

**SGP** The GEF  
Small Grants  
Programme



*Empowered lives.  
Resilient nations.*

# BLUE ECONOMY

## COMMUNITY SOLUTIONS



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# CONTENTS

<b>FOREWORD</b>	<b>2</b>
<b>MESSAGE OF THE GLOBAL MANAGER</b>	<b>4</b>
<b>ACRONYMS</b>	<b>6</b>
<b>INTRODUCTION</b>	<b>8</b>
<b>CASE 1: ANTIGUA AND BARBUDA</b> Adopt a coastline – Youth Stewardship Programme	<b>14</b>
<b>CASE 2: BARBADOS</b> Community-based conservation of the Barbados Marine Management Area	<b>17</b>
<b>CASE 3: CHINA</b> Restoration and sustainable management of mangrove forest for eco-aquaculture	<b>20</b>
<b>CASE 4: CHINA</b> Restoration and sustainable use of seagrass beds for sea cucumber aquaculture	<b>23</b>
<b>CASE 5: EL SALVADOR</b> Land and seascape rehabilitation for livelihood improvement	<b>26</b>
<b>CASE 6: INDIA</b> Fisherwomen harnessing solar energy for fish drying	<b>30</b>
<b>CASE 7: KENYA</b> Marine conservation for eco-tourism development	<b>34</b>
<b>CASE 8: KENYA</b> Mainstreaming biodiversity conservation into marine ecosystems and fisheries management	<b>37</b>
<b>CASE 9: MAURITIUS</b> Establishment and sustainable management of voluntary marine conservation areas	<b>40</b>
<b>CASE 10: MOROCCO</b> Sustainable fisheries and community-based management of the Al Hoceima marine protected area	<b>43</b>
<b>CASE 11: SAMOA</b> Coral reef restoration and sustainable fisheries	<b>46</b>
<b>CASE 12: VIET NAM</b> Community-based management of coastal and marine resources for livelihood improvement	<b>49</b>
<b>CONCLUSIONS: Experiences and Lessons Learned</b>	<b>52</b>
<b>REFERENCES</b>	<b>58</b>
<b>ACKNOWLEDGEMENTS</b>	<b>60</b>

# FOREWORD



Adriana Dinu



Gustavo Fonseca

Oceans are our planet's dominant ecological environment, home to an estimated 50 to 80% of all life on Earth, and provide us with oxygen, food, jobs, recreation, and other services. These key roles make oceans an essential part of sustainable development. The international community recognized this in the outcome document of Rio+20 "The Future We Want", and the 2030 Agenda for Sustainable Development.

Unfortunately, recent economic development has been at the cost of our oceans' environmental balance, threatening their ability to sustainably provide quality ecosystem functions and services for future generations. Increasing pollution, overfishing, invasive species, unsustainable coastal development and climate change all contribute significantly to the loss of biodiversity and ecosystem services, and to the decline in the environmental health of our oceans. We must find a way to meet our current needs without jeopardizing the ocean's ability to meet those of future generations.

The blue economy is an approach put forward by the international community to take into account the health of the oceans and seas as we strive to balance the three dimensions of sustainable development: economic, social and environmental. This concept promotes economic growth, social inclusion and improved livelihoods at the same time as ensuring the environmental sustainability of oceans and seas. It defines a new paradigm of ocean economy, one that is in balance with the long-term capacity of the assets, goods and services of marine ecosystems, and that considers social inclusiveness.

This publication includes examples from across different continents, ecosystems and cultures, but they all address the priorities of livelihoods and conservation in combination and bring benefits on both fronts. By giving local communities an immediate, concrete stake in the sustainable management of the ocean's resources, these projects have each secured the local stewardship they need to be a viable, long-term part of the blue economy.

For example, in Barbados, local fishers participated in designing a Maritime Management Area and as a result their suggestions and livelihood priorities helped shape the boundaries and management practices of the zone. In Morocco, a monitoring and surveillance program was developed to raise awareness about illegal fishing and over-exploitation of the Marine Park of Al Hoceima, contributing to the restoration of fish stocks and the conservation of 1,900 ha of marine area.

We hope these examples from the GEF Small Grants Programme will inspire further innovation from the local to the global level, boost interest in and resources for a sustainable blue economy, and contribute to achieving Sustainable Development Goal 14 on Life Below Water.



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*Director of Programs  
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# MESSAGE OF THE GLOBAL MANAGER



Healthy oceans are fundamental for human wellbeing and for achieving sustainable development. The world's marine and coastal ecosystems not only provide a range of critical services from providing food to fostering biodiversity, while also regulating the global climate and delivering opportunities for employment and livelihoods.

Launched in 1992, the Global Environment Facility's Small Grants Programme (SGP), implemented by United Nations Development Programme, has supported over 22,000 community-based projects that protect the global environment and empower local communities while improving their livelihoods. This publication highlights the experience and lessons learned of SGP in the context of the blue economy, which focuses on ocean and coastal management by balancing the environmental and socio-economic dimensions of sustainable development.

SGP has supported community-based blue economy projects that generate both marine environmental benefits and socioeconomic benefits. To date, SGP's international waters portfolio has supported 1,147 community projects with more than \$30 million in grants for the protection of international waters at the local level. A similar amount of SGP projects on biodiversity have also focused on sustainable ocean and coastal management, sustainable fisheries and ecotourism; while the climate change, land degradation, and chemical and waste management portfolios have provided cross-cutting benefits for healthy oceans and coastal management. The twelve cases from ten countries highlighted in this publication provide a glimpse of the SGP portfolio and feature good practices from various regions of the world.

Promoting and applying the blue economy approach at the local level has yielded a few key lessons on the value of science-based development, community involvement, visibility of local benefits, communications, and partnerships. Among them, that knowledge exchanges and multi-stakeholder partnerships are critical for project management and up-scaling the results.

I hope this publication will provide practical examples for local communities and partners on innovative approaches for sustainable community-based ocean governance. Together with partners at the global, national, and local levels, SGP will continue to work with and empower local communities towards healthy oceans and coastal ecosystems.

  
**Yoko Watanabe**  
Global Manager  
GEF Small Grants Programme



# COMMUNITY ACTION, GLOBAL IMPACT

# ACRONYMS



<b>ADESCO</b>	Asociación de Desarrollo Comunitaria
<b>AGIR</b>	Association of Integrated Resource Management
<b>BMMA</b>	Barbados Marine Management Area
<b>BMU</b>	Beach Management Unit
<b>CBO</b>	Community-based organization
<b>CCA</b>	Community-based Conservation Area
<b>CORDIO</b>	Coastal Oceans Research and Development
<b>CPUE</b>	Catch-Per-Unit-Effort
<b>FAO</b>	Food and Agriculture Organization
<b>FCGMPA</b>	Fangchenggang Mangrove Protection Association
<b>FED</b>	Fish enhancing device
<b>FMB</b>	Fixed mooring buoy
<b>GDP</b>	Gross Domestic Product
<b>GEF</b>	Global Environment Facility
<b>IWECO</b>	Integrating Water, Land and Ecosystem Management in Caribbean
<b>HA</b>	Hectares
<b>IUCN</b>	International Union for Conservation of Nature
<b>MAF</b>	Ministry of Agriculture and Fisheries
<b>MMA</b>	Marine management area
<b>MPA</b>	Marine protected area

<b>NGO</b>	Non-governmental organization
<b>PES</b>	Payment for Ecosystem Services
<b>PIC</b>	Project implementation committee
<b>PPSS</b>	Praja Pragathi Seva Sangham
<b>RMB</b>	Renminbi (currency Chinese Yuan)
<b>SAT</b>	Samoa Tala (currency)
<b>SHG</b>	Self-help group
<b>SGP</b>	Small Grants Programme
<b>UN</b>	United Nations
<b>UNCED</b>	United Nations Conference on Environment and Development
<b>UNDP</b>	United Nations Development Programme
<b>UNEP</b>	United Nations Environment Programme
<b>US</b>	United States
<b>US\$</b>	United States Dollar
<b>VMCA</b>	Voluntary Marine Conservation Area

# INTRODUCTION



## **UNSUSTAINABLE DEVELOPMENT: A THREAT TO OUR OCEANS**

The importance of oceans to people and other living things on Earth cannot be over-emphasized. Oceans cover about 71 percent of the surface of our planet, contain 97 percent of its water, and provide the living space to nearly 200 million identified species (UN, 2018).

In light of this, “Earth” seems something of a misnomer for a planet that might more accurately be called “Water”. Not only do oceans dominate the ecological environment, they provide direct life support to human beings and other living things. More than 3 billion people directly depend on marine and coastal biodiversity for their livelihoods, and the same number of people depend on the oceans as their primary source of protein (UN, 2018).

Human activities have seriously taxed the resilience of marine and coastal resources, threatening the sustainability of our oceans and its ability to continue providing the same quality ecosystem functions and services for future generations. Increasing pollution, overfishing, invasive species, unsustainable coastal development, and climate change contribute significantly to loss of biodiversity and ecological functions, and to the decline in environmental health of our oceans. Take land-based pollution for example: more than 80 percent of the world's wastewater, and over 95 percent in some least developed countries, flows directly into rivers, lakes and eventually oceans (UN, 2017). Global warming caused by increased anthropogenic greenhouse gas emissions further exacerbate ocean and coastal degradation and contribute to rapid ocean acidification, fundamentally altering the world's oceanic systems.

Moreover, marine activities have historically been under single-sector management with little engagement from relevant stakeholders, leading to the degradation and unsustainable use of an estimated 60 percent of the world's major marine ecosystems (UNEP, 2011). Several indicators suggest that regulation and conservation of vital ocean-based resources is failing to be effective. This failure can potentially lead to irreversible tipping points, and structural and functional shifts in the oceanic ecosystem.

In response to this global problem, the international community has come together to adopt global policies and directions for sustainable ocean management. There has been a growing awareness of the need to support and analyze the environmental and socio-economic dimensions of marine economic activities. The first-ever United Nations Ocean Conference, held in June 2017 in New York, and a Blue Economy Conference to be convened in November 2018 in Nairobi, show increased policy attention for sustainable ocean management.

### **THE BLUE ECONOMY: A PATHWAY FOR SUSTAINABLE DEVELOPMENT**

Sustainable management of our oceans is critical to achieving sustainable development. How to achieve a balance between continuous economic development, environmental sustainability, and social inclusion poses great intellectual and practical challenges to the international community and development practitioners.

A blue economy approach has been proposed by the international community to address the balance between the three dimensions of sustainable development.

Blue economy refers to a concept that seeks to promote economic growth, social inclusion and the preservation and improvement of livelihoods, while at the same time ensuring the environmental sustainability of the oceans and seas (World Bank and United Nations, 2017). These have always played a significant role in community livelihoods through the provision of food, medicine, energy and other ecosystem services and products.

In the blue economy, the seas and oceans contribute to poverty eradication by creating sustainable livelihoods and decent work, provide food and minerals, generate oxygen, absorb greenhouse gases and mitigate the impacts of climate change, determine weather patterns and temperatures, and serve as highways for seaborne international trade. Below are some quantitative data on oceans' contribution to economic growth and livelihoods:

- Over 3 billion people depend on marine and coastal biodiversity for their livelihoods;
- Globally, the market value of marine and coastal resources and industries is estimated at US\$3 trillion per year or about 5 percent of global gross domestic product (GDP);
- Oceans absorb about 30 percent of carbon dioxide produced by humans, buffering the impacts of global warming;
- More than 3 billion people depend on the oceans for their primary source of protein;
- Marine fisheries directly or indirectly employ more than 200 million people (UN, 2018).

Central to the blue economy approach is the de-coupling of socio-economic development from the degradation of the marine and other aquatic environment and ecosystems (UNEP, 2016). This approach demonstrates the potential synergy between socio-economic development and marine ecosystem conservation and rehabilitation. It assesses and includes the real value of the natural "blue" capital into all aspects of economic activity, including conceptualization, planning, infrastructure development, trade, travel, renewable resource exploitation, and energy production and consumption. Under this approach, marine natural resources and materials are used and sourced only where



PHOTO: SGP EL SALVADOR

sustainable, and “blue” low-energy options are utilized where feasible for the efficient and optimal use of resources.

The economic valuation of coastal habitats such as mangroves, coral reefs and seagrass and other wetland types include the direct and indirect use of their natural resources (Dewsbury, Bhat, Fourqurean, 2016). The ecosystem goods and services from these coastal habitats include, among others, tourism and recreation, fisheries, coastal protection, biodiversity and carbon sequestration (WRI, 2008). If managed properly and used sustainably, these coastal habitats will continue providing ecosystem services to human beings and other living things (UNEP, 2018).

While the potential of the oceans to serve the needs of sustainable development is quite high, it can only be made possible if they are maintained in or restored to a healthy ecological state. To this end, the importance of the oceans has been recognized from the beginning of the UNCED process, in Agenda 21 that came out of the UN Earth Summit in 1992, and more recently in the Sustainable Development Goals (SDGs) of the UN 2030 Agenda.

In September 2015, world leaders adopted 17 SDGs for humanity by 2030, covering the economic, social and environmental dimensions of development. Goal 14 is to “Conserve and sustainably use the oceans, seas and marine resources for sustainable development.” Within that goal, Target 14.7 focuses on enhancing the economic benefits to Small Island Developing States (SIDS) and Least Developed Countries (LDCs) from the sustainable use of marine resources, including through the sustainable management

of fisheries, aquaculture, and tourism. SDG Target 14.9 aims to “provide access for small-scale artisanal fishers to marine resources and markets.” The blue economy is not explicitly mentioned by the SDGs, but it is a means to achieve SDG 14 and other goals. There is a need to strengthen the implementation of SDG 14 at the local level (UN, 2018).

### SGP INTERNATIONAL WATERS PORTFOLIO

Launched in 1992, the GEF Small Grants Programme (SGP) supports innovative local and community-based actions to address global environmental issues, promote livelihoods, and empower local communities. To date, SGP has supported 1,147 community projects with more than US\$30 million GEF funding and has generated more than US\$45 million co-financing for the protection of international waters at the local and community level. SGP works to localize the implementation of SDGs, and contribute to the achievements of almost all SDGs.

In international waters focal area, table 1 shows the distribution of SGP’s international waters portfolio by region. SGP projects have mainly focused on the following categories of activities:

- conservation and rehabilitation of coastal ecosystems and habitats;
- prevention and reduction of land-based pollution;
- freshwater resources management;
- fisheries, land and forest and other natural resources management;
- capacity development, networking, knowledge sharing and learning.

Additionally, ocean management connects to other GEF focal areas including biodiversity, climate change, land degradation, chemicals and waste management through ecosystem interdependence, linkages and synergies. These other focal area portfolios have also implemented blue economy projects that generate both environmental and socioeconomic benefits.

For example, mainstreaming biodiversity into ocean and coastal management is essential for sustainable fisheries and eco-tourism. Over the years, SGP has supported at least 1000 projects related to marine and coastal management, including sustainable fisheries and coral reef conservation and rehabilitation.

Similarly, climate change mitigation and adaptation projects help ensure ocean health and improve carbon sequestration capacity. SGP’s Community-based Adaptation program, financed by Australian Aid, has been working on coastal management issues in small island development states and least developing countries.

Land-based pollution is a key determining factor of coastal habitats and ocean health, and has been addressed through SGP’s chemicals and waste management. Therefore, SGP’s contribution to blue economy practices goes beyond the international waters portfolio, and this cross-cutting approach strengthens the overall effectiveness of SGP.

**FROM POLICY TO PRACTICE: COMMUNITY BLUE ECONOMY SOLUTIONS**

While the global sustainable development principles and policies in the form of the SDGs have been adopted by heads

of 193 member states at the highest intergovernmental level, good practices of blue economy remain limited or undocumented, and are often easier said than done. Recent blue economy publications have largely focused on the general approach, policies and strategies for maintaining balanced relationships between the economic, social and environmental dimensions of sustainable development in the context of the oceans.<sup>1</sup> There is a large body of research that documents and maps the exploitation of marine and ocean ecosystems. While many of these disciplines touch upon the concept of blue economy, there is a gap in the literature on how the blue economy can be implemented or practiced in the field, especially at local and community level, or on what good local practices exist that can be replicated or scaled up.

This publication intends to fill this gap. It draws on innovative community experiences from around the world to test and experiment different approaches to achieving economic returns in an environmentally sustainable and socially inclusive manner in our oceans. These projects have been designed, developed, and implemented by local communities with support from SGP.

The cases included in the publication show that there is a way to reconcile the environmental and socio-economic dimensions of ocean management. They also offer direct experiences and lessons learned for practitioners and policy makers to further refine on-the-ground practices, the approach and the policies to harness the great potential of the blue economy. Table 2 below summarizes the environmental and socio-economic benefits of these projects.

**TABLE 1**  
**SGP INTERNATIONAL WATERS PORTFOLIO BY REGION**

 REGION	 NUMBER OF PROJECTS	 GRANT AMOUNT	 CO-FINANCING IN CASH	 CO-FINANCING IN KIND
<b>AFRICA</b>	378	US\$10,621,096	US\$7,821,842	US\$17,822,289
<b>ARAB STATES</b>	93	US\$2,945,660	US\$2,168,960	US\$1,718,592
<b>ASIA AND THE PACIFIC</b>	421	US\$10,674,350	US\$2,638,665	US\$9,305,024
<b>EUROPE AND THE CIS</b>	131	US\$2,870,050	US\$3,852,820	US\$1,377,131
<b>LATIN AMERICA AND THE CARIBBEAN</b>	124	US\$3,380,948	US\$2,142,957	US\$3,384,621

<sup>1</sup> See for example Caribbean Development Bank, 2018. World Bank and United Nations, 2017. UNEP, 2011. UNEP, 2018.

# TABLE 2

## SUMMARY OF PROJECT CASES

PROJECT TITLE AND COUNTRY	DURATION	PROJECT FUNDING	CO-FINANCING	ENVIRONMENTAL RESULTS	SOCIO-ECONOMIC RESULTS
Adopt a coastline - Youth Stewardship Programme <b>Antigua and Barbuda</b>	February 2018 – May 2019	US\$50,000	US\$11,795	<ul style="list-style-type: none"> <li>Restoration of wildlife habitats and healthy beach environment</li> <li>Reef recovery</li> <li>Less waste and plastic pollution of marine environment</li> </ul>	<ul style="list-style-type: none"> <li>Diversification of livelihoods by producing products from recycled waste and selling them at local artisanal markets</li> <li>A portion of the additional income is reinvested to support a youth stewards' and volunteers' stipend</li> </ul>
Community-based conservation of the Barbados Marine Management Area <b>Barbados</b>	January 2017 – February 2018	US\$46,540	US\$40,820	<ul style="list-style-type: none"> <li>Community consensus over zoning and operation of marine protected area, increasing chances of MMA sustainability</li> <li>Increase in marine biodiversity</li> <li>Good prospects of rehabilitation of coral reef and associated fauna e.g. sea turtle</li> </ul>	<ul style="list-style-type: none"> <li>Increase of fish quantity, and improved livelihoods of the fishing communities</li> </ul>
Restoration and sustainable management of mangrove forest for eco-aquaculture, <i>Guangxi</i> <b>China</b>	December 2011 – December 2013	US\$42,798	US\$2,148	<ul style="list-style-type: none"> <li>Reforestation of 300 acres of mangroves in three coastal cities: Beihai, Qinzhou and Fang Chenggang</li> <li>20,000 new mangrove seedlings planted</li> <li>Rehabilitation of the natural habitats of many marine species and birds</li> <li>Mangrove conservation and marine protection trainings for 90 villagers and 800 students</li> </ul>	<ul style="list-style-type: none"> <li>40% increase in production value of fish-farm area with application of the eco-aquaculture system</li> <li>Increased fish quality resulting in increased market price compared to fish farmed with the traditional aquaculture</li> <li>System can be farmed twice a year, resulting in an average annual income of US\$3,675 per family (an increase of US\$3,000)</li> <li>Special training for local women to increase their income and improve their socio-economic status</li> </ul>
Restoration and sustainable use of seagrass beds for sea cucumber aquaculture, <i>Shandong</i> <b>China</b>	October 2013 – September 2015	US\$50,000	US\$39,492	<ul style="list-style-type: none"> <li>Restoration of 3,050 ha of seagrass bed</li> <li>Increased density of <i>Zostera marina</i> to 110 plants per square meter</li> </ul>	<ul style="list-style-type: none"> <li>The sea-cucumber cultivation has brought more than US\$70,000 per year to the local community with about 500 people</li> <li>More than US\$7,000 has been generated from eco-tourism per year</li> </ul>
Land and Seascape Rehabilitation for livelihood improvement, <i>El Salamar</i> <b>El Salvador</b>	April 2017 – April 2018	US\$50,000	US\$82,660	<ul style="list-style-type: none"> <li>Reforestation of 40 ha of degraded mangrove areas (including 3 km along the Jalponga river banks)</li> <li>Reduction of wood consumption by the community</li> <li>Preservation of the forest plantation</li> <li>Rehabilitation and maintenance of populations of: 9 species of fish, 1 species of shell, 2 species of shrimp and 2 species of crabs</li> <li>Better solid waste collection and avoidance of waste burning</li> </ul>	<ul style="list-style-type: none"> <li>Technological innovations for climate-smart agroecology and for access to low-carbon energy sources (instead of wood)</li> <li>Diversification of livelihoods by introducing new activities such as artisanal fishing, small-scale tourism, development of productive crops, and working with palm trees in construction sector</li> <li>A portion of the additional income is reinvested in local infrastructure and education</li> </ul>
Fisherwomen harnessing solar energy for fish drying, <i>Giripuram and Palakaitippa</i> <b>India</b>	December 2017 – January 2018	US\$12,032	US\$7,344	<ul style="list-style-type: none"> <li>Decrease of greenhouse gas emissions by switching from wood burning to solar energy for drying fish</li> <li>Reduction of wood consumption by the community</li> <li>More sanitary fish conservation practices</li> </ul>	<ul style="list-style-type: none"> <li>Reported 50% rise in monthly incomes</li> <li>Reduction in women's labor</li> <li>Time saving</li> <li>Community involvement</li> <li>Long-term and sustainable process for fish preservation</li> </ul>

PROJECT TITLE AND COUNTRY	DURATION	PROJECT FUNDING	CO-FINANCING	ENVIRONMENTAL RESULTS	SOCIO-ECONOMIC RESULTS
Marine conservation for eco-tourism development, <i>Wasini Island</i> <b>Kenya</b>	March 2013 – October 2015	US\$36,833	US\$25,203	<ul style="list-style-type: none"> <li>Establishment of 200 ha of marine protected area within the Wasini Beach Management Unit</li> <li>Protection of an estimated 64 coral genera and more than 250 fish species</li> <li>Successful pilot of coral transplantation</li> </ul>	<ul style="list-style-type: none"> <li>Livelihoods are diversified by introducing new economic activities such as ecotourism and associated job opportunities</li> <li>Increase in fish catch and additional income for fishers and fishmongers</li> <li>A portion of the additional income is reinvested in community activities e.g. environmental education for youth</li> </ul>
Mainstreaming biodiversity conservation into marine ecosystems and fisheries management, <i>Msambweni and Diani-Chale</i> <b>Kenya</b>	September 2013 – April 2015	US\$139,524	US\$101,548	<ul style="list-style-type: none"> <li>Establishment of two community-managed marine conservation areas</li> <li>Protection of reef fish (<i>Siganus canaliculatus</i> and <i>Siganus sutor</i>)</li> </ul>	<ul style="list-style-type: none"> <li>Diversification of livelihoods through ecotourism</li> <li>Improvement of community groups' leadership and decision-making</li> </ul>
Community-based marine conservation, research and management through the establishment of marine conservation areas (VMCAs) <b>Mauritius</b>	June 2012 – August 2014	US\$50,000	US\$106,667	<ul style="list-style-type: none"> <li>Protected 50 ha of coral reef habitat Anse La Raie, representing the 9% of the lagoon</li> <li>Protected 8 ha of seagrass and coral patches in the lagoon of Roches Noires, which is on the border of a fishing reserve</li> <li>Introduction of fixed mooring buoys (FMBs), a snorkel trail and ongoing training to skippers from hotels and private boat operators on how to protect the coral from anchor damage</li> <li>An ecosystem-monitoring program has been established for each VMCA</li> </ul>	<ul style="list-style-type: none"> <li>Conservation initiatives attracts visitors to the site has helped them secure more business</li> <li>Ecosystem training provided to skippers and operators to help them guide tourists better</li> <li>Investment in infrastructure on the site leads to better tourism practices</li> <li>Raising awareness of marine ecosystems, and establishment of VMCA committees in both communities</li> </ul>
Sustainable fisheries and community-based management of the Al Hoceima marine protected area <b>Morocco</b>	January 2013 – March 2015	US\$50,000	US\$91,983	<ul style="list-style-type: none"> <li>Adoption of international environmental standards</li> <li>Sustainable fishing gear replaced driftnets, resulting in less damage to the ecosystem</li> <li>Restoration of fish stocks and the conservation and protection of 1,900 ha of marine area</li> </ul>	<ul style="list-style-type: none"> <li>Increased quality and quantity of the fish stock, resulting in 50% income increase for fishers</li> <li>Diversification of livelihoods and reduced reliance on fisheries</li> <li>Women's economic empowerment, the establishment of a women's cooperative for production and marketing of biodegradable fishing material generated an additional income for women of US\$8,055 over a period of six months</li> </ul>
Coral reef restoration and sustainable fisheries, <i>Lefagaalii</i> <b>Samoa</b>	June 2015 – March 2018	US\$30,000	US\$10,000	<ul style="list-style-type: none"> <li>Expanding MPA from 400 metres to 5 ha</li> <li>Increase in Coral Growth</li> <li>Increase in Fish Stock</li> <li>Seawall construction</li> </ul>	<ul style="list-style-type: none"> <li>100% Increase in fishing incomes</li> <li>Creation of new partnerships</li> <li>Planning for Ecotourism approaches</li> <li>Long term and sustainable process for biodiversity conservation</li> </ul>
Community-based management of coastal and marine resources for livelihood improvement, <i>Thuan Quy, Binh Thuan</i> <b>Viet Nam</b>	October 2014 – June 2017	US\$48,000	US\$31,060	<ul style="list-style-type: none"> <li>Restoration of seabed ecosystem and habitat recovery for 20 aquatic species on a project surface of 500 m<sup>2</sup></li> <li>Full rehabilitation and maintenance of <i>Anadara antiquate</i> (clam) population in the same area</li> </ul>	<ul style="list-style-type: none"> <li>40% income increase for fishers due to new production models</li> <li>66% income increase for local population due to livelihood diversification through agriculture, ecotourism, and small-scale trading</li> </ul>

## CASE STUDY

# 1 ANTIGUA AND BARBUDA ADOPT A COASTLINE – YOUTH STEWARDSHIP PROGRAMME



### GRANTEE PARTNER

Yellow Boat



### LOCATION

The North East Marine Managed Authority (NEMMA)



### SGP CONTRIBUTION

US\$50,000



### CO-FINANCING

US\$11,795



### START DATE

February 2018



### END DATE

May 2019

## PROJECT CONTEXT

Antigua and Barbuda, together with a number of smaller islands located between the Caribbean Sea and the Atlantic Ocean, constitute a sovereign state in the West Indies in the Americas. The population is 103,050 (UN WPP, 2018) and the capital and largest port city is St. John's, on Antigua. Antigua and Barbuda are mostly low-lying islands, and their shorelines are indented with many beaches, lagoons, and natural harbors. Tourism dominates the economy, accounting for more than 50 percent of the GDP. Agricultural production is focused on the domestic market and constrained by limited water supply, as well as by labor shortages due to higher wages in the tourism and construction sectors. The fishery sector of Antigua and Barbuda is artisanal and small-scale, making up only 0.7 percent of GDP.

Antigua and Barbuda are home to a wide range of marine habitats and very diverse marine fauna and flora. Along the coast, there are several species of mangroves and seagrasses, a wide variety of coral species, and nesting and feeding grounds for endangered sea turtles. Conserving the islands' marine environment has been challenging as environmental abuse is rampant. Enforcement and implementation of regulations are inadequate or lacking. Unregulated coastal development, unsustainable seaweed extraction, sand mining, net fishing, and the dumping of toxic chemicals are all commonplace. In addition, the public remains insufficiently aware of the impact of litter on the islands' land and marine ecosystems, resulting in the shorelines being polluted with waste from nearby villages and businesses.

## PROJECT IMPLEMENTATION

In 2017, with the support of the GEF Small Grants Programme (SGP), the community-based organization Yellow Boat set out to protect the marine environment of Antigua and Barbuda. The base of the initiative titled Adopt a coastline – Youth Stewardship Programme is located within the North East Marine Managed Authority (NEMMA),



PHOTO: SGP ANTIGUA AND BARBUDA



PHOTO: SGP ANTIGUA AND BARBUDA

the largest marine protected area of the islands. The project promotes the sustainable management of coastal and marine ecosystems, the rehabilitation and protection of key natural resources, and the improvement of local livelihoods. To achieve these goals, the project trains youth to become active stewards who are able to raise awareness among the local population about the benefits of marine protection and waste management, and of the economic potential of developing and marketing products from recycled materials.

The project kicked off with a group beach clean-up and the installation of garbage bins along the shore to raise awareness about the problem of pollution. Progress on waste collection was monitored and the beautification of the shore was documented online by local youth. After the pilot beach, more clean-ups were organized in other areas. Priority was given to sites and shorelines that host mangroves and constitute important nesting and feeding grounds for sea turtles and other marine species. A group of youths aged 15-23 volunteered in teams and rotated between six different project locations while documenting and broadcasting the project's progress online. The project used social media to spread information about the project and to recruit new volunteers, adult mentors, and support and sponsorship from businesses and peer groups. During implementation awareness was also raised about the value of waste, and

the opportunity was explored to develop products and small-business ideas from recycled materials. Prototype products were developed and test-marketed between February and May 2018 at local markets that specialize in locally made products. Efforts to upscale this initiative are under way.

Women and girls are key players in the project cycle, including in planning, site selection, implementation, deliverables and outreach. The project aims to launch a website in November 2019 that captures all efforts and achievements of this community-based approach to marine rehabilitation and conservation. With a stewardship model working well for eight years on one shoreline (Dieppe Bay), participation in the project has grown and evolved, and the community has witnessed a remarkable recovery of the coastal and marine environment.

## ENVIRONMENTAL RESULTS

Given the constant threat of mismanagement of the coastal environment by government agencies and representatives, achieving long-term environmental results is still challenging in Antigua and Barbuda. However, in places where the Adopt a coastline Project and Youth Stewardship Programme has been active and able to maintain a long-term presence, wildlife habitat has been restored and a near pristine, healthy beach environment had returned. At Dieppe Bay, reefs showed signs of recovery, and



PHOTO: SGP ANTIGUA AND BARBUDA

endangered turtle species nested in increasing numbers for each of the years 2015, 2016, and 2017. It should however be noted that community efforts are sometimes threatened by aggressive development and mismanagement of shores by government agencies and representatives. In 2018, developers, despite laws, brought in machinery onto the beaches and turtle nesting and bird feeding ground were destroyed, while green belts and even groves of palm trees were uprooted. As a consequence, no turtles at all nested on this particular beach in 2018. To upscale its impact, this project focused on creating awareness and helped to change the behavior and attitude of the community and youth. So far, its impact has been considerable as many community members and participants to the project have become more conscious of the environmental issues at stake, a result that could be replicated in other communities if the project continues to expand.

### SOCIO-ECONOMIC RESULTS

The Adopt a coastline Project and Youth Stewardship Programme has developed a small line of functional art and home-decor items made of recycled waste, that are sold directly at local markets and events. The sale of the products serves primarily to increase revenue and garner support for other projects such as bicycles for youth mobility.

Another example is making litter bins out of used vehicle tires and installing them on public beaches. By undertaking initiatives like this the project is responding directly to community requests and needs. The tire-based litter bins are sponsored by local businesses, and that income directly supports the stipends of the youth stewards and volunteers who are working together to document and broadcast the project progress. Next steps in the project include fine-tuning the product range and exploring the possibility of starting an online store by summer 2019. The project also initiated,

with the support of the SGP and other donors, a collaboration with the Antigua and Barbuda Waste Recycling Company as a supplier of some recycled materials for product development.

### EXPERIENCES AND LESSONS LEARNED

One of the key lessons from the project is that changing the mindset and behavior of relevant stakeholders towards environmental conservation requires time and perseverance. Practical results demonstrating the value of ecosystems and shared natural resources are necessary to avoid further coastal environmental degradation. By putting stakeholders in direct relationship with the natural environment, a sense of community ownership is created that induces changes in lifestyle and habits, and increases awareness about pollution in areas shared with other species.

The main strategies used by this project to alter the mindset of stakeholders were: (i) to create concrete examples through beach clean-ups and the provision of waste collection services; (ii) to engage and train youth stewards in this process and increase their ability to advocate for the project within their communities; (iii) to promote the positive results of solid waste collection in these areas through social media and with the public; and (iv) to provide income-generating activities and livelihoods to the local population by upcycling waste to new products. Social media played an important role in spreading the message and encouraging others including partner organizations to join the effort or start a similar initiative in their own community. As soon as six months after project launch, the initiative was replicated in three other locations along the shoreline. For this intervention to be successful in the long term, continuous monitoring of the sites is required and the benefits of coastal rehabilitation and beach beautification should continue to be broadcasted in order to gain visibility and increase awareness and engagement of more communities on the islands.

CASE STUDY

# 2 BARBADOS

## COMMUNITY-BASED CONSERVATION OF THE BARBADOS MARINE MANAGEMENT AREA



**GRANTEE PARTNER**

Coenostrum



**LOCATION**

The Barbados Marine Management Area



**SGP CONTRIBUTION**

US\$46,540



**CO-FINANCING**

US\$40,820



**START DATE**

January 2017



**END DATE**

February 2018

### PROJECT CONTEXT

Barbados is the easternmost island in the Caribbean, and covers a land area of 432 km<sup>2</sup> with a coastline that spans 92 km. The island is the most densely populated of the Eastern Caribbean islands, with an estimated population of 286,000 people. The annual value of ecosystem services provided by Caribbean coral reefs in terms of fishing, tourism, sand extraction and medicines has been estimated at between US\$3.1 billion and US\$4.6 billion, with degradation by 2015 potentially costing between US\$350 million and US\$870 million per year (Whalley, 2011).

In spite of their importance, coral reefs are being decimated at an unprecedented rate; coral reefs in the Caribbean have declined by approximately 80 percent since the 1970s (Mumby, Flower *et al.* 2014). In Barbados, there have been considerable declines in coral cover on offshore reefs since the 1980s, linked to eutrophication from urbanization, tourism development, and unsustainable fishing. In 2005, ocean temperature increase resulted in coral bleaching and the mortality of corals as high as 26 percent, which was the most severe bleaching event ever recorded for Barbados (Wilkinson and Souter, 2008). As to unsustainable fishing, restrictions on fishing parrotfish could significantly enhance the resilience of coral reef, as this herbivorous fish scrape algae off the coral to eat, helping to keep it clean and healthy.

According to a study of 2012, Caribbean corals may disappear in the next 20 years as a direct result of the loss of parrotfish and sea urchins, which are the two main grazers in the area. Meanwhile, some of the healthiest Caribbean coral reefs are those in areas where governments have restricted or banned fishing practices that harm parrotfish, such as fish traps and spearfishing (Jackson *et al.*, 2014). Local sources of marine pollution including agricultural run-off, waste water from households and industry, solid waste and sedimentation from coastal construction further aggravate these risks and better control of these local threats can contribute to reef resilience and the stabilization of ecosystem services.



PHOTO: ANDREW WESTERN (ECODRIVE)



PHOTO: ANDREW WESTERN (ECODRIVE)

One tool to restrain unsustainable fishing has been the designation of marine management areas (MMAs), which determine marine reserves or areas where fishing is prohibited. But MMAs often fail, primarily due to a lack of participatory management or engagement of local stakeholders. In the absence of local participation or buy-in, these conservation projects often end up as parks in little more than name, or only on paper. This project therefore proposed to establish a comprehensive participatory co-management system, based on transparency and inclusion of local stakeholders, to be rolled out in parallel with the designation of the Barbados Marine Management Area (BMMA), on the west and south-west coasts of the island.

The project is embedded in the country's Integrated Coastal Zone Management plan, and forms a component of the Blue Finance project. The project is aimed at developing innovative financing options for the BMMA, which itself feeds into the 1992 Convention on Biological Diversity, specifically Aichi Target 10, one of 20 objectives drawn up at the 2014 Conference of the Parties in the Japanese town of Aichi. There are also linkages with a GEF full-size project in the Caribbean, called Integrating Water, Land and Ecosystem Management (IWEco), implemented by UNEP.

## PROJECT IMPLEMENTATION

In January 2017, in preparation for the process to secure designation for the BMMA, local grantee partner Coenostrium, with support from the SGP, conducted a national stakeholder consultation and an advocacy campaign to monitor the local fishery sector, based on Catch-Per-Unit-Effort (CPUE) monitoring. Stakeholder meetings were held to identify potential concerns with the proposed BMMA, to develop a zonation map based on usage, and to gauge interest in the establishment of

a co-management area with the government. The meetings were organized per sector, representing fishers, divers, catamaran owners and sailors, water sports practitioners, swimmers, and recreational beach businesses and hoteliers. From each group, two people were selected to attend an inter-sectoral meeting where areas of concern were negotiated, and possible common grounds were identified. As a result, a zonation map for the BMMA was developed with input from the most important groups of marine stakeholders and decisions were made about what activities should and should not be allowed in the designated area.

In the first six months of the project, a Stakeholder Advisory Committee was established, which ensured a participatory approach for the development and management of the BMMA, and which would assist the government in taking the designation process forward. The involvement of fishers from the BMMA communities was considered crucial for the success of the project. Therefore, 10 fishers from local communities were trained to collect their own data and determine catch productivity for the most common reef fish, within and outside the proposed BMMA's boundaries, using the CPUE method. This allowed them to gather baseline information that could later be used to determine the effectiveness of the fish-management strategy of the BMMA. In addition, the BMMA Fisher's Consortium was set up to bring together all fishers who operate within the Management Area. The project provided funding for their log books for ongoing recording of CPUE data, a practice that the project aims to continue with the financial support of the operation of the BMMA.

Social media, short videos, government information service material, local television, fliers, and newspapers were all used to encourage the public to attend the stakeholder

meetings and to distribute information about the BMMA proposal. The aim was to raise awareness of the importance of marine and coastal conservation in Barbados among the broader public and users of this specific area.

The main partners in the project were: the non-governmental organization (NGO) Blue Finance, which provided technical and financial assistance; the Fisheries Division of the Ministry of Agriculture, which assisted with stakeholder consultations; the local video bloggers “Research and Some Sense”, which were responsible for social media and video development; and the East Coast Conservation Organisation, which led the CPUE training for the fishers. The project team also collaborated with the Future Centre Trust of Barbados, the Centre for Resource Management and Environmental Studies at the University of the West Indies, and the Bellairs Research Institute (a Barbados-based field station of Canada’s McGill University), as well as benefiting from the support of several individual scientists. Throughout the project, the SGP also performed a crucial advisory and guidance role.

The nature of this approach and the engagement of the Government of Barbados in this project make it feasible to replicate this practice of marine co-management in other locations. As an initial effort the results of this project have been widely shared with fishing communities across Barbados.

## ENVIRONMENTAL RESULTS

The main environmental results of this project can be measured by the project’s achievement of establishing consensus over the designation and operation of the BMMA among a diverse and inclusive group of stakeholders, significantly increasing the sustainability and longevity of the designated marine area. It is estimated that once the Government of Barbados executes the BMMA in full, the health of the coral reefs and their associated flora and fauna, such as the endangered sea turtle, will increase rapidly.

## SOCIO-ECONOMIC RESULTS

With a healthier marine environment and improved biodiversity comes also an increase in fish numbers, and improved livelihoods for those working in the

fishing industry. Training fishers to collect their own catch-abundance data has empowered them to find answers for local problems themselves, and to develop a sense of ownership over the BMMA and of their own alignment with the project goals.

## EXPERIENCE AND LESSONS LEARNED

This SGP was instrumental in ensuring public participation in the designation of the BMMA and in securing buy-in from fishing communities, as they are crucial partners in the success of any MMA. Fishers are often opposed to the establishment of protected areas, as they perceive them as a threat to their livelihoods. Even if they recognize the benefit of MMAs as a form of bank or secure stock of fish resources which they can draw down on in the future, they do suffer some short-term losses due to the prohibition on fishing in certain zones. Financial compensation to cease fishing can therefore be a helpful tool to bring fishers on board initially.

In the early stages of the project, the importance of communication and advocacy was very apparent. Facilitators of meetings and workshops were non-partisan, and the overall message to be conveyed to stakeholders were carefully crafted in order to overcome preconceived notions about MMAs. Involving a professional public relations team early on in the project helped in overcoming certain communication challenges. Setting up a national sensitization program in a first phase was beneficial for communicating and demonstrating the benefits of the BMMA and conservation of the marine and coastal ecosystem, and drew much support from the community.

The outcomes of the stakeholder consultation significantly helped to inform government policy regarding the development of the BMMA. This project clearly demonstrated the benefits of bottom-up crafting of MMAs: Securing the buy-in from the community before the designation of the marine zone greatly facilitates its eventual roll-out and its long-term sustainability. Peer-to-peer knowledge is extremely important in this process, more so than desk research. SGP support for this project was very timely as the marine area had not yet been designated, and community interest had been stoked early. It is suggested that after its designation, a sustainable, private sector-driven source of financing should be developed to continue support of the BMMA.

CASE STUDY

# 3 CHINA

## RESTORATION AND SUSTAINABLE MANAGEMENT OF MANGROVE FOREST FOR ECO-AQUACULTURE



**GRANTEE PARTNER**

Fangchenggang Mangrove Protection Association (FCGMPA)



**LOCATION**

Datang Natural Village, Datao Village, Maoling Township, Fangchenggang City, Guangxi Zhuang Autonomous Region



**SGP CONTRIBUTION**

US\$42,798



**CO-FINANCING**

US\$2,148



**START DATE**

December 2011



**END DATE**

December 2013

### PROJECT CONTEXT

The Beibu Gulf is located in the north-west of the South China Sea. It is traditionally an important fishing ground for fishers from Guangxi, Guangdong and Hainan provinces. The tropical landscape of the gulf's coast consists of mangroves and coral reefs. The area spans maritime, land, and intermediary habitats and is therefore rich in biodiversity, yet ecologically very vulnerable. The area suffers from the impacts of climate change and human interference, which have already resulted in a process of coastal development and the continuous transformation of the coastline according to the needs of nearby communities (Ferreira, Silva and Polette, 2009). These impacts include the fragmentation and decline of natural habitats, sea water pollution and frequent red tides, loss of marine ecosystems and coastal wetland habitat, biodiversity decline, and outbreaks of mangrove diseases and pests.

Datao village in the Beibu Gulf has 48 households with 300 people. The main economic activities are fishing and aquaculture. In recent years, most of the village and surrounding areas have built aquaculture ponds, e.g. shrimp ponds. Excessive pond culture has caused a large reduction of the mangroves due to converting mangrove areas into aquaculture ponds by encroachment, and produced severe farming pollution.

Local NGO the Fangchenggang Mangrove Protection Association (FCGMPA) adopted a sustainable eco-aquaculture technology developed by the Guangxi Mangrove Research Center. With financial support from SGP and technical support from the research centre, the project embarked on a mission to improve local livelihoods in Datao village by demonstrating how this eco-aquaculture system is able to restore mangroves destroyed by unsustainable fishery.

### PROJECT IMPLEMENTATION

The mission was to demonstrate that an eco-aquaculture system approach can address and resolve the conflict between mangrove conservation and aquaculture-based income generation for the local population. The project



PHOTO: SGP CHINA

demonstrated a fishing system using laid pipes, developed by the Guangxi Mangrove Research Center. At the location of the destroyed mangroves, this system is buried under the tidal flats and the mangrove seedlings are planted on the top of system. The pipeline system connects with the sea and when the tide rises, it brings large quantities of small organisms from the sea bed, which acts as natural bait to attract fish through the pipes and into the newly planted mangroves. The mangrove ecosystem purifies the water, further increasing the quality of the fish and their habitat and forming a virtuous circle of mangrove conservation and fish culture. During project implementation, technical trainings on eco-aquaculture were organized for the local community and an eco-aquaculture development system was installed at Datao village. A total of 12 environmental education classes were organized to raise awareness about the bird species of the mangrove ecosystem and the production value of mangroves.

Guangxi Mangrove Research Center provided the technological support for building the eco-aquaculture system and training on eco-aquaculture and mangrove restoration. The FCGMPA was responsible for project implementation within the community. Two other local NGOs, the Beihai Civil Volunteers Association and Qinzhou Wetland Conservation Association, lead efforts on public awareness-raising through school education, mangrove-planting activities and a media campaign.

## ENVIRONMENTAL RESULTS

This project resulted in the reforestation of mangroves in three coastal cities: Beihai, Qinzhou and Fang Chenggang. At the end of the project, sustainable mangrove management was practiced on a much larger scale than initially forecast: Instead of the projected 9,000 new mangrove trees, more than 20,000 mangrove seedlings were planted and a total of 300 acres of mangroves were restored across the three sites. This led to the rehabilitation of the natural habitats of many marine species and birds. In addition, trainings were organized on sustainable mangrove management and eco-aquaculture, during which 90 villagers, including 50 women, learned about the importance of mangrove ecosystems to the quality of aquaculture, and how to best manage both the mangrove system and the eco-aquaculture system. Trainings on mangrove conservation and marine protection, and other environmental-education sessions, were also organized for around 800 students in the coastal areas in Beibu Gulf. As a consequence, local people's awareness of mangrove conservation and sustainable aquaculture was enhanced significantly.

## SOCIO-ECONOMIC RESULTS

Mangroves protect against tidal waves and storm surges. They are vital nursery grounds for fish, provide communities with timber, honey, and other products, and raise land levels by trapping sediment (FAO, 2012). Restoring mangroves thus means regaining extremely productive ecosystems that





PHOTO: SGP CHINA

provide breeding and nursery grounds and ideal habitats for a variety of plant and animal species (Blum and Dorothée, 2017). Poor and vulnerable populations especially can benefit from locally restored mangrove ecosystems and the readily available resources they represent: Sustainable aquaculture and the harvest of aquatic species such as shrimp can create valuable business for local communities and small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers (Blum and Dorothée, 2017).

In Datao village, the eco-aquaculture system demonstration site covered about 2 ha, and its operation resulted in a 40-percent increase in production value. Because the quality of the fish in eco-aquaculture increased, the fish could also be sold at a higher price, resulting in nearly US\$3,000 extra per year per family compared with the traditional aquaculture, in the same aquaculture area and with the same aquatic breeds. According to the report submitted by the Guangxi Mangrove Research Center, the system can be farmed twice a year, with an average annual income of US\$3,675 per family. With more than 4.3 million rural workers directly employed in aquaculture in China (FAO, 2014), the economic impact of moving to sustainable aquaculture could be significant.

Capacity building has been an important component of this project. As a result of the technical trainings the local community has mastered the eco-aquaculture system, which will continue to secure community livelihoods. The project also designed a special training for local women, which enabled them to further increase their income and improve their socio-economic status.

## EXPERIENCES AND LESSONS LEARNED

The eco-aquaculture system has proven to be very efficient for cultivating high-quality fish. The investment cost, however, is high, and involvement of the private sector could help to expand the size of the system and

its results. A certain level of institutionalization, personnel and a viable funding source are crucial elements to ensure the sustainability of the project over the long term. While this project lends itself to opportunities for peer-to-peer exchange, community members usually cannot afford travel, hence an additional funding source may need to be developed to support exchanges. The synergy between the partners, an NGO (the grantee partner), an academic institution and the community helped to bring science-based solutions for mangrove restoration and livelihood improvement to the community.

Coastal aquaculture in this area is also susceptible to natural disasters such as typhoon and heavy rain. There is a lack of early-warning systems for typhoons, which resulted in extensive damage from typhoon Qi De suffered by Fangchenggang in 2012. The extreme weather event damaged mangroves and part of the eco-aquaculture pipe system, impeding project implementation. Project design in this area should therefore always include a risk-management strategy and an awareness-raising component for community members about how best to respond to and protect themselves from the impact of natural disasters. Better broadcasting of weather forecasts regarding typhoons and the deployment of early-warning systems could enhance the resilience of the local population.

In 2013, SGP China organized an NGO exchange and sharing workshop in Fangchenggang, and brought all participants to visit this project site and learn about this model. Project activities have not yet been replicated by other institutions or regions, but there is potential in places with similar geographic and ecological characteristics. A potential barrier for replication may be the cost of investment; if there is no fund to support this initiative, it may be difficult for a community to implement it.

CASE STUDY

# 4 CHINA

## RESTORATION AND SUSTAINABLE USE OF SEAGRASS BEDS FOR SEA CUCUMBER AQUACULTURE



**GRANTEE PARTNER**  
Pacific Society of China



**LOCATION**  
Dongchudao island, Shidao, Rongcheng City, Shandong province



**SGP CONTRIBUTION**  
US\$50,000



**CO-FINANCING**  
US\$39,492



**START DATE**  
October 2013



**END DATE**  
September 2015



PHOTO: SGP CHINA

### PROJECT CONTEXT

The Yellow Sea, including the Bohai Sea and Korea Bay, forms a flat, shallow, and partly enclosed marine embayment. The Yellow Sea is famous for its fishing grounds. The rich fishery resources by have been exploited by Chinese, Korean, and Japanese trawlers for years. The main species caught include sea bream, croakers, lizard fish, prawns, cutlassfish, horse mackerel, squid, and flounders. All species, however, are overfished, and the catch of particularly valuable species has declined. Water pollution, eutrophication, harmful algal blooms, over-fishing, unsustainable aquaculture, and habitat loss and degradation, are the main problems the Yellow Sea is facing.

The project site of Chudao is a traditional fishing village on the coast of the Yellow Sea, located in Shidao, Rongcheng City, and surrounded on three sides by the sea. There are 180 households with 460 people in this village. The traditional houses are constructed from packed clumps of seaweed and have been well maintained. Because of this, it is renowned as a famous Chinese historical and cultural village. Fishery and tourism are the main industries in this area.

Coastal habitats have over the years severely degraded. The seagrass *Zostera marina*, once widely distributed across northern China, now has been reduced to small populations, due to lack of awareness of the importance of seagrass bed and the pressure caused by human activities including coastal construction, dredging, destructive fishing and land-based pollution. The remaining fragmented seagrass beds cannot support sustainable marine biodiversity or local fisheries.

### PROJECT IMPLEMENTATION

The objective of this project is to restore seagrass beds and conserve marine biodiversity through providing sustainable alternative livelihoods including both sea cucumber aquaculture and ecotourism development for



PHOTO: SGP CHINA

local communities. Specifically, the project tested new technology to replant seagrass, restore seagrass beds and demonstrate ecological marine aquaculture to improve local livelihoods.

The grantee partner the Pacific Society of China was involved in GEF Yellow Sea Large Marine Ecosystem project, which is a multi-million dollar regional project involving China and South Korea. The Pacific Society of China conducted a baseline study in this area and found that the seagrass bed of *Zostera marina* provides shelter to many marine species including sea cucumbers. However, industrialization, heavy dredging, pollution and destructive fishing practices have reduced the bed. The Pacific Society of China, having received a grant from SGP, has worked with the local community to train them on *Zostera marina* cultivation and conservation of seagrass beds to provide habitat and shelter for breeding sea cucumbers to improve local livelihoods.

With the support of the Oceanic and Fishery Bureau of Rongcheng City, this project gained permission to use 3,000 km<sup>2</sup> of coastal area. Additionally, the First Institute of Oceanography of the State Oceanic Administration provided the technical support to obtain the seeds of *Zostera marina*, and plant the seeds on sea beds instead of transferring seagrass from other sites. The Pacific Society of China organized the local community and provided technical trainings and necessary support to fishers on seagrass bed restoration and breeding sea cucumbers in the seagrass bed. The local community (62 fishers) participated in the seagrass bed restoration and sea cucumber breeding in the bed.

The main activities of this project include: 1) Coordinate with the local management department to obtain permission to use the sea area; 2) Develop and apply a sexual reproduction technology to obtain the seeds of *Zostera marina* for restoring the seagrass beds;

3) Organize technical trainings to fishers and provide necessary support to restore seagrass beds; 4) Provide trainings to fishers on technology for sea cucumber culture in seagrass beds; and 5) Compile a technical manual of seagrass bed restoration and promote the project model.

### ENVIRONMENTAL RESULTS

The key innovation of this project was to develop and apply a new method of seagrass reproduction and restoration, using sexual reproduction technology, to obtain the seeds of *Zostera marina*. This method avoided the need to transplant seagrass from another place. The restored seagrass bed provides natural habitats to marine species including sea cucumbers. Sea cucumbers in their natural habitat eat plankton and organic food generated by the seagrass habitat. This way they grow in the same way as wild sea cucumbers, and there is no need for the food and drugs required by aquaculture pools, which often end up polluting the sea water. Breeding sea cucumber on seagrass beds only uses the natural nutrition in the seagrass bed, which will reduce the negative impact to sea environment caused by aquaculture.

The project implemented artificial seedling cultivation to restore 3,050 km<sup>2</sup> of seagrass bed, slightly larger than the originally planned area. The restored seagrass provides shelter to many marine species. The project compared the ecological environment inside and outside the seagrass beds. The seagrass bed in the demonstration area has been restored. The density of *Zostera marina* reached 110 plants per square meter, and the number of crabs reached 12 individuals per km<sup>2</sup> in seabed areas where no seagrass nor crabs were seen before the implementation of this project.

### SOCIO-ECONOMIC RESULTS

The project has raised public awareness on marine biodiversity conservation, seagrass use and protection. It has enhanced local capacity in marine conservation, and alternative livelihood development. All the participants are local fishermen and their families. The project has involved and empowered women with a woman project team leader.

Sea-cucumber cultivation has brought about 500,000 RMB (US\$70000) per year to the local community with about 500 local people. The project also assisted local

communities in designing and developing aquatic recreational activities and recreational fishing. About 50,000 RMB (US\$7,000) has been generated from tourism per year, boosting fishers' enthusiasm for seagrass-bed restoration and protection. Seagrass restoration also contributed to the local culture of seaweed houses, which helps the local community to develop tourism around local features of cultural interest.

### EXPERIENCE AND LESSONS LEARNED

The project developed the technology for germinating *Zostera marina* seedlings. The percentage of viable seedlings has grown to be several times higher than for naturally grown seeds in the sea. The old established method of sea grass restoration was to transplant donor seagrass plants from one place to another. The new method developed by this project is use seeds to plant sea grass, creating no disturbance to existing sea grass in other locations. This is particularly suitable for the current situation of northern China where the seagrass bed is distributed sporadically and there is a shortage of natural seagrass resources.

Due to the increase in supply and the fall in demand in the domestic market for sea cucumbers, economic returns from their cultivation are relatively low. In addition, the cultivation of sea cucumber in open-sea areas such as seagrass beds is still immature. To solve the problems, sustainable cultivation of sea cucumber was adopted in this case. By reducing the sea cucumber aquaculture density in the natural seagrass bed environment, the sea cucumbers not only adapt to natural food breeding mode, but also the model has reduced the possible adverse effects on the seagrass bed.



PHOTO: SGP CHINA

CASE STUDY

# 5 EL SALVADOR

## LAND AND SEASCAPE REHABILITATION FOR LIVELIHOOD IMPROVEMENT



**GRANTEE PARTNER**

Association of Community Development Caserío El Salamar (ADESCOCASAL)



**LOCATION**

El Salamar Community, San Luis La Herradura Municipality of La Paz Department



**SGP CONTRIBUTION**

US\$50,000



**CO-FINANCING**

US\$82,660



**START DATE**

April 2017



**END DATE**

April 2018

### PROJECT CONTEXT

El Salvador is located in Central America, bordering the North Pacific Ocean, between Guatemala and Honduras. It is known as the Land of the Volcanoes, covers an area of 21,040 km<sup>2</sup>, and has a coastline on the Pacific of 307 km. Less than one-fifth of El Salvador's territory is suitable for agriculture and the country is highly dependent on food imports. Additionally, one-third of the population lives below the poverty line. The conservation area of Estero de Jaltepeque is part of a larger, northern dry Pacific Coast eco-region where unique mangrove ecosystems serve as the basis for most life in the surrounding environment (World Wildlife Fund, 2018). The region is a mosaic of marine and terrestrial coastal eco- and agroecosystems recognized by the Ramsar Convention, and local communities benefit from the ecosystems' different natural processes to generate livelihoods, such as the production of shrimp, coconut, sugar cane, small-scale livestock, fruit trees, and the cultivation of basic grains and vegetables in some of the wet areas.

But there has been a significant loss of wildlife habitats from a range of causes. These include deforestation caused by fires, soil degradation caused by livestock overgrazing and by agricultural expansion with indiscriminate use of chemical fertilizers and pesticides, over-extraction of wood including for fuel, and the construction of illegal human settlements. The impact on habitats has resulted in turn in a sharp decrease of terrestrial biodiversity in the region. Exploitation of marine and coastal resources through unsustainable harvesting of shellfish including *Anadara tuberculosa* (large, edible clams known locally as curiles), has depleted much of the aquatic biodiversity. In addition, the exploitation of certain crops, such as sugarcane, have caused significant loss of freshwater, which is also located at the edge of the buffer zone of the mangrove forests.

This land and seascape rehabilitation project is located in the El Salamar community, one of the communities in Estero de Jaltepeque that relies heavily on marine and



PHOTO: SGP EL SALVADOR



PHOTO: SGP EL SALVADOR

forest resources for income. There is high unemployment and poverty and the area is regularly exposed to hydro-meteorological phenomena (droughts, floods, river overflows and tropical storms), making the living conditions of its inhabitants increasingly precarious. By 2007, the mangrove-based natural capital of El Salamar was depleted by wood extraction and aquatic resources had degraded to the extent that fishers had to travel up to 13 hours to fish. In this context, and in search of practical solutions that would allow the recovery of productive activities of the local community, the SGP, with further contributions from the Spanish Agency for International Cooperation (AECID, or Agencia Española de Cooperación Internacional para el Desarrollo) started a first project in 2007, with follow-up cycles in 2008, 2009, 2012, 2014 and 2016. For this project, the Chilean Development Fund as well as the Community Development and Knowledge Management for the Satoyama Initiative Programme (COMDEKS) have been important partners.

### PROJECT IMPLEMENTATION

The project is implemented by ADESCOCASAL, one of the local, community-based development organizations that works to enhance the economic productivity of the local ecosystems with the population, for example by developing artisanal fishing activities and small-scale agriculture practices. ADESCOCASAL belongs to the Local Development Committee of the Municipality of the Village of San Luis La Herradura, in which around 22 local

community development organizations known as ADESCOs (Asociación de Desarrollo Comunitaria) participate and that meet periodically to discuss developments at the local level. ADESCOCASAL promotes economic and environmental projects, as well as the development of good practices in the sustainable use of livelihoods in the following sectors: marine, terrestrial, socially appropriate technologies and crafts. The association also delivers support to neighboring communities and islands committed to the protection of the mangroves and the decontamination of its marine coast. For the Salamar community, the scope of this project implemented by ADESCOCASAL was to develop and maintain the best mangroves in El Salvador's coast, and by doing so increase the well-being and livelihoods of the local community.

The project specifically engaged in the following:

- Capacity building for reforestation activities: reforestation of 40 ha of mangroves, and of 3 km of the banks along the Jalponga river.
- Strengthening infrastructure and capacity for ecotourism development: Craftsmanship, e.g. hammock workshops.
- Developing sustainable and artisanal fishery practices: catching the local crab varieties of punche and blue crab. Artisanal fishing tools were made available providing families with different artisanal fishing techniques, which allows the sustainable use of different scales of artisanal fishing.



PHOTO: SGP EL SALVADOR

- Capacity building for establishing productive crops: establishment of Brazil, bamboo, fruit trees, cajeta pineapple, Salvadoran palm, agroforestry systems and other productive facilities (e.g. workshops or fairs).
- Capacity building: development of good practices for the management of solid waste, developing methods for the sustainable use of firewood, solid waste collection of plastics and aluminum, elimination of garbage and stubble burning.
- Monitoring and evaluation of all above project activities and systematization of all lessons learned.

For the purpose of this project, El Salamar community is organized in committees (fishery, cooking, and tourism) that work like micro-businesses in each of these fields. Knowledge is then shared peer-to-peer. For example, farmers and fishers share information about lessons learned and challenges encountered during the execution of the project, and this information is then recorded and systematized in a visual and documentary way. Afterwards the different committees hold regular meetings and also share their experiences with a broader audience in workshops with academia, international cooperation and government institutions linked to the theme.

## ENVIRONMENTAL RESULTS

As a result of the approach of SGP and the implementation of this project, the people of Salamar were able to recognize the comprehensive value of their natural capital and the importance of the mangrove valuation, leading to a better understanding of its vulnerability and production cycle. Local families have adopted a new vision that moves from an extraction approach to a more sustainable use of ecosystems, resulting in the protection and recovery of the ecosystem.

Each of the project activities contributed in its turn to the recovery of degraded mangrove areas and the rehabilitation of different species in the mangrove ecosystem. Around 40 ha of mangrove were successfully reclaimed, and nine species of fish, one species of shell, two species of shrimp and two species of crabs were rehabilitated and maintained. The decrease in the consumption of firewood helped in turn to conserve freshwater and saltwater forests and the preservation of tree plantations.

## SOCIO-ECONOMIC RESULTS

The project realized a few technological innovations, including the development of climate-smart agroecology and the creation of access to low-carbon energy sources (instead of wood). The “Magic Kitchen” and “Rocket Fog” technologies allow for the reduction of wood consumption,

since the food is prepared at a specific temperature and then transferred to a thermos which maintains the temperature for the completion of the cooking of the food. The community achieved a decrease in wood utilization, with consequential cost reductions.

The learning process allowed the community to strengthen their human capital and capabilities: there has been an increase in income from the activities of artisanal fishing, managing small-scale rural touristic schemes, and working with palm trees in the construction sector. Due to these technological innovations, less time was spent on the preparation of their food, which enhanced the quality of life of the local families. Also, the health of the community has been improved, given that there are different sources of livelihoods per family and more diversified food supplies. In addition, some of the extra income generated from the activities of the projects has been re-invested in local infrastructure and education.

Livelihoods were strengthened through community management plans for the sustainable use of the mangrove ecosystem's terrestrial and aquatic species that generate income. The knowledge acquired by each of the families in learning by doing strengthened their abilities and their self-esteem, which engaged and consolidated the social fabric of the community. The positive results from the first 18 months of this project motivated the community to establish a capacity-building centre, where other communities are invited to learn about their experience. This project was awarded the National Environment Award in 2017 by the Government of El Salvador.

## EXPERIENCES AND LESSONS LEARNED

This project was able to build upon the outputs of previous project cycles, which resulted in the community being fairly well organized from the start, with a strong level of trust between SGP, the implementing grantee partner, and the community. Identifying the priorities of the communities and developing good practices prior to project financing ensures greater sustainability of the project in the long term. Examples of good practices include the collection of plastics, avoiding the burning of stubble on housing and farming plots, the reforestation of the river banks and the recovery of the mangrove forest when there was one. Women provide valuable leadership

skills, and contribute significantly to all project activities. Electoral periods are sometimes barriers to progress; municipal authorities change every three years and the central government every five years, which can impede continuity and cause delays for project implementation.

SGP is of vital importance in the exchange of knowledge to solve the common problem. Trust, good practices, levels of organization, previous experience and knowledge of each of the facilitators were the key elements of the success achieved with this initiative.



# CASE STUDY

# 6 INDIA

## FISHERWOMEN HARNESSING SOLAR ENERGY FOR FISH DRYING



### GRANTEE PARTNER

Praja Pragathi Seva Sangham & Centre for Environment Education  
(National Host Institution)



### LOCATION

Giripuram and Palakaitippa Villages, Andhra Pradesh, India



### SGP CONTRIBUTION

US\$12,032



### CO-FINANCING

US\$13,594



### START DATE

December 2017



### END DATE

January 2018

### PROJECT CONTEXT

The fisheries sector is a source of livelihood for 14.49 million people in India. It is one of the main occupations of the coastal population, and occupies a significant role in the socio-economic development of the country. The state of Andhra Pradesh on the south-eastern coast is the gateway to East and South-East Asia. It has fertile river basins, extensive canal systems, and conducive climatic conditions for fishery promotion. Andhra Pradesh has 974 km of coastline, is one of the largest producers of marine products, and ranks fifth in contribution to the marine fish landings of the country. The state's coastline has a long sea-faring tradition and is dotted with numerous major and minor ports.

In Andhra Pradesh, the fishers have a low-caste status, i.e. they are classified as a "backward class" and belong to the socially and economically weaker section of the population. Within the communities, women play a key role as household financial managers and as income earners through post-harvest fishery activities such as preservation, sales, and net mending. This enables them to gain and maintain power at the community and family levels. Unfortunately, despite their multiple roles in the fishing economy, their contributions and involvement remain invisible in the bigger picture. In addition, fishing villages in India remain geographically isolated to a large extent. They lack adequate infrastructure facilities, proper road communication and sufficient fresh water supplies. The standard of housing is also usually very low, a fact which is routinely aggravated by frequent fires and cyclones. Due to the seasonal and geographical nature of their livelihoods, more than 80 percent of fishing villages face great economic uncertainties, are disaster prone, and face severe difficulties during the monsoon.

SGP grants have supported Praja Pragathi Seva Sangham (PPSS) in two projects in the villages of Giripuram and Palakaitippa. Gender aspect was considered in choosing the project sites, because these villages have a relatively high number of women involved in post-harvest fishery activities.



PHOTO: SGP INDIA

Women's Self-Help Groups (SHGs) were formed through the initial project, which strengthened local community engaged in Participatory Rural Appraisal exercises. These exercises brought unemployment and market stagnation issues to the forefront, and alternative value-addition practices were discussed as possible solutions.

## PROJECT IMPLEMENTATION

One example of an alternative value-addition practice is fish-drying, where the fish is dried under the sun as a preservation method, to be sold later. In peak seasons, this lets fishers earn a monthly average salary of US\$80-100. Fish is an extremely perishable commodity and quality loss can occur very rapidly after catch. Therefore, fishers use a variety of preservation methods such as refrigeration, drying, and smoking. Among these, sun drying of fish is a simple and popular way as it is low in costs, effective, can be done by the fishers easily, and the dried fish can be transported easily to the market. Drying methods are also considered the least expensive method of fish preservation, and dried fish has a long shelf life. The traditional way of sun-drying fish is to lay them under the sun on the open shore, roadsides, mats, or even on the ground. This results in extremely unhygienic, time-consuming, and often contaminated end produce due to dust, sand, pollution, flies, rodents, ants, stray

animals, etc. This reduces the quantity and quality of the catch and makes them unsuitable for human consumption.

The fact that often there are no viable alternative livelihoods for the fisher communities compels them to catch juvenile fish as well, leading to over-exploitation of the ecosystem services, not just regarding fish, but also by affecting their breeding environment such as mangroves. Introducing faster and more efficient fish-drying techniques will enable them to dry and conserve fish for the monsoon (when fishing is prohibited and earnings are low), and market them throughout the year.

The central goal of this project was to create better livelihood opportunities for women's Self-Help Groups through introducing solar dryers and facilitating market linkages. The key objectives were:

- to replant and restore mangrove forests;
- to demonstrate low-cost, eco-friendly and energy-efficient technology for drying fish;
- to train women in producing good quality hygienic dry fish;
- to get better price for the dry fish produced through tunnel solar drier; and
- to create a market network for the sustainability of the enterprise.





PHOTO: SGP INDIA

The PPSS facilitated community engagement in mangrove restoration and management and livelihood enhancement of the fisher folk. Through the project, more than 50 ha of degraded areas identified for mangrove restoration and 1,100 households demonstrated sustainable land management through mangrove plantation. The degraded mangroves have been planted with six mangrove species.

A plan was developed to set up solar-tunnel drying units in two locations as an energy-efficient technology to dry fish. The potential sites in the village for such units were identified jointly with the community. The experts visited the area and had a first round of discussions related to the site suitability, willingness of the community for fish drying, availability of fish and their traditional practices of processing. The community agreed to provide the land for fish drying, and to develop the area for constructing the solar dryer. PPSS has adopted a solar tunnel model introduced by the Centre for Advanced Studies, Marine Biology, Annamalai University, Tamil Nadu.

Around 50 fisher women and 30 men were trained on hygienic dry-fish production and also on the problems of conventional drying. Related aspects like value addition of the dry based product were also discussed during training. A separate training for government officials and the nearby villagers was also organized to increase awareness. Panchayat Raj Institutions, Traditional Panchayat, and CBOs (community-based organizations) were involved in the management of the solar dryer units. Need based technical support and facilitation for financial support from the financial institution (linkages) for the group will be extended through SHGs and banks.

## ENVIRONMENTAL RESULTS

The environmental benefits were many. Solar energy was utilized to dry fish leading to no GHG emissions. Firewood usage has been reduced as the community has stopped the smoke-drying technique. Given the rise in family incomes, fishers have stopped fishing during the breeding season, or catching any juvenile fish.

A healthy mangrove ecosystem is conducive to a flourishing fish population, thereby helping fishing communities earn a sustainable income. Restoration of degraded mangroves helps to minimize vulnerability and a risk from natural disasters such as cyclones. Restoration of degraded mangroves restores biodiversity by increasing bird and crab populations. It also increases fish resources, as well as improving access for catching them, due to the restored canals.

The land given by the local panchayat is one of the indicators of policy change at community level. In addition, banks have now started approaching the SHG members offering loans to start income generation activities. Finally, the village community strongly advocated for selling the solar tunnel-dried fish, rather than fish dried in the open unhygienic places. Ongoing discussions on ways to replicate this model in adjacent villages is being undertaken by the Department of Fisheries.

In recognition of the PPSS' interventions among fishing communities and SHGs, the Department of Science and Technology of the Government of India has given them a project to set up Fish Amino Acid Production unit in Giripuram Village. The Fish Amino Acid Unit is being managed by the women SHG members of Giripuram village, which is one of the operational areas of SGP.

## SOCIO-ECONOMIC RESULTS

In terms of economic impact, more than 450 women have reported an increase in their income, as the fish dried in the solar tunnel sell for more than fish dried through traditional methods. It also freed up a significant portion of their time and effort compared to the traditional fish drying method. Fish drying income allows them to support their children's school fees and add to their bank savings. They now earn around US\$100-150 per month during the six-to-eight months of the peak season each year. The average sale prices of solar dried fish are 50 percent higher than fish dried on the ground.

## EXPERIENCES AND LESSONS LEARNED

The tunnel solar drier is designed to be suitable for all seasons. It is faster, saves time and labor, and produces high-quality produce, leading to better market prices. Where open drying may take at least three days, the solar-tunnel technique can dry a ton of fish in eight hours, or within a working day. The dryers were also set up with a plan for long-term sustainability: The SHG members collect a user charge of 1 rupee per kg of fish for sustaining the tunnel drier. The rate was decided by SHGs in consultation with the local Panchayat. In addition, Panchayat Raj Institutions, Traditional Panchayat and CBOs are involved in the management of the solar dryer and ensure the sustainability of the common land given to the solar dryer.

Key elements of the project's success were community involvement and support from local governing bodies and partners:

- The SGP team facilitated the networking and monitoring
- The local Panchayat provided the land to set up the units
- The Department of Fisheries provided training to the members of the women's SHG.
- Jeyasorna Agro Tech provided the installation and maintenance support with a one-year warranty for the tunnels and other installed equipment
- Fishers and members of the women's SHGs are benefiting from the units
- The members of two SHGs manage the regular functioning of the units
- The buyers including the tourists are attracted to buy the clean and hygienic dry fish.

In addition, capacity building and awareness raising contributed extensively. The most significant factor, however, was the women's willingness to learn and fearlessness in trying and advocating new techniques and technologies to better their situation.



# CASE STUDY

# 7 KENYA

## MARINE CONSERVATION FOR ECO-TOURISM DEVELOPMENT



**GRANTEE PARTNER**  
Wasini Beach Management Unit



**LOCATION**  
Southern Kenyan coast, Tanzania border



**SGP CONTRIBUTION**  
US\$36,833



**CO-FINANCING**  
US\$25,203



**START DATE**  
March 2013



**END DATE**  
October 2015



PHOTO: SGP KENYA

### PROJECT CONTEXT

The project was implemented within and surrounding the Wasini Island, located along the southern coast of Kenya, near the Tanzanian border. The island is 8 km long by 3 km wide and has approximately 1,550 inhabitants in three villages, namely Wasini (1,000), Mkwiro (500) and Nyuma maji (50). The island is well endowed with extensive mangrove forests, which cover 5 km<sup>2</sup> on the Wasini village side of the island and provide protection for the nearby coral reefs. The waters around the island are a renowned ecological hotspot with a high diversity of corals, fish species and seagrass species. These include 64 coral genera (including black corals), nine species of mangroves, 12 species of seagrass and nearly 250 fish species and five turtle species, which use the marine waters as feeding grounds.

Nearly 90 percent of the local community members depend on fishing and tourism for their livelihoods as the island is a rocky coral crag with no available areas for other activities such as farming. However, a rapidly growing human population on the island and the nearby inshore areas has had substantial negative impacts on the coastal and marine resources within the area, and an increased demand for marine products such as fish has led to resource degradation and over-exploitation.

The Wasini Beach Management Unit was established to effectively address some of the challenges faced by the Wasini community i.e. address the continued deterioration of the local marine resources, and provide for collaborative engagement of the local community in management of marine and fisheries resource.<sup>2</sup> This was undertaken by government of Kenya through the Fisheries Department with support from civil society, through the Fisheries (BMU) regulations of 2007.

<sup>2</sup> A Beach Management Unit (BMU) is a formal institution that brings together fishers and other key stakeholders within an identified area/landing site. The establishment of Beach Management Units is anchored within the Fisheries Act, and is a strategic approach of the Kenyan government to involve communities in the co-management of fishery resources to reduce degradation and over-exploitation of natural resources.



PHOTO: SGP KENYA

## PROJECT IMPLEMENTATION

A pilot assessment of the Wasini BMU by the Fisheries Department demonstrated that the BMU did not yet have an operational co-management plan, faced considerable challenges in terms of resource governance and stewardship (i.e. enforcement of rules on resource use), and monitoring of the resource base. In addition, most of the BMU executive committees were not active and most BMU assembly members were not aware of the roles and responsibilities of the BMU, making it difficult for the BMU to effectively deliver on its stated objectives. This project was therefore designed to support the BMU through focused capacity building of the BMU and rehabilitation of degraded areas.

The specific project objectives were to build the capacity of the Wasini BMU through focused trainings on resource governance, conflict management, monitoring and surveillance; to support the development and approval of the Wasini BMU co-management plan for the 350 ha co-management area; to support awareness and dissemination programs within the Wasini BMU Assembly, local communities and other stakeholders and to rehabilitate degraded corals within the BMU co-management area. The vision was that a healthy coastal and marine environment providing sustainable benefits for present and future generations continues to be the driving force behind the on-going efforts of the BMU.

The project was able to benefit from the support of a number of local partner organizations, including the African Nature Organization, which facilitated i.e. BMU trainings on co-management; the Fisheries Department of the Kenyan Government that i.e. approved BMU by-laws and its co-management plan; the Kenya Wildlife Services, which organized trainings of the community scouts and provided guidance in the development of ecotourism activities; and the Kenya Marine and Fisheries Research Institute, which provided the required technical support for coral transplantation and monitoring.

Funding support from SGP was used to train community monitors who regularly monitor the resources within the co-management area. In addition, community resource monitoring programs are supplemented by continuous monitoring programs conducted by government institutions such as the Kenya Marine and Fisheries Research Institute and NGOs such as the Wildlife Conservation Society and CORDIO.

## ENVIRONMENTAL RESULTS

One of the key outcomes from the project was the development of a marine protected area within the BMU co-management area. The closed areas provide protection of critical habitats such as coral reefs, seagrass beds and fish breeding areas. One of the observable impacts closely associated with the closed area is the recovery of



PHOTO: SGP KENYA

degraded habitats such as coral reefs and fish populations. Local fishers fishing in the areas close to but outside the protected areas are able to benefit from fish spill over and an increase in fish catches. The establishment of a 200 ha marine closed area, has led to protection of an estimated 64 coral genera and more than 250 species of fish.

Through targeted awareness raising, participatory development of fishing regulations and strengthened enforcement of fishing regulations within the BMU co-management area, illegal fishing gears such as the beach seine have been completely eliminated from the BMU co-management areas, leading to a drastic reduction in resource use conflicts and overfishing.

The project also piloted a coral transplantation initiative, the first and the only one in the region. The coral transplantation is considered to be one of the most successful initiatives of the project with a high success rate observed for the replanted corals. The coral garden has become a major attraction for tourists visiting the marine protected area with observable increase in fish populations within the replanted areas. The Wasini BMU, with technical guidance from Kenya Marine and Fisheries Research Institute, has now trained other BMUs on coral transplantation, along the southern Kenyan coast and also in neighboring Zanzibar.

## SOCIO-ECONOMIC RESULTS

Successful coral transplantations have stirred a rise of ecotourism and increasing job opportunities for local coxswains, cleaners, security guards and restaurants. Increase in fish catch resulted in an additional income for fishers and fish mongers. Revenue generated through the project has also been used to fund other community activities such as environmental field trips for school students. Women were members of the executive committee and contributed to management and governance decisions. Ten youths, both male and female, actively participated in the monitoring, control and surveillance training to become scouts.

## EXPERIENCES AND LESSONS LEARNED

The partnerships established at the beginning of the project between the local community organization (Wasini BMU), relevant government partners and a local NGO was important to successfully advance the objective of coral rehabilitation. It was important to get the community leaders and elders on board; and working with them to mobilize community members to attend village meetings about the project. The success of this project was largely attributed to a participatory work planning approach, financial budgeting and management within the responsibility of the BMU, support of key partners, as well as the fact that the project interventions resonated well with community livelihood needs.

Mentoring rather than mere capacity development was a key component of the project. Peer-to-peer knowledge was important, also among communities and responsible for the replication of this project's model in more than 8 communities spread along the Kenyan coast that include seven communities in Pate island and Kiwayu within the Lamu archipelago as well as communities from Pemba island. Inadequate financial resources can hamper effective knowledge exchange, which can be overcome by prioritizing this exercise and allocating sufficient funds to it.

Funding support from the SGP was instrumental in assisting the community to develop a co-management plan for the BMU in which key interventions were identified. The SGP contribution also helped to mobilize support from key partners such as Kenya Marine and Fisheries Research Institute, and to conduct a community wide awareness and dissemination program on resource governance as well as targeted trainings on resource management for the BMU Executive Committee members.

The Wasini Island Marine Conservation Project won three awards over the last two years. In June 2017, the project was awarded the Pwani Mazingira Award Scheme by the National Environment Management Authority for its efforts in environmental conservation and promotion of good practices. In June 2018, the organization awarded the project with the World Environment Day award for its continued effort in this field, and in September 2018, the International Coastal Cleanup and Ocean Conservancy granted the project the Ocean Conservancy award.

CASE STUDY

# 8 KENYA

## MAINSTREAMING BIODIVERSITY CONSERVATION INTO MARINE ECOSYSTEMS AND FISHERIES MANAGEMENT



**GRANTEE PARTNER**

CORDIO East Africa



**LOCATION**

Msambweni and Diani-Chale Marine Reserve



**SGP CONTRIBUTION**

US\$139,524



**CO-FINANCING**

US\$101,548



**START DATE**

September, 2013



**END DATE**

April, 2015

### PROJECT CONTEXT

Poor fisheries management, high dependence on marine resources in coastal communities and climate change constitute the most significant threats to marine biodiversity in Eastern Africa, and Kenya in particular. To address these critical issues, this project was designed to support marine conservation opportunities through the proliferation of community-based conservation areas (CCAs) in Kenya. Its primary objective was to enhance environmental sustainability by mainstreaming biodiversity conservation into the management of marine and coastal ecosystems. This objective was achieved through scientific research combined with community-based initiatives that helped improve livelihoods.

The South coast of Kenya prides itself on sites and habitats critical to the life of the Whitespotted Rabbitfish (*Siganus canaliculatus*) and the Shoemaker Spinefoot Rabbitfish (*Siganus sutor*), two reef fish species endemic to the Western Indian Ocean and a significant component of artisanal catches. The two species have been confirmed to reproduce in large numbers at specific times of the year at known locations on the south coast. However, the spawning sites for these species was increasingly being targeted by fishing and tourism activities, which threatened their existence.

This project intended to protect the spawning aggregation sites and their catchment area. The project assisted Msambweni communities in making informed decisions regarding the management of their marine resources and the benefits of CCAs, and to play an active role as guardians of their valuable natural resources. Another key element was to address the persistent problem of the continued use of the destructive fishing practices, particularly beach seine, by presenting alternative and eco-friendly gear.

### PROJECT IMPLEMENTATION

This initiative was a result of research by CORDIO East Africa and others in Kenya that revealed a number of critical marine conservation issues around overfishing,



PHOTO: SGP KENYA

the continued use of illegal and destructive fishing gear and poor artisanal fishery management. In November 2011, CORDIO submitted a policy brief to the State Department of Fisheries & Blue Economy and other relevant stakeholders recommending actions to improve coastal fisheries and their habitats, so that they could continue to provide ecosystem services, also in terms of food and livelihoods for the population. For this project, CORDIO worked with multiple partners and stakeholders to incorporate and implement some of these recommended actions, including the State Department of Fisheries & Blue Economy, the Kenya Wildlife Services, the East African Wildlife Society, the Kuruwitu Conservation and the Welfare Association and Watamu Marine Association, the Beach Management Units (Msambeni BMUs) and a few selected BMUs in the north coast.

The project facilitated the establishment of a CCA on Kenya's south coast through (i) public consultation of fishing communities and other stakeholders on the implications of research results regarding the spawning aggregations and the impacts of artisanal fishing gear, (ii) consultative meetings which led to the development

of a co-management plan in Msambweni, (iii) the inclusion of fishers for the monitoring of aquatic resources as baseline and for future evaluation of the impacts of the CCA.

Technical advice on biodiversity conservation and fisheries management was exchanged among the different CCAs in Kenya; the project developed monitoring tools to survey marine biodiversity and fish catches and conducted research to identify the most eco-friendly gillnets. Learning material were produced in Kiswahili for fishers and other coastal community members. Further, a standardized community monitoring tool was developed to enable coral reef and fisheries ecological surveys. The monitoring manual has been successfully launched and is currently in use in selected CCAs. Plans are under way to train more communities for its use in additional sites along the coast of Kenya.

The project identified the most sustainable gillnet type, to substitute beach seines and other destructive gear. Policy recommendations were made for management of the coastal gillnet fishery among commercial and artisanal fishers and recommendations were provided on mesh



sizes that strike a balance between minimal negative gear impacts on the marine ecosystem and a sustainable fishers' profitability using CPUE level. The project explored the feasibility of a Payment for Ecosystem Services (PES) scheme as a mechanism for implementing a CCA, and how "Reef Conservation Agreements" could be integrated as a means to addressing the financing of CCAs in Kenya. In a fisheries management and biodiversity conservation context, this approach would need to a) require adherence to no-take zones and gear restrictions b) conditionally reward these activities with cash payments and c) partnership with stakeholders from the tourism industry.

### ENVIRONMENTAL RESULTS

Two new community conservation areas were established in South Coast Kenya, enhancing the protection of reef fish. Protection of these sites through a CCA is further expected to increase fish production, reduce targeted overfishing, protect spawning stocks, and contribute to building the resilience of coral reefs to climate change.

The project contributed to the development of national and legislative guidelines for marine conservation areas that were endorsed by the government. The model for this project was also replicated in the Lamu Archipelago in Pate Conservancy by The Nature Conservancy.

### SOCIO-ECONOMIC RESULTS

The development of ecotourism such as snorkeling and diving has created alternative income sources for the local population. In addition, communities participating in the project gained skills to better protect their natural resources and improve their livelihoods. The project has also seen community group leadership improve in terms of their organization, response to action, pro-activeness and informed decision making. Women in the BMU leadership were involved in project activities including education and awareness, and planning of activities, which increased their understanding of marine natural resources and planning of CCA related events.

### EXPERIENCE AND LESSONS LEARNED

An innovative component in this project that enhanced effective project implementation and increased ownership was the involvement of local leaders and champions that have the motivation, drive, and understanding of the complex issues facing the fishing



community. Further, working with national institutions has given a basis for continuity of various initiatives, while working together with the county government has created an opportunity for fishing communities to directly benefit (as they are considered during budgeting).

Community groups and other stakeholders need to be regularly sensitized in the project lifetime. This will ensure that only informed decisions are being implemented and avenues for mismanagement handled. Often projects are too complex, and there is a need to break down the information for community members.

Different community needs should be clearly identified at the onset of the project. To mobilize different stakeholders into participating in the project, it is important that most community groups and persons are benefiting from project implementation of activities. Stakeholders' roles and responsibilities need to be clear to avoid overlapping functions. The formation of a project implementation committee (PIC) was an innovation that was used to detect challenges and opportunities and provide guidance. Mechanisms for ensuring better engagement by the PIC would probably involve some remuneration – as a voluntary group their time was limited. The project team further needs to be trained on conflict resolution and how to adapt to certain field conditions. Finally, lessons provided by the PES study indicated that projects need to have some aspects of financial sustainability in order to guarantee its longevity or expansion.

The review of this CCA development and management process was very informative and alerted the project partners to other significant aspects of CCA establishment such as the importance of education and an awareness-raising strategy, monitoring, control and surveillance, and the interface of local knowledge versus academic science.

CASE STUDY

# 9 MAURITIUS

## ESTABLISHMENT AND SUSTAINABLE MANAGEMENT OF VOLUNTARY MARINE CONSERVATION AREAS



**GRANTEE PARTNER**

Reef Conservation



**LOCATION**

Roches Noires and Anse La Raie



**SGP CONTRIBUTION**

US\$50,000



**CO-FINANCING**

US\$106,667



**START DATE**

June 2012



**END DATE**

August 2014

### PROJECT CONTEXT

In Mauritius, 150 kilometers of fringing coastal reefs enclose around 243 km<sup>2</sup> of lagoon areas. Coastal lagoons are deeply significant in economic, social, and cultural dimensions for the nation. Tourism accounts for 11 percent of the country's total GDP, and is mainly focused in the coastal regions with a number of activities linked to the lagoons and sea (Meethoo, 2018). More importantly, local communities also use the lagoons for subsistence and recreational fishing, and beaches are an important recreational space for most Mauritian families.

Reefs are on the decline due to increasing human pressures including, but not limited to, overfishing, destructive fishing techniques, over-exploitation of natural resources, poor management of the environment by tourist operators, coastal development, tourism pressure, anchor damage, and pollution. There is a lack of knowledge by the coastal population on the importance of preserving and conserving lagoons. In addition, coral bleaching has increased over the past two decades from 10 percent in 1998 to 24 percent in 2004 and more than 50 percent in 2009 (Pillay et al 2011; David Obura et al, 2017). This bleaching was caused by high sea water temperatures. The ongoing risk of further climate change-related threats, combined with human impacts, greatly slow the recovery of the reef system.

### PROJECT IMPLEMENTATION

The Voluntary Marine Conservation Area (VMCA) Project was started in response to the declining lagoon patch reefs around Mauritius. VMCA's are selected sites in the lagoon where communities agree to abstain from extractive or destructive activities. The primary objective is to help the marine life within these VMCA's and the surrounding lagoons recover and flourish. The project is based on a belief that communities could help effectively manage marine areas that they depend on. The NGO Reef Conservation facilitates between stakeholders, and is responsible for all project actions, monitoring and scientific research.



PHOTO: SGP MAURITIUS

The project was initially implemented in Roches Noires to support a newly formed VMCA community committee. It also aimed to transfer the process to another coastal village, Anse La Raie. The key objectives of the project were as follows:

- To demonstrate biodiversity conservation, ecosystem protection, and ecosystem regeneration potential through the development of a comprehensive and replicable marine ecosystem and resource use monitoring program. This would then be used as a tool for the continued implementation and sustainable management of VMCA's.
- To ensure sustainability by strengthening the role and authority of the Roches Noires VMCA Committee through capacity building and development of a communication strategy for outreach to the local community and surrounding villages.
- To replicate the pilot project by establishing a VMCA in the lagoon of Anse La Raie to demonstrate that the VMCA Program is viable.
- To investigate the feasibility of creating new ecotourism initiatives for future development, in support of the VMCA and trained Marine Eco-guides.

The local partners of this project were the coastal community in each area, the Roches Noires VMCA

Committee, the Anse La Raie VMCA Committee, tourism and boat operators, and fishers. The SGP country program team in Mauritius provided support through counselling, facilitating media coverage during project actions and open days, as well as direct input and comments on the development of resource materials produced during the project. The SGP country program team also ensured that the project was highlighted nationally within relevant ministries and government bodies, and advocated for VMCA's with officials. The VMCA project was also showcased, through SGP, with officials from the UNDP Mauritius and Seychelles Office, internationally with other UNDP delegates, and with eminent personalities including former UNDP Administrator Helen Clark.

## ENVIRONMENTAL RESULTS

The project has protected 50 ha of coral reef habitat in the lagoon of Anse La Raie and represents 9 percent of the lagoon with patches of live corals, thus protecting healthy coral patch reefs and their biodiversity. It has also protected 8 ha of seagrass and coral patches in the lagoon of Roches Noires, located on the border of a fishing reserve. The area of the sites will be increased by 18 ha for Anse La Raie VMCA and 8.3 ha for Roches Noires VMCA under the new project titled Critical Coastal Ecosystem Conservation Through a Community Integrated Approach, funded by SGP and due to be completed in December 2018.



The Anse La Raie VMCA is a popular snorkeling site, where the introduction of fixed mooring buoys (FMBs), a snorkel trail and ongoing training to skippers from hotels and private boat operators helped to directly protect the coral from anchor damage. These tools are maintained by the team with the support of the boat operators. Community and stakeholder participants have also benefited from sensitization and training sessions on coastal and marine habitats, marine eco-guide training, and communication and presentation skills training. In addition, an ecosystem monitoring program has been established for each VMCA. This monitors hard coral cover, sea grass cover, other benthos and organisms, water quality, fish biodiversity, natural impacts such as coral bleaching and crown-of-thorns starfish, and snorkeler damage. The impacts are monitored using standardized monitoring methods, and are scheduled monthly and bi-annually according to the parameters being measured.

## SOCIO-ECONOMIC RESULTS

The project directly benefits the stakeholders who are earning a living within the VMCA conservation sites. A sign identifying the VMCA site and giving information about the conservation initiative in Anse La Raie has been placed on the beach close to the embarkation point for local operators. The local operators have noted that this attracts visitors to the site and has helped them secure more business. Skippers and operators have also been trained on the specific coastal and marine habitats and the fish and other organisms that a visitor might encounter at the VMCA site. These operators have also been provided with waterproof slates that are used on their boats to give further information about the VMCA sites to their clients. The investment in infrastructure on the site, including FMBs, snorkel trail, and maintenance of these tools, is an added bonus not only to ecosystem protection but also to the skippers. They take pride in not damaging the corals, and share this positive measure with their clients as the site and the snorkelling activity is eco-friendly.

The project was led and implemented by a team of female marine biologists and project manager. Throughout the project, women participated actively in training, sensitization, ecosystem monitoring, open days, outreach activities and in the VMCA community committee.

## EXPERIENCES AND LESSONS LEARNED

This project used a multi-stakeholder approach where direct users and community members were encouraged and supported to actively participate in project actions and manage their resources. Finding innovative ways to engage communities and build a rapport was very important. Community mapping was one such way, and brought stakeholders around a table to indicate where resources, activities, problems were located. Direct users (fishers' associations, community members, hotel groups and tourism operators) from both project areas supported the project by attending meetings and participating in sharing local knowledge, identifying problems facing their marine resources, and agreeing over marine conservation sites.

One major challenge faced by the community was the lack of time to attend all meetings or to get fully involved. Conservation of sites is a lengthy process and requires a long-term commitment from the NGO and the stakeholders. Hence, community committees were formed, and this helped the project team work with persons who represent the community and who were able to and willing to be involved in project actions. Time was still an issue especially at certain religious times of year. The project team adapted the project time frame and meeting times to accommodate these concerns.

Stakeholders who were directly earning a living from the resource were also more engaged when they could see tangible benefits from the conservation actions such as training, sustainable tools (FMBs, snorkel trail and communication materials). The Roches Noires VMCA does not have any economic activities around or inside the site, making it more difficult to maintain the interest of the community in the project over the years. When choosing VMCA sites it is important to carefully consider the sustainability of the site with stakeholders. For community conservation to work in the long term the sites must be part of important economic, social or cultural areas to maintain the interest of stakeholders in the long term.

The project has also won the Youth Excellence Award given by the Mauritius Ministry of Youth and Sports. The VMCA concept has been adapted by another local NGO in Mauritius and a site implemented in the Blue Bay Marine Park with boat operators working in the MPA. Information about the process and steps was exchanged through informal meetings and discussions.

CASE STUDY

# 10 MOROCCO

## SUSTAINABLE FISHERIES AND COMMUNITY-BASED MANAGEMENT OF THE AL HOCEIMA MARINE PROTECTED AREA



**GRANTEE PARTNER**

AGIR (Association of Integrated Resources)



**LOCATION**

Al Hoceima National Park



**SGP CONTRIBUTION**

US\$50,000



**CO-FINANCING**

US\$91,983



**START DATE**

January 2013



**END DATE**

March 2015



PHOTO: SGP MOROCCO

### PROJECT CONTEXT

Located on the Mediterranean coast, Al Hoceima National Park is a biodiversity hotspot and hosts several endangered species listed on the IUCN Red List, such as the monk seal, osprey, Audouin's gull and the giant limpet. Despite a wealth of aquatic species and fishing potential, the artisanal fishing sector is weakened by a lack of infrastructure and unsustainable human practices such as the use of driftnets, trawling at shallow depths, dynamite and copper-sulphate fishing, poaching, and osprey disturbance. As a result, the approximately 2,000 artisanal fishers and their families are among the most vulnerable and marginalized low-income groups in the community, and live in precarious socio-economic conditions characterized by poverty, limited access to basic social services, and unemployment.

In addition, the project area is characterized by a climate that is progressively changing with a warming trend and an increase in extreme events that induce unprecedented changes in the distribution of species, migration, reduction or even disappearance of marine species. The combination of these factors further threatens the stock of fishery resources and negatively influences fishers' livelihoods.

### PROJECT IMPLEMENTATION

SGP, UNDP Morocco, the MAVA Foundation and the Association for Sustainable Financing of Marine Protected Areas in the Mediterranean joined forces towards integrated and joint management of Al Hoceima National Park, led by the Moroccan Office of the High Commissioner for Water and Forests and the Fight against Desertification. Because of its support to the creation of a network of Marine Protected Areas (MPAs) for sustainable fisheries, this project is considered a first step towards implementing the law for the protection of marine areas in Morocco. It aims to mobilize fishers around the eradication of illegal fishing practices, which is causing irreversible damage to marine sources in the Al Hoceima National Park Marine Protected Area. The project was implemented by the local NGO Association of Integrated Resource Management (AGIR),



PHOTO: SGP MOROCCO

which works towards the conservation of Mediterranean ecosystems in the Al Hoceima region and the strengthening of the small-scale fisheries sector, including through capacity building, and participatory monitoring and surveillance systems.

A series of participatory workshops with fishers served to define the main threats to local marine biodiversity and to identify local solutions. Further important input elements consisted of recommendations and conclusions of scientific studies conducted by the University of Barcelona as well as international recommendations as outlined by the International Commission for the Conservation of Atlantic Tunas.

A monitoring committee and surveillance program was created that aimed to raise awareness about the environmental and socio-economic risks of illegal fishing and over-exploitation of Al Hoceima National Park. The monitoring committee gathered all relevant

stakeholders, including the Delegation of Marine Fisheries, the Royal Gendarmerie, the High Commission for Water and Forests and the Fight against Desertification Fisheries, fishers associations, and NGO and implementing partner AGIR. In particular, the committee monitored endangered species such as the osprey (*Pandion haliaetus*), a coralline algae (*Sidewalks Lithophyllum*), the giant limpet (*Megathura crenulata*), the fan mussel (*Pinna nobilis*) and the Audouin gull (*Ichthyaetus audouinii*). The participatory surveillance programme served to register environmental offences (illegal fishing) in coordination with the park's management office, the Delegation of Marine Fisheries, the Royal Gendarmerie, the Royal Navy and fishers and NGOs. The community of fishers works closely with local authorities to alert them about illegal fishing practices.

At the end of the project, new sustainable fishing techniques were introduced, illegal fishing gear was converted, dynamite fishing prohibited, and fishers were re-oriented to fishing new species of a higher added value.

Capacity building workshops engaged more than 1,200 artisanal fishers, including 200 women, throughout the project and involved them in the implementation of the marine protected area management and zoning plan.

The project also established a sustainable financial mechanism, a revolving fund that provided free loans to fishers to replace driftnets and to support the acquisition of sustainable fishing gear. The involvement of decentralized services of the National Office of Fisheries managed the revolving fund, through a direct withholding on the harbor, which facilitated the conversion of the fishing gear within the community. The initial revolving fund was rotated many times allowing more than 150 fishers to revert to legal assistance and sustainable practices.

## ENVIRONMENTAL RESULTS

The project contributed to the integration of international environmental standards in Mediterranean, fishing-related policies and helped prohibit the use of driftnets as a major cause of the decline in fish stocks. Driftnets have been replaced by sustainable fishing gear such as selective long-lines. The project strongly supported the restoration of the Marine Ecosystem of Al Hoceima National Park and the creation of a network of MPAs for sustainable fisheries in Morocco, by mobilizing fishers to abandon the practice of illegal fishing. This has resulted in the restoration of fish stocks and the conservation of 1,900 ha of marine area and contributed to more sustainable fishing activities.

## SOCIO-ECONOMIC RESULTS

The project improved food security and the standard of living of artisanal fishers through sustainable fishing, enhancing quality and price of the fish products and the support to alternative income-generating activities aiming at reducing reliance on fishery as a livelihood. As a result, the project strengthened the resilience of fishers, particularly through the improvement of their income and securing the availability of high-value fish stock.

Women empowerment was achieved through the reinforcement of the fishers' women's cooperative named Med Nasses, which includes 50 households with 300 individuals, and is in charge of producing and marketing sustainable fishing gear and marine clothing.

This cooperative, with an initial fund of US\$17,076 ensured the production and marketing of biodegradable fishing material (fishing traps), generating an income of US\$8,055 over a period of six months. The provision of initial capital enhanced women's capacity in key areas of entrepreneurship, namely management, marketing, literacy, and quality assurance. It further ensured women's financial autonomy and provided alternative and sustainable livelihoods for households, especially during the seasonal rest period during which the artisanal fishers remain unemployed. Because sustainable equipment became available to the fishers, they were able to fish quality species with high added value, which improved the income of the fishers with 50 percent. Improving the livelihoods of the fishing community has significantly improved their social benefits and allowed for their affiliation to the National Social Security Fund for medical care and retirement.

## EXPERIENCE AND LESSONS LEARNED

Twenty years of monitoring the osprey, a flagship species, allowed for a better understanding of the ecology and conditions of the local marine ecosystem. Because of its central position in the ecosystem, these monitoring efforts have delivered the means to understand the problems and dysfunctions of many other species in the ecosystem of Al Hoceima National Park Marine Protected Area. This served as a guide to better define project goals and targets, and define the objectives and priorities for reducing threats to the ecosystem. The efficiency of the project's interventions resulted in the evolution of the marine zone of Al Hoceima National Park from a degraded state to moderately degraded, a result that is very encouraging when compared to the relative amount of human resources deployed. It is therefore considered possible to further improve the state of conservation and restoration of this ecosystem, a process for which fishers communities hold many of the solutions. Micro-systemic analysis allowed for monitoring the actions that were effective from a conservation perspective, as well as any potential gaps in the project's participatory approach. Extensive fieldwork, and the measurement of objective indicators has further allowed for easily verifiable result chains.

# CASE STUDY

# 11 SAMOA

## CORAL REEF RESTORATION AND SUSTAINABLE FISHERIES



### GRANTEE PARTNER

Village Council of Lefagaoalii, Environment Committee



### LOCATION

Lefagaoalii



### SGP CONTRIBUTION

US\$30,000



### CO-FINANCING

US\$10,000



### START DATE

June 2015



### END DATE

March 2018

### PROJECT CONTEXT

For generations, the Lefagaoalii lagoon has been a significant breeding area for the fish known as bigeye scad or akule (*Selar crumenophthalmus*). The reef used to be rich in corals, and the village was famous for the abundance of palolo worm (*Palola viridis*). But the coastal area and biodiversity have been gravely affected by climatic events, land-based human activities, and unsustainable fishing practices. With the destruction of fish habitat, the village's fishers saw a considerable decline in their marine harvest in its inshore reef and lagoon.

Realizing the impact of damaged marine ecosystems and biodiversity had on the village's livelihood, Lefagaoalii established its Marine Protected Area (MPA) in 2009 with assistance from the Ministry of Agriculture and Fisheries (MAF). Underpinning this initiative was the development of the village's Fisheries Management Plan and undertaking a baseline survey by the MAF Fisheries Division in that same year. From their baseline survey, The MAF Fisheries Division identified that there was low presence of marine life, but that the area was a good environment for coral growth, with the dominance of live-hard and soft corals. They also found that the Lefagaoalii marine environment was excellent for an aggregation site of the bigeye scad as a seasonal species, and a potential area for other aquaculture activities such as raising *Trochus* snails or giant clams, and sea-grape farming.

The restoration of the village's marine ecosystems and biodiversity required a larger scale of management than just the no-take zone stretching 400 m from the coast that the MPA had established. Lefagaoalii required further assistance through technical expertise and funding. Therefore, the village council and its MPA committee reached out to the SGP in 2014.



PHOTO: SGP SAMOA

## PROJECT IMPLEMENTATION

The primary goal of Lefagaoalii for its SGP-funded project was to protect and rehabilitate its marine biodiversity and the ecological environment while enhancing livelihood opportunities for Lefagaoalii villagers who have traditionally relied on marine resources. The project activities included the following:

- Sustain the protection of the ecological and biodiversity of the Lefagaoalii MPA with the application of sound management practices.
- Improve the environmental condition of threatened habitat and inshore resources and marine biodiversity.
- Promote ecotourism and develop income-generating opportunities for the village community.
- Raise awareness and build technical capacity of the Lefagaoalii community to manage the MPA sustainably.
- Promote active collaboration and partnership with relevant stakeholders and supporting partners for the effective management of project activities.

The Village Council had the primary responsibility of enforcing the village by-laws that ban dangerous fishing practices. The council imposes a fine of 500 SAT (about US\$189) for anyone that enters and fishes in the MPA without permission.

## ENVIRONMENTAL RESULTS

The first visible environmental impact of the Lefagaoalii SGP-funded project is the demarcation and expansion of its MPA to 5 ha. Within this expansion, coral growth has increased because of the village's clean-up of the crown-of-thorns starfish that affect corals, and enforcement of by-laws that ban dangerous fishing practices. Also, the Government of Samoa through the MAF Fisheries Division supplied giant clams and 100 coral plates for coral planting within the reserve. The village planted at least 700 seedlings of coastal trees from the Ministry of Natural Resources and Environment (MNRE), which now protect the coastline from erosion. The project committee built a seawall with big rocks (Rockwall), which adds strength to the village's shoreline.

The expanding coral growth within and outside of the reserve will replenish both the lagoon inshore as well as the reef. The villagers can now catch fish in larger sizes and quantities, and collect many invertebrates and other species they have not found in a long time in their coastal area. The project also enabled the village to renovate and maintain their spring pools and prevent any impacts on the MPA.

## SOCIO-ECONOMIC RESULTS

The Lefagaoalii MPA strongly supports the villagers' wellbeing. Now that the corals and marine species in the MPA are growing in abundance, the fishers are catching bigger fish in larger numbers from the lagoon surrounding the MPA and reef area. On average, there has been a 100-percent increase in their weekly income, from US\$160 to US\$320. Another significant socio-economic impact for Lefagaoalii is the increased awareness and capacity of villagers regarding biodiversity conservation and project planning and implementation, which reflect Lefagaoalii's intentions to sustain its natural resource base for socio-economic development. For example, the village is considering ecotourism development and the conservation of mangroves, which covers the entire western coastal area of the Lefagaoalii flat plain which will have a positive effect on the MPA.

A significant policy outcome for Lefagaoalii is the establishment of partnerships not only with SGP but also with the Ministry of Natural Resources and Environment, the MAF, the Samoa Tourism Authority, and the Small Business Enterprise Center. Their leadership and the proactive work of the project committee led to the achievement of other vital policy outcomes such as the review of the Fisheries Management Plan and the establishment of bylaws and village rules for the management of the MPA. Other visible policy outcomes is the installation of the project signboard with the village rules, and the building of a committee fale – a traditional Samoan house, overlooking the MPA. The signboard stands as a reminder for Lefagaoalii residents of the significance of the MPA, and is visible to travellers and visitors that pass through the village. The village also built a boat ramp to make it easier for the villagers and their canoes to go out into the MPA or the general lagoon area. The project committee continues to build the capacity and awareness of villagers; conduct ongoing meetings and cooperate with villagers for monitoring the MPA.



PHOTO: SGP SAMOA

## EXPERIENCES AND LESSONS LEARNED

The Lefagaoalii project enabled villagers to collectively engage for its MPA. This approach reinforces community action, which is at the core of GEF-SGP assistance, and that in turn encourages the participation of people in communities to address their own needs and priorities. The firm and effective leadership of the high chief and village council ensured community participation. The village council is made up of about 80 chiefs, or matais, which include both men and women, and who support the high chief in drawing support from the community to enforce the protection of their marine ecosystems. Their leadership also encouraged the participation of other groups in their society, namely children, women, youth, and untitled men.

With a population of around 900 people, there are more Lefagaoalii women than men. There were more women participants than men in the capacity building activities during project implementation. Women were also well represented in the project committee, and contributed to decision-making pre- and post-project completion. Youth and men participated in project activities and continued to assist the project committee in its monitoring and

conservation efforts. The village council recognizes the significance of these groups in the implementation of the project and the development of their community. The project helped to improve project management skills of the community to better manage any other future projects. They benefited from knowledge sharing from partners on how to sustain marine conservations, and exchange visits amongst villages with similar initiatives. The comprehensive involvement of all members of the community led to better decision making, implementation, monitoring & evaluation, and supervision.

The grantee partners received awards for the best marine reserve and best giant clams from the Ministry of Agriculture and Fisheries in recognition of their consistency in meeting the marking criteria of abundant coral growth, including the growth of clam farming. The grantee partners have won these awards every consecutive year from 2015 to 2018.

CASE STUDY

# 12 VIET NAM

## COMMUNITY-BASED MANAGEMENT OF COASTAL AND MARINE RESOURCES FOR LIVELIHOOD IMPROVEMENT



**GRANTEE PARTNER**

Binh Thuan Fisheries Association



**LOCATION**

Thuan Quy, Ham Thuan Nam, Binh Thuan Province



**SGP CONTRIBUTION**

US\$48,000



**CO-FINANCING**

US\$31,060



**START DATE**

October 2014



**END DATE**

June 2017

### PROJECT CONTEXT

Viet Nam's marine ecosystems provide habitats to an estimated 10,837 species of plants and animals, including several threatened turtle species, corals, endemic fish species and mammals (Garcia-Herrera 2009). Due to consistent over-fishing the country's marine resources have come increasingly under pressure, which in turn has led to a decrease in economic performance for small-scale fishers and increased vulnerability of coastal communities. Thuan Quy, a coastal community in southern Viet Nam, covers an area of 51 km<sup>2</sup> and a coastline of more than 4 km. This marine area used to be a rich breeding and feeding ground for aquatic species, with a particularly dense population of bivalve mollusks and clams, making it a regular fishing ground for fishers from Thuan Quy and other localities in Binh Thuan province. However, as the volume of clams (*Anadara antiquata*) sharply declined due to overfishing, one of the main income sources of the local population became unavailable, resulting in increased economic vulnerability and poverty of coastal communities in the area.

Government support for the fishery sector is insufficient and no concrete measures have been taken to implement the 2003 Fisheries Law of Viet Nam on co-management. To ensure a more sustainable use of aquatic resources, particularly clams, in the marine area of Thuan Quy, the Binh Thuan Fisheries Association proposed a system of co-management, which envisioned the restoration of the local marine ecosystem through sustainable fishing, while improving the livelihoods of local fishers and their families.

### PROJECT IMPLEMENTATION

In 2014, the Binh Thuan Fisheries Association, with the support of SGP, embarked on a joint mission to establish a community management program for the restoration and exploitation of marine resources that could serve as an example of sustainable fishery for other communities.

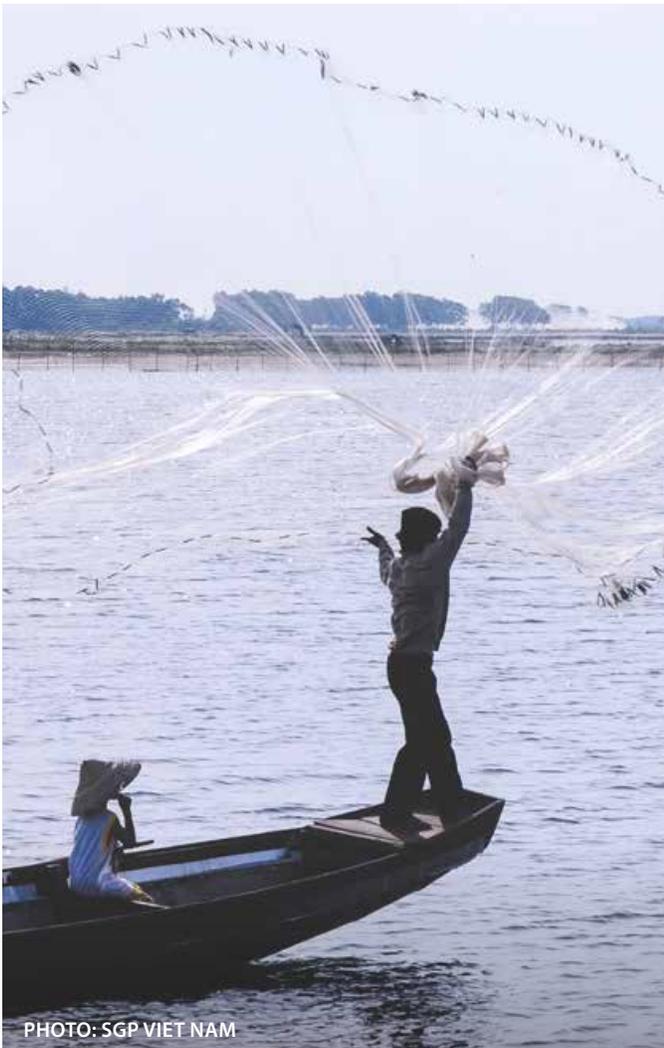


PHOTO: SGP VIET NAM



PHOTO: SGP VIET NAM

In the first phase, the Fishermen's Community Association was established, consisting of an executive board representing the fishing community, a team for the supervision and enforcement of state and community regulations, and separate communication and livelihood teams. With input from the fishing communities, the Association developed internal rules for meetings, reporting, financial management, and the settlement of disputes. The Association proposed a decentralized approach to aquatic resource exploitation, and enhanced coordination and benefit-sharing among local stakeholders. Activities to restore and maintain aquatic resources included the breeding and stocking of species, the demarcation of zones for exploitation and protection of parent breeds, installation of artificial reefs to replace reef habitat and collection of water samples for environmental quality assessment.

The Association designed sustainable livelihood models by establishing a revolving fund that provides financial support to the community for fishing, trading, aquaculture, ecotourism and agricultural activities. Considerable efforts went into developing outreach and advocacy strategies in order to engage the broader fishing community in the project; knowledge and project information was provided during meetings, dialogues, and public consultations, and communication materials were disseminated in the form of posters, leaflets and radio and television broadcasts. External

experts were regularly invited to trainings and capacity building workshops to share knowledge and technical skills regarding project management and administration, communication and conflict resolution, as well as best practices for the co-management of aquatic resources and marine ecosystems.

The Fishermen's Community Association received additional financial support from the Fisheries Department of Binh Thuan province, the People's Committee and the fishers' community of the Thuan Quy Community. The Tan Thanh Border Guard, the People's Committee of the Ham Thuan Nam District, and local unions of farmers, women, youth and veterans provided support for the implementation of the project. The Nha Trang Institute of Oceanography and the Southeast Asian Fisheries Development Center provided technical support for trainings about resource protection, demonstrating how FED (fish enhancing device) systems can be used to create safe habitats for marine species.<sup>3</sup> Also the Japan International Cooperation Agency supported the project by dispatching experts to organize trainings and share Japan's experiences in community-based, sustainable and decentralized fishery management. SGP played a crucial role in the execution of this project: It supported local authorities and relevant government agencies in the development and promulgation of policies for co-management of marine resources, assisted in building bridges to other donors, and provided insights on project development.

The project's outcomes and best practices were shared during numerous conferences and seminars, including the National Co-Management Conference in which 15 other Vietnamese provinces participated. Progress and practical results were regularly demonstrated to stakeholders, local authorities, government agencies and fishing communities from other localities. The Thuan Quy community received several delegations from other provinces, and reportages about the coastal management model developed by the project were broadcasted on television and in the media. The results of this project informed the People's Committee of Binh Thuan province's decision to revise the Fisheries Law of 2003 and pilot a policy for allocating exploitation rights to fishers in an attempt to restore and protect aquatic resources while improving the livelihoods of the local population.

<sup>3</sup> Fish aggregating devices (FADs) are deployed to aggregate fish over a limited area to improve fish catch. Fish enhancing devices (FEDs), which are FADs deployed in no-fishing areas, are fast gaining popularity as a fisheries management tool in the western Pacific. Yet, the impacts of utilizing FADs and FEDs are not yet well understood." (Cabral et al. 2014)

## ENVIRONMENTAL RESULTS

Overall, the project affected people's awareness and behavior about the benefits of marine conservation in a positive way; none of the fishers of the Association violated regulations on sustainable exploitation and protection of aquatic resources, while the number of violations among fishers from other localities decreased by more than 90 percent. As a consequence, the seabed ecosystem and the habitats of more than 20 aquatic species were restored, with a positive spill-over effect in the surrounding areas, and an overall improvement and enrichment of the local marine environment. The once-depleted clam population, the main income source of the local population, was restored in less than one year's time, reaching an average density of 10 to 15 individuals per m<sup>2</sup>. Today, thanks to continuous monitoring of the marine environment by the association, the clam population has further grown to and stabilized at around 20-25 individuals per m<sup>2</sup>.

## SOCIO-ECONOMIC RESULTS

The project improved food security and the standard of living of artisanal fishers through sustainable fishing, enhancing quality and price of the fish products and the support to alternative income-generating activities aiming at reducing reliance on fishery as a livelihood. As a result, the project strengthened the resilience of fishers, particularly through the improvement of their income and securing the availability of high-value fish stock.

Women empowerment was achieved through the reinforcement of the fishers' women's cooperative named Med Nasses, which includes 50 households with 300 individuals, and is in charge of producing and marketing sustainable fishing gear and marine clothing. This cooperative, with an initial fund of US\$17,076 ensured the production and marketing of biodegradable fishing material (fishing traps), generating an income of US\$8,055 over a period of six months. The provision of initial capital enhanced women's capacity in key areas of entrepreneurship, namely management, marketing, literacy, and quality assurance. It further ensured women's financial autonomy and provided alternative and sustainable livelihoods for households, especially during the seasonal rest period during which the artisanal fishers remain unemployed. Because sustainable equipment became available to the

fishers, they were able to fish quality species with high added value, which improved the income of the fishers with 50 percent. Improving the livelihoods of the fishing community has significantly improved their social benefits and allowed for their affiliation to the National Social Security Fund for medical care and retirement.

## EXPERIENCE AND LESSONS LEARNED

From a project management perspective: In the initial phase of the project it was important to increase awareness and build trust, strengthen communication within the community, and to organize information sessions and training activities for local stakeholders. Mobilizing members of the community that were considered influential proved effective for increasing outreach. Once more members joined, it was practical to divide them into different groups according to occupation and living area. To enhance transparency, new rules and regulations were formulated in such a way that they would be easy to understand and implement, which could gradually develop and expand. Regular stakeholder meetings were important for the association to receive community feedback, reassess planned interventions and adjust regulations. Monitoring and evaluation, including the collection of data and statistics, are necessary to adjust working plans and propose measures to prevent and deal with risks and challenges. Promoting the role of the community in self- and cross-monitoring proved helpful in this process.

From a financial perspective: A better understanding of the project intentions and proceedings motivated the community to contribute their own resources such as boats, equipment and small capital. This was also catalytic for gaining external support. The revolving fund granted non-interest loans to people with technical capacity but insufficient resources, and low interest rates to other members.

From an environmental conservation perspective: Starting small-scale is important, selecting a limited number (one or two) of target species for rehabilitation and a project area that can expand in parallel with project management capacity. The recognition and granting of fishing rights should only be made in a final stage of the project, when the community members are capable and qualified to perform the tasks and responsibilities in accordance to the rules and regulations of the association.

# CONCLUSIONS

## EXPERIENCES AND LESSONS LEARNED

For a long time, development has frequently been achieved at the expense of the environment. The debate between development and environment has been persistent, largely pitching them as opposing forces. As a result, oceans are under threat from unsustainable exploitation and pollution, even though marine and coastal ecosystems provide a range of critical services, reaching across supply chains, from food, biodiversity and culture to regulating important functions such as carbon sinks, climate regulation and flood protection (IIED, 2018). One of the most critical ocean governance challenges is the lack of understanding of the socio-economic benefits generated from healthy ocean ecosystems. How can we reconcile the relationships between development and the marine environment, and implement strategies and practices that balance the needs of both? This is not just a key question for political debate, but also a challenge to daily practices on the ground.

The adoption of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals provides a common framework to achieve development that balances the economic, social and environmental benefits. In the context of oceans and seas, the blue economy approach reconciles the economic, social and environmental dimensions of the development-versus-environment relationship, turning it from conflictual to mutually reinforcing.

This publication demonstrates good on-the-ground blue economy community practices that have successfully reconciled protection of the oceans

and local marine ecosystems with the safeguarding of community livelihoods. It documents twelve community-led examples that have turned the blue economy concept into practice on the ground.

We realize that the blue economy concept in local contexts varies according to the different challenges and needs faced by the communities and the local environment, and therefore, each solution should be customized to respond to the local context. Each case presents good practices based on local situations and includes specific and cross-cutting experiences and lessons learned at the end of each case.

### SCIENCE-BASED BLUE ECONOMY

Science and technology play an important role in designing and implementing blue economy projects in the field, and in bridging and reconciling the needs of economic development and ocean sustainability. If communities continue with business-as-usual schemes, the environment and livelihoods will not be sustainable. Relationships between the economic, social and environmental aspects of sustainable development are extremely complicated and delicate. Finding new solutions must involve new information, science and technologies including baseline data collection, management interventions, and design of alternative livelihoods. For example, the restoration of mangroves and coral reefs may sound straightforward, but in reality these are highly technical and scientific measures, involving careful selection of species, nursery, timing and spacing. Understanding these ecosystem functions, identifying flagship species



PHOTO: ANDREW WESTERN (ECODRIVE)

for conservation, and the monitoring of species can provide a more sound understanding of ecosystems and their relationship with economic activity.

In China's mangrove restoration and sustainable aquaculture case, the project established a partnership between the Guangxi Mangrove Research Center (an academic institute), an NGO (the grantee partner) and the local community, which ensures that the community can benefit from new technology and learn from the academic institute. In the China seagrass case, the first Institute of Oceanography of the State Oceanic Administration provided the technical support

on sexual reproduction technology to obtain the seeds of *Zostera marina*, a new innovative technology on seagrass reproduction and restoration.

In Viet Nam, The Nha Trang Institute of Oceanography and the Southeast Asian Fisheries Development Center provided technical support for training on resource protection, demonstrating how FED systems can be used to create safe habitats for marine species. The Japan International Cooperation Agency also supported the project by dispatching experts to organize trainings and share Japan's experiences in community-based, sustainable, and decentralized fishery management.



PHOTO: SGP VIET NAM

## COMMUNITY-BASED BLUE ECONOMY

Community ownership and community participation are considered crucial components for a sustained positive impact.

Recognizing the important role participatory approaches, many community-based organizations strive for regular communication with stakeholders through periodic meetings, workshops, trainings and other activities to get feedback from community members on the progress of the project. To enhance transparency, information should be conveyed in an understandable way that facilitates implementation.

Regular stakeholder meetings are important to receive community feedback, reassess planned interventions and adjust implementation processes. Within the community, efforts should continuously be made to build trust and develop community mechanisms for conflict resolution.

It is essential to involve the community in all phases of the project: from design to monitoring of project

outputs. Although science-based input is essential for providing solutions to technical challenges in ocean conservation, or highly specialized issues such as coral transplantation, local challenges often benefit most from local solutions. For example, giving fishers' associations or local women's cooperatives a prominent role in problem-solving helps the community to implement and take ownership over the project.

Community ownership in projects also goes hand-in-hand with giving primary stakeholders the tools and responsibility for independent and continuous monitoring and evaluation. For example, involving fishers in the designation of a marine protected area.

Project monitoring is important, including surveillance, data gathering, involving the community in the monitoring process, and monitoring periodically to answer questions such as: Are we reaching all stakeholders and beneficiaries? Are we getting the projected results?



Field work and field visits for data collection are important for effective monitoring and evaluation, and necessary to remain flexible in adjusting working plans and in dealing with risk prevention and challenges. Promoting the role of the communities in self monitoring and cross-monitoring is helpful in this process.

Consistent information sharing of project developments, both in terms of achievements and setbacks, as well as the use of social media are effective tools for outreach. Stakeholders who were directly earning a living from the local ecosystem services, such as fishers, were also more engaged when they could see tangible benefits and practical results from conservation actions, such as enhanced biodiversity and more aquatic species, or an increase of high-value fish stocks.

Temporary closure of marine areas is a powerful management tool that can demonstrate the economic benefits of fisheries management rapidly, to fishers and seafood consumers alike. By producing tangible

benefits to coastal communities, this approach can build robust support for broader marine management initiatives.

### **VISIBILITY AND VALUE OF LOCAL BENEFITS AND RESULTS**

It is paramount for communities to witness the tangible benefits of blue economy projects right from the beginning.

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economic benefits of fisheries management rapidly, to fishers and seafood consumers alike. By producing tangible benefits to coastal communities, this approach can build robust support for broader marine management initiatives.

In El Salvador, the project provided direct local benefits through a few technological innovations, including the development of climate-smart agroecology and access to low-carbon energy sources. Innovative technologies allow for the reduction of wood consumption, since the food is prepared at a specific temperature and then transferred to a thermos which maintains the temperature for the completion of the cooking of the food. The community achieved a decrease in wood use with subsequent cost reductions. This project achieved not only “blue” benefits through the reduction of mangroves cut, but also energy efficiency and livelihoods benefits.

In India, more than 450 women have reported an increase in their income, as the fish dried in the solar tunnel sell for more than fish dried through traditional methods. They have identified and are practicing fish drying as a key source of income, are able to support their children’s school fees and add to their bank savings.

These local livelihood benefits are critical to ensure community buy-in and participation. All projects documented in this publication have presented the socio-economic benefits of these projects under each project.

## COMMUNICATION

Awareness raising and advocacy are key to the development, implementation and sustainability of blue economy projects.

Introducing new ideas and approaches to managing natural resources and ecosystem services has always been challenging. A comprehensive communication strategy is important to strengthen communication

with and within the community, to increase awareness about project motivation and goals, and to build trust. Engaging formal and informal community leaders who share the motivation and understanding of the complex issues facing community is helpful to bring more people on board. In India’s fish-drying case, the women’s willingness to learn, fearlessness to try and advocate for new techniques and technologies are considered important factors for better communication and alignment between project and community goals.

The Barbados project demonstrates the importance of having the right messages and right channels for distribution and recommends involving a professional public relations team early on in the project to help overcome communication challenges. Setting up a national sensitization program in a first phase could be beneficial for communicating and demonstrating the benefits marine and coastal ecosystem conservation. While it is important to facilitate the interface between local knowledge and academic scientific findings, many projects indicate that peer-to-peer knowledge transfer between different villages and communities in similar situations is highly effective.

## MULTI-STAKEHOLDER PARTNERSHIPS

The involvement of civil society, government, private sector and other key stakeholders is fundamental to successful implementation and potential for scaling up blue economy projects. Collaboration and alignment between various international and regional organizations, national governments and local authorities, project implementers and community-based organizations, as well as with members of the community are also crucial. Roles and responsibilities of each partner or potential stakeholder group should be thought-through and clearly defined and agreed upon beforehand. Almost all cases made reference to the important role of SGP in building the relationships with local communities.



PHOTO: SGP MAURITIUS

In some cases these relationships were institutionalized by way of a project steering committee that met regularly and helped in solving issues regarding the implementation of the project. Further, working with national institutions has in some cases given a basis for continuity of various initiatives.

Partnerships are particularly important for scaling up good practices. Government policies and strategies often play an instrumental role in the scaling up process. In Mauritius, the government of Mauritius has taken account of the successful voluntary marine conservation sites established by SGP projects and are expected to include them in the national accounting of protected marine areas alongside legally designated areas through the UNDP GEF Project titled “Mainstreaming Biodiversity into the Management of the Coastal Zone in the Republic of Mauritius.” The establishment of more such sites is being encouraged by the Ministry of Ocean Economy, Marine Resources, Fisheries and Shipping. This is important as new management arrangements and partnerships for marine resources are being recognized and embraced in a traditionally top down management structure.

Involvement of the private sector could help to expand the blue economy, for example the replication of sustainable aquaculture and ecotourism practices. However, due to the small scale of these blue economy projects, the engagement of the private sector usually remains at an artisanal, small-scale fishers level. In Viet Nam, there is a need to enhance a better understanding of the project intentions and proceedings to motivate the community to contribute their own resources such as boats, equipment and small capital. The grantee partner designed sustainable livelihood models by establishing a revolving fund that provides financial support to the community for fishing, trading, aquaculture, ecotourism and agricultural activities. The model of a revolving fund has offered non-interest loan in the first phase; priority is given to the persons in difficulty, enthusiastic, having clear and potential plans with high possibility of loan return. After the first round, low interest rates will be applied to reach more members. It should be noted that experiences of developing and managing revolving funds are still evolving and should be further explored.

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PHOTO: SGP EL SALVADOR



The Small Grants Programme (SGP) is a corporate programme of the Global Environment Facility (GEF) implemented by the United Nations Development Programme (UNDP) since 1992. SGP grantmaking in over 125 countries promotes community-based innovation, capacity development, and empowerment through sustainable development projects of local civil society organizations with special consideration for indigenous peoples, women, and youth. SGP has supported over 20,000 community-based projects in biodiversity conservation, climate change mitigation and adaptation, prevention of land degradation, protection of international waters, and reduction of the impact of chemicals, while generating sustainable livelihoods.



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