

PRECONDITIONS FOR LOCAL SOCIO-ECONOMIC DEVELOPMENT IN THE BLUE ECONOMY

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SUMMARY AND CONCLUSION

The study examines preconditions for the extraction of marine resources to benefit local communities in the West Indian Ocean. Using United Nation and World Bank literature a total of 17 successful cases have been identified that concern fisheries, aquaculture, conservation and seaweed farming. The cases focus mainly on small-scale activities.

The cases point to multiple key factors of success. A common feature in multiple of the cases is the use of cooperative and co-management practices to reach more sustainable levels of resource use. The projects have resulted in stricter restrictions on access to fishing water, cooperation in monitoring efforts of illegal fishing activities, and stronger sense of ownership among fishers. Other forms of cooperation strengthen users market power enabling access to inputs and markets as well as providing a forum for knowledge sharing.

Where initial investments are needed to move into new business areas, such as aquaculture and value-adding activities, access to credit is very important. Access to credit is often a hindrance for the poor communities which often lack collateral to guarantee loan repayment, but where it is accessible there is potential to increase household incomes

Innovation and new technology have the potential to increase productivity in the blue economy. In two cases easily accessible new technologies were developed which appear to both increase productivity and are easily implemented in small-scale enterprises.

For the aquaculture sector a number of conditions that must be met for fish farming to be successful. There must be functioning supply chains for farmers to access seed and feed as well as the market. To facilitate access functioning road infrastructure is required. As aquaculture requires technical know-how and initial investments access to information and credit is important.

Lastly, infrastructure is recognized as a precondition for private sector investment and productivity growth in the fisheries sector. This includes fishing port, docking and storage facilities, cold chains, logistic networks).

1 INTRODUCTION

Since 2019 the Swedish Agency for Marine and Water Management (SwAM) is engaged with the SwAM Ocean program, which supports capacity building on holistic marine management and blue growth in Least Developed Countries (LDC) and Small Island Developing States (SIDS). The program is financed by Sida (Swedish International Development Cooperation Agency) and aims to assist poverty alleviation through strengthening a sustainable use of marine ecosystem services. One key to socio-economic development from the utilization of marine resources is that economic revenues remain in the local community with turnover that benefits the wider society.

The Blue Economy includes sectors related to aquatic and marine spaces. This includes fisheries, aquaculture, tourism, transport, shipbuilding, energy, bioprospecting, and underwater mining. In the West Indian Ocean, the most significant blue sectors are fisheries, aquaculture, and tourism. The Blue Economy concept views productive marine and aquatic ecosystems as an opportunity to improve the conditions for maritime-based communities and promotes the sustainable use of marine and aquatic resources (UN Economic Commission for Africa, 2016). However, as recognized by the UN Economic Commission for Africa (2016), the experiences and practices necessary to seize the opportunities of the Blue Economy is limited within the African context and more knowledge is necessary moving forward. It also points out that economic development, if focused on technology-intensive and higher value-added enterprises, will not necessarily benefit local communities, i.e. fishing communities and aquaculture farmers. It is therefore important study which conditions benefit local economic development as the Blue Economy expands.

Within SwAM Ocean this key question is targeted by several undertakings. While academic literature and Swedish experiences are compiled elsewhere, this study, conducted by WSP, focuses on materials and research produced by organizations outside the traditional academic channels, such as the United Nations or the World Bank. The purpose of this report is to gain a perspective on which infrastructural and institutional factors that generate inclusive economic growth and socio-economic development for the local communities. The objective is to identify and describe successful cases where such local economic development has occurred, thus looking for positive correlations. The study thereby disregards unsuccessful cases and the causes of their failure.

Specifically, the question addressed by this literature review is phrased as:

- What are the key institutional and infrastructure factors promoting economic growth of local communities from marine resources?

The report is structured as follows. Chapter 2 describes the methodology as well as the thematic and geographical scope of the project. In Chapter 3 all identified successful cases are presented with a description of types of interventions, context and outcomes. In Chapter 4 the institutional and infrastructural causes of the success of the cases in Chapter 3 are discussed.

2 METHODS AND SCOPE

Data was collected through a literature review and an interview study. The focus of the literature review was successful cases where the extraction of marine resources has contributed to economic growth and socio-economic development in local communities. The literature review was limited official publication by the following multinational organizations:

- ❖ International Labor Organization (ILO);
- ❖ United Nations Environment Programme (UNEP);
- ❖ United Nations Entity for Gender Equality and the Empowerment of Women (UNWomen);
- ❖ Food and Agriculture Organization (FAO);
- ❖ United Nations Development Programme (UNDP);
- ❖ Global Environmental Facility (GEF);
- ❖ The World Bank Group (WBG) (incl. i.e. The International Bank for Reconstruction and Development (IBDR, The International Development Association (IDA, International Finance Corporation (IFC), Multilateral Investment Guarantee Agency – MIGA.

The review involved the following sectors:

- ❖ Fisheries
- ❖ Tourism
- ❖ Aquaculture
- ❖ Exploitation of minerals
- ❖ Maritime transportation and ports
- ❖ Environmental conservation

The geographical scope was first set to Least Developed Countries (LDC) and Small Island Development States (SIDS) in the West Indian Ocean (WIO). Due to difficulties identifying a satisfying amount of reports the scope was expanded to also include LDCs in all of Sub-Saharan and SIDS in South East Asia. When relevant reports were identified from other LDC from outside the selected areas they were also included. However, the literature searches for Sub-Saharan Africa were not as exhaustive as those made for the WIO-region. The countries in the WIO region included are:

- ❖ Somalia
- ❖ Kenya
- ❖ Tanzania
- ❖ Mozambique
- ❖ South Africa
- ❖ Madagascar
- ❖ Comoros
- ❖ Mauritius
- ❖ Seychelles
- ❖ La Réunion

A large amount of literature had to be consulted and to identify the most relevant reports the collection of reports was done in three steps. In the first step reports were quickly scanned

for relevance in theme and geography. Relevant reports were added to a list for further reading. In the second step abstracts were read to select reports for in-depth study in the third step.

The information and reports were extracted from the organizations' official websites where searches were conducted under publication databases for books and reports, journals, subcategories including information about oceans and seas, digital libraries and infographics. The search words used were combinations of sectors and countries. Search words used for sectors were "marine fisheries", "small-scale fisheries", "inland fisheries", "tourism", "aquaculture", "exploitation of minerals", "maritime transportation and ports" and "environmental conservation"; search words for countries were "Somalia", "Kenya", "Tanzania", "Mozambique", "South Africa", "Madagascar", "Comoros", "Mauritius" and "Seychelles". When the geographical scope was expanded additional African countries and SIDS in South East Asia were included in the searches as well.

A large share of examined reports were project and program evaluations. Although varying, the most common grading system used was to classify the reports as "satisfactory", "moderately satisfactory", "moderately unsatisfactory" and "unsatisfactory". The evaluations included in this report were those with "satisfactory" and "moderately satisfactory" results.

The interview study consisted of three interviews. The interviewees were selected in consultation with SwAM and represents experiences from academia, capacity development, and work with the Nairobi Convention. The interviews were semi-structured and an interview guide was sent to the interviewees beforehand. The interview guide was structured based on a list of possible infrastructural and institutional factors of importance provided by SwAM, containing in total 18 factors. Due to time-constraints such a high number made it impractical to discuss each factor during the interviews. Instead the interviewees were asked to read through the list prior to the interview and consider which factors they viewed as most important. The interview would then focus around those factors. The interviewees were also asked to provide examples that substantiated their claims.

3 RESULTS - IDENTIFIED CASES

3.1 RURAL FISHERS AND SEAWEED FARMING IN TAMPOLOVE, MADAGASCAR

Overfishing has been one of the many problems affecting the oceans and potentially hurting sustainability of small-scale fisheries around the world.

The rural village of Tampolove is located in the southwestern coast of Madagascar. Rural fishers in the region has been facing the consequences of damages to the sea, among others overfishing, acidity in the water and the loss of coral reefs. Rural fishers started to develop seaweed farming with the assistance of non-governmental organizations. Soon, they managed to turn this experiment into a profitable economic activity and the fishers in Tampolove started to sell their production of seaweed to foreign markets, where it is used to produce a large variety of articles such as food, paint, cosmetics, dyes, adhesives and gels. (UNEP, 2019) Unfortunately the report does not specify further details on the assistance provided by non-governmental organizations or specifics on the socio-economic outcomes.

Economic activities such as seaweed farming have the potential to result in new economic prospects, especially for women in rural villages. Seaweed farming can also be more environmentally friendly than other aquaculture activities as it does not need any fertilizer to grow, but sunlight, carbon dioxide and water. The accessibility of seaweed farming relative to other aquaculture activities may indicate that economic ways of improving income, trade and sustainability can reinforce each other.

3.2 GENETICALLY IMPROVED FARMED TILAPIA (GIFT) IN TIMOR-LESTE

A nutrition profile made by USAID (2018), Timor-Leste, in 2013, estimate that of 90,000 children under the age of 5, or 50 percent of all children, suffered from chronic malnutrition (stunting or low-weight-for-age) and 40 percent of the children were anemic. The development of aquaculture has been identified as one way to improve food security in Timor-Leste, as well as a way to improve the livelihoods of coastal and inland communities and increase economic growth. The government of Timor-Leste has established a National Aquaculture Development Strategy for 2012-2030 with the support of WorldFish. The strategy aims to boost fish supply from aquaculture to 12,000 tons by 2030 and contribute to the reduction of malnutrition by increasing the average annual per capita consumption of fish from 6 kg to 15 kg. (Pant J, 2019)

Nile tilapia is the world's second-most commercially cultured species, after carps. It is a tropical fish suitable for year-round production in Timor-Leste. Genetically improved farmed tilapia (GIFT), which WorldFish has developed through selective breeding, is a fast-growing, hardy and resilient strain of Nile tilapia. WorldFish, in partnership with the Ministry of Agriculture and Fisheries (MAF) conducted on-farm testing and validation of sustainable GIFT farming technologies applying best management practices (BMPs). The tests were carried out from 2016 to 2018 across three municipalities—Ermera, Baucau and Bobonaro—employing a farmers' field school approach. The field school approach is a group-based participatory learning method that allows farmers to analyze a problem and reach a solution suitable for their local context. In this particular setting, low-cost feeding and fertilization options based on locally available resources were devised, and with the adoption of these the participating farmers successfully realized an average extrapolated fish productivity of

4.3±1.5 tons per hectare every cycle. Thus, it was successfully demonstrated that GIFT can make a notable contribution to improving the food and nutrition security and augmenting the household income of farmers. (Pant J, 2019)

By giving access to the “know-how”, training to the farmers involved and an active participation of the local farmers in the community, tilapia farmers did not only increase their food security, but also their incomes.

A manual of BMPs has been created in order to contribute to this development and it is available for the general public at the WorldFish official website. The manual is a guideline for fish farmers in Timor-Leste and uses the farmers’ field school approach including key aspects for sustainable tilapia aquaculture:

- Organizing farmers into groups at a village level is an ideal approach to facilitate an easy access to input (seed¹, feed), services (technology, extension, market) and knowledge sharing between farmers.
- Planning a crop calendar and stocking, harvesting and marketing strategies according to the needs of the group.
- GIFT is a good quality seed, using it facilitates the survival rate and growth.
- The quality of the water and the depth is important in order for the tilapia to thrive. Maintaining a proper water depth (> 1 m) through the whole production cycle.
- Fertilization with organic manure
- Locally available ingredients like rice bran, leucaena leaf meal, cornmeal, taro leaf meal and cassava leaf meal are a few ingredients that can be used for on-farm feed preparation.
- Strengthening farmer groups by linking them with markets (local and distant) and input supply system (seed, feed) and financial services. (Pant J, 2019)

It is, however, not clear in which way the last BPM was applied. But emphasis should be paid to the organization of farmers and the advantages it brings with it, among others: Reduced prices when buying feeding inputs, assistance during the harvest and knowledge sharing.

3.3 FISH AGGREGATING DEVICES: EXPERIMENTAL EVIDENCE

Small-scale fisheries in many Small Islands Developing States (SIDS) rely mostly on coral reef habitats that are increasingly under threat. In these SIDS, fish provides the major source of animal protein and it is vital for countries like Timor-Leste to tackle malnutrition.

Since 2002, an independent post-conflict Timor-Leste has made rapid development progress but the country still faces significant challenges regarding poverty and malnourishment. In these settings, interventions that have successfully improved livelihoods from fishing and reduced threats to biodiversity are rare. Elsewhere in the Pacific, nearshore anchored fish aggregating devices (FADs) have shown success in improving catch rates by making pelagic stocks² more accessible to small-scale fishers.

FADs are defined by the FAO as permanent, semi-permanent or temporary structure or device made from any material and used to lure fish. Traditional FADs are made on-the-spot

¹ According to the FAOs nomenclature fish seed implies a collective term for all the young life stages of fish: Hatching (the larvae is emerging from the fertilized eggs); spawn (the mouth is formed and starts to take small zooplankton); fry (the spawn assume the shape of the fish and grows about 1-2 cm); fingerling (the fry grow up to 10 to 15 cm). See: <http://www.fao.org/3/AC381E/AC381E02.htm#ch2>

² Pelagic fish can be categorized as coastal and oceanic fish, based on the depth of the water they inhabit. Coastal pelagic fish inhabit sunlit waters up to about 655 feet deep, typically above the continental shelf. Examples of species include forage fish such as anchovies, sardines, shad, and menhaden and the predatory fish that feed on them. Oceanic pelagic fish typically inhabit waters below the continental shelf. Examples include larger fish such as swordfish, tuna, mackerel, and even sharks.

with local materials and used in shallow coastal waters (depth 50-200 m) by small-scale fishers to catch small pelagic fish and bait. (FAO, 2005)

In Timor-Leste, FADs primarily increase access to stocks of small pelagic fish³, promoting the use of a high productivity resource (rapid growth, short lifespans, and high mortality rates) better adapted for supporting sustainable fisheries (Dalzell, 1993).

WorldFish's researchers Tilley a.o. (2019) tested the effects of FADs at increasing captured fish by deploying eight experimental FADs at four sites around Timor-Leste and recording catch and effort data from FAD and non-FAD fishing trips. They assessed the effects of FADs on catch rates and catch assemblage and the rate of 100 percent return on investment (RoI). Their results show significant positive effect of FADs on catch rates when controlling for random site variation.

Across all sites and fishing types, 63 species were identified, but FAD catches significantly reduced overall assemblage diversity, with three species (*Sardinella* spp., *Decapterus macarellus*, *Rastrelliger brachysoma*) representing 96 percent of the catch. Catch rates were higher where fishers invested in FAD fishing and formed catch sharing groups with access rights to specific FADs. (Tilley A, 2019) The fishers employing the specialized fishing technique documented in Mills et. al. (2013) where lights are deployed above the FAD before dawn and a modified scoop-seine is deployed around the schooling fish⁴ reported optimal return rates and relatively higher catches.

The authors conclude that a national level investment into a FAD program by the government could realistically increase overall fish production in the country, thereby improving availability of micronutrient rich fish to combat malnutrition, such program should be complemented with capacity building around group formation and defining access rights to ensure equitable community benefits.

3.4 PRO-POOR BUSINESS MODELS IN TONKOLILI DISTRICT, SIERRA LEONE

In Sierra Leone, Tonkolili District is one of the poorest regions in the country, with a 25 percent childhood stunting rate. Involving farmers in small-scale aquaculture has good potential to combat this problem by increasing fish consumption and earnings.

In 2017, WorldFish (2017) through the Consortium of International Agricultural Research Center (CGIAR) program on Fish Agri-Food Systems led a project funded by USAID, the project, called SAP⁵, tested pro-poor models in Tonkolili District to engage farmers into small-scale fish farming.

To solve the financing problem, the project partnered with a microfinance organization (Apex Bank) to provide fish farmers with seasonal loans. Farmers who pay back their loans without defaulting with the bank can then borrow money again, which encourages farmers to continue developing their businesses.

Besides limited access to credit, most farmers have little knowledge about the best ways to market and sell their harvest. In 2018, just before harvest, farmers worked with the SAP project to study different ways to sell their fish, such as in guesthouses and local and district markets. This resulted in advertisements and jingles for airing on local radio stations to

³ According to Freón a.o. (2005) although there are many definitions of "small pelagic fish," this expression most commonly refers to shoaling epipelagic fish characterized by high horizontal and vertical mobility in coastal areas and which, as adults, are usually 10–30 cm in length. This includes typical forage species like sardine and anchovy preying on phytoplankton and/or micro-meso- zooplankton.

⁴ According to Pavlov and Kasumyan (2000), in the English literature on biology, the overall aggregation of fish into a group is called a school.

⁵ Feed the Future Sierra Leone Scaling up Aquaculture Production (SAP)

promote their products. Due to this effort, markets for tilapia were found, with the particular comparative advantage of being the only ones selling fresh tilapia in local markets, providing an income for the new fish-farmers.

Sixty out of sixty-five fishermen paid back their loans fully, and the rest made partial payments. Despite the success in sales of tilapia, the farmers produced enough fish to keep some for own consumption, with amounts ranging from 8 to 26 kg per household. (WorldFish, 2017)

The success of the seasonal loan program and marketing activities demonstrated the potential for small-scale aquaculture to improve the lives of poor households in the country. (WorldFish, 2017)

3.5 THE EMPOWERING ROLE OF COOPERATIVES IN SOUTH AFRICA AND KENYA

A cooperative is defined as “autonomous associations of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically-controlled enterprise”.⁶ Cooperatives are a powerful economic and social force, present in most countries in the world and in most sectors of the economy.

In empowering fishers and fish workers, cooperatives play an important role in helping to address unequal power relationships and in supporting and empowering marginalized populations within the sector, such as women.

In South Africa, a women’s cooperative for small-scale fisheries was enabled and reinforced by a Nature Conservancy project (Gordon and Betty Moore Foundation, 2018). This cooperative manages the supply chain of fisheries processes in three small coastal villages: Pringle Bay, Betty’s Bay and Kleinmond Harbour. The cooperative directly connects fishers with the market, removing any middle-men transaction costs.

South Africa’s amended Small-Scale Fisheries Policy allocates collective commercial rights to small-scale fishers through cooperatives, inspiring fishers to work together to pursue legal and economically viable livelihoods. One of the policy actions included is the creation of a women’s fishing cooperative to operate a supply chain restaurant project and serve as the main local fishery and marine resource management body. This women cooperative has received good technical and economic support from different partners including national institutions and international NGOs.

The nine-person women’s cooperative aims to buy locally caught line-fish species from 80 fishers in Pringle Bay, Betty Bay and Kleinmond Harbour, and then sell the product at higher minimum prices negotiated with two seafood restaurants.

Members sell fish to restaurants and manage all steps in the supply chain, from catch to the delivery of the product. The cooperative works with local business and tourism authorities to build consumer awareness and demand for products that support fishing community livelihoods. Some of the actions include:

- Two seafood restaurants buy catch from the cooperative at preferential prices.
- Some of the cooperative members have received training from a notable chef on how to prepare the fish for high-end restaurants.
- The local tourism bureau developed a culinary roots marketing campaign.
- There are plans to establish a fish market in Kleimond Harbour.

⁶ International Co-operative Alliance (ICA). 1995. Statement on the Co-operative Identity. Available at <https://ica.coop/en/whats-co-op/co-operative-identity-values-principles>

- Pick n' Pay⁷ indicated a commitment to sell the cooperatives pickled mussels at stores nationwide. (Gordon and Betty Moore Foundation, 2018)

Technology has also been important in the development of this cooperative. In a collaboration with the University of Cape Town, with a smartphone application, the women can access a monitoring system, through recording catch data, supporting supply chain traceability efforts. Women in the cooperative have also improved their business capacities, which will allow them to continue developing their entrepreneurship opportunities, including the setting up of a restaurant value chain project. Overall, this project has reinvigorated the local fisheries economy and allowed women, as well as the small-scale fishers involved in the supply chain, to generate their own income. (COPAC, 2018)

In Kenya, the Dunga Fishermen Cooperative Society is working to solve the problem of the low stock levels of fish due to overexploitation and climate change, by breeding fish through an aquaculture development initiative and then releasing the fish into the Dunga lake. The fishermen involved made this possible as a result of a grant they received by the ILO COOP Africa project, which was intended to address the decline of fish production along Lake Victoria. The cooperative is also actively discouraging fishermen from using trawling nets and other equipment that can deplete fish. Thus, helping to ensure more sustainable resource management in the area. (COPAC, 2018)

3.6 PRODUCING FISH-BASED POWDER IN TIMOR-LESTE

With support from the project “Enhancing livelihoods while governing marine resources in Pacific Island countries 2016-2019” a group of women in Timor-Leste developed the idea of making and selling fish-based powder (WorldFish, 2020). The women had previously received training on how to make this powder from the Resource Center Interpeoples’ Cooperation (PARCIC), an NGO that helps improve the skills of rural people.

To produce the powder, the women blend, heat and mix the ingredients (fish, marungi leaves, dry shrimp, roasted sesame seeds, salt, pepper, onion powder and cooked chili) into a green powder that is then spooned into small packages ready for sale and consumption.

This powder has been a good investment for the group of women. The raw ingredients cost USD 10–15 for one batch of fish powder, which produces 40 small packets. Since 2019, the group has been selling the packets for USD 1 each to three shops and supermarkets in the nation’s capital Dili.

Being made from fish, the powder has a lot of potential as a nutritious food source and it represents an easy and effective way to complement feeding for children under five years of age, pregnant and lactating women and thus, contributing to fight malnutrition in the country.

Now, the project is planning a nutrient analysis of the fish powder and is talking with the Ministry of Health in Timor-Leste about getting the fish powder into feeding programs at primary schools and in hospitals.

A key element in this setting has been the work that the women have done together, they have received important training on working as a group and financial literacy, besides previous training on how to make the fish-powder. To date, the women continue to receive support. At the moment, the group uses all the profit to buy new ingredients, in the future, they hope to make enough money to distribute among the members.

⁷ Supermarket chain store in South Africa

3.7 AQUACULTURE DEVELOPMENT IN ZAMBIA

Recently, aquaculture production in Sub-Saharan Africa has increased at an annual average growth rate of 12.6 percent, and there is evidence of commercial growth in certain countries such as Nigeria, Ghana, Uganda and Kenya (Genschick S, 2017). A positive trend can also be seen in Zambia, the sixth-largest producer of farmed fish in Africa. Zambia is also the biggest producer of tilapia in the South African Development Community (SADC), and some of the largest freshwater farms in Africa are located in Zambia. (FAO, The state of world fisheries and aquaculture 2016: Contributing to food security and nutrition for all, 2016) The value chain is made up almost entirely of tilapia, and there have been large investments made into the seed and feed sectors (Genschick S, 2017).

Much of the development that is present in Zambia was and still is supported by national and international programs (Mudenda, 2009). Those programs started originally as a way to fight malnutrition and increase fish consumption among households, and also to promote aquaculture for the small-scale sector. Today, it is recognized as a way to promote aquaculture as an enterprise. It is believed that seeing aquaculture as a business would enable farmers to sustainably manage their systems for increased incomes. (Edwards, 2000).

A number of donor agencies have been involved in promoting aquaculture and capacity building. Most active have been the United Nations Development Programme (UNDP), United Nations High Commission for Refugees (UNHCR), United States Agency for International Development (USAID), Japan International Co-operation Agency (JICA), Norwegian Agency for Development (NORAD), and, the Food and Agriculture Organization of the United Nations (FAO). Other notable organizations include Aquaculture for Local Communities (ALCOM), a programme sponsored by FAO, United States Peace Corps Volunteers (PCV), and Africare who have all provided finance, materials and personnel in the form of administrators, experts and extension volunteers for the implementation of national aquaculture programmes, including training for local staff and fish farmers.

There are people working full-time on private fish farms and in government institutions such as the fisheries and agriculture departments, farmer training colleges, the Natural Resources Development College and the Kasaka Fisheries Training Institute. There are also some government agencies and non-governmental organisations which periodically carry out duties relevant to the sector. (FAO, 2020)

In this setting, the African Development Bank (AfDB) approved a loan in 2017 for the Zambian government to implement the Zambia Aquaculture Enterprise Development Project (ZAEDP) (Genschick S, 2017). The project aimed to present aquaculture as an inclusive business opportunity for small and medium-sized farmers to improve livelihoods along the aquaculture value chain. This could help to increase per capita income and fight poverty. The relevance of this matter is critical given that in 2015, 54.4 percent of the population lived below the poverty line and 40.8 percent of people were considered extremely poor. (CSO, 2016) As the project is so recent there are no results available yet.

3.8 THE WORLD'S FIRST BLUE BOND IN THE SEYCHELLES

In order to provide its society with the necessary food, nutrition and adequate livelihoods, the Seychelles' economy is highly dependent on the blue economy sectors such as tourism and fisheries. It is indeed in that order that those sectors are relevant to the economy of the island, meaning that after tourism, the fisheries sector is the most important industry, employing 17 percent of the population. (The World Bank, 2018)

With the continuous growth of the economy, fisheries became more exploited and the necessity to rebuild and utilize fish stocks in a sustainable way was addressed. A transition to sustainable fisheries can be critical in terms of the management costs and economic losses as fish stocks recover. A blue bond to finance this transition was identified and the government of Seychelles was persistent in exploring a new financial instrument for its own agenda. At last, the beneficiaries of this bond will be the general population that will enjoy a healthier marine environment and increased food security.

Due to the novelty of blue bonds, the concrete results of their beneficial impact are still unknown. Its conceptual approaches are still emerging, and national financial institutions are familiarizing with this financial instrument.

3.9 REFORESTING THE MANGROVES IN DJIBOUTI

Djibouti is one of many countries facing the consequences of climate change: rising sea levels and temperature, deforestation and unpredictable rains. This is clearly making big damages to fragile coastal ecosystems like the one in Khor Angar, the biggest and most important mangrove forest in Djibouti.

The rising levels of seawater start forming sand banks that block the channel feeding oxygenated sea water to the mangrove forest providing a breeding ground for fish and crabs. As trees die, their fallen trunks further suffocate the forest and the fish tend to disappear.

In order to save this ecosystem and help the people who rely on it, the Government of Djibouti and UN Environment, with funding from the Global Environment Facility (GEF) implemented the project “Implementing NAPA priority interventions to build resilience in the most vulnerable coast zones in Djibouti” (UN Environment, 2017).

The project's goal was to address the impacts of climate change on coastal ecosystems and communities by implementing a set of urgent measures that will strengthen the capacity to predict future changes, while helping local populations to adapt through the adoption of more sustainable production methods, particularly in the areas of water management, agriculture, fisheries and tourism.

The project supported the restoration of mangrove forest to provide a buffer for ecosystems and communities from seawater intrusion. With the participation of the local community, which engaged in training on sustainable coastal development, the Khon Angar nursery was created, producing around 35,000 seedlings a year. To date about 100,000 seedlings have been planted by the community. The project estimates that it will take between 50 and 100 years to fully restore the mangrove forest, but the villages are already seeing environmental, though not yet socioeconomic, results in the form of the return of the crabs to the area.

3.10 CO-MANAGEMENT OF FISHERIES ON PRASLIN, SEYCHELLES

In the Seychelles, GEF has co-funded a government program to introduce biodiversity management into production activities, of which one was artisanal fisheries (Lenoci J. , 2016). The project ran 2007 to 2015. Although no direct improvements in socio-economic conditions have been observed the project managed to develop a pilot of collaborative fisheries management of the demersal fisheries encompassing a 611.7 km² area around the island of Praslin, the second most habituated island in the Seychelles.

“The project facilitated the establishment of the Praslin Fishers Association (PFA) and provided extensive assistance to the PFA over the past few years, including helping them form the Praslin Fishers Co-Management Coordination Committee (PFCCC), procurement of monitoring equipment and cool boxes, training, preparation of a photograph-based fish identification guide, and development of a Monitoring, Control and Surveillance (MCS) protocol, with the assistance of an international experts. At project end, 93 percent of fishermen were registered members of the PFA.” (Lenoci J. , 2016)

PFCCC consisted of Praslin fishers, the Seychelles fishing authority as well as other stakeholder such as Nature Seychelles, an NGO, and had a leading role in introducing and implementing the co-management plan (Nature Seychelles , 2014). The fishermen were concerned decreasing catch rates, fishing on spawning sites and the fishing of small fish (UNDP and GEF Programme and Coordination Unit, u.d.), a concern they shared with the Seychelles Fishing Authority (Seychelles News Agency, 2014). The GEF-funded project assisted in informing and raising awareness among stake-holders on the co-management plan which was introduced in 2014 (UNDP and GEF Programme and Coordination Unit, u.d.). In 2018, additional restrictions were introduced in on an initiative from the PFD proving the success of the local co-management initiative. The restrictions limits access to the bay of Baie Saint Anne during large parts of the year to protect the fish stocks in the lagoons and in the long term the livelihoods of the fishermen (Seychelles News Agency, 2019).

3.11 CONTRACT FARMING IN AQUACULTURE, EAST AFRICA

In a FAO report (2018) they studied the effects of contract farming targeted towards young people in four East African countries, Burundi, Rwanda, Kenya and Uganda. In Uganda and Kenya, the production centered around aquaculture (fish farming, raising finfish in cages and selling fingerlings) whereas the Burundi and Rwanda cases focused on poultry and egg production. The project started in 2014 and was funded by the African Solidarity Trust Fund and implemented by the Subregional office for Eastern Africa (SFE). Its aim was to provide decent employment opportunities for young people and to increase food security and reduce rural poverty.

In contract farming producers agrees to supply their produce to a third part such as a retailer or agri-processor. The third party guarantees a market and often also supply the producer with inputs, technology and access to credit. In Kenya and Uganda young people were provided training (technology, production and management) and given support to connect with partners (buyers) by the SFE. Through private sector involvement access to feed was made available and additional business and technical knowledge.

By 2017, 400 beneficiaries were included with 570 ponds for aquaculture, all generating a profit. The main benefits reported by the beneficiaries are increased knowledge in aquaculture production and a large production of quality fingerlings. There are also reported issues, such as low access to affordable fish feed (although the county government has agreed to establish a fish feed mill), side selling and lack of formal contracts guaranteeing a market. In Uganda the projects had 490 beneficiaries by 2017 which were organized in small cooperatives either managing their own fish cages or ponds, producing feed or constructing ponds or cages for other farmers. A big hindrance has been the reluctance of companies to sign agreements due to market price fluctuations and the low quantity and reliability of produce supplied by the cooperatives. It is not uncommon to encounter such issues as mentioned above in the earlier phases of these kinds of projects and FAO (2018) deem the chances of continued success as good.

By comparing the cases the report concludes that a few factors seem to have supported successful implementation. Good governance is a key factor as it enables functioning institutions that ensures food and safety regulations, facilitate contract negotiation and compliance, market information and rural transport systems. In an uncertain political situation private companies might hesitate to make long-term commitments. In general contract farming is concluded to be suitable where there are diseconomies of scale in cultivation and economies of scale in processing, which is the case with aquaculture. Fish farmers must also possess rudimentary financial skills or gain such knowledge through training or communication with peers.

3.12 MARINE FISHERIES AND SOCIO-ECONOMIC DEVELOPMENT PROJECT, KENYA

The World Bank (2019) is funding the implementation of the Kenya Marine Fisheries and Socio-Economic Development Project, implemented by the Kenyan state. The Project Development Objective is to “improve management of priority fisheries and mariculture and increase access to complementary livelihood activities in coastal communities”. The project is under implementation and no impact assessments are available at this point. Still, the design of the project highlights important enabling factors for the Kenyan fisheries and mariculture to increase their production.

The marine fisheries of Kenya are mostly artisanal and subsistence fisheries. As a consequence, 80 percent of catches are from coastal waters and reefs and 20 percent from offshore fishing. However, measured in tons the commercial fishing fleet produces most landings. The catches of licensed offshore fishing vessels are generally not landed in Kenya due to insufficient landing and processing infrastructure. Nearshore fish stocks are suffering from overexploitation due to open access in fisheries, a large population dependent on fisheries for their livelihoods, and the use of destructive fishing gear. There have been initiatives to introduce mariculture as an alternative to fishing however the results have been disappointing and have not advanced beyond the pilot phase. Constraining factors are largely a lack of inputs such as fingerlings, feed as well as lacking technical knowledge and access to credit.

Part of the project consists of enhancing governance of marine fisheries and introducing new management practices for nearshore fisheries. For the artisanal fisheries this means a co-management governance framework will be developed. Since 2007 there already exist regulation in Beach Management Units (BMU) and the current co-management framework, consisting of national co-management guidelines and BMU standard operating procedures, will be implemented through the BMUs. All BMUs will receive training on these new governance instruments, with the hope of it strengthening the ability for artisanal fisher to co-manage the fish stocks.

To increase the amount of catches landed in Kenya new regulations require fishing vessels to land a share of their catch in Kenya and processing infrastructure is being rebuilt. To strengthen the capacity in mariculture the project will, through a resource and training center, support the spread of technical knowledge and improve the supply of broodstock for commercial hatcheries. The project will also pursue establishing functioning value chains from hatcheries to out-growers through contract farming.

3.13 SOUTH WEST INDIAN OCEAN FISHERIES GOVERNANCE AND SHARED GROWTH, MOZAMBIQUE

Another project funded by the World Bank (n.d.) and implemented by The South West Indian Ocean Fisheries Commission (SWIOFC), has the aim to “reduce resource degradation and strengthen fisheries management to boost the regional economy and enhance local livelihoods.” As in section 4.12 the project is ongoing, and outcomes have not yet been evaluated. Still, its design point to a few critical factors for success, similar to those identified in section 4.12.

The core actions of the project are to “strengthen governance and sustainable management, expand financing and link sustainable community fisheries to urban and markets, and industrial growth poles.” To move towards a sustainable use of the ocean resources two parallel strategies will be pursued. Management plans of fish stocks will be introduced, although in different ways for artisanal and industrial fisheries. A top-down approach will be used for industrial fisheries whereas co-management plans will be implemented for artisanal fisheries as well as community participation in monitoring and surveillance. The second strategy is to diversify fishers’ livelihoods to reduce the pressure on the fish stocks. Mentioned sectors are health, cosmetics and tourism. A precondition for diversification is the access to credit which will be facilitated by promoting rotating savings and credit schemes. Lastly investments in infrastructure to improve fisheries value chains, i.e. proper landing sites.

3.14 SOUTH WEST INDIAN OCEAN FISHERIES GOVERNANCE AND SHARED GROWTH PROJECT, TANZANIA

Mainland Tanzania and Zanzibar have an estimated 16 million people living in coastal areas which are highly dependent on marine and coastal resources for livelihoods and food. The fishing is largely artisanal including small scale commercial fisheries, fish and seaweed farmers, and subsistence farmers. Women mostly work in processing, marketing and seaweed farming. The fish stocks, however, have been exploited and catches have begun to diminish. The Tanzanian government are participating in a world bank fisheries governance program (SWIOFish1) to improve management and increase the economic benefits of marine resources (Everett, Mwangamilo, & Shalli, 2014). The project has only been active for a few years and there are no impact assessments as of yet. However, the Ministry of Livestock and Fisheries Development conducted an environmental and social assessment in the earlier phases of the project to assess potential impacts. The design of the project highlights the factors the World Bank has identified as crucial for successful resource management and increase economic benefits for coastal communities.

The purpose of the project is to improve the governance of priority fisheries by implementing new legal frameworks, policies and strategies to increase fisheries performance and marine environmental health. This shall be done both within the public sector and the coastal communities. It also aims at simultaneously increase the economic benefits derived from the priority fisheries by creating more favourable conditions for private sector investment and productivity through crucial public investments in infrastructure (i.e. possibly including fishing port, docking and storage facilities, cold chains, logistic networks).

Healthy and sustainable fish stocks are viewed as a precondition for deriving continued economic benefits from the marine resources. The environmental and social assessment concludes that due to stronger enforcement of conservation strategies in combination with an emphasis on strengthening co-management institutions the economic and environmental outcomes are likely to be largely positive. Local co-management institutions are Beach Management Units and Village Fishing Communities which already manage local fishing

activities, including issuing licenses, collecting landing fees and making decisions on access to local marine resources. Through the local co-management institutions better fisheries practices and sustainable harvestings levels will be implemented as well as mechanisms to cope with the negative consequences of reduced access to fisheries. How the co-management institutions are to be strengthened is not well described besides assistance in data collection on fish stocks, and engaging NGOs to supply technical assistance and assistance in implementing area restrictions. A reduced level of access to fisheries will, however, most likely reduce the income of fishers, but the project seeks to counteract this by promoting access to credit to allow fishers to diversify away from fisheries.

3.15 COMMUNITY MANAGEMENT OF MARINE CONSERVATION AREA, ZANZIBAR

In 1997 the Menai Bay Conservation area opened to deal with destructive fishing practices and uncontrolled fishing in the Menai Bay on Zanzibar, Tanzania (Colbert-Sangree, 2012). The management strategies include co-management practices with the local fishermen through Village Fishermen Committees (VFC). Each fishing village has a VFC consisting of ten fishermen and serve as a communication channel between the fishermen and the government. The fishermen report illegal to the government who operate patrol boats in within the conservation area, thereby making monitoring efforts more efficient. The VFC is also active in data collection and reef monitoring as well as encouraging the fishermen to adopt sustainable fishing methods. The VFC also communicates the views of the fishermen to the Fisheries Department that can revise the conservation area regulations. The new regulations are adapted to each village through the VFC.

Negative aspects of the VFC-system have also been observed such as VFCs accepting fishing methods not allowed in the conservation area and warning users of illegal methods of patrols.

The main benefit so far has been the improved efficiency in monitoring. There is still an over-capacity within the fishing sector, leading to smaller catches per fishing boat and a risk of overfishing. Thus, no direct economic development has been observed from the project. But, the participation rate among fishermen in VFC meetings is high and Colbert-Sangree (2012) thing the outlook for solving these problems as well as promising.

3.16 SEAWEED FARMING IN TANZANIA

Although facing different difficulties over the years the seaweed farming industry is worth mentioning as partly a successful case. Starting in 1989, the seaweed industry is the third biggest export in terms of money in Tanzania and by far the largest marine export product and employed 26 000 farmers nationally in 2012 (Kyewalayanga, 2016). it employed 26 000 farmers nationally. Initially it only employed women but today about 70 percent of the workforce consists of women (Kyewalayanga, 2016). Seaweed farming has improved the living standards of coastal communities, often adding a second source of income to the household (Mwangi, 2020). Living conditions in general has improved with farmers able to afford education for their children, initiating small businesses and food security (Kyewalayanga, 2016).

Although appearing largely successful today the industry has faces multiple challenges. The first decades the seaweed was dried and exported with any processing (Msuya, 2005). According to Msuya (2005), overseas companies, through local branches, supplied farmers

with material and seed (cuttings). This was used as binding factor to have the farmer sell the seaweed to the provider of materials which enabled the company to establish a monopoly. Bryceson (2002) claims that this allowed for the international companies to lower prices around the turn of the millennium, affecting the farmers negatively.

The two types of seaweed grown in Tanzania has also been affected by disease, partly due to increased water temperatures according to Kyewalayanga(2016). In the early 2000s the Cottonii seaweed was severely affected and can no longer be produced with common methods (Kyewalayanga, 2016). The Spinosum seaweed has been affected by fouling by micro and other macro-algae, reducing production for some villagers.

Still, the industry is continuing to produce benefits for local communities and there have been successful attempts in increasing innovation in the sector, led by a cluster with partners from academia, the government and the seaweed industry (Kyewalayanga, 2016). The farmers can communicate their issues to the cluster which research solutions and give feedback to the farmers. The research has also focused on methods for producing value-added products. The cluster has then educated farmers on how to produce different products such as soap, massage oil and different food items as well as aid in marketing the products on national and international exhibitions. As a consequence, the farmers have been able to increase their incomes. The cooperation within the cluster has also helped changing policies to minimize conflicts with other coastal zone users and to make sure prices do not drop to low. Another positive outcome is an increase in communication between farmers regarding their day-to-day need which can then be conveyed to researchers in the cluster.

3.17 NO-TAKE ZONE, OCTOPUS FISHING IN MADAGASCAR

On Madagascar periodic fishery closures for octopus have been implemented using local co-management practices (Oliver, o.a., 2015). Periodic fishery closures mean harvesting in specific areas is temporarily banned. The Co-management initiative was initiated by the NGO Blue Ventures in 2003 who organized meetings with communities in southwestern Madagascar discussing ways to manage marine resources. A 7-month closure of octopus fishing on an offshore reef was used as a test pilot.

The pilot was successful, and the use of fishery closures spread and in 2004 a locally managed marine area (LMMA) was set up with 25 villages. The LMMA was governed by a elected management body, the committee. The role of Blue Venture was to provide technical and financial support for management efforts. Between 2004 and 2011 they oversaw 69 octopus fishery closures where normally 20 percent of the fishing area is closed off for 2-7 months. In 2005 the national government formalized the initiative by closing down areas suggested by the committee. The closures are enforced by the communities and local law prescribes sanctions and enforced at community meetings. The committee later expanded their management efforts outside octopus fisheries to mangrove closures, crab fishing, ecological monitoring, and complete no-take areas.

The octopus closures had positive effects on landing and incomes. During closure Oliver o.a. (2015) found no reduction in income and when the areas opened incomes would double. The incomes didn't diminish since the fishers had access to the remaining 80 percent of the fishing area.

4 ANALYSIS

The objective of the study was to identify, through the study of practical successful examples, infrastructural and institutional factors that have been shown successful in accomplishing economic growth and socio-economic development in local communities from the extraction of marine resources. Due to data constraints the study can only give a partial picture of such factors. This section discusses data constraints followed by an analysis of the identified important factors.

4.1 METHODOLOGICAL DISCUSSION

In total 17 cases were identified and included in the report, however, some of them are ongoing and results on actual outcomes are not yet available. This is particularly the case for World Bank- funded programs and projects in the SWIO region of which most were initiated recently. The cases differ greatly in terms of type of intervention and affected sectors where fishing and aquaculture are most common but no case concerns tourism. The limited and varied sample makes it difficult to draw general conclusions on important factors.

Reports were sifted through three different levels, first a quick scan checking for relevance, secondly skimming the reports and choosing which to study in-depth in the third and last step. The reasons for discarding reports were mainly that the cases were not successful and/or that no results were reported.

The reports for the chosen cases were often lacking essential information. The socio-economic outcomes were rarely quantified or thoroughly described; the geographical distribution of the outcomes – whether it was local or not – was never explored; the mechanisms causing socio-economic improvements were not analyzed nor underlying catalyzing factors outside the control of the project.

The reports chosen for the second and third step were mainly focused on small-scale enterprises and the effects of individual projects or programs. Less attention was given to trends on a general scale or the development of the commercial sectors, i.e. the growth of commercial aquaculture in Sub-Saharan Africa, discussed by for example Genschick (2017). Perhaps this bias is a consequence of the UN organs and the WB financing projects and programs with more direct poverty-alleviating targets. Since these organizations fund a lot of projects it is natural that reports on their results will be plentiful compared to analyses on more general trends.

A large share of the reports in the second step was evaluation reports of UN and WB financed projects and programs, and many were lacking information on socio-economic outcomes. Multiple factors seem to have caused this. Firstly, most of the evaluations did not report satisfactory results. Secondly, the impact of the projects was either not clearly described or the evaluation was made before, or just after, the projects ended making it difficult to draw conclusions on long-term benefits. MacFadyen (2008) reaches a similar conclusion in a review of evaluations on programs for fisheries and aquaculture development assistance, that although claims of positive outcomes often preclude any certainty that the outcomes actually occurred. Thirdly, impacts are only a part of an evaluation which also examines project implementation, relevant, efficiency etc., something also observed by MacFadyen (2008). Evaluations are more specific on outputs and activities, as they are possible to measure, instead of outcomes and impacts (Macfadyen, 2008) as these are much more difficult to see and requires the evaluation to be committed long time after the ending of

the project/program. Often there is barely any mentioning of the outcomes (Alm, 2020). How the activities of a project or program actually caused a successful outcome is rarely explored as it in reality is very difficult to assure.

4.2 IDENTIFIED INSTITUTIONAL AND INFRASTRUCTURAL FACTORS FOR SUCCESS

In this chapter the factors for success are analyzed based on the findings in the case studies. One factor is examined at time except aquaculture where the entire sector is analyzed.

4.2.1 *Necessary conditions for aqua- and mariculture*

Multiple cases concern aquaculture which appear to have unique prerequisites. The sector is therefore analyzed separately.

There are a number of necessary conditions that must be met for fish farming to be successful (based on cases 4.2, 4.4, 4.7, and 4.11). Farmers are dependent on functioning supply chains of seed and feed to grow their fish and access to buyers, either consumers or processors. Accessing markets is often an issue for the small-scale sector which instead largely use the produce for household consumption (Nsonga (2015); Mosuka & Mosunda (2013)). Aquaculture also requires technical know-how and an initial investment in equipment and inputs which varies from expensive cages to cheaper pond aquaculture, thereby requiring training and either direct support or access to credit.

The literature examining the general trends in aquaculture in Sub-Saharan Africa has observed similar necessary conditions. Brummett et. al. (2008) points to lack of quality seed and feed, poor access to markets, low access to technical advice and policies that hinder expansion.

It appears that all successful cases mentioned above were able to meet these several of the preconditions mentioned above, although to varying extent. In Timor-Leste (4.2) Zambia (4.7) and Uganda and Kenya (4.11) training was given to participants. No project report issues with the training or that technical know-how is lacking, indicating that knowledge gaps are possible to overcome. All projects but the one in Zambia (4.7) provided support in accessing markets through different measures. In Kenda and Uganda (4.11) fish farmers were connected with buyers to sign contract farming-agreements, and in Sierra Leone (4.4) the project included market research and outreach to possible local buyers such as guesthouses. In the same projects connections were also made with input suppliers. Lastly, the need for financial credit was recognized within all projects, which was either supplied directly through the project or a third party, such as microfinance organizations.

Other factors are recognized within the cases as important for success. Access to lenders is not enough, farmers must possess rudimentary financial skills to be able to seize such opportunities and access to markets requires a functioning transportation system (FAO, 2018).

Mariculture has similar preconditions as aquaculture which can be illustrated by a less successful case in Kenya (4.12). Although having high hopes on establishing mariculture as an alternative livelihood to fishing expanding beyond the pilot phase has been constrained by poor availability of fingerlings and other seed and technical knowledge.

In their study on barriers to aquaculture in Sub-Saharan Africa Beveridge et. al. (2010) notes that although the growth rate has been low compared to other parts of South-East Asia and North Africa the established aquaculture often has a smallholder focus which provides food security a good source of nutrition. However, if aquaculture is to increase the evidence points to the potential lying with small and medium enterprises which should be supported to form

new value-chains. Brummett (2008) finds that private enterprises with a more commercial orientation increase aquaculture production more than centrally planned projects.

4.2.2 Local cooperation and co-management

Many cases report the successful use of co-management practices and other forms of local cooperation when implementing new practices in local communities. Co-management of fish stocks is common as well as a few other forms of cooperation.

Co-management of fish stocks is a common feature in the cases where local fishermen cooperate with the fishing authorities. In the fisheries management projects (4.12, 4.13, 4.14) there is great emphasis on the use of co-management practice for nearshore fisheries for increased performance and health of the stocks. Where commercial fisheries are managed by a top-down approach cooperation co-management with artisanal fishers is seen as a key factor for success (4.13). The specifics of the co-management plans are still largely unspecific although they mention community participation in monitoring and surveillance, access to fishing areas, and licensing. Through the existing beach management units, that already have mandates to issue licenses and collect landing fees, better fisheries practices and more sustainable harvesting levels will be implemented.

Three cases show successful implementation of co-management practices with positive outcomes (4.10, 4.15, 4.17). All received external assistance to set up a structure for how to organize local fishers, i.e. through a World Bank-funded government program and an NGO. The results from these projects thus far are stricter restrictions on access to fishing water, cooperation in monitoring of illegal fishing activities, and stronger sense of ownership among fishers. For these local forms of cooperation, a proper legal framework is necessary on both the local and national level to create concurrence between local management units and national agencies (Bryceson, 2020).

Other forms of cooperation in the cases are organizing small-scale aquaculture farmers in groups which facilitates access to seed, feed, services, market and creates knowledge sharing between farmers. Genschick (2017) has observed that aquaculture development in Sub-Saharan Africa has been centered around commercial aquaculture and it's difficult for small-scale actors to gain access to the commercial supply chains of seed and feed. Horizontal cooperation in farmer networks has therefore been key for small-scale farmers to gain access to seed. Cooperation was also seen as a key factor in training women in fish powder production.

For a few of the identified cases, though implemented through forming small cooperatives or farmer field schools, the reports do not explicitly state whether the cooperation between participants was key for a successful outcome. Rather, in some cases, forming cooperatives and providing education for larger groups seem to be mainly an effective way of implementing projects (see for example 4.11). In conclusion, all forms of cooperation are not equally effective where more in-depth cooperation appear more important for success than for example forming groups to convey information.

4.2.3 Conservation essential for long term socio-economic development

The cases working on a national level (4.12, 4.13, 4.14) all view a sustainable use of renewable marine resources as a prerequisite for socio-economic development in the fishery sector. They aim to reduce overexploitation of the fish stocks to safeguard the livelihoods of coastal communities. The same view is expressed in other World Bank reports (World Bank, 2019) as well as in one of the interviews where functioning resource management is seen as

the first step for any long-term improvement in socio-economic conditions (Alm, 2020). Besides fisheries, well-managed ecosystems can also attract tourists to hotspots for wildlife (World Bank, 2019).

4.2.4 Credit

In multiple cases increased access to credits enabled locals to start businesses in new fields. Accessing credits is often difficult as they require collateral to guarantee the loan repayment and microcredit institutions require repayments within a short time span which is often not enough for an enterprise to start generating revenue (WorldFish, 2017).

Two purposes can be identified for government agencies and other external organizations to promote these ventures. The first is to create alternative livelihoods for fishermen to reduce the pressure on fish stocks (4.13). Such development is this seen largely as a management and conservation measure. Similarly creating alternative livelihoods is necessary when national management policies restrict fishing rights of local fishers (4.14). The second purpose is to actually improve socio-economic conditions for local communities by increasing incomes. Such development is seen in the aquaculture field which, as discussed in chapter 4.2, is dependent on acquiring new equipment (3.4, 3.5, 3.7), and in the field of processing of fish products (3.6).

A promising venture is the blue bonds on the Seychelles (3.8) which is a relatively new type of sustainability bond which finances projects related to ocean conservation. Blue bonds operate similarly to other debt instruments by providing capital to issuers who repay the debt with interest over time but dedicate use of proceeds to marine projects, such as supporting economies reliant upon healthy and sustainable fisheries (The World Bank, 2018).

4.2.5 Technology

In two cases the adoption of new technologies has increase the productivity of blue sector activities. The cases are introduction of new types of fish in aquaculture (3.2) and new fishing techniques (3.3). Both have been recently tried in pilot projects and the use has not yet spread. However, the potential to further introduce them is deemed high and there is no mention of hindrances or possible downsides. Both technologies appear to work well with current methods in aquaculture and fisheries which should allow for a smooth introduction and increased productivity in aquaculture and fisheries. These findings are supported by MacFadyen (2008) who finds that the use of appropriate technologies is a key factor of success in development projects.

4.2.6 Value chains, post-harvest and infrastructure

The necessity of functioning value chains, post-harvest enterprises and road infrastructure has, with regards to aquaculture, discussed in Chapter 4.2.1 which requires all these factors to reach the market with its products. For the other blue sector these aspects are seldom discussed in the identified cases. Infrastructure is, however, mentioned (case 4.12, 4.13, 4.14) as a precondition for private sector investment and productivity growth in the fisheries sector. This includes fishing port, docking and storage facilities, cold chains, logistic networks) although no cases are provided as evidence to support this.

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1 APPENDIX - GENERAL RECOMMENDATIONS IN BLUE ECONOMY HANDBOOKS

According to the World Bank, the Blue Economy is sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and ocean ecosystem health. The blue economy encompasses many activities such as renewable energy, fisheries, maritime transport, tourism, climate change, and waste management among others (World Bank, 2020).

In the African context, the Blue Economy covers aquatic and marine spaces, this includes oceans, seas, rivers, lakes, and underground water. It encompasses a range of productive sectors including fisheries, aquaculture, tourism, transport, energy and underwater activities (UN Economic Commission for Africa, 2016).

This section presents the World Wild Fund's recommended actions for a sustainable future and the United Nations Economic Commission for Africa's general policy recommendations. These recommendations aim to promote the development of the Blue Economy in the West Indian Ocean.

1.1 A LONG-TERM ACTION PLAN FOR SUSTAINABLE DEVELOPMENT

In Africa, the use of the ocean is expanding faster than at any point in history. The continent has still the opportunity to develop innovative resource- efficient methods towards sustainable development. The World Wild Fund's report "Reviving the Western Indian Ocean Economy, Actions for a Sustainable Future" from 2017, proposes 7 measures for blue economic development of the West Indian Ocean (Obura, 2017). These measures were created using a 15-year timescale to 2030, corresponding to the timeline set for the SDG agenda.

1. *Implement effective management of ocean assets*

By protecting natural assets they can deliver benefits to society. The Nairobi Convention and the UNEP suggest implementing Marine Protected Areas (MPA), where some form of fishing and other activities are allowed.

2. *Sustainability of small-scale and industrial fisheries and aquaculture*

A core strategy in this matter is to implement the FAO's Ecosystem Approach to Fisheries, Code of Conduct on Responsible Fisheries and Voluntary Guidelines on Small-Scale Fisheries¹ in order to build more resilient and secure food provision from the sea. Countries in the region need to identify actions to implement those guidelines locally.

Other measures to improve sustainability in this sector include investing in improved monitoring, control and surveillance of fisheries activities to prevent illegal fishing; removing pressure by developing alternative income and food products and empowering local communities; exploring innovative ways to increase the value of fisheries (e.g. value-added); facilitating access to high-value markets to increase the livelihood benefits of small scale fisheries (e.g. through cooperatives).

3. *Climate-resilient and carbon-neutral economies*

A key priority for developing countries is to build climate resilience.

Climate-resilient pathways are development trajectories that combine mitigation and adaptation to realize the goal of sustainable development and help avoid dangerous interference with the climate.

¹ <http://www.fao.org/3/a-i4356en.pdf>

Strategies such as improving people's ability to cope with climate hazards through greater and diversified income at household level and build capacity to facilitate access to funds for climate adaptation and disaster risk reduction at the central and local government level, must be prioritized.

Another important strategy is to innovate with carbon finance mechanisms that capitalize the value of living natural capital assets such as payments for ecosystem services schemes for coastal habitats that sequester carbon and protect coastlines.

4. *Adopt a sustainable, inclusive blue economy approach*

The natural capital of the ocean should be valued and internalized in government decision making processes, with clear policies supporting “blue infrastructure” (e.g. ecosystems) as distinct from “grey infrastructure” (e.g. engineering structures, roads). Metrics such as the Human Development Index, the World Happiness Index (Helliwell J.F, 2015), the Sustainable Economic Development Assessment (BCG., 2015) and other indicators proposed for measuring the sustainable development goals (SDGs) can help to document such development (Sachs, 2016).

5. *Implement integrated ocean planning and management*

Develop plans for integrated ocean management at relevant scales (national, sub-regional, sub-national). These should align with one another and cover the entire West Indian Ocean.

6. *Invest in social capital as a pillar for future prosperity*

Strengthening social capital can be done through multiple measures. Education is essential to social and economic development. Gender equality results in greater social and economic benefits for children, families, businesses and society (Blomqvist, 2014).

Ensuring access to sexual and reproductive health services, as well as to education and empowerment to reduce family size, will be fundamental to lowering population growth rates and maximizing the potential for sustainability.

7. *Build partnerships for sustainable development*

Partnerships are important to assist governments to ensure aligned and supportive action across the SDGs and across countries. Three main levels are identified: Partnership and/or cooperation among countries, public- private partnerships, and co-management partnerships between government, communities and civil society. Cooperative action among countries can be coordinated through regional and intergovernmental institutions in the West Indian Ocean.

1.2 TOWARDS A BLUE ECONOMY POLICY

These sets of recommendations aim to provide a guide on how to mainstream the Blue Economy into continental, sub-regional, and national policies and plans. These recommendations were published by the United Nations Economic Commission for Africa in 2016 in its report “Africa’s Blue Economy: A policy handbook” (UN Economic Commission for Africa, 2016). It targets African states and intergovernmental organizations (IGOs) mainly. The recommendations intend to raise the level of understanding of the Blue Economy concept among all relevant stakeholders in pursuit of structural transformation and sustainable economic growth.

1. *Agenda setting, awareness, and sensitization*

It is crucial to communicate a sense of urgency for action and to have a good understanding of the Blue Economy resource base, including natural and human capital. An initial synthesis report of current knowledge is suggested. Base knowledge can be reached from existing studies and reports and then updated on the Blue Economy sectors from national, regional, and international sources.

2. *Coordination in formulating the Blue Economy Policy*

The agency responsible for implementation of blue economy policies should have sufficient authority, resources and operational independence. Its ability and mandate to shape the process and make decisions required to move toward the successful development of the policy can be strengthened if it is established through a legislative act by the government or parliament.

3. *Building national ownership of the Blue Economy policy formulation process*

An important key for success is to undertake a complete mapping of all potential interest groups: policy makers (at all levels), civil society, local community groups, the private sector, labor, media, and other possible parties. The different values and understanding of the benefits streams of the Blue Economy for each stakeholder group must be clearly identified.

4. *Sector identification and prioritization*

The Blue Economy includes many sectors, each with different characteristics and regulatory agendas. The policy framework should address all relevant sectors while identifying the high-priority sectors. This process should be objective and analytical.

5. *Designing the Blue Economy policy*

A possible tool for policy assessment is to develop scenarios with baseline conditions and progressive implementation of the strategies and policies. Institutional capacity and skills-gap analysis tools can be utilized here.

6. *Policy implementation*

The establishment of institutional roles and responsibilities of the stakeholders should be clearly identified. The plan could be organized into short, medium and long-term outcomes.

7. *Resource Mobilization*

Financing will be a challenge given the scarcity of resources in the African States. Thus, it will be important to prioritize interventions and build a resource base accordingly. Policy documents should give an initial evaluation of resource requirements. The roles of the public sector, private sector, development agencies, and traditional and nontraditional financiers need to be articulated as well.

8. *Monitoring and Evaluation*

Monitoring and evaluating the implemented policies and programs are key tools to observe the nature of the results obtained by the implemented policies. Evaluations provide knowledge about what kind of policies are working in favor of the Blue Economy, and what policies should be improved.

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