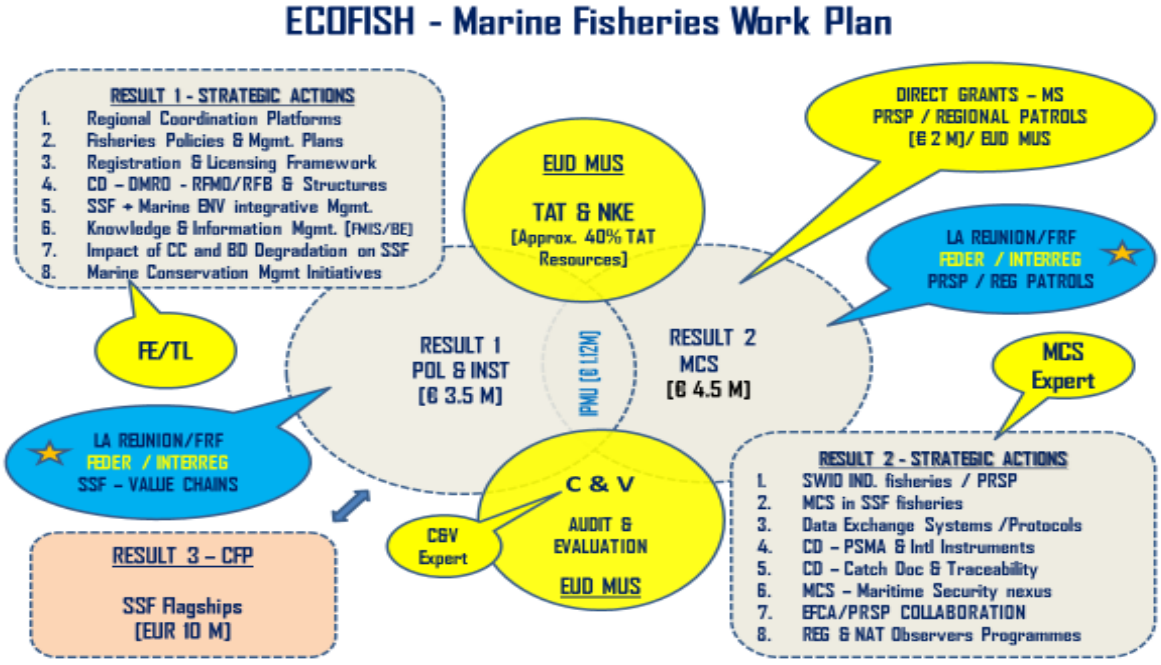
Annexe 5 – Synopsis of Ecofish Marine Fisheries Work Plan

The *"Contribution of Sustainable Fisheries to the Blue Economy of Eastern Africa, Southern Africa and the Indian Ocean region (ES-SA-IO) - "Ecofish"* is financed by the *11th EDF Cross-Regional Initiative*. The Financial Agreement was signed by the European Union and the Indian Ocean Commission, on behalf of the five Duly Mandated Regional Organisations of the EA-SA-IO region on the 13th September 2018. The programme is managed by the EUD Mauritius and is implemented by the IOC Secretariat in collaboration with the eligible regional economic and fisheries organisations and partner countries. It has a financial envelope of *EUR 28 million for a life span of 62 months.* The overall objective of the programme is *"to enhance equitable economic growth by promoting sustainable fisheries in the EA-SA-IO region"*. The specific objective is **"***to support sustainable management and development of fisheries in order to contribute to poverty alleviation, food and nutrition security while addressing climate change resilience and enhancing marine biodiversity***"**.

The programme consists of three inter-connected Results: *Result 1* – Enhanced Policy and Institutional Frameworks; *Result 2* – Improved Regional Monitoring, Control and Surveillance capacities and *Result 3* –

Call for Proposal for sustainable management/development and governance flagship in the inland and marine small-scale fisheries. It is implemented through *five Work Plans* which are managed directly (Service Contract for the procurement of TAT and NKE), Result 3 – Call for Proposals, Direct Grants and financial audits and external evaluations), semi-directly (LVFO and LTA Work Plans) and indirectly (Marine fisheries Work Plan which is implemented by the IOC Secretariat). The Technical Assistance Team (TAT) is a cross-cutting component and is composed of a Fisheries Economist/Team Leader who is also responsible for the overall technical coordination of the Programme; an MCS Expert and a Communication and Visibility Expert.

Besides the implementation of the strategic actions of Result 1 and 2 in marine fisheries of the EA-SA-IO, the IOC Secretariat is hosting the Integrated Programme Management Unit (IPMU). The Work Plan has a budget of EUR 9,750,000 (about 34% of the total funding), in addition to the external financial support of about EUR 3.6 million through the participation of La Reunion/France as a member of the IOC. Result 1 has a budget of EUR 3,510,000 to enhance the sustainable management of the regional marine fisheries and environmental conservation. The initiative consists of mainstreaming several strategic mechanisms, including the BE Fisheries Database to enable informed policymaking and monitoring. In all, it aims to enhance the socio-ecological sustainability, financial viability, and climate resilience of the EA-SA-IO marine fisheries for the present and future generations.



Annexe 6 - Zanzibar Marine Fisheries Research Centre

Zanzibar, 18th December 2019.

Brief minutes of the first meeting between the Institute of Fisheries Research Zanzibar (IFRZ) and EU-funded Ecofish Programme for the EA-SA-IO Region at the Nyangumi House, Zanzibar

Participants:

Institute of Fisheries Research Zanzibar

1. Dr Narriman Jiddawi, Director-General
2. Ms Ramla Talib Omar - Head of Planning Section
3. Mr Omar Hakim Foum - Senior Fisheries officer Marine Conservation unit (MCU), Department of Fisheries Development Zanzibar.

Ecofish Programme

4. Dr Soobaschand (Sunil) Sweenarain, Technical Coordinator & Team Leader

The main objective of the meeting was to explore the possibilities of effective collaboration between the Institute of Fisheries Research (IFR) of the Zanzibar Department of Fisheries and the Ecofish Marine Fisheries Work Plan for the sustainable and inclusive management of the small-scale fisheries in the SWIO region.

Dr Sunil presented an overview of the "Contribution of Sustainable Fisheries to the Blue Economy of Eastern Africa, Southern Africa and the Indian Ocean region (ES-SA-IO)", popularly called "Ecofish" to underscore the triple-win of the sustainable fisheries in the coastal communities through enhanced livelihoods and shared prosperity, environmental stewardship and biodiversity conservation as well as climate change adaptation and resilience. The programme, being a Cross-Regional Initiative under the 11th EDF, emphasizes the value-added of regional cooperation for the sustainable management of shared fisheries resources and national fisheries of regional socio-ecological importance, including exchange of information and capacity building. Ecofish is a continuity of SmartFish in some thematic areas and it, therefore, intends to build on the existing national networks to kick-off the earmarked strategic actions at cruising speed.

Initially, three key areas of potential collaboration have been identified in the Ecofish IOC Work Plan:

1. Strategic Action 1.5 *Co-management initiatives in the coastal marine fisheries related conservation and protected areas*

2. Strategic Action 1.6 *Assessment and Monitoring of Biodiversity loss and climate change on the coastal marine fisheries and ecosystems*

3. Strategic Action 1.7 *Operationalization of the National chapter /Node of a Regional Fisheries Management Information System for informed policymaking and management decisions.*

Both parties have pledged to share available information at the national and regional levels on the above thematic areas. The marine fisheries of the EA-SA-IO region are differentiated into two sub-groups namely, the SWIO region which consists of the five IOC member states Comoros, La Reunion/France, Madagascar, Mauritius and Seychelles and three East African countries: Mozambique, Tanzania and Kenya[29]. The other sub-group includes the coastal states of the Horn of Africa: Somalia, Eritrea, Djibouti and Sudan. These two groups adopt a harmonized conceptual framework and methodologies to ensure the consolidation of the data.

The other national marine fisheries and environmental research agencies will be asked to participate in these regional projects. A formal National Focal Point will be established through the parent Ministry and will comprise of a panel of 3 to 5 cross-sector experts, including Environment, Economy and Finance, National Statistics and so on. As an RWA (Ready, Willing and Able) signal, it is thought necessary to obtain the approval and possibly, a firm commitment in terms of a matching fund and/or contribution in-kind on the part of the parent Ministry and/or the national Government.

[29] *It is assumed that Kenya is closer to the SWIO region.*

Way Forward

ZNZ Institute of Fisheries Research

i) *To undertake preliminary research/inventory on the proposed thematic areas at the sub-national and national levels to inform the preparation of a concise Concept Note/Project Plan that will include situational analysis, needs and gaps assessment, a feasible theory of change, intervention logics and the implementation modalities.*

ii) *To liaise with its parent Ministry to obtain the necessary approval and support for rolling out these regional projects at the sub-national and national levels.*

iii) *To assume effective consultation and collaboration with the other Sectoral Ministries as well as Research and Development Agencies in the process of assuring an integrative/synergistic approach for the realization of these projects.*

Ecofish Programme

i) *To provide an appropriate Concept Note template, expert advice and guidance for the strategic planning of the proposed projects*

ii) *To ensure effective coordination of these regional projects among the national nodes of the other participating of the SWIO.*

iii) *To formalize the collaboration between the ZNZ Fisheries Research Institute and the Ecofish IPMU through a Memorandum of Understanding.*

Timeline

It is mutually agreed that the preparation of the Concept Note will be completed before the end of February 2020. The participants have agreed to keep in touch to ensure that the Concept Note and project plan are adequate for the implementation of these projects.

Annexe 7 – Kenya Marine Fisheries Research Institute

MINUTES OF MEETING WITH TECHNICAL COORDINATOR ECOFISH PROGRAMME HELD ON 20TH DECEMBER 2019 AT 4TH FLOOR BOARD ROOM

Meeting Participants

Prof. James Njiru	-Director, KMFRI
Dr Soobaschand Sweenarain	-Technical Coordinator, ECOFISH Programme
Dr Jacob Ochiewo	-Assistant Director Socioeconomics, KMFRI
Dr Gladys Okemwa	-Senior Research Scientist, Fisheries (taking minutes)

Agenda

The meeting aimed at exploring the possibilities of a collaboration between Ecofish programme and KMFRI for the setting up a Fisheries Management Information System (FIMS) to inform policymakers and management decision-making in the fisheries sector, particularly small-scale fisheries, at the national and regional level.

MIN 1/12/2019: Opening

Director KMFRI opened the meeting by welcoming the participants. He emphasized the importance and benefits of regional collaboration and partnerships, especially taking into consideration past initiatives. He then welcomed Dr Sweenarain to brief the team on the project.

MIN 2/12/2019: Briefing of the ECOFISH Project

Dr Sweenarain provided a brief overview of the ECOFISH Project. He noted that the project will provide an opportunity for valorising strategic tools to capture the economics of the fisheries sector including the cost benefits of sustainable fisheries. The Project will focus on assessing the economic impact of the marine fisheries sector in terms of wealth creation (GDP), employment, as well as the distributive effects of the revenue derived from the fisheries sector. It will, therefore, aim at an equitable distribution of income and wealth in the marine fisheries sector by promoting sustainable fisheries enterprises.

A meeting of the ECOFISH Programme Steering Committee will be held at the end of February, and a Project Implementation meeting by the end of the same month. It is therefore expected that the strategic planning for launching the project will be in March. The Project will last for about 4 years and will be implemented in four stages: (I) research and development, (II) implementation/experimental phase, (III) consolidation and (IV) exit strategy. Deliverables of the project will include:

1. Formulating a satellite account on bioeconomic indicators of the fisheries sector for targeted audiences (policymakers) in the public and private sector as well as the civil society organisations.
2. Analysis and monitoring of indicators in the context of the blue economy to facilitate mobilization of resources for the blue economy
3. Participating in the development and operationalisation of a Regional Fisheries-Climate-Biodiversity- Outlook Network in the EA-SA-IO region

4. Capture learning investments from the project

The outputs of the project will include:

- Awareness-raising, sensitization, evidence-based communications for social innovation in favour of sustainable fisheries.
- The process will also lead to capacity building at the national and regional levels
- Unleashing the development potential of the fisheries sector by maximizing the value chain
- The project will provide the necessary IT equipment that will be required for the proper functioning of the EFMIS

The project will also explore the possibility of attracting matching funds at the national level to enhance capabilities for consolidation and exit strategy and strategic alliances with other development partners

MIN 3/12/2019: Project endorsement and Way Forward

Both parties mutually agreed to work together in the formulation of a concept note and identification of the partners in the regional countries for the operationalization of the system. KMFRI will play the leading role and will together with ECOFISH programme to develop the concept and operational modalities of the FIMS database from start to finish. Further, a national network of experts of those who can contribute to the project will be developed nationally and regionally, whereby KMFRI will play a coordinating role.

Following the deliberations, the Director, KMFRI fully endorsed the project and extended his full support during the process of operationalizing the project. This was further seconded by AD Socioeconomics. The Director thanked Dr Sweenarain for taking the time to visit KMFRI and wished him a safe trip back.

The meeting came to closure at 2:00 pm

Annexe 8 – Key Features of Coastal Marine fisheries in the EA-SA-IO Region

Apart from the inter-sectoral Ministries, the table below highlights the major features of the small-scale fisheries, potential partners, and key stakeholder groups of the partner countries [non-exhaustive].

1. Comoros	*- 3 autonomous islands - Grande Comore, Anjouan, and Mohali.* *- Predominantly coastal tuna fisheries with patches of reef fishery* *- Centre National de Documentation et de Recherche Scientifique des Comores* *- Institut National de Recherche pour l'Agriculture, la Pêche et l'Environnement.* *- Fisher and Fish Worker Associations at National and Sub-National levels; ENGO*
2. La Reunion/ France	*- Predominantly coastal (FAD) tuna fisheries* *- Institute of Research and Development, IFREMER and University of La Reunion* *- Comité Régional Pêche Maritime – RE et autres associations Professionnelles*
3. Madagascar	*- One of the largest island countries of the world with a diverse coastal landscape* *- Subsistence & Com. Artisanal fisheries (reef fish, molluscs, and shrimps…)* *- IHSM (Tuléar), Observatoire Socio-économique Pêche Artisanale - DRH* *- ICZM, Fisher Associations, Ecofish R 3 Project (C3) in the northern part; ENGO*
4. Mauritius	*- Mainland + Rodrigues* *- Reef fish and coastal tuna fishing (artisanal and extended artisanal fleets)* *- AFRC, FiTEC and MOI, Unif. of Mauritius / Ecofish R3 - UNDP FAD fishery Project* *- Fisher Associations & Cooperatives (FPAOI, Sea Apostolate…), ENGO*
5. Seychelles	*- Mainland + Praslin and La Digue* *- Predominantly demersal and reef fisheries (artisanal and extended- artisanal)* *- Seychelles Fishing Authority, Environmental NGO, University of Seychelles (Uni Sey)* *- Fisher Associations + ENGO,*
6. Mozambique	*- Mainland + other inhabited islands* *- Predominantly subsistence and artisanal demersal fisheries* *- Marine Fisheries Research Institutes, IDPPE* *- Fisher Associations & Cooperatives, ENGO…*
7. Tanzania	*- Mainland + Zanzibar [Significant continental fisheries)* *- Subsistence and artisanal fisheries (predominantly demersal species)* *- Several Fisheries Research and Marine Science Institutes, TAFIRI, Institute of Marine science (Dar es Salam & Zanzibar)*

	- BMU and ENGO + Ecofish R 3 Pilot Project (Mwambao)
8. Kenya	*- Mainland + Mombasa*
	- Subsistence and Artisanal Commercial demersal and coastal tuna fisheries
	- KMFRI, WIOMSA + BMU, Fisher Associations + ENGO
9. Somalia	*- Republic of Somalia + 3 autonomous states*
	- Predominant subsistence and artisanal demersal and coastal tuna fisheries
	- Somalia Marine and Fisheries Research Institute
	- Fisher Associations and ENGO
10. Eritrea	*- Mainly subsistence and com. artisanal demersal and coastal tuna fisheries*
	- Marine Fisheries Research Capacity – To be advised
	- Fisher Associations & ENGO – To be advised
11. Djibouti	*- Mainly subsistence and com. artisanal demersal and coastal tuna fisheries*
	- Marine Fisheries Research Capacity – To be advised
	- Fisher Associations & Coop + ENGO
12. Sudan	*- Mainly subsistence and com. artisanal demersal and coastal tuna fisheries*
	Institute of Marine Research, Port Sudan
	-Marine Fisheries Research Capacity – To be advised
	- Fisher Associations & Coop + ENGO

Annexe 9 - Abbreviations and Acronyms

AOIH	: Africa Ocean Information Hub
AUC	: African Union Commission
BE	: Blue Economy
BEFSA	: Blue Economy Fisheries Satellite Account
COM	: Comoros
COMESA	: Community of Eastern-Southern Africa
CRI	: Cross-Regional Initiative
DJI	: Djibouti
DMRO	: Duly Mandated Regional Organisation
EAC	: Eastern African Community
EA-SA-IO	: Eastern Africa, Southern Africa, and the Indian Ocean region
ERI	: Eritrea

EUD : European Union Delegation
FMIS : Fisheries Management Information System
GMES : Global Marine Environment and Security
GOOS : Global Ocean Observations System
IGAD : Inter-Governmental Agency for Development
IOC : International Oceanography Commission
IOTC : Indian Ocean Tuna Commission
IPMU : Integrated Programme Management Unit
KEN : Kenya
MAD : Madagascar
MAU : Mauritius
MOZ : Mozambique
NFP : National Focal Point
RCM : Regional Coordination Mechanism
RFP : Regional Focal Points
RKM : Regional Knowledge Management
RO-CC/BD : Regional Network – Climate Change and Biodiversity /Coast Fisheries
RSMFS : Regional Sustainable Marine Fisheries Strategy
SADC : Southern Africa Development Community
SAM : Social Accounting Matrix
SDG : Sustainable Development Goals
SOM : Somalia
SSTF : Sustainable Small-Scale Tuna Fisheries
SUD : Sudan
SWIOFC : South-West Indian Ocean Fisheries Commission
TAT : Technical Assistance Team
TWG : Technical Working Group
UNECA : United Nations Economic Commission for Africa
UNESCO : United Nations Educational, Scientific and Cultural Organisation
VCA : Value Chain Approach
WIO : Western Indian Ocean

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