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LOCAL SOLUTIONS

ADAPTING TO CLIMATE CHANGE IN SMALL ISLAND DEVELOPING STATES

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Introduction

Climate change continues to be one of the greatest challenges facing our planet and humanity today, and local communities and small island developing states (SIDS) are at the front line of its impacts. Drought and rising temperatures, excessive precipitation and flooding, sea level rise and salt-water intrusion, coastal erosion, loss of agricultural crops, degradation of coral reefs due to bleaching, increased instances of pests and diseases, and unpredictable storms and weather events are just some of the challenges experienced by SIDS. These variations in climate not only affect the environment and resilience of natural ecosystems, but also have ripple effects on every sector of the economy and society including economic stability, agriculture and food security, water access and sanitation, health and well-being, education, tourism and livelihoods.

SIDS often experience acceleration or intensification of climate change impacts due to their small land areas, susceptibility to natural disasters, geographical isolation, limited natural resources and sensitive ecosystems. Many of these natural resources are often already facing other anthropogenic pressures such as overexploitation, over-harvesting, pollution, deforestation and degradation. In addition, many SIDS also struggle with fragile economies, emigration of active population, political instability, high import costs and heavy dependence on external aid. Many countries do not have enough resources to combat climate change impacts on their own, and further degradation of natural resources and ecosystems will increase poverty, hunger and economic and social inequalities. Thus, climate change can significantly limit progress towards achieving sustainable development.

With these challenges in mind, in 2009 the GEF Small Grants Programme (SGP) entered into a partnership with the Australian Overseas Aid Programme, now assimilated within the Australian's Government Department of Foreign Affairs and Trade (DFAT). With funding from DFAT, the objective of the partnership is to improve the climate resilience of local communities in 42 countries, including 37 SIDS.

The goals of the programme are to:

- reduce the vulnerability and improve the adaptive capacity of local communities to the adverse impacts of climate change;
- provide countries with concrete ground level experience on local climate change adaptation; and
- provide clear policy lessons and mainstream community-based adaptation (CBA) within national processes, and scale up best practices.

Rice harvesting in Cambodia

To realize these objectives, CBA projects invest in **capacity development and awareness-raising initiatives** aimed at strengthening local communities' resilience to climate change through sustainable **nature-based solutions that optimize environmental, economic and social outcomes.** The projects' integrated approach to land, water, forest and coastal resource management also contributes to environmental benefits in other multi-focal areas.

CBA's focus on **social inclusion** and cohesion ensures that all members of society have a voice, a role, and access to opportunities and services, irrespective of gender, age, ethnicity, or mental and physical abilities. This **participatory approach** throughout the project cycle allows capacity development in every component, including project proposal writing, development of action plans, financial management, and development of income-generating and/or alternative livelihoods. Through the vulnerability reduction assessment (VRA) process, communities can identify problems and measures, and design interventions that are specific to their community and **adapted to their local culture and traditions**. This results in an **engaged**, empowered and mobilized community. Indigenous and traditional knowledge is also combined with scientific practices to ensure that adaptation strategies are relevant and context-specific.

To **bridge the gap between local, national and regional actors**, various multi-level consultation meetings and dialogues are held throughout the project cycle. These engagements serve as a space for communities' voices to be heard, their needs to be understood, and their challenges to be recognized and addressed by various decision makers. In addition, these processes enable community views and actions to be mainstreamed into development processes, and to inform global actions. The resulting **increased awareness** of all stakeholders **reinforces the collective responsibility** in tackling climate change, and **identifies opportunities for shared action**. These inclusive partnerships are established on a shared vision, that put people and nature at the centre. These synergies also serve as a line of communication for expanded support to scale up CBA interventions. The CBA Country Programme Strategy (CCPS) of each country is also aligned to its national and sub-national planning and adaptation priorities. Hence, the country programmes have the foundation to influence the policies and development programs at various levels.

The following case studies highlight how CBA projects have integrated these principles into their design and implementation to build the adaptive capacities of local communities in SIDS.

Results snapshot from 2009 to 2018

50 PLANNING GRANTS

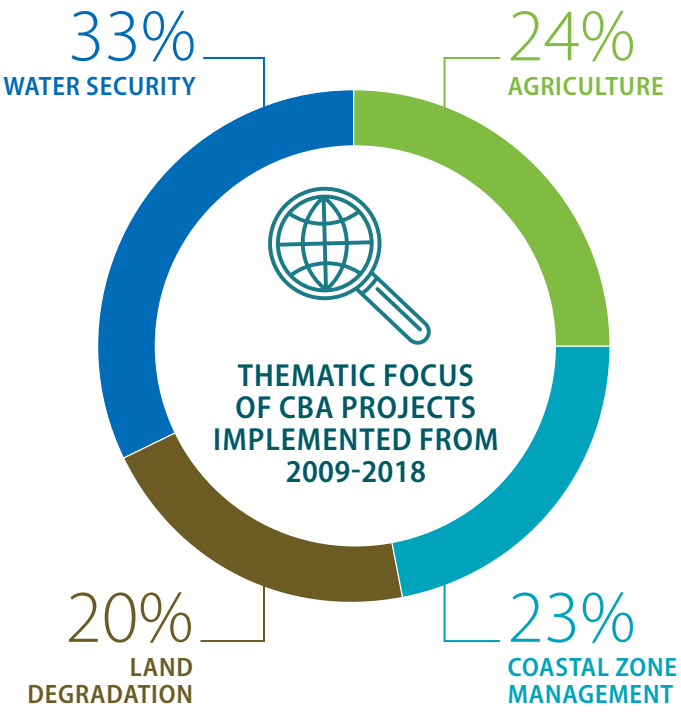
153 PROJECTS have been implemented

42 COUNTRIES

200,186 PERSONS
have participated in CBA projects and activities

12,520 HECTARES
of land have been restored
(NOTE: definition of restoration is that more than 70 percent of land has been rehabilitated to near its original condition)

6,156 HECTARES
of land are under improved management
(NOTE: applied practice is in progress and improved conditions are evident but have only reached up to 70 percent of original status)



Participating Countries

Pacific


Cook Islands


Fiji


Federated States of Micronesia


Kiribati


Marshall Islands


Nauru


Niue


Palau


Papua New Guinea


Samoa


Solomon Islands


Timor Leste


Tokelau


Tonga


Tuvalu


Vanuatu

Caribbean


Antigua & Barbuda


Barbados


Belize


Cuba


Dominica


Dominican Republic


Grenada


Guyana


Haiti


Jamaica


Saint Kitts & Nevis


Saint Lucia


Saint Vincent & Grenadines


Suriname


Trinidad & Tobago

Atlantic & Indian Ocean


Cape Verde


Comoros


Guinea Bissau


Maldives


Mauritius


Seychelles

Mekong/Asia


Cambodia


Laos


Vietnam

Sri Lanka

CBA project examples

Climate-smart agriculture on **Cuban** farms

BACKGROUND

The Cooperativa Agrícola Niceto Pérez (CANP) is an agricultural cooperative located in the Cuban municipality of Güira de Melena, around 50 kilometres south of Havana. The area is particularly vulnerable to climate change due to its physical landscape of the swampy, low-lying Havana-Matanzas Plain, and its partially flooded forests. Despite these features, agriculture remains the main source of subsistence for the communities in this region. Years of poor agricultural practices have contributed to a deterioration of soil quality, increased incidence of pests and diseases, and soil salinization. From 2014-2017 Cuba also experienced one of the most extensive droughts in 115 years, affecting 80 percent of the country, including crop and livestock production. To compound these problems, in September 2017 Hurricane Irma devastated the island, severely crippling the economy including the agricultural sector. For Cuban farmers the effects of climate change such as irregular rainfall, high temperatures and unpredictable weather patterns is a real and daily struggle.

Considering these challenges, the CANP embarked on a project to build the adaptive capacity of its farmers to climate change. The CANP has a membership of 204 farmers across 64 farms, representing a total of 540 hectares of land dedicated to the cultivation of crops and cattle farming. The cooperative is the primary source of income for 10 small settlements with a total population of 1,400.

ADAPTATION STRATEGIES

The CBA project worked with key stakeholders in the agriculture and research sectors to provide training to the farmers on climate-smart agriculture techniques and good agricultural practices, to build the resilience of their farms to climate change.

Project activities involved working with research centres in Cuba that have developed varieties of crops that are more resistant to extreme weather, including tomato, onion, garlic, chilli, banana, sweet potato and taro. The farmers were educated and trained on these new varieties of crops, and started using them on their farms to increase production during drought periods.

The project has also facilitated partnerships with the University of Havana to train farmers in the use of bio-stimulants on their farms. The stimulants are naturally derived fertilizer additives used to enhance plant growth, nutrient use and resistance to temperature and water stresses, thereby increasing yields. Farmers have also eliminated the use of artificial chemicals on their farms and are now using organic products, repellent plants, crop rotation, vermiculture and beneficial micro-organisms to control pests and diseases, as a result of the training from the University.

Farmers and their temperature resistant seedlings

Farmers monitor drought resistant plants in their fields

Farmers share knowledge at an agricultural outreach session

As part of the CBA project, the National Meteorological Services also trained farmers in the use of early warning systems to detect and monitor the concentrations of tropospheric ozone. In the stratosphere, ozone is a helpful shield against ultra-violet radiation. However, most tropospheric ozone forms when nitrogen oxides, carbon monoxide and volatile organic compounds react in the atmosphere in the presence of sunlight. These reactions produce tropospheric ozone, which is a secondary air pollutant and a greenhouse gas. Over 20 years of data collected and analysed by the Institute of Plant Health Research and the National Centre of Scientific Research have suggested that tropospheric ozone reduces the ability of plants to photosynthesize and sequester carbon, affects water regulation, flowering and fruiting and ultimately affects crop health and productivity. The National Meteorological Services worked with the farmers to create communication networks using mobile phones, which allowed farmers to receive SMS text message updates on weather and ozone conditions. The system enabled farmers to be better prepared by employing adaptive measures such as increasing irrigation and applying a lime hydrate solution during times of increased ozone concentration. These two measures protect plant foliage and significantly reduce instances of crop failure during these periods. The early warning systems also made it possible to introduce other meteorological warnings and agro-meteorological information, which were used to plan crop irrigation based on the weather forecast, thus making more effective use of water supplies.

Other project activities included the establishment of three greenhouses, education and outreach to schools and other farms, development and dissemination of agro-ecological manuals, and monthly training and knowledge-sharing sessions. Farmers are also using other good agricultural practices such as planting along contour lines to reduce soil erosion, crop rotation, and reducing the use of heavy machinery to prevent soil compaction.

RESULTS AND IMPACT

To date, 210 hectares of farmlands have come under sustainable management through these climate-smart measures, and more than 90 percent of the farmers apply these techniques on their individual plots. At the beginning of the project in 2014, the production rate of the farmers was 12 tonnes per hectare, this has increased to 29 tonnes per hectare as of 2018. The farmers also experienced a 25 percent increase in their average yearly income due to increased production and quality of crops. The capacity of the CANP has been built such that it now acts as a demonstration site and training centre on the island. In 2018, 31 producers from 7 provinces and 10 municipalities around Cuba participated in training workshops hosted by CANP, facilitating the sharing of technology and the dissemination of information.

Disaster preparedness for persons with disabilities in **Trinidad and Tobago**

BACKGROUND

Trinidad and Tobago is a small island nation vulnerable to climate change-induced hazards including flash flooding, landslides, bush fires and tropical storms. Traditionally, national disaster preparedness efforts largely excluded persons with cognitive disorders such as autism, cerebral palsy, Down syndrome, dyslexia, or dysgraphia. To address this gap, the Digicel Trinidad and Tobago Foundation, the NGO arm of the private-sector telecommunications company DIGICEL, embarked on a disaster risk reduction (DRR) programme with eight special schools across the country, to increase their resilience to climate change and other natural disasters.

ADAPTATION STRATEGIES

The project developed resilience within the special-needs community by embracing a public-private partnership (PPP) approach. These partnerships engaged national agencies such as the Office of Disaster Preparedness and Management (ODPM) in Trinidad, the Tobago Emergency Management Agency (TEMA), the Trinidad and Tobago Fire Service (TTFS) and relevant Disaster Management Units (DMUs) of the Ministry of Rural Development and Local Government. Project activities focused on building relationships and increasing interactions and trainings between these agencies and the special-needs schools. Main project activities included provision of disaster preparedness training to the project beneficiaries, facility inspections and upgrades to the schools, climate-change education and awareness, and revision of the national disaster database to include persons with disabilities (PWDs).

RESULTS AND IMPACT

Thanks to the project, 50 teachers and caregivers, and 350 persons with disabilities participated in initiatives to boost disaster preparedness and climate change adaptation. Workshops and trainings focused on first aid, proper use of fire extinguishers, evacuation drills, preparation of personal disaster kits and emergency checklists, and development of disaster management plans for each school and household. Interactive songs, puppet shows, performances and practical demonstrations were utilized to teach students with

Children learn about climate change and DRR during an interactive puppet show

Special needs students learn how to use fire extinguishers as part of the DRR training

varying learning capacities. The facilities and buildings of the eight schools were upgraded and modified to include emergency equipment such as fire extinguishers, smoke detectors, emergency alarms, emergency lighting and signage; and in one case the entire school was reconstructed to improve its safety. The schools also developed a working relationship with the fire services and the first responders of the local disaster management units in each location- these relationships did not exist prior to the project. Regular site visits and equipment checks are now carried out by these agencies at the schools. Two project videos, four hazard instructional videos, one blog and five posters were created and circulated to public agencies and schools to raise awareness on climate change and natural disasters.

Through the partnerships established, the ODPM is currently working with the Digicel Foundation to revise and update the national database to include the geographic information system (GIS) data on the location and specific medical information for PWDs. This will ensure that DRR methodologies are appropriate and tailored to this vulnerable community for future responses.

Policy

Due to the project, the ODPM and TEMA now acknowledge PWDs as a sector of the community with specific requirements, and have adapted their policies to be more inclusive. A key policy result also included the revision of the ODPM's National Disaster Emergency Handbook to include persons with intellectual disabilities. Outreach for persons with intellectual disabilities now forms part of ODPM's Communities Organised and Ready for Emergencies (CORE) Programme. The relationships and networks established among the various national agencies have strengthened because of the project.

Replication and scaling up

Digicel T&T Foundation has now entered into a partnership with the Inter-American Development Bank (IDB) and has received additional funding to scale up the CBA DRR interventions to 10 more schools in Trinidad and Tobago, and to other special schools in Dominica, Haiti and Jamaica.

Linking research, education and policy at **Jellyfish Lake, Palau**

BACKGROUND

Ongeim'l Tketau (*Fifth Lake*), also known as Jellyfish Lake, is a marine lake located in the Rock Islands Southern Lagoon of Palau's Koror State, and is typically home to millions of Golden jellyfish (*Mastigias papua etpisoni)*, an endemic sub-species. The lake and its ecosystem contribute significantly to Palau's biodiversity and it is a major site for research and tourism- as visitors from around the world come to swim with these harmless jellyfish, known to have only a mild sting that enables them to feed. The lake was once home to 10 million to 20 million jellyfish, hitting 30 million at its peak in 2005, with an average typical population size of 5-7 million jellies. However, the strong El Niño drought event in 2015-2016 influenced the lake ecosystem and resulted in sharp jellyfish population declines.

The Coral Reef Research Foundation (CRRF) is a research NGO based in Palau, and has been engaged in conservation and environmental monitoring since 1991. In 1998, the CRRF embarked on a project to monitor the impacts of climate change and tourism on the lake ecosystem, and its ability to recover from climatic and anthropogenic stresses.

ADAPTATION STRATEGIES

Through the project, the CRRF monitored the lake to complete a 15-year data set on the lake ecosystem. Changes in oxygen levels, salinity, weather patterns, temperature and sea levels were documented to understand how these factors affect jellyfish population numbers, and by extension the income to local authorities and communities. Several researchers and collaborators have also been collecting data for several years on other parameters such as microbial diversity, food web dynamics and ecosystem community structure, which all contribute to the greater understanding of the lake ecosystem and its resilience to climate change. The CRRF also analysed visitor numbers during peak tourist seasons by digitizing visitor log-books, allowing Koror State to monitor tourist behaviour at the lake.

Community member participating in Jellyfish monitoring

Aurelia sp

Mastigias papua etpisoni

RESULTS AND IMPACT

Years of data indicated that the lake ecosystem is susceptible to changes in weather and climate. Research suggested that extreme drought periods might lead to decreased essential nutrients affecting survival of juvenile jellies, while higher temperatures influence jellyfish reproduction. Human activities, such as bringing non-native and invasive species and harmful sunscreen pollutants to the lake, are also a concern to the lake's health, but were not thought to be related to the 2016 jellyfish population crash.

Policy and Advocacy

The research and data collected was submitted to the Koror State Department of Conservation and Law Enforcement, and insights gained from the monitoring and analysis were discussed with policy makers, tour operators and key stakeholders. These actions helped to improve management of the lake ecosystem by reducing tourism and anthropogenic pressures on the lake in light of climate change impacts.

Education and Capacity Building

The project also provided training and capacity development of one Palauan woman as a marine lake specialist, and four other locals working part time on the project. These community members now play an active role in the CRRF's ongoing monitoring programmes. Outreach activities, school visits and lectures to raise awareness and instil pride and ownership of the marine lakes directly reached 575 people, 8 schools and 17 agencies involved in tourism. Information detailing the jellyfish population crash and conservation strategies, and the threats from tourism were presented to the traditional and state leadership. The information provided to the local state government was also shared with public via newspapers, engaging the entire Palau population.

"We learned key lessons through the project's emphasis on information dissemination through community outreach and policy dialogue. We learned the art of diplomacy while staying true to the objectivity of science in dealing with diverse stakeholders."

This project promoted the protection of Jellyfish Lake, its unique endemic Golden jellyfish, and other marine lakes of Palau, thereby contributing to biodiversity conservation of the Rock Islands Southern Lagoon, a UNESCO World Heritage Site. The lake ecosystem has been recovering from the El Niño drought, and in 2019 CRRF reported that jellyfish population numbers increased to around 3 million. Tourists are once again visiting the lake and CRRF is optimistic that jellyfish numbers will continue to increase.

This project illustrates the importance of research and data analysis in understanding the impacts of climate change on sensitive ecosystems. This is often a vital first step before adaptation strategies can be designed and implemented; and is important in contributing to sound management and policy decisions. Engaging community members and key stakeholders throughout the process creates ownership and encourages participation at all levels.

Improving water security and sanitation in **Kiribati**

BACKGROUND

Kiribati is a small Pacific island nation comprising of 33 coral atolls and isles with an average height of 3 to 4 metres above mean sea level. Its geographic location and economic situation make Kiribati one of the most vulnerable countries to climate change, with sea level rise, coastal erosion, coral bleaching and storm surges already threatening the county's physical existence. A major challenge on the island is insufficient freshwater supplies due to drought, stresses on existing underground wells, salt water intrusion, and contamination from animal and human waste. Over the last 10 years, population numbers have also increased, putting additional demands on the limited water supplies, as well as on the poor sewage and sanitation systems.

ADAPTATION STRATEGIES

To address these challenges the village councils from five Kiribati communities, namely Bonnano, Mauanako, Kaue, St. Patrick and Te Roti, embarked on adaptation projects to rehabilitate their community rainwater catchment and sanitation systems. Rainwater harvesting is a commonly used adaptation technique, which captures rainwater during periods of rainfall and stores it for later use when water is less available. Many rural communities use this technique to improve water supply to households and agriculture fields in the absence of a reliable main water supply.

By improving access to clean water, the projects also helped to increase the communities' capacity to cope with drought and other climate change impacts. Toilet blocks were built in all the communities, each comprising of four toilets and two showers, and overhead water supply tanks of 3,000 litres apiece were also installed. Four 5,000-litre tanks were also linked to rainwater-catchment roofs of the five community centres, or *Maneaba* halls. The halls were also installed with 1.5-kiloWatt solar electricity systems to support community night-time activities, and each now acts as a homework centre. Community members also participated in education and awareness sessions focused on water conservation, good sanitation and hygiene and climate change. The project also encouraged the active participation of community members in the construction of the water and sanitation systems, and provided basic training on their maintenance.

Water tanks installed at the Maneaba Hall

Village leader and community at the opening of the newly constructed facilities

RESULTS AND IMPACT

In total, 28,900 community members including 5,779 children benefited from projects focused on clean water access and sanitation. Before the project, many children did not have access to safe drinking water, and most of children were tasked each morning with fetching water for the family from wells located far distances from their homes. This took time away from their school hours and affected their concentration and learning capacities. With the instillation of the solar panels on the *Maneaba* halls, children can now spend longer hours reading and studying, and more community activities can now take place in the evenings and nights. The community toilets also improved the cleanliness and sanitation of the villages and beaches. This project has improved the quality of life, health and welfare of these Kiribati families.

SPOTLIGHT ON LOCAL CULTURE

In Kiribati, the *Maneaba* is a traditional village leadership system based on community consensus, where everyone contributes to discussion and decision-making. It is a well-established and respected community institution with its own laws and governance systems, and contributes to community cohesion. Village elders play a key role in distributing responsibilities and sharing resources, and within each village *Maneaba*, every family or clan has a particular role or function. This system has played an important role on the small Kiribati islands where land and water resources are limited, as it allows for equal distribution of scarce resources. At the centre of most Kiribati villages is the traditional *Maneaba* hall, which serves as a meeting place for formal and informal matters. The whole community is involved in its construction, and every aspect of the *Maneaba* has a symbolic as well as a practical function.

This indigenous community system played a crucial role in getting support from community members at the start of the project. Consultation meetings were held with the communities at the *Maneaba* halls to explain the project and to get their input into the planning and design. Complex terminology often associated with climate change was broken down into simple local terms, and vulnerability reduction exercises were conducted in local language to ensure that everyone understood the proposed CBA strategies. Village elders also assigned certain tasks to families and community members to ensure that the communities became fully engaged in the project and understood the importance of their commitment and participation. The *Maneaba* system was beneficial in mobilizing the community and sustaining its members' interest and engagement throughout implementation.

Agro-forestry: an effective measure to alleviate land degradation in **Timor-Leste**

BACKGROUND

Timor-Leste is a small country located between the Australia continent and the Indonesian archipelago, which gained independence from Portugal in 1975 and then from Indonesia in 2002. The petroleum and agricultural (coffee) sectors are primary economic earners for this small nation. In Timor-Leste, most of the population lives in rural areas and more than 80 percent are dependent on agriculture for income. However, drought, rainfall variability and bush fires frequently affect their crops and their livelihoods. Many rural farmers also still engage in poor farming practices such as shifting cultivation, slash-and-burn and overgrazing, which degrades the land and exacerbates the challenges from climate change.

ADAPTATION STRATEGIES

The CBA project implemented with the Grupu Komunidade To'os Nain Hadomi Ambiente (GKTHA) community group in 2017 worked with 87 households in the area of Suco (village) Gariuai. The initiatives were focused on agro-forestry and reforestation measures to improve ecosystem efficiency and the associated services linked to agriculture and food security. The GKTHA also held several awareness-building and -training sessions to educate community members on the impacts of deforestation, sustainable agriculture and climate change.

RESULTS AND IMPACT

Thus far, a total of 2.5 hectares of degraded land has been replanted with a variety of forest trees and crops such as candlenut trees, peanut and corn plants. To date, 2,000 candlenut seedlings have been planted and two nurseries established. The candlenut tree is known for its tolerance of high temperatures and infrequent rainfall and is often used as an intercropping species. It also produces fruit several time per year, which has a good market price. The leaves, fruit and wood of the tree are also used in medicine, craft and art.

Farmer harvests crops

Farmer displays his bitter melon crops

Prior to the project, household income generally came from the sale of cassava crops and firewood. Due to the new agro-forestry techniques, more vegetables with shorter growing cycles are being planted such as bitter gourd, eggplant and chillies. These crops can be harvested several times a year and this has increased household incomes from USD30 to USD70 per week. This project also contributes to the objectives of Timor-Leste's National Adaptation Plan, which focuses on food security and agriculture.

SPOTLIGHT ON LOCAL CULTURE

In Timor-Leste the indigenous practice of *Tara Bandu* Law has historically been used to resolve conflict, and is based on the power of public agreement. During formal ceremonies, the community agrees on banning or promoting certain practices, and the ceremony reinforces the community's commitment to abide by the new decisions. *Tara Bandu* also promotes sustainable use and governance of natural resources. Today, NGOs and communities are using these traditions to regulate how agricultural and forest land can be used, to ensure it is farmed in a way that supports people's livelihoods without harming the environment. CBA projects integrated *Tara Bandu* into the project design and implementation with close guidance and support from traditional leaders. This proved beneficial in engaging the community, encouraging participation in communal activities, problem solving and encouraging communication. With *Tara Bandu*, communities can simultaneously honour ancient traditions and ensure their farming is sustainable.

"Now I don't have to wait for my husband to give money, I have my own income. With funds from this project, I can learn, and I know how to grow vegetables properly. Now we can buy food and school supplies for our children. I am very happy now."

Building resilience of coastal communities in **Mauritius**

BACKGROUND

The island of Rodrigues (Republic of Mauritius) is situated in the South-West Indian Ocean. The small volcanic island, surrounded by an extensive reef platform, supports a diversity of habitats and endemic species, and is recognized as global biodiversity hotspot.

The economy of Rodrigues is heavily dependent on agriculture, livestock and fisheries, and more than one third of the workforce is employed in these sectors. However, agriculture on Rodrigues is challenged by a lack of water and by droughts, particularly during the summer months, resulting in poor harvests and unhealthy livestock. During severe droughts, community members must purchase water, further straining already limited household incomes. Fishermen in Rodrigues have also reported that catches of octopus and reef fish have declined by approximately 75 percent over the past 10 years due to anthropogenic and climate change impacts on the surrounding reefs. This has reduced the earnings and affected the livelihood of fishers on Rodrigues.

ADAPTATION STRATEGIES

With these challenges in mind, in 2015 the Shoals Rodrigues Association implemented a CBA funded project with the community of Baie du Nord, a settlement on the north coast of the island, to help fisher-dependent communities on Rodrigues adapt to climate change. Main project activities included the instillation of rainwater-harvesting tanks, livelihood diversification training to reduce the community's dependency on fishing, and the creation of a coastal vulnerability map.

RESULTS AND IMPACT

Rainwater-harvesting tanks with a capacity of 2,000 litres each were installed on the houses of 28 community members, which has reduced their dependence on truck- borne water and increased the amount of water available for their gardens and livestock. Community members are now saving between USD30-USD44 per month on water. Project beneficiaries were also trained in chicken and poultry farming, business and budget management, marketing, and strategic planning

Beneficiary with his chickens

Coastal vulnerability assessment map

as part of the livelihood diversification component of the project. Sixteen families have now started selling eggs, chickens and chicks, which has improved their monthly income. Prior to the project the monthly income per family was USD43, and now it has increased to USD60. The eggs and the chickens also supplement their household food consumption and generates savings. A total of 144 people have benefited from these project interventions to date.

A key project activity also included a coastal vulnerability assessment (CVI) for Baie du Nord and the vicinity to aid coastal zone management and planning. To create the CVI, existing and new GIS data maps were compiled with various layers to highlight topography, coastal landforms, shoreline erosion, slope, infrastructure, and distribution of vegetation, corals, seagrasses and mangroves. The data was used to prepare a series of maps to illustrate the vulnerability of the coast near Baie du Nord to wave impact and sea level rise. The maps showed that mangroves offered coastal protection to low-lying agricultural areas, and that some residential areas and beaches were more vulnerable to sea level rise and erosion due to lack of natural buffers. The results of the CVI GIS-based technique enabled community members to apply their local knowledge about natural resources to the planning process, and increased their understanding of the potential risks of climate change. These activities also made them more aware of and prepared for the impacts of extreme weather events and natural disasters.

"This tank has greatly help me and my family, as before the project I had only four drums of water per month and these [were] usually finished after a week, but now with the water tank I can go up to 20-25 days. Right now it is helping greatly as the domestic water supply has not worked since Cyclone Gelena [which hit Mauritius on 10 February 2019]. [But] the tanks are collecting water each time it rains". *Tolbize Louis Joseph, beneficiary of the water tank*

Policy and replication

A policy brief was also prepared to highlight the CVI study and made key recommendations to the local authorities regarding future infrastructural development work, and underscored the importance of protecting natural buffers such as coral reefs, seagrass beds and mangroves. This work also contributes to the National Integrated Coastal Zone Management Plan for the Rodrigues Island. The CVI method can be adopted by other practitioners by refining the data inputs and adding new datasets (e.g. modelling data for storm waves), and by addressing different types of hazards (e.g. salt water intrusion). The small size of Rodrigues proved to be advantageous in demonstrating these types of techniques, and in implementing strategies to build internal sustainability and resilience to external impacts.

Key project learnings

1 **Local culture**, traditional community systems and village leadership contribute to community cohesion and mobilization. By integrating these systems into CBA project design and implementation, community participation and ownership can increase, improving sustainability of the project. This ensures that traditional knowledge is also incorporated into project design.

2 Project planning must be **participatory and inclusive** to ensure that everyone is meaningfully engaged. This means that often the most vulnerable, whose opinions many times do not count, are proactively brought into the management and decision making process early on. Women, youth, persons with disabilities, the elderly, and other marginalized groups must have a voice and play an active role in these processes.

3 Durable **partnerships** with government officials, private sector, civil society, other UN agencies and international organizations established at the on-set of the projects, and further expanded throughout the project, ensure that interventions will be sustained even after project activities are completed. There must be a clear logical plan to incorporate the benefits of the projects in the longer-term vision and activities of all partners, especially the government.

4 Local-level adaptation projects should be aligned with national plans and policies, and **policy advocacy** should begin from the design stages of the project. The earlier technical experts, policymakers, and government agencies are brought into the project, the easier it will be to influence decision making and secure support for specific policy measures.

Rice harvesting in Cambodia

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