# Building Coastal Resilience for Disaster Risk Reduction and Climate Change Adaptation in Small Island Communities through Green-Grey Infrastructures

## Concepcion, Iloilo, Philippines

FINAL REPORT

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Conservation International Philippines in partnership with the Department of Environment and Natural Resources-Biodiversity Management Bureau (DENR-BMB) and the Local Government Unit of Concepcion in Iloilo Province

*The community partners in the implementation of the Green-Grey Infrastructure Project in Concepcion were:*

The Barangay Councils of Bacjawan Norte, Bagongon, Loong, Tambaliza and Polopiňa

Tigbatas Fisherfolk Organization (TFO) in Barangay Bacjawan Norte

Bagongon Fisherfolks Association (BFA) in Barangay Bagongon

Baskal Operators of Loong Association (BOLA) in Loong with collaborative arrangements with Kusog Sang Mangingisda sa Loong (KUMALO)

Tambaliza Fisherfolk Organization (TASFA) in Barangay Tambaliza

Proper-Pasil Guardian of Marine Protected Area in Barangay Polopiňa

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# ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| ADB | Asian Development Bank |
| AECOM | Architecture, Engineering, Consultancy, Operations & Maintenance |
| AFD | Agence Française de Développement |
| BFA | Bagongon Fisherfolk Association |
| BFAR | Bureau of Fisheries and Aquatic Resources |
| BLGU | Barangay Local Government Unit |
| BOLA | Baskal Operators of Loong Association |
| BZ | Buffer Zone |
| CALABARZON | Cavite, Laguna, Batangas, Quezon |
| CB | Community-Based |
| CB-MPA | Community-Based Marine Protected Area/s |
| CCA | Climate Change Adaptation |
| CCC | Climate Change Commission |
| CCSO | Climate Change Service Office |
| CENRO | Community Environment and Natural Resources Office |
| CFLC | Community Fish Landing Center |
| CIP | Conservation International Philippines |
| COMSCA | Community Managed Savings and Credit Association |
| COP | Community of Practice |
| COVID | Corona Virus Disease |
| CRM | Coastal Resource Management |
| DA RFO6 | Department of Agriculture Regional Field Office 6 |
| DENR | Department of Environment and Natural Resources |
| DILG | Department of Interior and Local Government |
| DRM | Disaster Risk Management |
| DRR | Disaster Risk Reduction |
| DTI | Department of Trade and Industry |
| EAFM | Ecosystems Approach to Fisheries Management |
| EDC | Economic Development Council |
| ERDB | Ecosystems Research and Development Bureau |
| EU | European Union |

| | |
|---|---|
| FEBA | Friends of Ecosystem-Based Adaptation |
| FFEM | Fonds Français pour l'Environnement Mondial |
| FGD | Focused Group Discussion |
| GGI | Green-Grey Infrastructure |
| GIZ | German Agency for International Cooperation |
| I-CODE | Iloilo Code NGOs |
| IUCN | International Union for Conservation of Nature |
| JMC | Joint Memorandum Circular |
| KII | Key Informant Interview |
| KPI | Key Performance Indicator |
| KSPFI | Kahublagan Sang Panimalay Foundation, Inc. |
| KUMALO | Kusog Sang Mangingisda sa Loong |
| LABS | Lactic Acid Bacteria Serum |
| LCCAP | Local Climate Change Action Plan |
| LGU-NGO | Local Government Unit-Non-Government Organization |
| LMMA | Locally Managed Marine Area |
| MDRRMO | Municipal Disaster Risk Reduction and Management Office |
| MENRO | Municipal Environment and Natural Resource Office |
| MEO | Municipal Engineering Office |
| MIMAROPA | Mindoro, Marinduque, Romblon, Palawan |
| MMM | Mangrove Macrobenthos and Management meeting |
| MOV | Means of Verification |
| MPA | Marine Protected Area |
| MPDC | Municipal Planning and Development Officer |
| MTWG | Municipal Technical Working Group |
| NBS | Nature-Based Solutions |
| NEDA | National Economic Development Authority |
| NFR | NGOs for Fisheries Reform |
| NFS | Natural Farming System |
| NGO | Non-Government Organization |
| NTZ | No Take Zone |
| PANAGAT | Pangingisda Natin Gawing Tama |
| PCA | Philippine Coconut Authority |
| PG | Provincial Government |

| | |
|---|---|
| PIUS | Performance Indicator Updating Sheet |
| PMP | Project Monitoring Plan |
| PPP | Public Private Partnership |
| PRC | Philippine Red Cross |
| PROPAGAMPA | Proper-Pasil Guardian of Marine Protected Area |
| PSC | Project Steering Committee |
| RTD | Roundtable Discussion |
| RUZ | Regulated Use Zone |
| SBSTA | Subsidiary Body for Scientific and Technological Advice |
| SILOSFA | Sitio Looc Small Fisherfolks Association |
| SOW | Scope of Work |
| STAG | Scientific and Technical Advisory Group |
| TASFA | Tambaliza Small Fisherfolk Association |
| TEC | Technology Executive Committee |
| TESDA | Technical Education and Skills Development Authority |
| TFO | Tigbatas Fisherfolk Organizations |
| TIP | Technological Institute of the Philippines |
| TNC | The Nature Conservancy |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| UNFCC | United Nations Framework Convention on Climate Change |
| UPVFI | University of the Philippines-Visayas Foundation Incorporated |
| VCA | Value Chain Analysis |
| VCO | Virgin Coconut Oil |
| WESVIARC | Western Visayas Agricultural Research Center |
| WWF | World Wildlife Fund |
| ZSL | Zoological Society of London |

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# EXECUTIVE SUMMARY

The Philippines is highly vulnerable to the impacts of climate change, which include sea level rise, increased frequency of extreme weather events, rising temperatures, and extreme rainfall. This is due to its high exposure to natural hazards (cyclones, landslides, floods, droughts), dependence on climate-sensitive natural resources, and vast coastlines where all its major cities are located and most of the population reside. This exacerbates the increasingly depleting natural and marine resource base that supports livelihoods and provide critical ecosystem services to communities such as shoreline protection, flood control, soil stability, and habitats for biodiversity. Nature-based solutions (NBS) are considered strategic priorities by the government due to its remarkable potentials for enhancing national and local resilience to various climate change impacts.

In line with this, the Fonds Français pour l'Environnement Mondial (FFEM) support projects that strengthen coastal resilience, help coastal communities adapt to climate change, and are replicable and innovative. From November 2015 to June 2022, the agency supported the implementation of the 'Building Coastal Resilience for Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) in small island communities through Green-Grey Infrastructure (GGI) project", in the Municipality of Concepcion in Iloilo Province as it is one of the severely devastated areas by Typhoon Haiyan in the Philippines in 2013. The project aimed to demonstrate the potential for natural systems to adapt to the consequences of climate change and the relevance of setting up grey (classic/traditional engineering) and green (ecosystems conservation) infrastructures to build resilience into coastal territories and communities especially during typhoons.

The project was carried out by Conservation International (CI) Philippines, in partnership with the Department of Environment and Natural Resources (DENR) through the Biodiversity Management Bureau (BMB) and the Local Government of Concepcion in the Province of Iloilo. Formal and informal partnerships were also established with other relevant government agencies, private sector, non-government organizations and community organizations to implement the various components of the project.

To demonstrate the viability of a hybrid green-grey adaptation model for coastal and small island communities in building coastal resilience to impacts of climate change, four (4) project components were implemented. Progress of project implementation was monitored based on the targets identified in the logical framework and achievement of targets were measured against 33 indicators. This Summary presents in brief, the following:

- Accomplishments of the GGI implementation per project component
- Challenges, opportunities, and lessons learned
- Sustainability and replicability of action

## ACCOMPLISHMENTS OF THE GGI IMPLEMENTATION PER PROJECT COMPONENT

### Component 1: Definition and implementation of green-grey infrastructure demonstration projects

To determine specific GGI demonstration sites, a technical feasibility study was conducted to assess the vulnerabilities and potential application of GGI in seven (7) barangays in

Concepcion. Results of the study were presented to stakeholder consultations and inputs. From these processes, four (4) sites were finally selected for GGI implementation, and these were Bacjawan Norte, Bagongon, Loong and Tambaliza. A 5th site, Polopiňa, was included for implementation of green solutions only but was considered because of its expected role to support GGI implementation in the other selected sites and its potential to contribute to the overall objective of building coastal resiliency in Concepcion.

To set the stage for GGI implementation in these demonstration sites, simultaneous activities were undertaken. Project endorsements were secured from different concerned government agencies at the national and regional levels and from the Municipal Government of Concepcion. On a finer scale, Barangay Resolutions, which approved the implementation of the GGI project in each of the demonstration sites were secured. Other necessary formal and informal partnerships developed with the academe, private sector and relevant NGOs also fall under Project Component 1. CI engaged with various organizations from national and local government as well as the private sector to provide technical and co-financing support for the green-grey concept design development and actual implementation of green-grey solutions projects in Concepcion, Iloilo.

For each of the project site, particular vulnerability issues were identified, technical design of green-grey solutions and plans to address the issues were developed with the local government units and communities, a community partner was identified, and necessary capacity building programs were identified and provided to make the communities able partners in project implementation. Ten (10) general technical training programs were provided to partner communities and local governments that empowered a total of 1,399 participants on GGI, disaster risk reduction (DRR), climate change adaptation (CCA) and coastal resource management (CRM). Basic DRR equipment and supplies support were also provided to two (2) sites – Bagongon and Tambaliza. Among the results of these training programs were the development of Barangay Disaster Risk Reduction Management Plans, which included CCA in the five (5) project sites and the establishment of networks of community emergency response volunteers in two sites to support the Barangay Local Government during emergencies.

Site-level accomplishments of GGI implementation are presented below:

Bagongon

The GGI project in Bagongon was implemented through the community organization, Bagongon Fisherfolk Association (BFA). The issue in Bagongon was the need to facilitate sediment accumulation to provide substrate for mangrove planting as well provide supplemental protection to households and ecosystems exposed to harsh coastal conditions during extreme weather events. As grey solutions to building coastal resiliency, eight (8) wave attenuation fences with a total length of 1,145 meters, five (5) sediment trapping fences spanning 895 meters and two (2) 75-meter low-crest permeable breakwaters were installed near the coast of Bagongon. These structures were installed to break the waves and reduce their energy, promote sediment accumulation in the mangrove rehabilitation area where seedlings would be planted, and provide supplemental coastal protection to the households located along the coast This was complemented by the green solution to coastal vulnerability, which was the rehabilitation and enrichment of eleven (11) hectares of mangrove area by planting 110.363 seedlings. The establishment of a 769.7-hectare community-based marine protected area (CB-MPA) was also supported by the project as part of the green solution in Bagongon through the: (1) review and updating of the MPA Management Plan for 2021-2025; (2) provision of basic equipment and supplies for effective MPA enforcement ad

patrolling; (3) installation of MPA marker buoys to delineate the MPA boundaries and MPA signages to increase awareness and support; and (3) provision of capacity-building support through trainings and facilitation of community-based MPA plan formulation.

## Tambaliza

The community partner in implementing the GGI Project in Tambaliza was the Tambaliza Small Fisherfolk Organization (TASFA). The selected mangrove rehabilitation area in Tambaliza was the abandoned fishponds where some mangroves had grown. But the issue was the flow of water between the ocean and this mangrove rehabilitation area was impeded by the old berm of the fishponds and the concrete 54-meter concrete footwalk with a single culvert opening that cut across the mangrove stands. For the grey solutions to increasing resiliency of mangrove ecosystem and coastal communities, the berm on the seaward side was removed and four culvert boxes were installed in the footwalk. These grey solutions established the hydrologic connections between the ocean and the abandoned fishponds that are critical to the survival of the existing mangrove stands in this rehabilitation area and the mangrove seedlings that would be planted as part of the GGI project.

The grey solutions in Tambaliza were complemented by mangrove enrichment planting in a 2-hectare rehabilitation area in Sitio Punting that utilized 36,000 seedlings. The planted mangroves were intended to provide a natural buffer and decrease impact of strong wind waves and storm surge. Another green solution was the restoration of the 17-hectare Mangrove Eco- Park in Sitio Banban to ensure the protection of the existing mangroves. This is part of the Community-Based Ecotourism Initiative that TASFA and the Barangay Government of Tambaliza have been envisioning for Tambaliza. As part of the Ecopark initiatives, TASFA also established two (2) mangrove nurseries in Sitio Banban to ensure a reliable source of mangrove seedlings for enrichment planting by tourists at the ecopark and replacement planting in Sitio Punting mangrove rehabilitation area.

## Loong

In Loong, the GGI project was implemented with the Baskal Operators of Loong Association (BOLA), which engaged some members of another community organization, the Kusog Sang Mangingisda sa Loong (KUMALO), in some undertakings. Loong has few remaining mangrove stands and these, together with households and livelihoods, are exposed to coastal hazards. As grey solutions to building coastal resiliency to climate change and disaster risks, permeable living breakwaters were installed in two sites in Loong – 100 meters for Purok Malipayon (Site 1) and 80 meters for Purok Mabinuligon (Site 2). The breakwaters were meant to facilitate sediment accumulation to favor mangrove planting and rehabilitation of degraded mangrove area. They were also installed to provide the community of food and livelihood from the gathering and selling of local oysters that colonized the breakwaters. This was supplemented with the green solution, which was the rehabilitation of 2 hectares of degraded mangrove area by planting 20,000 seedlings. The establishment of a 147.3-hectare community-based marine protected area (CB-MPA) was also part of the green solution and the GGI project support came in the following forms: (1) review and updating of the MPA Management Plan for 2021-2025; (2) provision of basic equipment and supplies for effective MPA enforcement ad patrolling; (3) installation of MPA marker buoys to delineate the MPA boundaries and MPA signages to increase awareness and support; and (3) provision of

capacity-building support through trainings and facilitation of community-based MPA plan formulation.

Bacjawan Norte

The GGI project in Bacjawan Norte was implemented in partnership with the Tigbatas Fisherfolk Organization (TFO). Here, mangrove trees are only in patches and cannot serve as barriers to strong waves and storm surges. As the grey solution to increasing climate resiliency, a 108-meter permeable living breakwater was established in Bacjawan Norte. The breakwater was installed to reduce wave energy, facilitate sediment accumulation to provide a substrate for mangrove planting, and as aid to natural shell colonization. This was matched with green solution, which was the rehabilitation of 2.5 hectares of degraded mangrove area by planting 25,000 seedlings. The planting was made possible by the accumulation of sediment brought about by the installation of breakwater. Months after, the breakwater has been colonized by local oysters and other shellfish and has become a source of supplemental food and income of the local communities.

Polopiña

The GGI project implementation in Concepcion, Iloilo targeted 3-4 sites. The 4 sites have been covered through GGI implementation in Bagongon, Bacjawan Norte, Loong and Tambaliza. The project implementation in Polopiña differed from the other four sites in that it did not include grey solutions. Polopiña was selected as a 5th site to support the implementation of green solutions in 3 GGI project sites, particularly as a source of seedlings for mangrove rehabilitation. In view of this, CI Philippines partnered with the Proper-Pasil Guardian of Marine Protected Area (PROPAGAMPA) and achieved two things:

(1) Supported PROPAGAMPA in the establishment of a mangrove nursery in Polopiña which resulted in the production of 57,900 seedlings that were used in mangrove rehabilitation and enrichment planting in Loong and Tambaliza
(2) Supported PROPAGAMPA in contributing to the green solution to building coastal resiliency in Concepcion through the planting of 30,000 seedlings in 2.84 -hectare degraded mangrove area in Polopiña. The seedlings that were planted were raised by PROPAGAMPA in the mangrove nursery that was established by the GGI project.

The establishment of a 147.3-hectare community-based marine protected area (CB-MPA) was also supported by the project through the: (1) review and updating of the MPA Management Plan for 2021-2025; (2) provision of basic equipment and supplies for effective MPA enforcement ad patrolling; (3) installation of MPA marker buoys to delineate the MPA boundaries and MPA signages to increase awareness and support; and (3) provision of capacity-building support through trainings and facilitation of community-based MPA plan formulation.

## Component 2: Implementation of a programme for the development of alternative and sustainable subsistence resources

Support to livelihood development in GGI project sites were provided to community partners as incentive to their participation and direct implementation of the GGI projects in their localities. Livelihoods assessments and Value Chain Analysis workshop were conducted to analyze the community capacities for livelihood development, determine specific livelihood program appropriate for each community partner, and determine needs for capacity development. Based on the selected livelihood for development and gaps in

community capacities, training programs were developed and administered. A total of 1,865 participants benefitted from the training on entrepreneurship and organizational development, business plan formulation, and business management. For Bagongon, an additional training on community-managed savings and credit was necessary and was provided.

Highlights of the six (6) livelihood projects developed for partner communities are presented below:

Bagongon

The production of coconut-based products such as coco coir geonet and other products, and the production of virgin coconut oil (VCO) as liniment and ointment were established as livelihoods projects in Bagongon. BFA was provided with grants for basic equipment and materials for coco-coir production, construction of coco-based processing center, revolving funds for livelihoods operations and, technical capacity building and mentoring support. Community-Managed Savings and Credit Association (CoMSCA) groups were also established in Bagongon to encourage the community to regularly put aside savings from the income from the livelihood projects and provide a community-based simple savings and loan facilities to community members where access to finance is difficult. Part of the income is set aside as Environment Fund for the maintenance of the Green-Grey Infrastructure.

Tambaliza

Two (2) livelihood projects were established in Tambaliza – the Natural Farming System (NFS) for vegetable production in Sitio Punting, and the establishment of Community Mangrove Ecotourism with Boardwalk in the Mangrove Ecopark located in Sitio Banban. Provided to TASFA were basic supplies and materials needed for natural farming and construction of mangrove boardwalk and retrofitting of the exhibit area, as well as revolving funds for livelihoods operations and technical capacity building and mentoring support.

Loong

A livelihood on squid processing and production of squid-based goods, such as dried squids and bottled squid in different bases and flavors were established in Loong. Equipment and raw materials, retrofitting of the Community-Fish Landing Center as processing facility for squid-based products, revolving capital and technical capacity building and mentoring support were provided to BOLA.

Bacjawan Norte

An organic native chicken production project was established in Bacjawan Norte. This is to provide a sustainable source of native chicken for Bacjawan Norte and to bridge the gap in native chicken production in Concepcion. The project aimed to produce organic live chicken and poultry meat and native chicks and eggs. To support the native chicken production, TFO was provided with basic equipment and materials, funds for construction of chicken coops and incubation house, and support for technical capacity building and mentoring.

Polopiňa

Garments production was established as the livelihoods project in Polopiňa. The training for garments-making was done in partnership with the Technical Education and Skills Development Authority (TESDA). To support the garments production, the GGI project provided basic equipment and materials including a solar power system to operate the sewing machines, and technical capacity building and mentoring. This livelihood initially targeted public grade and high schools in Concepcion, Iloilo. In view of the limitations brought about by COVID-19 pandemic to face-to-face classroom sessions, PROPAGAMPA shifted to producing face masks, cook's hats and towels, and house garments

Component 3: Promotion of green-grey infrastructures at local, national and global level

The project promoted and advanced the adoption and implementation of green-grey infrastructure on three levels: (1) at the local level in Northern Iloilo and Panay; (2) at the national level especially in other small islands where there are existing projects that aim to address climate change challenges and restore and protect marine and coastal biodiversity; and (3) globally through networks to reinforce resilience to climate change and the protection of ecosystems in tropical areas.

At the local level, technical assistance in updating Local Climate Change Action Plan (LCCAP) was provided to the Municipalities of Carles and Concepcion. The assistance identified gaps and limitations in the LGUs' current LCCAP as well as possible solutions to address them. It was also to ensure that nature-based solutions such as ecosystem-based adaptation (EBA) and green-grey solutions were considered in the updated LCCAP.

Across the Philippines, eleven (11) Concept Designs for GGIs for potential expansion sites were developed in partnership AECOM and 11 cities and municipalities experiencing climate-related vulnerability issues. These concept designs include Letters of Intent signed by the mayors of these LGUs. These can be used by the LGUs for communicating with potential funders, soliciting technical support from partner organizations, and for LGU budget allocation to implement the projects. Through this exercise of developing the GGI concepts, the formation of the local Community of Practice on Green-Grey in the Philippines was initiated with the 11 assisted LGUs considered as initial members. Though this is an informal arrangement, the local Community of Practice can provide an avenue for these LGUs to continue coordinating and learning from each other on green-grey project journey.

Knowledge products such as factsheets, posters, videos, and the published Practical Guide on Green-Grey Infrastructure were also developed and distributed to concerned stakeholders such as government agencies, local governments, academic institutions, and communities. Green-Grey concept and project experiences were also shared through radio interviews and news articles.

Green-Grey specific webpage was established to raise awareness on and understanding of the green-grey concepts and its benefit. The webpage was developed to connect with a general audience including government, donors and private sector organizations who can be prospective advocates and partners of CI in advancing green-grey infrastructure solutions.

Technical seminars on Green-Grey Infrastructures were also conducted for Panay and the Verde Island Passage – a passage that encompasses 5 provinces - participants to raise awareness, improve understanding, and initiate a community of practice among the

participants on the use of green-grey solutions to address environmental and climate change adaptation challenges in the country. Green-Grey Infrastructure including the experiences in Concepcion, Iloilo were also shared through mini-seminars organized by other organizations and agencies to promote GGI and advance GGI to other stakeholders such private sectors and other civil society organizations at the regional and national levels. Technical and policy discussions on Green-Grey were also conducted to develop and expand partnerships with stakeholders and encourage policy support and financing for green-grey initiatives. Green-grey infrastructure including the experiences in Concepcion, Iloilo were also featured in news articles and radio interviews as well as postings in social media such as Facebook.

At the international level, Conservation International along with AECOM and the Friends of Ecosystem-Based Adaptation (FEBA) initiated the formation of the Global Green-Grey Community of Practice (COP). The COP is a venue to ensure that the experiences and lessons learned from the project are shared with other stakeholders to help improve implementation of future projects. Here, CI was able to contribute to the global body of knowledge on GGI implementation by sharing experiences, challenges and lessons learned in project implementation in Concepcion, Iloilo, Philippines.

### Component 4: The management, coordination, monitoring and assessment of the project

To provide guidance in the implementation of the GGI project and a platform for updating on the progress of the project, institutional mechanisms were set up. These were the steering committees at the national and regional levels whose members were relevant government agencies. However, the most useful to project implementation was the established LGU-NGO Coordination Group, which served as the local steering committee of the GGI Project. It was composed of representatives from LGU Concepcion (Municipal Planning and Development Office, Municipal Coastal Resource Management Office, Municipal Disaster Risk Reduction Office), non-government organizations implementing DRR-CCA projects in Concepcion, barangay officials and people's organization from the final project sites, and Environment and Natural Resource Office. It ensured that DRR-CCA efforts in the Municipality of Concepcion were well-coordinated, resources were maximized and shared, and NGO DRR-CCA initiatives complemented each other.

To track the progress of the project in terms of achieving its commitments, the logical framework was referenced. CI Philippines defined the targets in each project component based on the GGI Project Document and the 33 indicators in the logical framework. Of 33 targets, 20 were exceeded, 5 were met and 7 were adjusted as in view of conditions on the ground and as part of adaptive project management.

## CHALLENGES, OPPORTUNITIES AND LESSONS LEARNED

The project experienced various challenges in its 6 years of implementation. The logistical preparation and arrangement to establish green-grey infrastructures in coastal areas and small island settings posed a number of challenges to the project. The occurrence of squalls, extremely strong monsoon winds and gale force winds hampered travel to and from the island. These disrupted project activities such as delivery of construction materials and construction of grey infrastructure. It has also increased difficulty of accessing activity locations and/or mobilizing local participation. To address this, the project team grabbed opportunities to conduct activities in the islands on days or weeks, when the weather was favorable for sea travel and activities on the coasts.

The COVID-19 pandemic also impacted the project. The restriction of movement and mass gatherings disrupted project activities, such as trainings, livelihoods related activities, and green-grey implementation. Most of the activities were conducted in smaller groups and had considered measures to ensure safety of staff and community partners. It also delayed the review and approval of municipal and barangay policies relevant to the project.

Limited awareness and understanding of climate change and inadequate community organizational capacities were also key challenges. More investment in time and resources on continuous capacity building through trainings and mentoring were required by the project to capacitate the community partners in implementing the green-grey and livelihoods projects. However, not all capacity building can be done through training. Improving adaptive capacities and building resilience necessitate institutionalizing change and nurturing a culture of learning within communities and institutions.

Ownership of the project, support from the local government and national government agencies and the preparedness of the community to engage in the project were required for a successful GGI project. The formation of a multidisciplinary GGI team was also important to clearly define the issue that the green-grey infrastructure solution intended to address and develop with community inputs the initial design concepts to meet the project goals. There is no "one size fits all" solution. Therefore, it is vital to rely on the appropriate professional expertise and experience when it comes to project design and actual implementation.

Various actors have the potential to influence the adoption and implementation of GGI projects and policies (such as politicians, decision-makers, planners, scientists or technical advisors, potential investors, donors, etc). These stakeholders need to be fully convinced of the benefits of implementing a GGI approach, so they can ensure its viability, effectiveness, and sustainability. Thus, it was necessary to provide other stakeholders such as national government agencies and other civil society organizations with a convincing business case that presents the justification for the GGI project or GGI policy. Presenting a compelling business case for advancing GGI is needed to catalyze a paradigm shift in development towards GGI solution and to ensure financial sustainability and maintenance of GGI initiatives beyond project life.

Demonstrating immediate social, environmental, and economic outcomes from the grey structures established and ecosystems conserved and/or restored was also challenging. Most of the outcomes cannot be measured within the lifespan of the GGI project as these benefits can only be demonstrated over longer period. It should be put into context that resilience building, and the adaptive capacity of communities and institutions are often measured in terms of decades and not in project cycles. So, while the project ended, CI and the partners recognized that the adaptive capacity building process should be an ongoing process and thus should go beyond the project end date.

Monitoring of both living ecosystems and grey infrastructure is integral to ensure GGI project function and longevity. A Monitoring and Evaluation Framework is necessary measure and evaluate the project's intended and unintended outcomes from the combined green and grey solutions. However, the Monitoring, and Evaluation Framework specifically for an innovative approach such as GGI is not yet in place although there are some tools available that can be used. The GGI Community of Practice has plans to develop a GGI Monitoring and Evaluation Framework. The development of this framework will be useful to document and understand the strengths and weaknesses of GGI implemented projects, to inform future green-grey project design and implementation, catalyze further investments in GGI and support its broader adoption.

Despite the challenges experienced by the project, the overall results were encouraging and showed the viability of green-grey infrastructure combined with other adaptation solutions to increase the resilience of communities and ecosystems. Potential for application of GGI to other ecosystems and context and scaling up is immense. Stakeholder interests and support have been motivating.

Thus, the lessons learned from the project can contribute to improving the implementation of similar projects in the future, not only in the Philippines but globally. In fact, the experiences in GGI implementation in Concepcion are already embodied in the published Practical Guide to Implementing Green-Grey Infrastructure.

## SUSTAINABILITY AND REPLICABILITY OF ACTION

In 2021, CI Philippines signed with the Mayor of the Municipality of Concepcion, concerned Barangay Captains of the Barangay Councils, and partner Community Organizations, five (5) Conservation Agreements, one for each GGI project site. These agreements define the roles of each party in the implementation and the 5-year sustainability and maintenance of the GGI solutions in project sites. Linkages were also established with regional government offices in Western Visayas, the University of the Philippines-Visayas, and other technical service providers to ensure continued support to the partner communities.

The Local government of Concepcion is at the forefront of promoting the good results of the GGI project. These results can already be utilized in leveraging further support from other government agencies, funding institutions, and would-be partners in the academe and private sector to sustain and expand ecosystem-based adaptation to increase coastal resiliency.

Promotion and awareness of GGI work were conducted primarily to encourage integration and adoption of GGI in development projects by various sectors at all levels. The tools, experiences, and techniques in the Practical Guide to Implementing Green-Grey Infrastructure[1] were consolidated to leverage near-term investments to fundamentally shift the practice of civil engineering and construction towards designing and building with nature, using a hybrid green-grey infrastructure approach, that provides benefits of biodiversity and community climate adaptation. The Practical Guide was intended as a tool for education and outreach, resource for selecting, designing, and implementing green-grey infrastructure projects, and for use by a broad and diverse audience.

As part of scaling up of GGI initiatives in the Philippines, the 11 GGI concepts for 11 vulnerable cities and municipalities in different parts of the country that included signed Letters of Intent by local executives would be a good start. in the concept development. These concepts identified vulnerabilities in these localities that can be addressed by GGI solutions and are packaged for dissemination and communication to potential donors and supporting partners. These are also useful basis for local government budget allocation. In the course of developing the GGI concepts, the formation of Philippine GGI Community of Practice was initiated.

[1] Green-Grey Community of Practice (2020). Practical Guide to Implementing Green Grey Infrastructure. 158 p.

# CHAPTER 1. INTRODUCTION

The Philippines is highly vulnerable to the impacts of climate change, which include sea level rise, increased frequency of extreme weather events, rising temperatures, and extreme rainfall. This is due to its high exposure to natural hazards (cyclones, landslides, floods, droughts), dependence on climate-sensitive natural resources, and vast coastlines where major cities are located and most of the population reside.

It has a rich yet increasingly depleting natural and marine resource base that supports livelihoods through fisheries, agriculture, forestry, energy, mining, and tourism. These resources also provide critical ecosystem services to communities such as shoreline protection, flood control, soil stability, and habitats for biodiversity.

Considering the country's significant vulnerabilities, disaster risk management (DRM) and climate change adaptation (CCA), which includes nature-based solutions (NBS), are strategic priorities for the country. Nature-based solutions are recognized to have remarkable potentials for enhancing national and local resilience to numerous climate change impacts. The significance of NBS was even tacitly referenced in the country's recently submitted Nationally Determined Contributions (NDC) on 15 April 2021 to the United Framework Convention on Climate Change (UNFCCC). Under this self-determined pledge, the Philippines commits to uphold "the importance of ensuring ecosystems integrity and promoting the country's obligations on human rights and the rights of its indigenous peoples.[2]" This is in recognition that these solutions do not just involve ecosystems and biodiversity, but also local communities and their well-being.

The Fonds Français pour l'Environnement Mondial (FFEM) promotes innovation that targets environmental protection and sustainable development in developing countries. It encourages innovative initiatives and pilot projects that respond to global environment challenges and aim for environmental, social, and economic benefits. Its objective is to test solutions and learn lessons from them, and then to facilitate their dissemination and deployment in other places and/or on a broader scale. The distinctive features of the FFEM are innovation and replicability of action.

For years, the FFEM has been supporting projects that specifically strengthen coastal resilience and help coastal communities adapt to climate change. From November 2015 to June 2022, it supported the implementation of the 'Building Coastal Resilience for Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) in small island communities through Green-Grey Infrastructure project", to develop and demonstrate innovative adaptation solutions through hybrid green and grey infrastructure to strengthen the resilience of coastal communities. The project was carried out by Conservation International Philippines, in partnership with the Department of Environment and Natural Resources (DENR) through the Biodiversity Management Bureau (BMB) and the Local Government of Concepcion in the Province of Iloilo.

The Municipality of Concepcion was particularly selected for piloting green-grey infrastructure project because: (1) it was among the areas in the Philippines hardest hit by Super Typhoon Haiyan in 2013; (2) it is similar to many small island communities in the Philippines that has poorly developed and inadequate infrastructure, limited economic resources, and generally low capacity to adapt to climate change; (3) most of its population are highly dependent on natural and marine resources to meet their daily needs and these

[2] National Determined Contribution Communicated by the Republic of the Philippines to the United Nations Framework Convention on Climate Change (UNFCCC) on 15 April 2021

resources are being affected by climate change, e.g., coral reef bleaching and changing fish migration patterns due to sea temperature changes have affected fish catches; and 4) the local government is proactive and the community support for this type of project is strong.

The Local Government of Concepcion (LG-Concepcion) has long recognized the importance of protecting and rehabilitating its natural resources particularly its coastal resources. It has been actively implementing its Coastal Resource Management (CRM) Plan even prior to the devastation of Typhoon Haiyan. In 2018, the LG-Concepcion has leveled-up its CRM Plan and formulated and adopted the Ecosystem-Based Approach to Fisheries Management (EAFM)[3] Plan. It has established and is supporting 15 Marine Protected Areas in Concepcion. These were designed by the LGU and communities not only to achieve fisheries and biodiversity objectives but also to hopefully address climate change challenges. They also actively work with non-government organizations to ensure the sustainability of their coastal environment and resources. They also supplemented resources from the Provincial and National Government to implement plans and projects on ecological solid waste management, mangrove, and watershed rehabilitation.

It has also been vastly improving its capacities on disaster risk reduction (DRR) and climate change adaptation after Typhoon Haiyan through its own resources and through the support of the Provincial and National Government, as a well as, non-government and private sector organizations who have aided during the Typhoon Haiyan rehabilitation phase[4] in Concepcion It has invested in training its LGU personnel in the Municipal Disaster Risk Reduction and Management Office (MDRRMO) to enhance its DRR-CCA capacities[5]. Some LGU resources are allocated to improve facilities and infrastructure[6] to address disaster risk and climate change challenges.

With the funding support from FFEM, Conservation International Philippines (CIP) and its partners brought innovative green-grey adaptation solutions to selected highly vulnerable communities in Concepcion that were impacted by Typhoon Haiyan. In close consultation with the local governments, both at municipal and barangay levels, and communities, CI designed green-grey solutions that combined natural ecosystem restoration and traditional engineering practices and innovations to provide protection for communities, biodiversity, and critical coastal ecosystems. To implement these designs, CI established partnerships with the local government units, relevant national agencies, community-based organizations in the project sites and other concerned non-government groups.

This Final Report highlights the project's accomplishments; presents lessons learned during project implementation; and provides recommendations for scaling up green-grey solutions. It is structured around an Executive Summary and the following seven (7) chapters:

[3] The Plan covers a period of five years (5) from 2018 to 2022 which programs, strategies and activities are necessary to maintain the coastal resources that are of ecological and economic importance in the municipality of Concepcion for sustainable use and protection. It includes the following management programs: Management Zones/Zonation, Governance, Coastal and Marine Habitat Management, Coastal Law Enforcement, Climate Change Adaptation and DRRM, Sustainable Fisheries Management, Sustainable Livelihood ad Solid Waste Management.

[4] This phase was from 2016-2018.

[5] MDRRMO and key LGU personnel have been trained on emergency response, community-based DRRM, water search and rescue, first aid and basic life support, DRR-CCA concepts, integrating DRR-CCA governance especially in community-based disaster preparedness, and contingency planning using Participatory Capacity Vulnerability Analysis (PCVA)

[6] The LGU has invested on flood control, drainage systems and riprap and slope protection and shoreline protection, storm surge barriers/mitigation structures, disaster risk assessment, early warning systems, DRR and Communication Equipment and evacuation centers

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2. The Project Site
3. Project Purpose and Content
4. Project Approach
5. Project Accomplishments.
6. Challenges, Opportunities, and Lessons Learned
7. Scaling Up Green-Grey

# CHAPTER 2. THE PROJECT SITE

Concepcion is a third class coastal municipality in the province of Iloilo, which is in the center of the Philippine Archipelago in the western portion of the Visayan Sea. It is located on the north-eastern part of Panay Island[7] (known as the mainland), together with some 16 other smaller, associated islands. It is bounded on the north by the municipality of San Dionisio, in the south by the municipality of Ajuy, in the west by the municipality of Sara, and in the east by the Visayan Sea (Figure 1). It has a total land area of 9,702.04 hectares. It is politically subdivided into twenty-five (25) villages or barangays[8], eleven (11) of which are island barangays, and fourteen (14) are on the mainland (Panay Island).

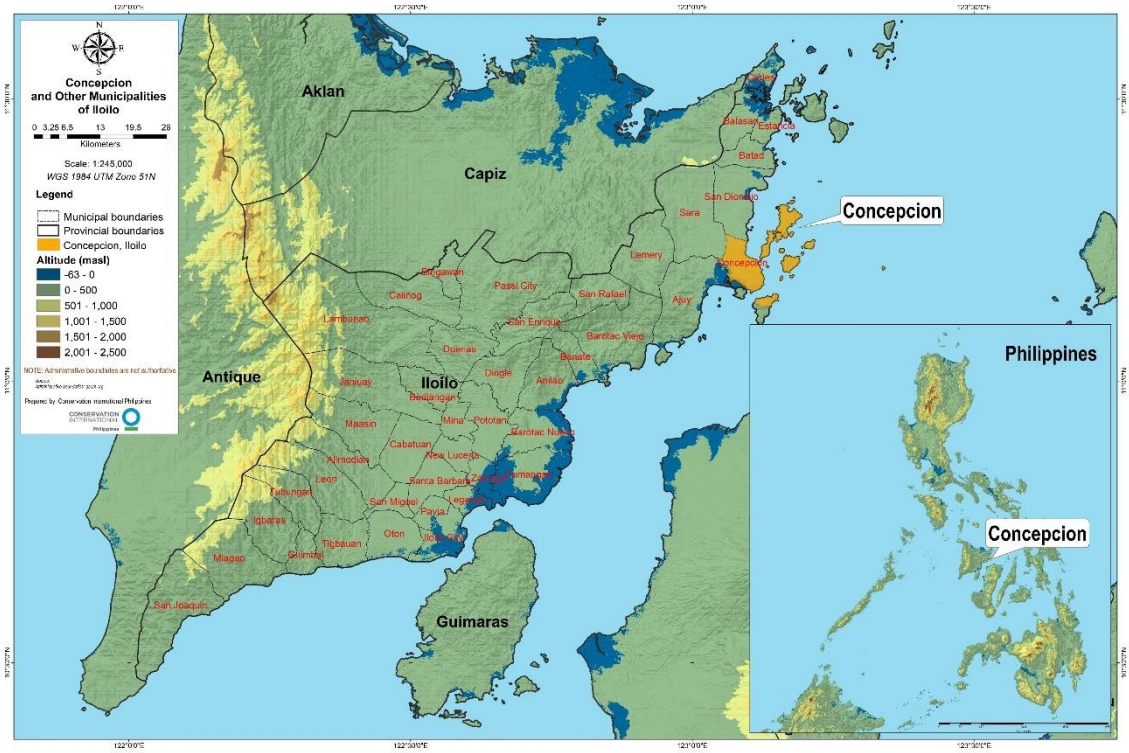



Figure 1. Map of Panay Island showing the location of Concepcion, Iloilo

According to the 2020 Philippine Census, Concepcion has a population of 44,663 with a density of 520 inhabitants per square kilometer. The primary economic activities are fishing and farming. Its vast territorial waters (96,481.56 hectares) constitute 20% of the coastal and marine waters of the Visayan Sea, which is considered as one of the country's most prolific fishing grounds.

Typhoon Haiyan (known locally as Typhoon Yolanda) with sustained winds of 295 kph, gusts as strong as 360 kph, made landfall in the Philippines in November 2013 and caused more than 6,000 deaths, affected 16 million people, and caused devastation across wide areas of

[7] The island of Panay belongs to the Western Visayas Region in central Philippines and is divided into five provinces, namely Aklan, Antique, Capiz, and Iloilo and Guimaras.

[8] A barangay is the smallest administrative division in the Philippines and is the native Filipino term for a village, district, or ward. In metropolitan areas, the term often refers to an inner-city neighborhood, a suburb, or a suburban neighborhood.

the Central Philippines – particularly the Eastern Central and Western Visayas Regions. In the municipality of Concepcion, a total of 8,426 houses were damaged and around 9,088 families were affected. Based on testimonies of residents in Concepcion, they experienced storm surges and wind waves reaching up to six (6) meters which washed away most of the houses and livelihoods. It also significantly damaged the marine habitats especially the mangroves and coral reefs which negatively affected Concepcion bay's fisheries productivity.

In 2016-2017, CI Philippines conducted a Participatory Capacities and Vulnerability Assessment[9] (PCVA) with the barangay local governments and communities in the prospective sites for GGI project implementation. Results showed commonly high vulnerability to climate change and coastal hazards as described below:

- Communities are plagued by successive and simultaneous natural hazards, which include typhoons, storm surges, wind waves and more intense monsoon winds.
- Natural coastal barriers, such as coral reefs, mangroves and even beach forests are degraded due to natural hazards and human activities. Most have been massively cleared to give way for livelihoods, coastal settlements, and boat docking. These increased the exposure of communities located along the coasts to coastal hazards.
- Communities and the barangay governments have limited understanding and awareness on climate change, its impacts, and strategies to mitigate/address its impacts.
- There is low capacity to respond to disasters or address their impacts. The barangays, especially in the small islands, have no or limited infrastructures for disaster risk reduction and climate change adaptation (DRR-CCA), such as weather and climate forecasting, early warning systems, nature-based solutions to climate change, livelihoods diversification. There is also a limited to no knowledge and skills on DRR-CCA on the part of the community members. The Barangay Disaster Risk Reduction and Management Councils are reactive as they are formed or revitalized only in actual disaster and not during disaster preparedness.
- The general area of human settlements in the project sites are in danger zones (near shoreline or riverbanks) where risk to storm surge, floods, and strong winds are much higher. In times of extreme events, the housing units which are generally made of light materials have no capacity to withstand the hazard.
- The most proximate mainland community has traditionally extended assistance to the small islands as manifested in coordination of relief efforts and the lending of equipment for search and rescue operations. This can, at times, be affected by political loyalties of those in power. A more programmed and institutionalized system of support will avoid capture of disaster work by political motives.

Moreover, the high vulnerability of small island communities contributes significantly to the following conditions:

- Community members attest to decrease in household income and food security mostly during the rainy/monsoon months when fishing activities are not possible.
- Most households have no savings and there is an increased dependence on informal credit facilities, under usurious arrangements

Results of the PCVA served as among inputs to the conduct of a technical feasibility study to evaluate sites for potential implementation of GGI. The study evaluated seven (7) proposed sites and results were subjected to stakeholder consultations. From seven (7) sites, four (4) sites for green-grey solutions were selected, i.e., Bagongon, Tambaliza, Loong and Bacjawan Norte (Figure 2). A 5th site, Polopiňa, was considered for implementation of green solutions only.

[9] The project conducted a Participatory Capacities and Vulnerabilities Assessment in 2016-17 which was also utilized as part of the Technical Feasibility Assessment study. This was reported in the 2nd Annual Report (2017) and 3rd Annual Report (2018).

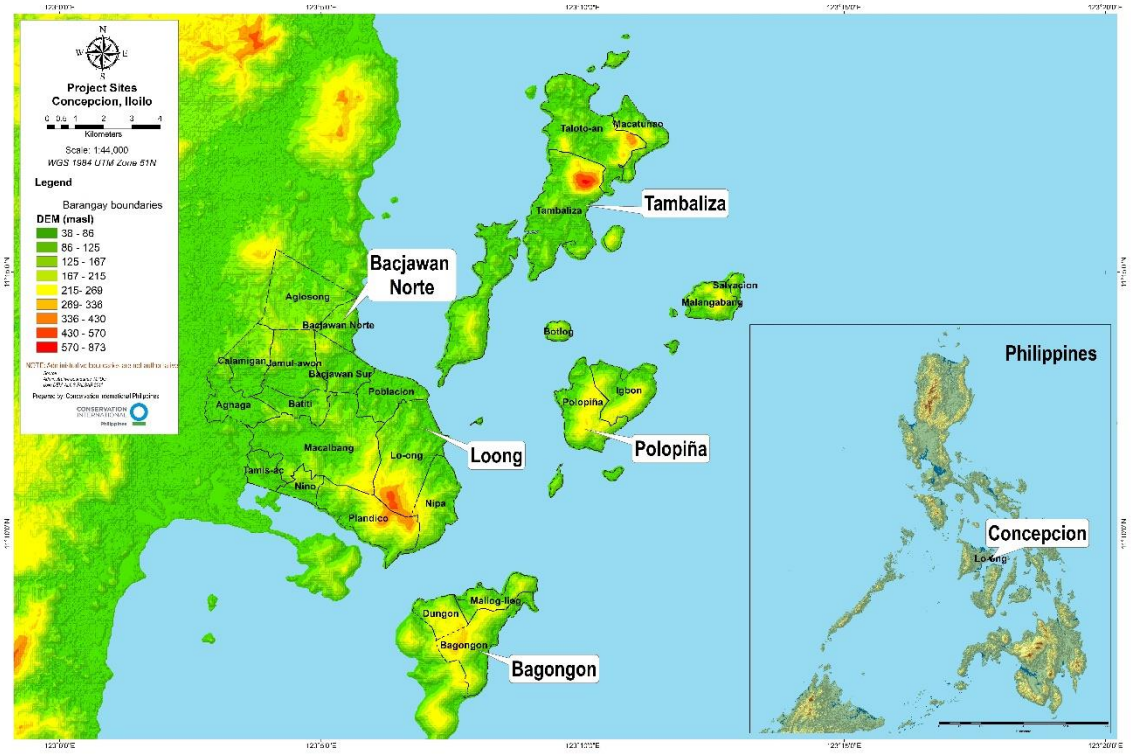



**Figure 2.** Map of Concepcion, Iloilo showing the 5 project sites

These sites aimed not only to build climate resilience for vulnerable communities but also to provide demonstrations for the relevance of GGI approaches to building climate resilience for potential application in other vulnerable areas in the Philippines.

The reasons for selecting the project sites for green-grey solutions in Concepcion are summarized in **Table 1**.

**Table 1.** Selected GGI project sites in Concepcion, Iloilo, and rationale for selection

| Barangay/Village | Vulnerability | Mitigation Potential |
|---|---|---|
| Bagongon | • Majority of households and structures located along the coast<br>• Exposed to open seas and defenseless to coastal hazards such as storm surge and monsoon winds and waves<br>• Households are highly dependent on fishing<br>• Long distance from mainland Concepcion and often isolated during extreme weather events | • High mangrove restoration potential along the seafront area<br>• Strong potential for engineering structure such as breakwater or sediment traps to restore sediments<br>• Historical mangrove cover that used to protect community |
| Tambaliza | • Majority of households and structures located in a cove near the coast<br>• Exposed to coastal hazards such as storm surge and monsoon winds and waves<br>• Households are highly dependent on fishing | • High mangrove restoration potential in abandoned pond and in the cover<br>• Strong potential for restoring water flow in mangrove area to ensure survival of mangroves |

| | | |
|---|---|---|
| | • Extensive coastal erosion<br>• Extensive coral damage | |
| Bacjawan Norte | • Exposed to open seas and defenseless to coastal hazards such as storm surge and monsoon winds and waves due to physical location and position in the Bay<br>• Significant coastal erosion | • Potential for mangrove restoration potential<br>• Potential for living breakwater/oyster reef that act as additional coastal barrier |
| Loong | • Considerable number of households located along the coast<br>• Exposed to open seas and defenseless to coastal hazards such as storm surge and monsoon winds and waves<br>• Significant coastal erosion | • Potential for mangrove restoration potential<br>• Potential for living breakwater/oyster reef that act as additional coastal barrier |

# CHAPTER 3. PROJECT PURPOSE AND CONTENT

The FFEM-supported green-grey project in Concepcion aimed to demonstrate the potential for natural systems to adapt to the consequences of climate change and the relevance of setting up grey (classic/traditional engineering) and green (ecosystems conservation) infrastructures to build resilience into coastal territories and communities especially during typhoons. The experiences and lessons learned in the demonstration of "green-grey" adaptation solutions in building coastal resilience would be documented and communicated to encourage the integration of this type of solutions into coastal protection policies on a regional, national, and international scale.

This demonstration project comprised four components:

Component 1: Definition and implementation of green-grey infrastructure demonstration projects. This aimed to develop and implement innovatory green-grey solutions to increase the resistance to disasters and capacity to adapt to climate change of several coastal sites in the Municipality of Concepcion, Iloilo, Philippines

Component 2: Implementation of a programme for the development of subsistence resources. The objective was to improve and diversify local subsistence aimed at supporting the sustainability of the green-grey solutions and building long-term resistance of communities to climate change and disasters.

Component 3: Promotion of green-grey infrastructure at local, national, and international levels. This component intended to support the development of institutional and political mechanisms which promote and support EbA-focused approaches and green-grey infrastructures at local, national, and global levels, by strengthening of capacities and direct support for the design of management plans and the implementation of policies.

Component 4: The management, coordination, monitoring, and assessment of the project. Under this component came the development of effective coordination and synergy among project partners and the effective assessment and monitoring of project implementation.

# CHAPTER 4. PROJECT APPROACH

## Establishing Committees

One of the project approaches to support the project is the establishment of National and Local Project Steering Committees.

The National Project Steering Committee[10] was formed in 2016. The goal of the National Steering Committee was mainly to provide advice, ensure delivery of the project outputs and the achievement of project outcomes. At the second meeting of the Committee in December 2018, the members suggested and agreed that for the purpose of the project, it would be more useful to regularly convene the meetings of, and secure guidance from, the Regional Steering Committee than from the National Steering Committee. This advice proved helpful to the project since the GGI pilot demonstration was in Panay and most of the coordination happened at the regional and local levels. Following the guidance by the National Project Steering Committee, CI coordinated with relevant regional government offices in Western Visayas that resulted in the establishment of the Regional Steering Committee in 2018.

At the local level, and as recommended by the Local Government of Concepcion, the LGU-NGO Coordination group (equivalent to a Local Project Steering Committee) was established in 2016 to serve as the mechanism for coordinating site-based project activities. It was composed of representatives from LGU Concepcion (Municipal Planning and Development Office, Municipal Coastal Resource Management Office, Municipal Disaster Risk Reduction Office), non-government organizations implementing DRR-CCA projects in Concepcion, barangay officials and people's organization from the final project sites, and Environment and Natural Resource Office. LGU-NGO Coordination Group served as the Local Project Steering Committee. The tasks of the group were to: (1) ensure that the local aspects of the project were properly implemented based on the needs of the Municipality, the Barangays and the communities targeted for the project; (2) support issue/conflict resolution at a local level as needed (e.g., use of coastal zone by residents); (3) ensure that the project was well-coordinated with other initiatives in the municipality and other neighboring towns; and (4) facilitate linkage and access to any opportunities that could help fulfill the project (e.g. motivate residents of the local economic environment or the local educational establishments). It is through this group that CI Philippines was able to collaborate well with other NGOs that operated in Concepcion, such as, the Iloilo Code NGO (I-Code), Zoological Society of London (ZSL), *Kahublagan Sang Panimalay*[11] Foundation, Inc (KSPFI), Save the Children, Adventist Development and Relief Agency (ADRA) through the LGU-NGO Coordination Group (Table 2). Among the matters tackled were complementation of activities in the GGI project sites to maximize resources.

[10] For the Year 1, CI invited the Biodiversity Management Bureau, Department of Interior and Local Government, Department of Public Works and Highways, National Economic Development Authority, Department of Environment and Natural Resources-Climate Change Office to be part of the National Project Steering Committee.

[11] Movement for communities or households

Table 2. Organizations with non-formal partnerships with CI Philippines

| Organization | Partnership |
|---|---|
| Iloilo Code NGO (I-Code) | • Conduct of DRR-CCA trainings in the 7 sites<br>• Assisted in livelihoods assessments and analysis<br>• Part of the LGU-NGO Coordinating Group to complement activities and interventions in the GGI project sites |
| Zoological Society of London-Iloilo (ZSL-Iloilo) | • Conduct of Marine Protected Area (MPA) trainings in coastal barangays<br>• Conduct of Artificial Reef and Marine Protected Area (MPA) discussions with Municipal Government of Concepcion and key coastal barangays<br>• Technical and logistical support in the MPA establishment and management in Tambaliza<br>• Part of the LGU-NGO Coordinating Group to complement activities and interventions in the GGI project sites |
| Adventist Development and Relief Agency (ADRA) | • Assisted in livelihoods assessments and analysis<br>• Part of the LGU-NGO Coordinating Group to complement activities and interventions in the GGI project sites |
| Save the Children | • Assisted in livelihoods assessments and analysis<br>• Part of the LGU-NGO Coordinating Group to complement activities and interventions in the GGI project sites |
| Kahublagan Sang Panimalay Foundation, Inc | • Proposal preparation for the possible watershed management in the 4 GGI sites |

The project also initially established the Scientific and Technical Advisory Group (STAG)[12] to provide scientific and technical guidance in the preparation of the Green-Grey conceptual designs for the project sites.

# Partnership Building

CI engaged with various organizations from national and local government as well as the private sector to provide technical and co-financing support for the green-grey concept design development and actual implementation of green-grey solutions projects in Concepcion, Iloilo. Throughout the project, CI developed five (5) formal partnerships through signed memoranda of understanding (Error! Reference source not found.). The project was a lso able to obtain barangay resolutions[13] from the Barangay Councils of the five project sites that expressed expressing support and commitment to collaborate on the GGI project implementation.

[12] The members of the STAG were Dr. Severino Salmo III (Ateneo de Manila University), Dr. Earl Dranreb Juanico (Technological Institute of the Philippines, Dr. Emily Pidgeon (CI), (Tam Nguyen) Bechtel Corporation and Takashi Hino( Taisei Corporation).

[13] A Resolution is a statement of policy by the governing body or an order by the governing body that a specific action be taken.

**Table 3.** Organizations with formal partnerships with CI Philippines

| Organization | Date of Signing | Partnership |
|---|---|---|
| Biodiversity Management Bureau (BMB) | 07 November 2017 | • Focal government partner: Collaborate in the promotion and implementation of climate change adaptation activities that makes use of ecosystem-based approaches such as green-grey infrastructure, climate-adaptive fisheries management approaches, etc. |
| Local Government of Concepcion | November 2016 | • Collaborate in the implementation of the green-grey solutions project in Concepcion, Iloilo |
| Taisei Corporation | 12 September 2016 | • Collaborate on the technical engineering aspects of the Project to effectively demonstrate the feasibility of green-grey adaptation solutions in strengthening adaptive capacities of communities; part of the Scientific and Technical Advisory Group (STAG) |
| Technological Institute of the Philippines (TIP) | 15 August 2016 | • Collaborate in producing technical and scientific data to support the design for the proposed green-grey infrastructure project in Concepcion, Iloilo. |
| Philippine Red Cross (PRC) | 1 February 2018 | • Collaborate on strengthening community adaptive and disaster risk capacities of partner communities in Concepcion Iloilo by providing training on First Aid and Basic Life Support and Emergency Simulation Drill. Additionally, the collaboration also aimed establish a network of community volunteers on DRRM that can be mobilized for rapid response and mobilization in emergencies and |
| Technological Institute of the Philippines | 09 June 2020 | • Collaborate on conduct of the Training on Community, Engineering and Ecology as technical resource persons and facilitators as well as promote green-grey solutions to other educational institutions particularly those in the engineering field. |

Five (5) community conservation agreements[14] were also developed with partner communities and local governments that spelled out the areas of collaboration in the implementation of the GGI project in each project site (Table 4) and the commitments and obligations of all signatories to ensure sustainability of the green-grey initiatives beyond the project duration. The signatories to each Conservation Agreement were the Mayor of the Municipality of Concepcion, the concerned Barangay Captain[15], the President of the partner community organization and CI Philippines.

**Table 4.** Conservation Agreement highlights in 5 project sites in Concepcion, Iloilo

| Barangay/Village | Areas of Collaboration |
|---|---|
| Bagongon | Installation and maintenance of 1,154-meter wave break fence, 846-meter sediment trap fence, and 150-meter low crest semi-permeable breakwater<br>Rehabilitation/enrichment of 12-hectare mangrove area<br>Protection/management of 1.5-hectare mangrove stand and rehabilitation area<br>Management/protection of 769.7-hectare marine protected area<br>Empowerment of community through capacity-building activities<br>Development of enterprise and skills training for sustainable income sources |
| Tambaliza | Construction of box culverts and hand railings along 54-meter foot walk, removal of berms and installation of slope protection<br>Rehabilitation/enrichment of 2-hectare mangrove area<br>Establishment of community-managed mangrove ecopark<br>Empowerment of community through capacity-building activities<br>Development of enterprise and skills training for sustainable income sources |
| Bacjawan Norte | Installation, monitoring, and maintenance of 108-meter living breakwater<br>Rehabilitation and/or enrichment of at least 2-hectare mangrove area<br>Empowerment of community through capacity-building activities<br>Development of enterprise and skills training for sustainable income sources |
| Loong | Installation, monitoring, and maintenance of living breakwater (grey component)<br>Rehabilitation and/or enrichment of at least 2-hectare mangrove area<br>Management/protection of 135.8-hectare marine protected area<br>Empowerment of community through capacity-building activities<br>Development of enterprise and skills training for sustainable income sources |
| Polopiňa | Establishment of at least 1-hectare mangrove nursery<br>Rehabilitation/enrichment of at least 3-hectare mangrove area<br>Management/protection of 1,217.77-hectare marine protected area<br>Empowerment of community through capacity-building activities<br>Development of enterprise and skills training for sustainable income sources |

All green-grey projects received Letters of Endorsements from relevant key government agencies and Local Governments. The project was also provided with Barangay Resolutions[16] accepting the Green-Grey projects in 2016.

[14] Conservation Agreements are negotiated arrangements with partner communities wherein development support i.e. grants, trainings, tools, equipment, etc., are provided in exchange for contributions to conservation actions.

[15] Barangay captain or village leader (Filipino: punong barangay) is the highest elected official in a barangay, the smallest level of administrative divisions of the Philippines.

[16] A Barangay Resolution generally states a position or policy of a barangay or village.

# Selecting and finalizing the sites

To select the specific sites for the GGI implementation, an evaluation of potential sites was undertaken. For this purpose, CI commissioned Ascott Pacific Consultants[17] to conduct a Technical Feasibility Study (TFS), which evaluated seven (7) potential sites[18] for green-grey infrastructure implementation. The TFS provided: (1) an evaluation and ranking of each of the seven potential project sites based upon green-grey project suitability; (2) identification of the final project sites; and (3) development of conceptual green-grey designs for the top ranked two (2) project sites.

The STAG then reviewed the recommendations of the TFS and analyzed two other sites using the following criteria for site selection:

- Vulnerability, expressed as a function of the sensitivity, exposure and adaptive capacity of the ecosystems and human communities therein.
- Mitigation potential incorporating inherent site characteristics such as coastal integrity, initial coastal vegetative cover, and engineering fitness for civil works; and
- Applicability of green-grey engineering solutions.

Using these criteria, green-grey solutions were identified for the barangays of Bagongon, Tambaliza, Loong and Bacjawan Norte. Nipa and Malangabang were removed from project consideration because there were minimal green or grey solution potential, and several other NGOs were supporting conservation initiatives in these areas.

# Designing and implementing green-grey projects

For each project site, grey solutions were designed by developing the Grey Scope of Work (SOW). The SOW stated the purpose of the grey solutions, the specifications of the grey structures, the construction materials needed, and required activities to build the structures. The draft SOW was subjected to stakeholder consultation to incorporate local knowledge and feedback into project design. As for the green solutions, CI facilitated the formulation of Mangrove Management Plan in each project site as well as the development of Marine Protected Area Management Plan where needed.

To implement the green-grey projects, CI applied the community-build model[19], which emphasized the people-centered approach. CI guided the partner communities so that they could develop proposals for their own implementation of the green-grey projects in their localities. These proposals were reviewed by CI and when found acceptable, became the basis for issuing funds to implement the grey and green projects covered by a signed Grant Agreement between CI and the partner community organization in a given project site. The Grant Agreement also specified the counterpart support of the partner community organization to the project, and the Concepcion LGU, as the case may be.

[17] Ascott Pacific is an environmental and engineering firm.

[18] Bagongon, Tambaliza, Malangabang, Bacjawan Norte, Loong, Polopiña and Nipa.

[19] Community-Build model is a green-grey construction approach where local community organizations are engaged to build, monitor, and maintain the green-grey projects. It is done to foster ownership and responsibility for the projects and structures and, keep human and materials resources local. The process builds community members', construction skills, by providing experience that can lead to supplemental livelihoods.

The community-build model provides livelihood grants to community members who implement, monitor, and maintain the green-grey project. The livelihood grants serve as incentives their active participation.

CI managed the implementation of the grant agreements and provided technical support to community partner organizations in the preparation of their progress and financial reports as well as in the procurement of necessary materials and equipment that were not covered by the grant agreements.

# Identification of livelihoods incentives

Livelihood support through grants for income diversification options and capacity building were also provided to partner community-based organizations as an incentive for their participation in the implementation and maintenance of the green-grey infrastructure and other agreed conservation tasks. Income diversification options are provided to community partners for supplemental income sources as well encourage community members to change behaviors that would impact biodiversity and natural resources.

Livelihoods Consultants were commissioned by the project to: (1) lead the engagement with community in developing viable livelihoods projects; and (2) provide the basic livelihoods capacity building and mentoring to partner communities. This is to ensure that they were equipped with the necessary skills and knowledge to operationalize and sustain their livelihoods projects. Resource persons with essential skills and knowledge by the partner communities were also invited to provide inputs and guidance to the communities.

The community livelihoods projects per site were identified through a series of preparatory activities such as Participatory Stakeholder Analysis and Livelihoods Assessments[20] which were conducted in 2016. Livelihoods Capacity Assessment, Value Chain Analysis (VCA) and Business Planning workshops[21] which were also conducted in 2018 with the partner community-based organizations. The target was to establish and support one (1) livelihood project per partner community

From the series of preparatory activities, five (5) Business Plans were developed, finalized, and funded by the project. Table 5 shows the livelihoods project with developed Business Plans. The details of the livelihood projects established per partner community are discussed in the Project Accomplishment Section of the report.

**Table 5.** Livelihood projects with developed Business Plans per site

| Barangay/Organization | Livelihoods |
|---|---|
| Bagongon | Coco Coir Processing (Geonets)<br>Coco based products (Virgin Coconut Oil) |
| Tambaliza | Community-based Ecotourism<br>Natural Vegetable Farming |
| Loong | Squid processing |
| Polopiña | Garments making, face masks making |
| Bacjawan Norte | Native Chicken Production |

[20] These activities were discussed in the 1st Annual Project Report to FFEM, November 2015-December 2016

[21] These activities were discussed in the 3rd Annual Project Report to FFEM, January-December 2018

# Appropriate capacity building

Capacity building and mentoring support were provided to partner communities and key local government staff to develop and/or strengthen skills, knowledge, and resources to manage the green-grey projects and ensure their active engagement. Coordination and collaboration with other organizations with similar objectives were developed to maximize resources and avoid duplication of activities. Capability building and mentoring support focused on technical[22], organizational development and livelihoods (Table 6).

Table 6. Actual number of capacity building activities conducted versus targets

| Training topics | No. of target capacity- building activities to be conducted | Number for actual capacity-building activities conducted |
|---|---|---|
| Technical | 5 | 10 |
| Livelihoods | 4 | 5 |

The technical training aimed at enhancing the knowledge and skills of partner communities on Ecosystem Based DRR-CCA (ECO-DRR-EBA) to foster their active participation in project, i. e., mangrove rehabilitation and management, MPA management and other nature-based adaptation solutions. Organizational development capacity-building focused on setting-up and/or improving organizational processes or creating new ones for effective functioning of the community organizations.

Also provided were training on business planning, value-chain analysis, community-managed savings, and business management based on the results of the assessments of capacities and limitations of each community organization. A series of training and mentoring activities specific to the livelihoods supported by the GGI Project were also conducted.

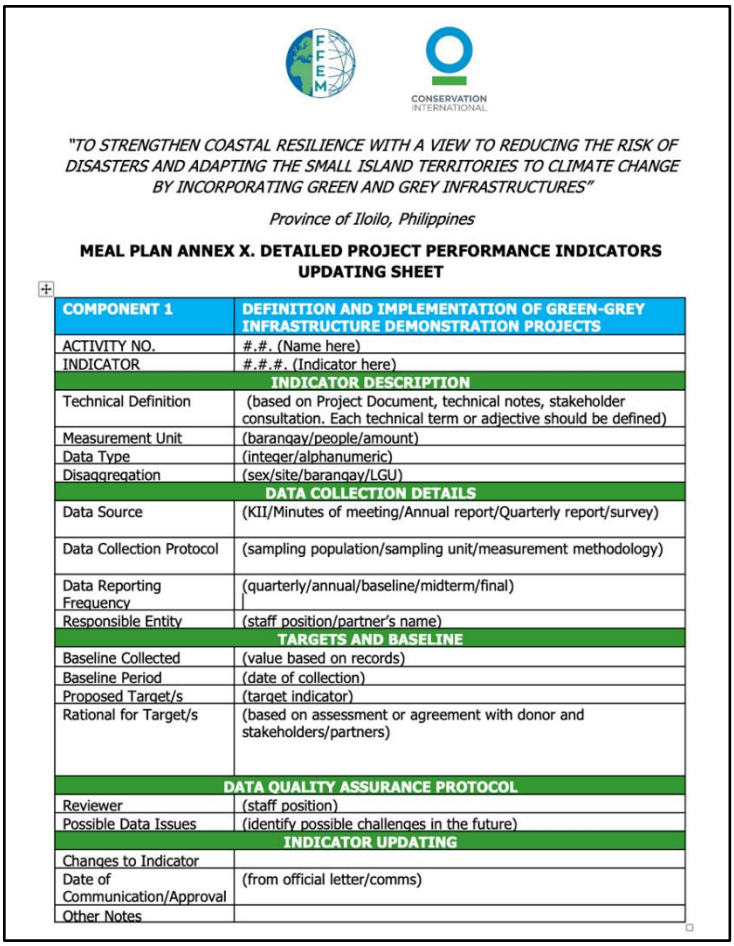
# Monitoring and Evaluation

Monitoring and evaluation (M&E) are important parts of project implementation. To ensure appropriate methodologies were in place for the project, the Logical Framework from the project document was examined.

There are 33 indicators presented in the logical framework. Each indicator was analyzed using the Detailed Project Performance Indicator Updating Sheet (PIUS) shown below (Table 7):

[22] This includes disaster risk reduction and climate change adaptation, marine protected area management and mangrove rehabilitation and management.

Table 7. Detailed Project Performance Indicators Updating Sheet (PIUS)



*"TO STRENGTHEN COASTAL RESILIENCE WITH A VIEW TO REDUCING THE RISK OF DISASTERS AND ADAPTING THE SMALL ISLAND TERRITORIES TO CLIMATE CHANGE BY INCORPORATING GREEN AND GREY INFRASTRUCTURES"*

*Province of Iloilo, Philippines*

**MEAL PLAN ANNEX X. DETAILED PROJECT PERFORMANCE INDICATORS UPDATING SHEET**

| **COMPONENT 1** | **DEFINITION AND IMPLEMENTATION OF GREEN-GREY INFRASTRUCTURE DEMONSTRATION PROJECTS** |
|---|---|
| ACTIVITY NO. | #.#. (Name here) |
| INDICATOR | #.#.#. (Indicator here) |
| **INDICATOR DESCRIPTION** | |
| Technical Definition | (based on Project Document, technical notes, stakeholder consultation. Each technical term or adjective should be defined) |
| Measurement Unit | (barangay/people/amount) |
| Data Type | (integer/alphanumeric) |
| Disaggregation | (sex/site/barangay/LGU) |
| **DATA COLLECTION DETAILS** | |
| Data Source | (KII/Minutes of meeting/Annual report/Quarterly report/survey) |
| Data Collection Protocol | (sampling population/sampling unit/measurement methodology) |
| Data Reporting Frequency | (quarterly/annual/baseline/midterm/final) |
| Responsible Entity | (staff position/partner's name) |
| **TARGETS AND BASELINE** | |
| Baseline Collected | (value based on records) |
| Baseline Period | (date of collection) |
| Proposed Target/s | (target indicator) |
| Rational for Target/s | (based on assessment or agreement with donor and stakeholders/partners) |
| **DATA QUALITY ASSURANCE PROTOCOL** | |
| Reviewer | (staff position) |
| Possible Data Issues | (identify possible challenges in the future) |
| **INDICATOR UPDATING** | |
| Changes to Indicator | |
| Date of Communication/Approval | (from official letter/comms) |
| Other Notes | |

For each indicator the following information was determined:

1. Indicator description which includes:
    - technical definition of the indicator based on the project document, technical notes, and stakeholder consultation,
    - measurement unit which indicates what the observation unit for the indicator is
    - the data type for the indicator as to whether it is quantitative/measured or qualitative
    - disaggregation of the indicator
2. Data collection details which include:
    - data source in the form of minutes of meetings, reports, and primary data collection,
    - data collection protocol may require sampling from populations, identification of key informant, or desk review
    - data reporting frequency
    - who is the responsible for collecting the data for the indicator?
3. Targets and baselines for the indicator includes:
    - the baseline value collected,
    - baseline period which indicates the baseline data collection date,
    - the proposed target for the indicator
    - the rationale behind the target.

4. Data quality assurance protocol was also set in place for the indicator to determine who will be the reviewer and what are the possible data issues for the indicator.

As part of the project's adaptive management and implementation, a section on indicator updating was also included. This section includes the changes in the indicator details as described above, the date of communication or approval of such changes, and other notes about the indicator.

As an example, below is the PIUS (Table 8) for Indicator 1.1.1 *The feasibility study* under Activity No. 1.1 for Component 1.

Table 8. Project Indicator Updating Sheet (PIUS) for Indicator 1.1.1 (example)

| COMPONENT 1 | DEFINITION AND IMPLEMENTATION OF GREEN-GREY INFRASTRUCTURE DEMONSTRATION PROJECTS |
|---|---|
| ACTIVITY NO. | 1.1. Feasibility Study |
| INDICATOR | 1.1.1. The feasibility study |
| **INDICATOR DESCRIPTION** | |
| Technical Definition | (based on MOV, technical notes, project document. Each technical term or adjective should be defined)<br>This study will assess 6 barangays (Bacjawan Norte, Nipa, Loong, Malangabang, Polopina and Bagongon) in the commune of Concepcion and will make possible the choice of project demonstration sites for the implementation of green-gray infrastructures |
| Measurement Unit | (barangay/people/amount) - barangay |
| Data Type | (integer/alphanumeric) - integer |
| Disaggregation | (sex/site/barangay/LGU) - none |
| **DATA COLLECTION DETAILS** | |
| Data Source | primary data, secondary data from Local Government and NGOs, experts group, i.e. Scientific Technical Advirsory Group to be formed for the project |
| Data Collection Protocol | Site inspection, focused group discussions, interviews, desk research |
| Data Reporting Frequency | Once |
| Responsible Entity | (staff position/partner's name) – consultant, Project Manager |
| **TARGETS AND BASELINE** | |
| Baseline Collected | 0 |
| Baseline Period | 1st quarter of year 2 |
| Proposed Target/s | One (1) Feasibility Study of green-gray projects in 6 barangays |
| Rational for Target/s | Based on FFEM-GGI Project Document |
| **DATA QUALITY ASSURANCE PROTOCOL** | |
| Reviewer | Project Manager, CI HQ Technical Staff |
| Possible Data Issues | None |
| **INDICATOR UPDATING** | |
| Changes to Indicator | none |
| Date of Communication/Approval | NA |
| Other Notes | NA |

The Project's Logical Framework is presented in Table 9.

Table 9. Project Logical Framework

| Purpose | Specific objectives | Results expected | Indicators (33) | Targets |
|---|---|---|---|---|
| Demonstrate the potential of natural systems to favour adaptation to the consequences of climate change and the pertinence of the structuring of grey infrastructures (traditional engineering) and green ones (the conservation of ecosystems) to build the resilience of coastal territories and communities, particularly when typhoons occur in the Islands of the Philippines. | Component 1: Definition and implementation of green-grey infrastructure demonstration projects | | | |
| | To develop and implement several innovatory "green-grey" solution demonstration projects to increase the resistance to disasters and the capacity to adapt to climate change of several coastal sites in the municipality of Concepción in the province of Iloilo, central Philippine | Activity 1-1: Feasibility study<br>-Several possible green-grey solutions are defined and compared for each of the six barangays included in the study<br>- between 3 and 4 sites and projects are proposed for retention as demonstration project | 1.1.1 the feasibility study<br><br>1.1.2 the list of the sites retained | • 1 Feasibility Study of green-grey projects in 6 barangays<br><br>• 3-4 green-grey sites |
| | | Activity 1-2: Technical plans and partnerships<br>- technical plans are produced for each of the demonstration projects which include green and grey components<br>- partnerships are established between CI, the municipality of Concepción, the barangays concerned and the national administrations for the financing and implementation of the demonstration projects | 1.2.1 technical plans of the solutions retained<br><br>1.2.2 partnership agreements for the implementation of the demonstration projects | • 4 green-grey solutions<br><br>• 6 partnership agreements |
| | | Activity 1-3: Training in and support for local risk management planning<br>- several workshops are organised to be attended by representatives of the municipality and the local communities<br>- risk management is explained to members of the local communities at several training sessions | 1.3.1 support with producing DRRM and CCA plans<br><br>1.3.2 Training and awareness on any of the following: disaster risk reduction-climate change adaptation concepts, planning, participatory capacities and vulnerabilities assessment, natural resource management, sustainable livelihoods and social enterprise, as well as provision of tools for acquired capabilities | • 3-4 local DRRM-CCA Plans<br><br>• 5 barangays and 1 Municipal level with at least 1 training/ awareness session<br><br>• 2 sites with equipment support |

| | | | | |
|---|---|---|---|---|
| | | Activity 1-4: Implementation of the demonstration projects<br>- conservation agreements are established for each site for the implementation of the green component<br>- the people in charge of implementing the green component are trained<br>- the grey infrastructures are installed in accordance with the initial technical plans and the municipality takes part in the acceptance operations. | 1.4.1 conservation agreements signed | • 3-4 CAs |
| | | | 1.4.2 number of people trained in implementing green-grey components | • 2626 target participants |
| | | | 1.4.3 demonstration projects implementation with acceptance from municipality | • 4 green-grey projects |
| | · Component 2: Implementation of a programme for the development of subsistence resources | | | |
| | To improve and diversify local subsistence resources on the demonstration sites (through activities based on sustainable production and consumption) aimed at supporting the sustainability of the green-grey solution and building the long-term resistance of the communities to climate change and disasters. | 2-1 Preparatory activities<br>- The analysis of the key participants makes it possible to identify the needs and measure what is missing. - The capacities are assessed and the new activities possible are defined and prioritized.<br>- The local populations / communities are prepared to commit themselves to activities which are compatible with the success of component 1 and are likely to generate new incomes | 2.1.1 report on the analysis of needs and minutes of the information meetings.<br>2.1.2 training plan and documentation | • 1 report on analysis of needs and minutes of information meetings<br>• At least 4 general livelihoods training |
| | | 2-2 Assistance with the development of economic activities by the local populations<br>- Efficient and fair mechanisms are designed for the allocation of assistance.<br>- Those mechanisms are set up and explained to their potential beneficiaries.<br>- The mechanisms are implemented (project selection).<br>- The monitoring of the implementation enables a long-term allocation of assistance to be envisaged. | 2.2.1 number of projects analyzed and selected<br>2.2.2 number of projects financed.<br>2.2.3 number of people who have taken training and benefited from the projects | • 3-4 projects to be analyzed and selected<br>• 3 projects financed (2 in year 3; 1 in year 4)<br>• 1196 target participants |
| | Component 3 : Promotion of green-grey infrastructures at local, national and global level | | | |
| | To support the development of institutional and political mechanisms at local, national and | 3-1 Consolidation of the institutions' capacities to adopt EbAs<br>- Technical mini-seminars enable the ministries to be made aware of a prescriptive EbA operation.<br>- Central and local government officers are trained in the installation of green/grey solution | 3.1.1 records of technical mini-seminars.<br>3.1.2 technical documents (in English) and editorial recommendations for a | • 12 sessions of mini-seminars in Manila for groups of not more than 20 people each, and 6 technical data sheets |

| | | | | |
|---|---|---|---|---|
| | global level for the implementation of integrated green-grey infrastructures aimed at increasing resistance to the risks of coastal disasters and adaptation to climate change | | practical guide to design, construction, and maintenance. | • 24 (local) training sessions and a practical guide with 6 technical sheets |
| | | 3-2 Development and production of informative, educational and communication-based supporting materials<br>- Wide-ranging information concerning and justifying the project's achievements (website).<br><br>- A broad spectrum of Filipino technicians and professionals is informed (documentary film).<br><br>- A broader public is made aware of the subject matter of the project and the attractiveness of Concepción (promotional and consciousness-raising film).<br>- The media pass on the project's "messages" to Philippine public opinion.<br><br>- Hard-copy presentations of the project enable its promoters to ensure its promotion more easily | 3.2.1 website<br><br>3.2.2 20-minute documentary film in English, subtitled in Tagalog.<br><br>3.2.3 20-minute informational film in English, subtitled in Tagalog.<br><br>3.2.4 communication brochure of between 6 and 10 pages in English, 200 copies of which are printed<br><br>3.2.5 brochure presenting the project in English and Tagalog<br><br>3.2.6 media initiatives | • 1 partially dynamic website with double access in English and Tagalog<br><br>• 1 20-minute awareness film in English with Tagalog subtitle on technical and professional aims on green-grey solutions<br><br>• 1 20-minute awareness and promotional film in English with Tagalog subtitles<br><br>• 1 communication brochure of technical nature in English (6-10 pages; 200 copies)<br><br>• 4-page brochure presenting the project in English and Tagalog (1000 copies)<br><br>• At least 2 radio or television programmes with at least 10 references in the written press (local/ national/ international) |
| | | 3-3 Production of complete RCC and ACC plans and notes explaining the intention of the project<br>- The project facilitates the production and updating of the RCC/ACCs of the local authorities in northern Panay<br>- The project helps those local authorities to formulate projects like the one at Concepción in order to obtain their financing. | 3.3.1 RCC and ACC plans finalized and updated<br><br>3.3.2 notes explaining the intentions of potential green/grey projects in the Philippines and describing them, based on actual financing opportunities. | • 2-3 RCC Plans and 2-3 ACC Plans finalized and updated<br><br>• 10 project statements of intent graded according to effective funding opportunities |

| | | | | |
|---|---|---|---|---|
| | | 3-4 Contribution to the formulation of the national coastal protection policy<br>- The Piloting Committee's working parties produce recommendations and a (national) action plan for the implementation of green/grey solutions. | 3.4.1 minutes of meetings and notes on special studies by the working parties. | • At least 2 meetings with a set of recommendations for green-grey solutions |
| | | 3-5 Combinations of green/grey infrastructures and EbA and international dimensions<br>- The project's visibility in international dialogue entities on climate change, the protection of ecosystems and resilience in the face of natural disasters.<br>- Identification of opportunities to replicate the project elsewhere by providing support to institutional and international financiers (study of opportunities and final seminar at international level). | 3.5.1 analysis report on the project's effects at international level<br><br>3.5.2 analysis report on initiatives similar to the project at the international level<br><br>3.5.3 minutes of the final seminar. | • 1 report regarding the impact of the project in international networks and in international meetings<br><br>• 1 report on projects developed as inspired by FFEM-GGI<br><br>• Minutes of the final close out event |
| | Component 4 : The management, coordination, monitoring and assessment of the project | | | |
| | The project's effects are assessed and monitored, effective coordination and synergy between all the project's partners is provided and the synergies between partners are maximised | Activity 4-1: Follow-up and assessment<br>- several monitoring indicators for the project are defined and regularly assessed.<br>- reports on the progress of the demonstration projects and then on their monitoring are produced at least every six months | 4.1.1 list of monitoring indicators.<br><br>4.1.2 report on the monitoring and progress of the demonstration sites | • 1 assessment framework with monitoring indicators defined<br><br>• At least 8 reports on demonstration projects and then on their monitoring; 1 report on the use of METT for marine protected areas |
| | | Activity 4-2: Project management<br>- a local representative office is set up for the project in Concepción and members of CI's staff are assigned to it.<br>- quarterly reports on the monitoring of the activities and annual progress reports are produced.<br>-at least four piloting committees are organized.<br>- themed working parties are set up (Component 3). | 4.2.1 minutes of the piloting committees.<br><br>4.2.2 number of meetings of the themed working parties.<br><br>4.2.3 Half-year and annual progress reports. | • 9 meetings of Steering Committee (3 in year 1 and twice in subsequent years)<br><br>• 16 meetings (once every 3 months<br><br>• 8 reports (4 half-year and 4 annual reports) |

The project utilized various methodologies in collecting data for monitoring and evaluating the activities and the indicators for the project.

a. *Note-taking and recording of minutes of meetings*

   Community-based meetings as well as Steering Committee meetings are of equal importance. All discussions were recorded and transcribed in MS Word and exported to PDF form. This formed part of the means of verification (MOV) for the indicators.

b. *Use of Key Performance Indicators*

   Key Performance Indicators (KPIs) are the critical (key) indicators of progress toward an intended result. KPIs provide a focus for strategic and operational improvement, create an analytical basis for decision making and help focus attention on what matters most. As Peter Drucker famously said, "What gets measured gets done."

   Managing with the use of KPIs includes setting targets (the desired level of performance) and tracking progress against that target. Managing with KPIs often means working to improve leading indicators that will later drive lagging benefits. Leading indicators are precursors of future success; lagging indicators show how successful the organization was at achieving results in the past.

   As the project varies per barangay, which was tailored on the feasibility study conducted, anchoring at the same time from each grant agreement, using unique Key Performance Indicators (KPIs) are needed to measure unique deliverables per project. A grant agreement was a point of reference in plotting out individual success, as well as sustainability strategy of each association on the grant provided.

   KPI data was obtained through the conduct of Focus Group Discussions (FGDs) among project staff, community members and the LGU who were primarily involved on the project.

c. *Focus Group Discussion (FGD)*

   A focus group is a small-group discussion guided by a trained leader. It is used to learn about opinions on a designated topic, and to guide future action.

   In this particular methodology, key stakeholders such as members of community organizations, BLGU and MLGU are asked on their experiences and perception on the preparatory activities, technical access to intervention, implementation process, giving of feedback in the process of executing the project, and the short-term gains and anticipated long-term gains of the project to their groups and as an individual.

d. *Key Informant Interview* (KII)

   Key informant interviews are qualitative in-depth interviews with people who know what is going on in the community. The purpose of key informant interviews is to collect information from a wide range of people—including community leaders, professionals, or residents—who have first- hand knowledge about the community. These community experts, with their knowledge and understanding, can provide insight on the nature of problems and give recommendations for solutions.

Finally, a project monitoring plan (PMP) was created anchored on the objectives of the project and the details of the indicators. Annex 1 presents the summary of the (PMP).

# CHAPTER 5: PROJECT ACCOMPLISHMENTS

The project accomplishments are presented in three (3) sections. The description of each of the sections are presented below:

1. Site-Level Accomplishments. This section discusses the accomplishment per project site for Component 1 which is the definition and implementation of green-grey infrastructure demonstration projects in several coastal sites in the municipality of Concepción and Component 2 which is the implementation of a programme for the development of alternative and sustainable subsistence resources for the communities surrounding the demonstration projects to ensure the long-term viability of the projects, the communities, and their biodiversity.

2. Promotion of GGI at the local, national, and international levels. This section presents the project accomplishment for the initiatives to promote and increase awareness and understanding on GGI under project Component 3.

3. Monitoring and Evaluation. This section discusses the performance of the project in terms of delivering to the targets in the project logical framework which is part of Component 4. Other matters under Component 4 particularly on the establishment of Project Management mechanisms internal to CI, and the establishment of the Steering Committee at the national and regional levels and the coordinating mechanism for project implementation at the site level (i.e. LGU-NGO Coordinating Group) were presented in Chapter 4. Project Approach.

## Site Level Accomplishments

### Bagongon

#### Green-Green Solutions

The green-grey project in Bagongon was implemented in partnership with the community-based organization, Bagongon Fisherfolk Association (BFA). The project design included grey solutions (i.e. sediment trapping fences, wave attenuation structures and semi-permeable breakwaters), green solutions (i.e. 12-ha mangrove rehabilitation and marine protected area management) with livelihood incentives (i.e. coco-coir and virgin coconut oil) and provision of appropriate capacity building support.

Figure 3 depicts the interventions in place in Bagongon following project completion in July 2021.

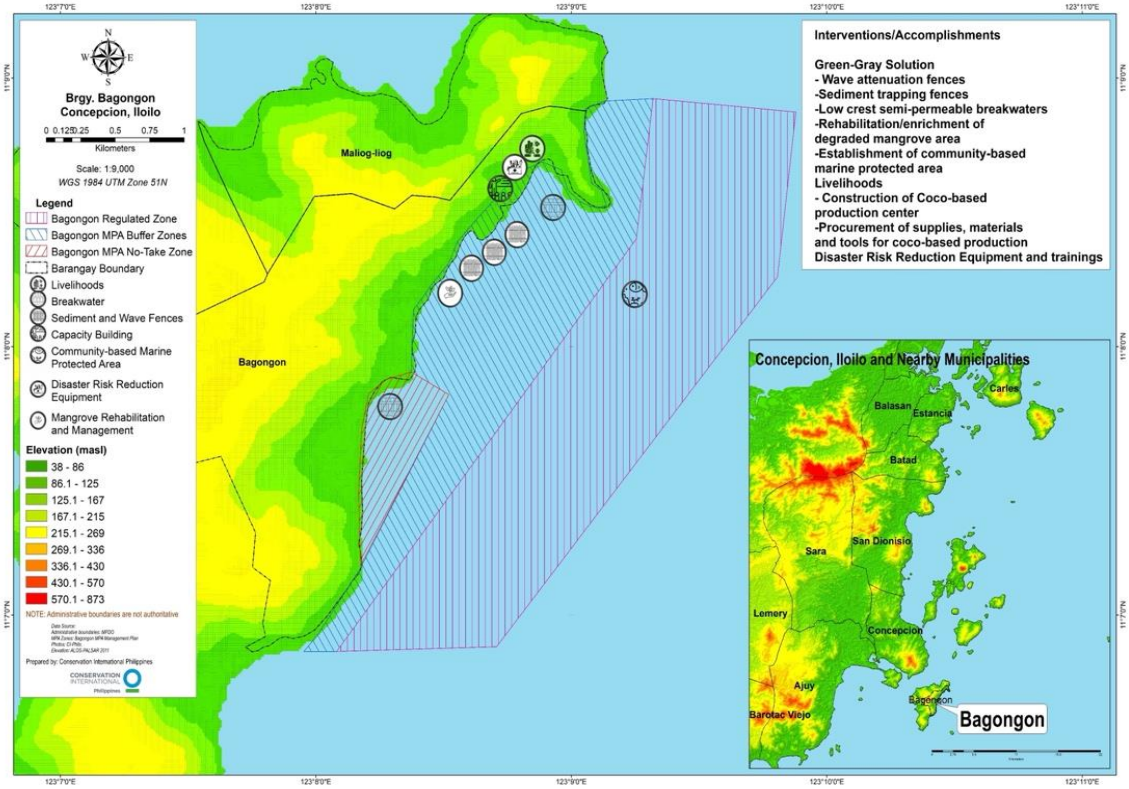



**Figure 3.** Map of Green-Grey Interventions in Bagongon, Concepcion

For the grey solution, eight (8) wave attenuation fences with a total length of 1,145-meter, five (5) sediment trapping fences spanning 895 meters and two (2) 75-meter low-crest permeable breakwaters were installed near the coast of Bagongon. This was to promote sediment accumulation where mangrove seedlings for rehabilitation were planted, break the waves, and reduce its energy, and provide supplemental coastal protection to the household located along the coast[23]. The sediment traps and wave attenuation fences were completed in December 2019 (**Figure 4**). The low-crest permeable breakwaters were installed in December 2020 (**Error! Reference source not found.**).

[23] 5th Annual Project Report

**Figure 4.** Sediment traps and wave attenuation in Bagongon

**Figure 5.** Low-crest semi-permeable breakwaters in Bagongon

For the green solutions, 110,363 seedlings were required to rehabilitate and enrich the 11-ha mangrove area. To produce the seedlings, a community-based mangrove nursery was established in Sitio Palina in Bagongon due to the numerous challenges encountered in maintaining the mangrove nursery[24] and producing the required number of seedlings for mangrove rehabilitation, BFA identified and agreed on alternative sources of mangrove seedlings. Plandico and Talotoan in Concepcion were identified as main sources. BFA coordinated with local community residents and organizations in Plandico and Talotoan to assist them in the production of their required mangrove seedlings. BFA was also able to source seedlings from the Municipality of Ajuy near the boundary of Bagongon and Polopiña.

The mangrove outplanting sites are in the coasts of Purok 1 (Palina Grande), Purok 2 (Palina Diutay) and Purok Proper. The original plan was to rehabilitate 12 hectares of degraded mangrove area. However, due to the community's request for additional space for boat navigation, the target has been reduced to 11.0 hectares. Rehabilitation and

[24] Extreme heat and prolonged dry season, strong wave action that encroached in the location of the mangrove nursery

enrichment planting[25] were conducted in Bagongon from April to July 2021 (**Figure 6**). For mangrove rehabilitation, seedlings were planted in rows (strip planting), equally spaced from each other at 1 x 1 meter (**Figure 7**). For this planting pattern and spacing, one hectare of mangrove required 10,000 seedlings. A total of 110,363 seedlings were planted that include various species of *Avicennia., Sonneratia,, Rhizophora stylosa* and *Rhizophora apiculata*.

**Figure 6.** Community members engaged in mangrove planting activities in Bagongon

**Figure 7.** Mangrove seedlings planted in Bagongon

The establishment of a 769.7-hectare community-based marine protected area (CB-MPA) composed of 59.7-hectare of No Take Zone (NTZ), 241-hectare buffer zone (BZ) and 689-hectare regulated use zone (RUZ) was also supported by the project through the:

- review and updating of the MPA Management Plan for 2021-2025
- provision of basic equipment and supplies[26] for effective MPA enforcement ad patrolling
- installation of MPA marker buoys (**Figure 8**) to delineate the MPA boundaries and MPA signages **(Figure 9)** to increase awareness and support

[25] Enrichment planting is the interplanting of suitable mangrove species in patchy or sparsely vegetated natural mangrove areas. Mangrove rehabilitation refers to any sites that have suffered large scale anthropogenic degradation resulting in the loss of mature tree canopy cover and subsequently through a change in management begun to establish new tree canopy cover.

[26] Life jackets, solar light with sensor for marker buoys, life buoy ring, megaphones with sirens and 2 mobile phones.

- provision of capacity-building support through trainings and facilitation of community-based MPA plan formulation.

**Figure 8.** MPA Marker Installation in Bagongon


**Figure 9.** MPA signage installation in Bagongon

## Livelihoods

The livelihood projects identified for Bagongon were the production of coconut-based products such as coco coir[27] geonet and other products, and the production of virgin coconut oil (VCO) as liniment and ointment.

### *Coco-Coir Processing*

CI provided BFA with the following support to establish these chosen livelihood projects:

1. Linkage with the Philippine Coconut Authority (PCA)[28], provider of technical assistance and training on coco-based product development and continuous mentoring support beyond CI's support (see **Annex 2)** for relevant training provided).
2. Provision of basic equipment[29] for the coco-coir production.
3. Construction of 64-square meter coco-based processing center to house the equipment, supplies and materials to produce coconut-based products such as coco coir geonet and other products, and virgin coconut oil (VCO). The structure is composed of a working shed area, soaking vat area, and open storage area for raw materials (whole coconuts and husks).
4. Labor fee for the initial production of coco coir geonets. This amount served as initial revolving capital.

As counterpart, BFA provided materials, such as, hose for water supply and twinning machines, as well as fabrication of de-huskers. It also entered a rent-to-own contract with one of the community members for a 100-square meter lot for a period of 15 months

[27] Coco coir is a durable fiber extracted from discarded coconut husks, and widely used as basic material in making nets, rolls, and mats as protective covers for soils and slope.

[28] The Philippine Coconut Authority (PCA) is a Philippine government agency mandated to promote the integrated development and growth of the coconut and other palm oil industry in the Philippines in all its aspects.

[29] Decorticating machine, weaving machines and twinning machines

where the coco-based processing center was built. The center will be operated and managed by BFA. A project management team was established to lead the implementation of the project.

Due to the limited space in the production center, twinning activities were usually done in the yard of the BFA members' houses. These allowed other members of the households to help in the twinning activities during their free time. These have become a family supplemental livelihood. In most cases both the husband and the wife were involved in the twinning activities. One family can twine 60 to 70 pieces of ropes per day. Thus, providing an additional income of 300.00 to 350.00 pesos per day.

Twenty-eight (28) women members of BFA were actively involved in the twinning activities. Each worker was paid PhP 5.00 for a 15-meter twiner coco-coir. Out of the 15,690 twined coco-coir target, BFA was only able to produce 7,518 pieces of twines from May to July 2021. Frequent rain during these months affected the twinning activities since these were done outdoors.

The twines produced were either made into coco coir geonets or coco pots. Coir geonets are permeable fabric capable to control soil erosion. It protects the earth and promotes vegetation retaining precious topsoil. Geonets were produced using a loom weaving machine. Figures 10 and 11 shows BFA members making geonets using the twining and loom weaving machine. From May to July 2021, BFA was able to produce twelve (12) rolls of geonets. However, the project target was to produce fifteen (15) rolls of geonets. Each roll of geonet measures 1-meter by 50-meters. At least 250 pcs of coco coir twine were used to produce a roll of geonet using the weaving machine provided by CIP.

Figure 10. BFA member working twining machine

Figure 11. BFA member making the coco coir using loom weaving machine

As a result of the growing demand for planting containers and supplies, BFA ventured into coco pots and coco poles making. The members experimented with different materials to determine the best ones to use as frames for coco pots and planters. Figures 12 and 13 shows BFA members making the coco pots.

**Figure 12.** BFA women making various types of coco coir pots

**Figure 13.** Close-up shot of making coco coir pots

## *Virgin Coconut Oil (VCO) Processing*

Another product that BFA ventured into is Virgin Coconut Oil (VCO). This oil is the purest form of coconut oil, water white in color and has not undergone oxidation. It is the oil obtained from the fresh and mature kernel of coconut by mechanical or natural means with or without the use of heat, without undergoing chemical refining, bleaching, or deodorizing, and does not lead to the alteration of the nature of the oil.

To produce a liter of VCO, twenty-five (25) freshly picked mature coconuts were selected. The coconuts were de-husked and washed before splitting into two. The meat of the coconut was extracted from the shell using an electric grating machine. **Figures 14 to 16** show the some of the processes for producing Virgin Coconut Oil. **Figure 17** shows the VCO products produced by BFA.

**Figure 14.** BFA member extracting coconut meat using an electric grater

**Figure 15.** BFA member extracting coconut milk using a mechanical presser

**Figure 16.** Extracted coconut milk stored for fermentation


**Figure 17.** BFA-produced Virgin Coconut Oil (VCO)

One of the challenges in small islands is the lack of savings and low-interest credit. Thus, the World Vision's Community Managed Savings and Credit Association or CoMSCA was introduced to partner communities where needed. This is an economic development project model that aims to provide simple savings and loan facilities to underprivileged communities where access to finance is difficult. It creates a mechanism for members of the community to save together, lend savings to each other, and share profits from joint investments. Using the funds pooled together with CoMSCA, members who need quick access to money for emergency situations can easily be accommodated with a loan or a grant. The CoMSCA was set-up for the project to encourage the community to regularly put aside savings from the income from the livelihood projects.

CI Philippines assisted Bagongon and Bacjawan Norte to set their Community-Managed Savings and Credit Association (CoMSCA) groups[30]. For Bagongon, seven groups have already been established with more than 175 members to date. As of 19 February 2022, the current total fund of the CoMSCA group in Bagongon is US$ 16,962.85 (Php 867,650.00). COMSCA group in Bagongon also set up an environmental fund, social fund, and sustainability fund. Every meeting (which is weekly for Bagongon), each member contributes US$.10 or Php 5.00 for environmental fund[31], US$.10 or Php 5.00 for social fund and US$ 0.02 or Php 1.00 for the sustainability fund. The current environmental fund is US$ 272.14 or Php 13,920.00. The social fund is utilized by the group to provide additional support to its members during emergencies such as healthcare, hospitalization, and death. Each member can only avail of the social support for one time per cycle. The social fund has been fully utilized by the members since there were a number of health emergencies in the community including COVID-19 for the past two years. The sustainability fund is used to assist new COMSCA groups to set-up by helping purchase the COMSCA box and to fund the officers in attending meetings or trainings outside Bagongon.

To encourage additional CoMSCA membership within Bagongon, Bacjawan Norte and other project sites in Concepcion, a CoMSCA Trainer's Training was conducted on 19 February 2019. The objectives of the training were: (1) to review the CoMSCA standards and monitoring tools and ensure that all CoMSCA agents in Concepcion are

[30] It is an economic development project model by World Vision that aims to provide simple savings and loan facilities to underprivileged communities where access to finance is difficult. It creates a mechanism for members of the community to save together, lend savings to each other, and share profits from joint investments.

[31] The environmental fund is used by BFA for coastal resource management related activities including the maintenance of the green-grey solutions.

implementing proper CoMSCA approach; (2) develop a collaborative mechanism for information sharing, reporting, and monitoring and (3) discuss how to scale up of CoMSCA and incorporate social enterprise that will provide opportunities for the member to engage in income generating activities.

## Capacity Building on Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA)

Bagongon is one of the few villages in Northern Iloilo where very limited relief assistance and no DRR interventions were provided after typhoon Haiyan in 2013. Based on the results of Participatory Capacities and Vulnerabilities Assessment (PCVA) conducted by CI in early 2017 and the Barangay Local Climate Change Action Planning, one of the weaknesses of the village is the community's lack of awareness on and understanding of DRR and climate change adaptation. Thus, sitio[32]-level DRR-CCA awareness was conducted during the earlier part of the project to raise awareness on and understanding of DRR-CCA. Moreover, a Training on First Aid and Basic Life Support was provided to enable selected community members to aid any person suffering a sudden illness or injury especially during emergencies. After the training a network of community emergency response volunteers was established. Key community members, barangay officials and schoolteachers participated in the trainings. An emergency response simulation drill was also conducted to test the skills that have been learned by participants from the training. Basic DRR supplies, materials, and tools[33] were also provided to the community.

# Tambaliza

## Green-Grey solutions

The community-based organization, Tambaliza Fisherfolk Association (TASFA) was the main partner for the green-grey project implementation in Tambaliza. The project design included grey solutions (i.e. culverts installation in concrete foot walk, berm removal in mangrove area, and slope protection), green solutions (i.e. 2-ha mangrove rehabilitation/enrichment, mangrove nursery and mangrove ecopark) with livelihood incentives (i.e. natural vegetable farm and mangrove ecotourism) and provision of appropriate capacity building support. Figure 18 depicts the interventions in place in Tambaliza following project completion in July 2021.

[32] A sitio in the Philippines is a territorial enclave that forms part of a village or barangay. Typically rural, a sitio's location is usually far from the village center.

[33] The Basic DRRM equipment and supplies provided by the project includes hand-held radios, cervical collars, emergency hardhats, emergency handheld lights and rescue gloves

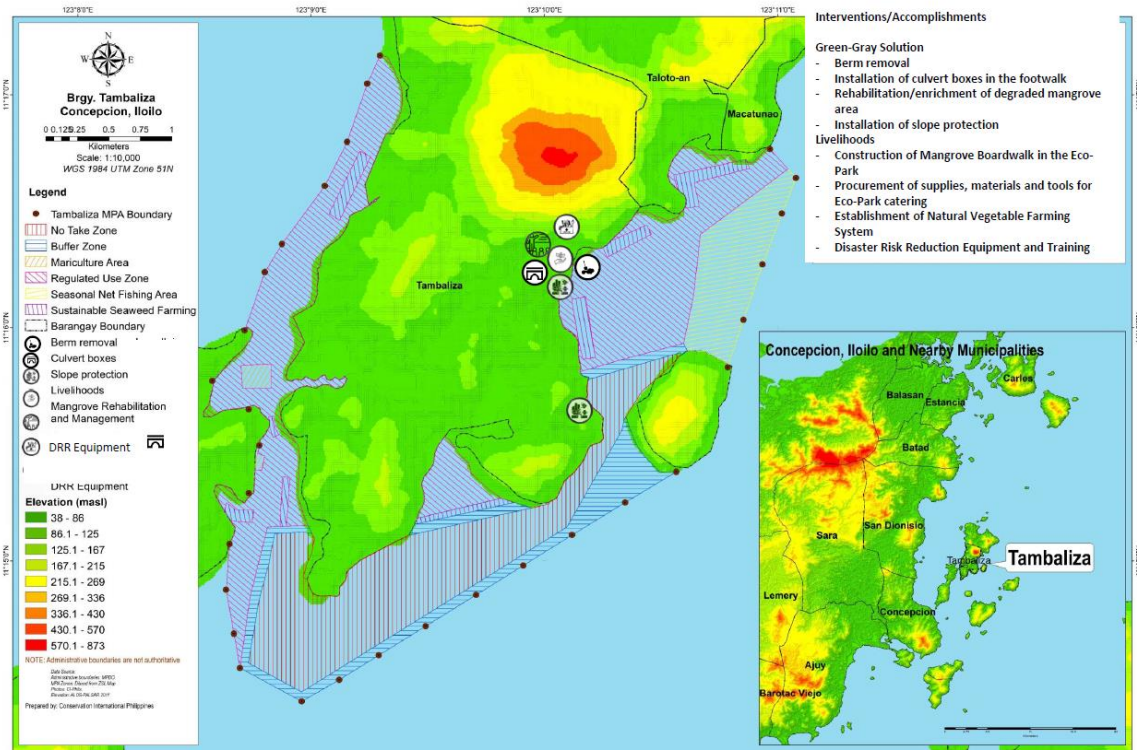



**Figure 18.** Map of Green-Grey Interventions in Tambaliza, Concepcion

A 54-meter long concrete footwalk that crosses the abandoned fishpond in Sitio Punting was constructed by Barangay Tambaliza. The structure connects the east and west portions of the community. Prior to the green-grey project, the footwalk had only one (1) box culvert with wingwalls that used to control water levels in the fishpond when the pond was still operational. The footwalk and the single opening through the concrete box culvert constricted freshwater flow from the northern mountains and the fishpond and ocean to the south. The reduced flow through the footwalk also prevented salt water from the ocean from reliably entering the northern portion of the fishpond. Without increasing the conveyance and capacity of salt water to flow through the footwalk (1) the existing mangroves to the north of the footwalk would perish and (2) any new mangroves planted north of the footwalk would not have adequate water inundation during the dry months of the year. Thus, four (4) new openings using concrete culverts (**Figure 19**) were installed in the footwalk in December 2020 to provide adequate freshwater and saltwater flows to support existing and proposed mangrove forests.

**Figure 19.** Box culverts installed in the footwalk in Tambaliza

The tidal entrance to the mangrove area in Punting was partially blocked by a sand/corral berm. The berm extends along the southern and southwestern edge of the abandoned fishpond, separating it from the open ocean. Hence, part of the grey construction was the partial removal of the berm. The area for the berm removal started at the northern most end of the berm near the existing constricted tidal opening and extends south approximately 48 meters. Approximatively 735 cubic meters of berm material was removed from the target area. Some the berm materials removed were used as filling for the box culvert and slope protection. The partial removal of berm resulted to erosion in the other parts of the berm. Consequently, a slope protection and reinforcement made of core stones for the houses near the tidal entrance (Figure 20) and bamboo posts and strap binders for the area of the excavated berm (Figure 21) were installed to prevent erosion. The construction was supervised by the LGU's Municipal Engineering Office.

Figure 20. Completed slope protection in Tambaliza

The bamboo post and strap binders were constructed through a separate in-kind grant with complementary funding from Swedish Post Code Foundation (SPCF).

Figure 21. Bamboo posts used as slope protection to prevent erosion from the area of excavated berm

To complement the grey solutions installed, mangrove enrichment planting was conducted in a 2-hectare area in the mangrove stands in Punting utilizing 36,000 seedlings. The planted mangroves intend to provide a natural buffer and decrease impact to the community in case of storm surge and wind waves events.

TASFA established a mangrove nursery in Sitio Punting to produce the required mangrove seedlings for rehabilitation activity (Figure 22). Due to extreme heat and

prolonged dry season, there were a significant mortality in the mangrove seedlings produced in the nursery.

**Figure 22.** Mangrove Nursery Established in 2018 at Sitio Punting, Tambaliza

The mangrove outplanting activity was conducted in mangrove area in Sitio Punting. Rehabilitation and enrichment planting were conducted in June 2021. Seedlings were planted in rows (strip planting) spaced at 0.5 meter from each individual tree (**Figure 23**). The short distance was to increase the chances of survival success of the enrichment planting considering the mangrove trees being planted are more than 1 year old. At least fifty (50) community members were able to participate in the outplanting activity. Spaces for boat docking area in the mangrove during high tide were considered. A temporary fence made of bamboo was also installed to prevent community members from entering the newly planted areas. The species planted were composed of *Avicennia sp.* and *Rhizophora sp*.


**Figure 23.** Planted *Sonneratia* and *Rhizophora* seedlings in Tambaliza

A community-based marine protected area (CB-MPA) was also implemented in Tambaliza. However, CI only provided supplemental technical support to the CB-MPA initiative. The CB-MPA complements the green-grey initiatives in the area. The Zoological Society of London in Iloilo which is part of the LGU-NGO Coordination Committee, provided the main technical and funding support for this initiative in partnership with LGU Concepcion and the Barangay Government of Tambaliza.

Additionally, TASFA also established two (2) new mangrove nurseries[34] in Sitio Banban (Figure 24) with a total of 25,000 seedlings. The grant covered costs of seedlings bags, labor for nursery construction, labor for collection of nursery seeds, propagules, and wildlings. The nursery will be the source of enrichment planting at the ecopark. The nursery is maintained by TASFA Officers and members.

Figure 24. Additional mangrove nurseries at Ecopark in Tambaliza

The organization also restored the 17-hectare Mangrove Eco- Park in Sitio Banban in Tambaliza to ensure the protection of the existing mangrove stands in the area. This initiative is part of the Community-Based Ecotourism Initiative that TASFA and the Barangay Government of Tambaliza has been envisioning for Tambaliza.

## Livelihoods

Two (2) livelihood projects were implemented in Tambaliza – the Natural Farming System (NFS) for vegetables in Sitio Punting, and the establishment of Community Mangrove Ecotourism with Boardwalk in the Mangrove Ecopark located in Sitio Banban.

### *Natural Farming System for Vegetables*

The NFS for vegetable emerged as a priority livelihood project due to the limited production and supply of vegetables in Tambaliza, as well as, in the town of Concepcion. In fact, local vegetables sold in Concepcion are sourced from other neighboring towns. Tambaliza also has vast area of unproductive land that can be used for vegetable production. Moreover, Tambaliza is being developed as a main tourism destination in the municipality, hence the TASFA also saw this as an opportunity to develop products in support of the tourism industry. The demand for vegetable is expected to increase with the influx of tourists in the municipality.

Since the start of the project in 2019, TASFA, through the support of the CI, has partnered with the Department of Agriculture Regional Field Office 6 (DA-RFO6). Farm inputs such as vegetable seeds and planting materials have been provided by DA-RFO6. A series of training and mentoring activities on natural farming systems for vegetables and legumes

[34] The two mangrove nurseries measure 7,000 square meters and is located near the ecopark exhibit area.

were conducted for these communities since 2019. Hands-on training on organic vegetables using NFS were conducted with the members of the TASFA. The training focused on providing the community with the necessary skills and knowledge on NFS to improve soil fertility in the planting area, keep crops healthy, and produce good quality vegetable and herb products and successfully sell them

Two sites for the NFS were established by TASFA. Site 1 was established in 2019 and has been fully operational since April 2020. A small plant nursery was established to house the seedlings for planting. TASFA has been producing good quality assorted vegetables such as eggplant, okra, chili, squash, spring onions, local pechay[35] and bitter gourd (ampalaya). Figure 25 to 28 shows the farm set-up in Site 1 and TASFA's vegetable harvests. The produce is sold in Concepcion town proper and within Tambaliza. Site 1 has vermicomposting[36] area to produce the farm's vermicompost requirements and minimize costs on commercial fertilizers. A water pump with housing and irrigation system was also installed. A circumference fence made of 200 pcs bamboo posts and 2 rolls of garden net was also installed to protect the transplanted seedlings from animals such as chicken, dogs and goats which frequent the vicinity of the farm.

**Figure 25.** Installed trellis for climbing bitter gourd plants in Site 1

**Figure 26.** NFS Vegetable Plots in Site 1

**Figure 27.** TASFA sorting their eggplant harvest

**Figure 28.** TASFA harvesting bitter gourd from their NFS

[36] Vermicompost is the materiel left behind after worms eat and digest kitchen scraps and other types of organic matter. It is aged worm poop, also referred to as worm castings.

For Site 2, the farm development started in November 2020. The main produce in Site 2 is mung beans as recommended by DA-due to the acidity of the soil in the area. Mung bean has been gaining attention as a short season crop that can tolerate dryland conditions, and fix atmospheric nitrogen, decreasing soil nutrient depletion. It is also a source of high-quality vegetable protein and can serve as a multipurpose crop. In addition to mung beans, TASFA also planted dragon fruit trees. The market for dragon fruit has been expanding in the Philippines, thus there is potential to market the dragon fruit produce only in Concepcion but in other areas in Western Visayas. Perimeter fence and a farm signage was also installed in Site 2. Aside from the installing water pump, TASFA also established a well, made of concrete culverts to allow the community to manually draw out water from the well if the water pump is not in order. The *tasuk* (deep hole) is very dependent on the water pump which puts irrigation as risk most especially when the water pump breaks or becomes out of order (Figure 29). An 8 x 10 feet vermicomposting house (Figure 30), enclosed with a net for security, was also constructed in Site 2. The project also provided initial support for the allowances of the farm manager and helpers.

Figure 29. Installed deep well made from culverts for the NFS irrigation system

Figure 30. Vermicomposting house in Site 2

## *Mangrove Ecopark*

Prior to Typhoon Haiyan (Yolanda) in 2013, the Barangay government of Tambaliza managed the Mangrove Ecopark and Resort in the area. It had a pavilion; an exhibit area and mangrove bamboo board walk but were destroyed by Typhoon Haiyan. The

Community-Based Ecotourism initiative supported by the GGI project aimed to revitalize tourism in Tambaliza by rebuilding the mangrove boardwalk, retrofitting the exhibit area to provide supplemental income to the community, and ensure the protection and management of the mangrove stands in the ecopark.

A 390.8-meter mangrove boardwalk (**Figure 31)** was constructed in Sitio Banban[37] as part of the Community-Based Ecotourism initiative. Out of the 390.8 meters boardwalk, 307.8 meters (1,010 feet) were made of concrete base, wood, and bamboo planks, approximately 83.3 meters were made from whole length bamboos while a movable 8 meters' raft was also constructed as part of the mangrove boardwalk. TASFA and the Barangay Council of Tambaliza were engaged in the designing and construction of the boardwalk. TASFA led the procurement of materials including hauling from the mainland while the Barangay Council Officers commissioned and supervised construction workers. Additionally, a community-based mangrove nursery was also established adjacent to the exhibit area. The mangrove nursery will be marketed by TASFA as a source of mangrove seedlings where DENR, LGU and other organizations will be able to purchase their seedlings requirements for mangrove rehabilitation.

**Figure 31.** Installed mangrove boardwalk in Tambaliza Ecopark

The project also supported the retrofitting of the 75-square meter ecopark exhibit area that will serve as the Ecopark's guest receiving area (**Figure 32**). Currently, the Ecopark exhibit area serves as storage for catering materials until the Ecopark starts its full operation. Electric wiring and light fixtures have already been installed. The Ecopark will utilize solar energy. Source of power will be a solar panel provided by TASFA as counterpart. Source of water will come from collected rainwater through gutters connected to the roof.

The project assisted TASFA in establishing linkage with Community Environment and Natural Resources Office (CENRO) in Sara Municipality, Iloilo, which conducted initial assessment at the Ecopark. The LGU Concepcion Municipal Tourism Office also committed to help in the marketing and promotion and other technical assistance once the Ecopark is in full operation.

[37] Sitio Banban is a cluster of houses located in the western part of the Pan de Azucar Island where Tambaliza is located.

Figure 32. Rehabilitated exhibit area in the Tambaliza Ecopark

## Capacity Building on Disaster Risk Reduction and Climate Change Adaptation

Communities in Tambaliza have been provided with capacity-building support on DRR-CCA by humanitarian and development organizations as part of the Typhoon Haiyan rehabilitation. However, Sitio Punting, a community which relatively far and isolated from village center[38] has very limited capacities. Based on the results of Participatory Capacities and Vulnerabilities Assessment (PCVA) and the Barangay Local Climate Change Action Planning facilitated by CI, lack of awareness on and understanding of DRR and climate change adaptation emerged as one of the weaknesses of the Sitio Punting community. Thus, a training on First Aid and Basic Life Support was provided to residents from Sitio Punting and other remote areas in Tambaliza. After the training, a network of community emergency response volunteers that could be mobilized by the Barangay Council during emergencies was established. Key community members, barangay officials and schoolteachers participated in the training. An emergency response simulation drill was also conducted to test the skills learned by participants from the training. The project also supported the development of the Barangay Disaster Risk Reduction and Management Plan for Tambaliza that also included Climate Change Adaptation. Basic DRR supplies, materials, and tools[39] were also provided to the community so that they can immediately and properly initiate and support the emergency response actions without largely depending on external support from the mainland.

[38] Tambaliza village center is in Purok Proper which is a 30-minute walk through the coast or through the forested area from Sitio Punting.

[39] The Basic DRRM equipment and supplies provided by the project includes hand-held radios, cervical collars, emergency hardhats, emergency handheld lights and rescue gloves

# Loong

## Green-Grey solutions

The green-grey project design for Loong included grey solutions (i.e. permeable living breakwater), green solutions (i.e. 2-ha mangrove rehabilitation/enrichment and marine protected area management) with livelihood incentives (i.e. squid processing) and provision of appropriate capacity building support.

Figure 33 presents green-grey interventions in place in Loong following project completion in July 2021.

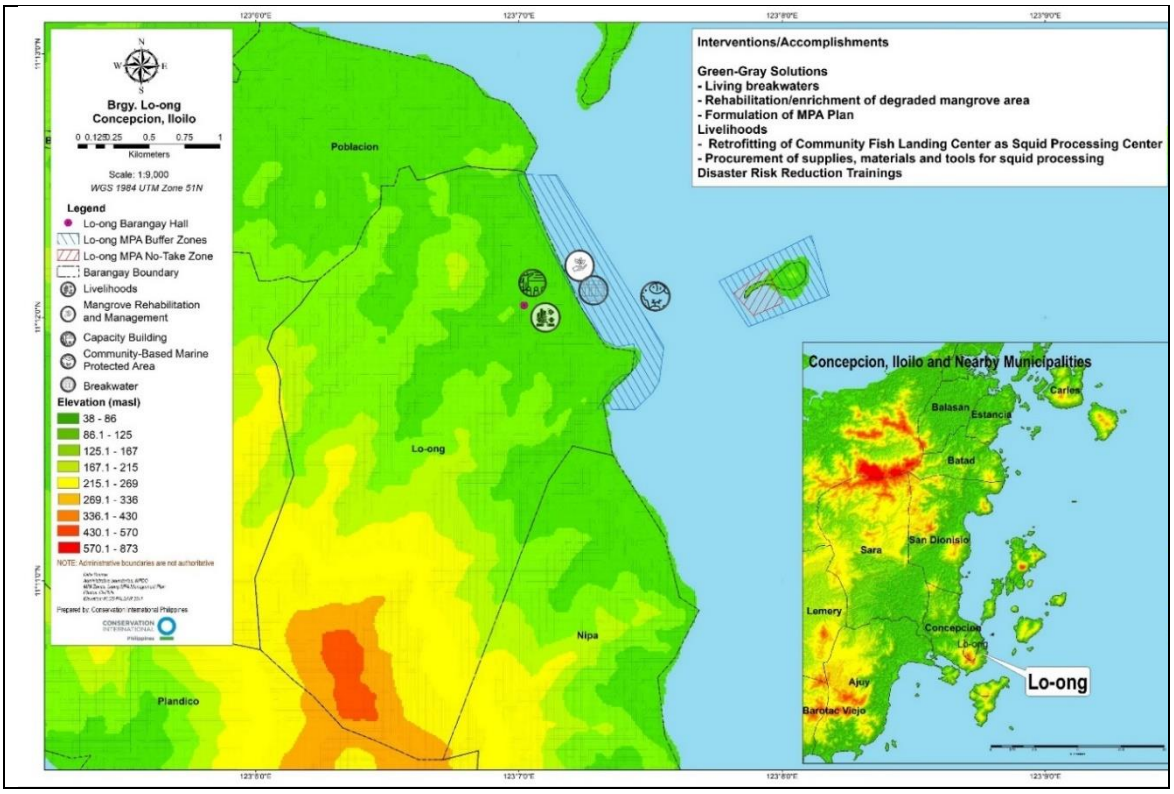



Figure 33. Map of Green-Grey Interventions in Loong, Concepcion

There are two (2) fisherfolk organizations in Loong, the *Baskal Operators of Loong Association (BOLA)* and the *Kusog sg Magagmay nga Mangingsda sa Loong (KUMALO)*. CIP partnered with BOLA in the implementation of the grey-grey project in Loong. However, to engage more community members in Barangay Loong, BOLA collaborated with KUMALO to support the implementation of green-grey project particularly in the construction of the breakwater. The two organizations also co-led the implementation and management of the green-grey solutions in the area, in close coordination with the Barangay government of Loong and the Local Government of Concepcion.

Living breakwaters were installed in two sites in Loong (Figures 34 to 35) – 100 meters in Purok Malipayon (Site 1) and 80 meters in Purok Mabinuligon (Site 2). The structures installed were 1 meter in height and 4 meters in width. The original target in Purok Malipayon was 102 meters of breakwater, however, from the total procured stones for the sites, the community organization was only able to construct 100 meters. The reason was

some stones that were delivered to the sites were rubbles and were not usable as materials for the breakwaters

Months after the completion of the breakwater construction, women and children in the community have started shell gleaning in the breakwater for home consumption and selling. The Barangay Council of Loong are planning to put in place a regulation on the use of the breakwater to avoid damage or rearrangement of stones in the breakwater which primarily to protect supplemental coastal protection to the community.

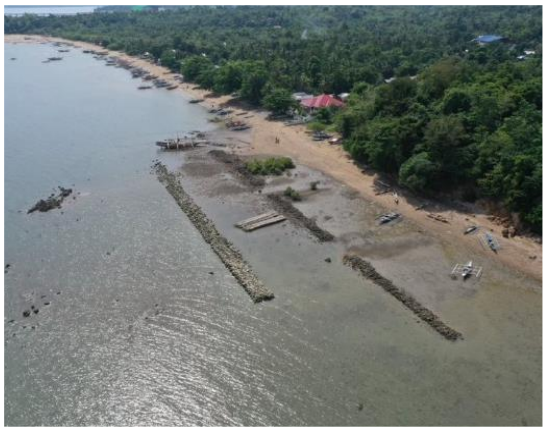


**Figure 34.** Drone view of the living breakwater installed in Loong (Site 1)

**Figure 35.** Constructed breakwater in Loong (Site 2)

The grey structures were established to promote sediment accumulation in the sites where mangrove seedlings were be planted. Moreover, the breakwaters also served as shellfish (oyster) reef. Shellfish larvae need a hard substrate on which to grow – attach themselves to the breakwater and gradually build up a solid reef structure that can withstand winds and waves. This also provide food and supplemental income to the community members, particularly women and children, who harvest shellfish in the area. The grey structures that were piloted in Loong were intended to be movable, in case, there are necessary adjustments needed in the orientation or location of the structure.

Mangrove rehabilitation was conducted near the living breakwaters in Purok Malipayon and Mabinuligon. BOLA rehabilitated two hectares of degraded mangrove area near the installed breakwaters – 0.5 hectares in Malipayon and 1.5 hectares in Mabinuligon. Mangrove seedlings were planted in rows (strip planting), equally spaced from each other at 1 x 1 meter. For this planting pattern and spacing, an area of one (1) hectare required 10,000 mangrove seedlings. Figures 36 to 39 show the mangrove outplanting activities in Loong and the planted mangrove seedlings in the two sites. The total number of seedlings planted is 20,000. The following mangrove species were used by BOLA for the outplanting activities: *Avicennia sp. (miapi), Sonneratia sp. (pagatpat), Rhizophora apiculata (bakhawan lalaki), Rhihzophora mucronata (bakhawan babae)* and *Ceriops sp. (tangal)*

**Figure 36.** BOLA members transporting and hauling the seedlings to outplanting site

**Figure 37.** BOLA members clearing mangrove area of debris and trash prior to outplanting

**Figure 38.** Mangrove outplanting activity in Site 1 in Loong (Sitio Malipayon)

**Figure 39.** Planted mangrove seedlings in Site 2 in Loong (Sitio Mabinuligon)

The project also supported the establishment of a 147.3-hectare community-based marine protected area (CB-MPA) composed of 14.1-hectare of No Take Zone (NTZ) and 133.2-hectare buffer zone (BZ) through the:

- provision of basic equipment and supplies[40] for effective MPA enforcement ad patrolling

[40] Life jackets, solar light with sensor for marker buoys, life buoy ring, megaphones with sirens and 2 mobile phones.

- installation of MPA marker buoys (Figure 40) to delineate the MPA boundaries to increase awareness and support
- provision of capacity-building support through trainings and facilitation of community-based MPA plan formulation.

Figure 40. MPA Marker Installation in Loong

## Livelihoods

The livelihoods project identified for Loong was squid processing and production of squid-based goods, such as dried squids and bottled squid in different bases and flavors. Squids are the major marine products that are caught by the fisherfolk, especially of the BOLA members. Majority of these catches are delivered to wholesalers in Iloilo City, while others are bought or consigned to local vendors in Concepcion. Some members of BOLA had previous training on squid crackers processing, and one was able to establish a personal business. Since there are surplus of fresh catch of squids, and to add value to these, the association proposed to venture into squid processing to include ready-to-eat squid meals aside from the popular dried squids. In this project, even class B or lower quality squids, could still be used hence, there would be no waste of raw materials.

CI provided BOLA with key equipment and necessary supplies[41] for the squid processing. Funds to purchase fresh squids for BOLA's squid processing were also provided. BOLA purchased 490 kilos of fresh squid from its members who are Baskal[42] operators. From the 490 kilos of fresh squid, BOLA was able to produce and sell 93 kilos of dried squid. A kilo of dried squid is sold at Php 1,200.00 or $23.46.00. Thus, for 98 kilos of squid, the organization will be able to earn back Php 111,600.00 or $2,181.81 if all the products are sold. However, due to COVID-19 restrictions, there were lesser wholesale dried fish traders buying from Loong. Thus, the price dropped below Php 1,200.00. The net income (minus the expenses and labor costs) would be used by BOLA as revolving capital to continue the procurement of fresh squids for their squid processing requirements. The processing costs (splitting and drying) is Php 9,800 or $191 .59 for the 490 kilos at Php 20.00 or $0.39. Figure 41 to 44 present activities for squid processing including the packaging of the dried squid products.

[41] This includes vacuum sealer, digital weighing scales, solar dyer and food processor.

[42] Baskal is a type of fishing gear used to catch squids. It is a modified bagnet.

**Figure 41.** BOLA members cleaning and splitting the fresh squid in preparation for sun-drying

**Figure 42.** BOLA member sun-drying the fresh squids

**Figure 43.** Size sorting of dried squids

**Figure 44.** Packaging of dried squids

In 2018, the Bureau of Fisheries and Aquatic Resources (BFAR) in partnership with the Local Government of Concepcion established the Community Fish Landing Facility (CFLC). The objective of the CFLC was to provide fisherfolk in Loong with a place to easily dock, report their catch, and sell to local buyers. However, the structure was not fully utilized by the community since its construction. Most of the fisherfolk in the community sell their fish catch to fish brokers in the town proper. At a meeting with BFAR VI, LGU Concepcion, MFARMC, Barangay Council of Loong, and representatives from BOLA and KUMALO in 2020, it was agreed that the Community Fish Landing Center would be enhanced through the support of the Green-Grey project and utilized as the processing center for squid-based products by the BOLA and KUMALO. The CFLC was originally designed as an open space for fish trading. However, for the squid processing, the area must be fully enclosed to avoid contamination of products during processing and secure the supplies, tools and materials used for squid processing. Double walls and fine mesh screens were mounted around the first level of the CFLC (**Figures 45 to 46**). BOLA also installed a steel bar gate to secure the area from intruders. The project provided funds to BOLA for the materials and labor cost for the enhancement of CFLC.

**Figure 45.** Completed wall installation of the CLFC


**Figure 46.** Exterior view of the CLFC with installed walls

In addition to the funding provided by the GGI project, the Local Government Unit of Concepcion allocated P500,000.00 for the installation of electricity and water supply in the Community Fish Landing Center. BOLA and KUMALO also allocated P100,000.00 pesos (50,000.00 from each of the organizations) for the procurement of fresh squids and other materials needed in implementing the project.

The CFLC has one (1) unit chest Freezer, 1-unit upright freezer and 6 units of stainless-steel tables that can be used by the BOLA in their squid processing initiative. They also have motorcycle with side car that can be used in procuring raw materials and in transporting/delivering the finished product to the town proper. They have also existing utensils that was provided by World Renew, a humanitarian organization after Typhoon Haiyan. These utensils and equipment can also be used in squid processing.

## Capacity Building on Disaster Risk Reduction and Climate Change Adaptation

The communities in Loong have been provided with numerous capacity-building support on DRR-CCA by humanitarian and development organizations as part of the Typhoon Haiyan rehabilitation. It is also located in mainland Concepcion and have more access to the support coming from LGU Concepcion. However, selected members of the BOLA and the Barangay Council of Loong also participated in the Training on First Aid and Basic Life Support provided by Red Cross in 2018. The project also supported the development of the Barangay Disaster Risk Reduction and Management Plan for Loong which also included Climate Change Adaptation.

# Bacjawan Norte

## Green-Grey solutions

The green-grey project in Bacjawan Norte was implemented in partnership with the community-based organization, Tigbatas Fisherfolks Organization (TFO). The project design included grey solutions (i.e. living breakwater) and green solutions (i.e. 2-hectare mangrove rehabilitation/enrichment) with livelihood incentive (i.e. native chicken production) and appropriate capacity building support.

Figure 47 depicts interventions in place in Bacjawan Norte following project completion in July 2021.

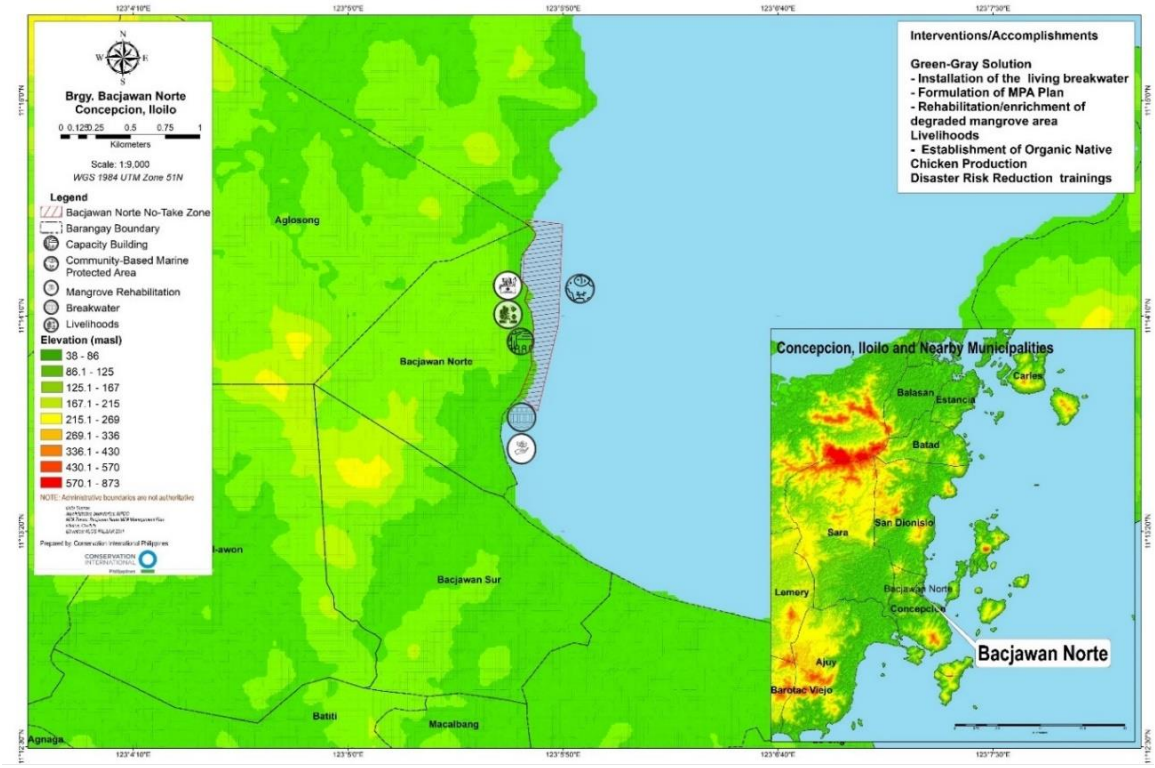



Figure 47. Map of Green-Grey Interventions in Bacjawan Norte

Like Loong, the living breakwater was installed to promote sediment accumulation in the target area for mangrove restoration and to also serve as shellfish (oyster) reef where shellfish gathering could be done by women and children in the community. The structure was also anticipated to build up a solid shellfish structure in time that would help protect communities along the coasts. The grey structures that were piloted in Bacjawan Norte were also intended to be movable, in case, there are necessary adjustments in the orientation or location of the structure.

A 108-meter living breakwater was installed in Bacjawan Norte (Figure 48). The original target was 112 meters of breakwater however from the total procured stones for the site, the community organization was only able to construct 108 meters. The volume of the stones was measured by the carrying load of the truck which was 16 cubic meters. Since the stones were blasted and not pre-cut, stone rubbles were included in the measurement of volume of delivered stones. Figure 49 shows community members collecting shellfish near the breakwater.

Figure 48. Completed 108-meter Living Breakwater in Bacjawan Norte (beach side view)

Figure 49. Community members from Bacjawan Norte collecting shellfish and crabs near the breakwater

After the completion of the breakwater construction, women and children in the community have started shell gleaning in the breakwater for home consumption and selling. The breakwater will formally tuner over to the Barangay Council. The barangay has an allotted budget for maintenance costs of the breakwater amounting to PhP 5,000.00 or $97.75.00 charged against the 2021 Annual Investment Plan (AIP) under Preparedness Pillar for the Barangay Disaster Risk Reduction and Management (BDRRM) Fund.

A 375-meter nursery was established to house the collected and potted seedlings and wildings (Figure 50). TFO rehabilitated 2.55 hectares of degraded mangroves near the installed breakwater, and thus exceeded their target of 2 hectares for this project. Mangrove seedlings were planted in rows (strip planting), equally spaced from each other at 00.r meters utilizing 25,000 seedlings. TFO used the following mangrove species in the outplanting activities: *Avicennia sp., (miapi), Rhizophora apiculata (bakhaw lalaki), R. mucronata (bakhaw babae)* and *Ceriops sp. (tangal)*.

Figure 50. Mangrove nursery in Bacjawan Norte

Technical inputs to the preparation of the MPA plan in Bacjawan Norte was also initially provided. However, the Barangay Council of Bacjawan Norte preferred to restore the joint community-based marine protected area (CB-MPA) with Bacjawan Sur and Población. Separate meeting with the three barangays were conducted with the three (3) barangays to schedule a joint MPA planning workshop, but the initiative did not move forward as there were challenges in bringing together the three communities to discuss the revitalization and re-design of the joint CB-MPA.

## Livelihoods

For the Bacjawan Norte, the livelihood project identified for the community was organic native chicken production. This project was identified by TFO to provide a sustainable source of native chicken for Bacjawan Norte and to bridge the gap in native chicken production in Concepcion. The project aims to produce organic live chicken and poultry meat and native chicks and eggs.

The livelihoods capacity building activities conducted with TFO to support the establishment of the Organic Native Chicken Production in Bacjawan Norte are presented in **Annex 1**.

As part of the support to TFI, key equipment such as egg incubators for the Organic Native Chicken Production were provided. The project also provided materials and labor support to TFO to construct a facility for Native Chicken Production. The facility consists of three (3) chicken coops or housing for (1) grow-out, (2) breeding, (3) incubation and hatching, (4) chick rearing; and an area for concoctions-making, vegetation for feeds and poultry farm water system (**Figure 51 to 54**). A net was installed in the circumference fence as an extra support to keep stray animals away. Various natural feed sources such as *madre de cacao (*mother of cacao*), alugbate (*Malabar spinach*), ahos-ahos, tanglad (*lemon grass*), malunggay* (moringa*), talinum (*spinach*), siling* labuyo (chili) and panyawan (Indian Guduchi) were planted around the fence. Space inside the poultry farm was planted with mani-mani (forage legume), talinum, kamote (sweet potato) and aloe vera as source of materials for organic concoctions. Houses were also labeled accordingly, and outdoor thermometer were installed to serve as gauge for TFO members of surrounding temperature. A water/irrigation system was also installed in the poultry farm from a nearby deep well as water source.

**Figure 51.** Grow-out coop for chicks

**Figure 52.** Grow-out coop for chicken

**Figure 53.** Coop for ready-to-lay chicken

**Figure 54.** Incubator and feeds house

TFO entered a lease contract with one of the community members for a 360-square meter lot for a period of 10 years, which is renewable every five (5) years.

Additionally, the project also provided funds to purchase ingredients for the customized native chicken feeds[43]. Fermented veggies are added to serve as source of vitamins and minerals. Rice and corn bran provides for the carbohydrate needs their homes.

### Capacity Building on Disaster Risk Reduction and Climate Change Adaptation

The communities in Bacjawan have been provided with capacity-building support on DRR-CCA by humanitarian and development organizations as part of the Typhoon Haiyan rehabilitation. It is also located in mainland Concepcion and have more access to the support coming from LGU Concepcion. However, to further develop their capacities, selected members of the TFO and the Barangay Council of Bacjawan also participated in the Training on First Aid and Basic Life Support arranged by CI and provided by Red Cross in 2018. The project also supported the development of the Barangay Disaster Risk Reduction and Management Plan for Bacjawan Norte which also included Climate Change Adaptation.

## Polopiňa

### Green Solutions

The project in Polopiňa was implemented in partnership with the community-based organization, Proper-Pasil Guardians Association of Marine Protected Area (PROPAGAMPA). The project implementation in Polopiňa differed from the other four sites in that it did not include grey solutions. The project design was on green solutions (i.e. rehabilitation/enrichment of 3-hectare mangrove area, 1-hectare mangrove nursery and marine protected area management) with livelihood incentive (i.e. garment-making) and appropriate capacity building support.

Figure 55 illustrates the interventions in place in Polopiňa, following project completion in July 2021.

[43] Customized organic native chicken feeds are made from locally available ingredients. Composition of the customized native chicken feed is estimated to have 75% carbohydrates, 15% protein, 10% fats and oil.

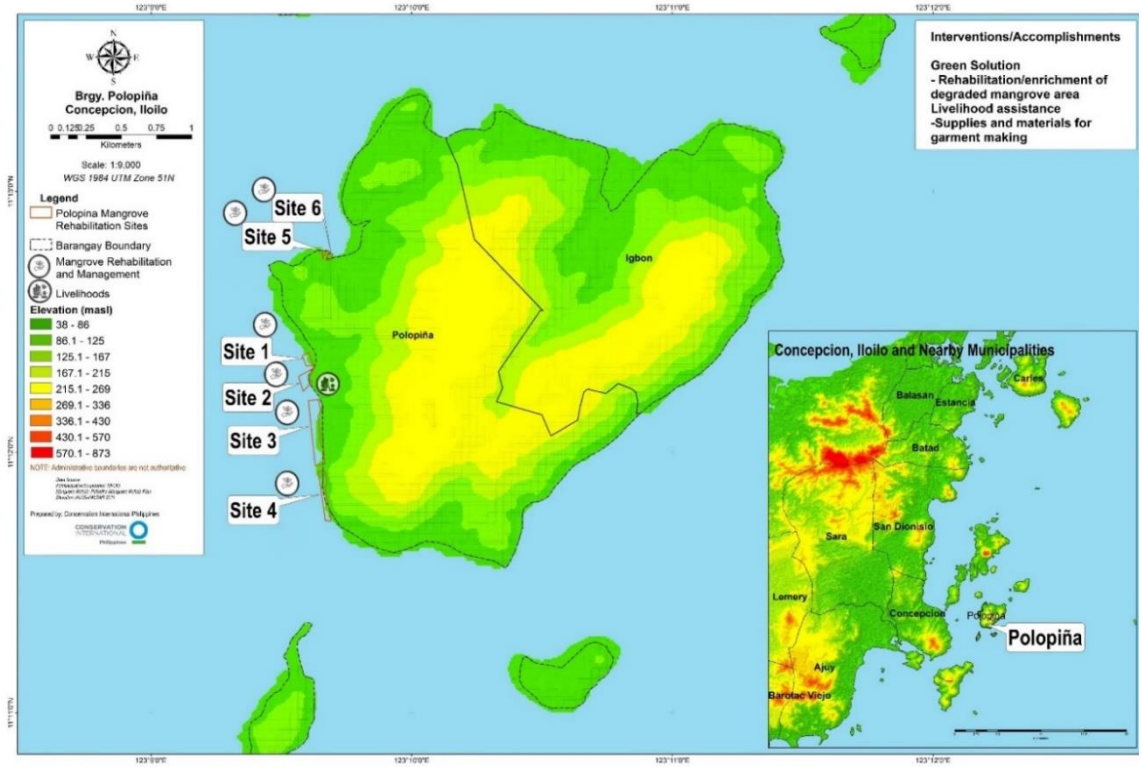



Figure 55. Map of Green Solutions in Polopiňa

An underdeveloped fishpond and an area alongside a creek in Sitio Bat-os in Barangay Polopiňa in Concepcion was identified as the mangrove nursery in Polopiňa. The area measured around 7,531 square meters. However, during the establishment of the mangrove nursery project, the mangrove nursery was only established in the underdeveloped fishpond measuring 5407 square meters. Some residents were worried that the collection of soil media from the mangrove area for the potting of seedlings would cause erosion during flooding and decrease their land cover

The mangrove nursery in Polopiňa (Figure 56) was established to produce at least 150,000 mangrove seedlings and wildlings for the planned mangrove rehabilitation in Polopiňa, Bagongon and Loong. However, only 57, 900 seedlings were produced in Polopiňa and the rest of the target production was distributed to Loong and Tambaliza. This is to make the collecting and bagging of mangrove seedlings and propagules more efficient instead of collecting and rearing all the seedlings in Polopiňa. The advantage of doing this is no transport and hauling will be required for the seedlings that will be produced in Sitio Punting, Tambaliza and Loong.

For Polopiňa, the outplanting sites are in the coasts of Sitio Looc and Proper. The outplanting sites used to be lined with mangroves in the 1970s but were cleared to give way to settlements and boat docking areas. Thus, the areas are exposed to coastal hazards such as strong waves during storms and monsoon season (southwest monsoon).

Figure 56. Mangrove nursery in Polopiňa

The mangrove rehabilitation initiative was part of the Barangay Polopiňa's Marine Protected Area Management Plan for 2021-2025 that was formulated as part of the project. The original plan was to rehabilitate three (3) hectares of mangroves, however, due to the request of the community for boat navigation area, the area was reduced to 2.84 hectares. Mangrove seedlings were planted in rows (strip planting), equally spaced from each other at 1 x 1 meter. For this planting pattern and spacing, an area of one hectare required 10,000 mangrove seedlings. The total number of seedlings planted was 30,050. The mangrove seedlings were all sourced from the mangrove nursery in Sitio Bat-os established by the project in partnership with the Sitio Looc Fisherfolk Association (SILOSFA).

On 23 July 2021, the Barangay Local Government of Polopiňa reported that strong waves as result of Typhoon Fabian[44] flooded twelve (12) houses and destroyed one (1) big fishing boat in Polopiňa and affected the project's mangrove rehabilitation area damaging 75% of the planted mangroves (22,537 seedlings). The strong waves brought wooden debris to the coast of Polopiňa which damaged the planted mangroves in Sitio Proper and Looc (Figure 57). The wave impact also uprooted some of the plants. PROPAGAMPA and the Local Government of Concepcion committed to conduct replacement planting activities for the affected seedlings.

[44] Typhoon Fabian, that was located 510 kilometers northeast of Batanes boosted the southwest monsoon in the Visayas Sea.

Figure 57. Damage to the project's planted mangrove in Polopiňa due to Typhoon Fabian

The project also supported the establishment of a 147.3-hectare community-based marine protected area (CB-MPA) composed of 14.1-hectare of No Take Zone (NTZ) and 133.2-hectare buffer zone (BZT) through the:

- provision of basic equipment and supplies[45] for effective MPA enforcement ad patrolling
- installation of six (6) MPA marker buoys (Figure 58) to delineate the MPA boundaries and MPA signages (Figure 59) to increase awareness and support
- provision of capacity-building support through trainings and facilitation of community-based MPA plan formulation

Figure 58. Installation of marker buoys in Polopiňa

[45] The equipment and supplies include life jackets, solar light with sensor for marker buoys, life buoy ring, megaphones with sirens and 2 mobile phones.


Figure 59. Installed MPA signages in Polopina

## Livelihoods

The main livelihood project identified for Polopiña was the production of (garments) school uniforms and jogging pants for physical education, initially targeting public grade and high schools in Concepcion, Iloilo. To prepare the sewers for this livelihood project, seventeen (17) members of the Proper-Pasil Guardians of Marine Protected Area (PROPAGAMPA) and Sitio Looc Small Fisherfolk Association (SILOSFA) were trained on Basic Dressmaking and Tailoring. The training was done in partnership with Technical Education and Skills Development Authority (TESDA).

The project provided the organization with five (5) units of manual sewing machines, one (1) high-speed sewing machine, one (1) zigzag stitching machine and one (1) edging machine (Figures 60 to 61). Since Polopiña does not have regular supply of electricity in the island, one unit of solar power system (Figure 62) was also provided by the project to operate the sewing machines. Textiles required for the school uniform production were also procured. However, because of the COVID-19 pandemic, face-to-face classes were suspended, so the partner organization sought other income-generating activities that could use the equipment they already had. In June 2020, the women members of PROPAGAMPA and SILOSFA accepted orders and produced cloth face masks (1,100 pieces for their barangay; and 1000 pieces for the power plant; 1600 pieces with embroidered logo for Conservation International Headquarters in the United States of America. They also had sales in other barangays and nearby towns and provinces.

Figure 60. Manual sewing machine provided by the project

Figure 61. Electric high speed sewing machine

Figure 62. Solar panel installed in the production center

The production center being used by the partner organization was donated by the Iloilo Code NGOs through Fundación de France. However, the space is limited to accommodate all sewing equipment. Hence, the organization, in collaboration with the project team, requested funding assistance from the Local Government of Concepcion to construct the extension of production center (Figure 63). The lot where the production center is built, is owned by PROPAGAMPA.

Figure 63. Expansion and concreting of production center in partnership with the LGU

## Capacity Building on Disaster Risk Reduction and Climate Change Adaptation

The communities in Polopiña have been provided with capacity-building support on DRR-CCA by humanitarian and development organizations as part of the Typhoon Haiyan rehabilitation. Although it is in an island, it has better access to the support coming from LGU Concepcion compared to Bagongon and Tambaliza. Selected members of the PROPAGAMPA and SILOSFA, and the Barangay Council of Polopiña also

participated in the Training on First Aid and Basic Life Support arranged by CI and conducted by Red Cross in 2018. The project also supported the development of the Barangay Disaster Risk Reduction and Management Plan for Polopiňa which also included Climate Change Adaptation.

# Promotion of GGI at local, national, and international levels

Stakeholders need to be fully convinced of the advantages of implementing a green-grey infrastructure approach, so they can ensure its viability, effectiveness, and sustainability. As part of stakeholder engagement, it is necessary to provide stakeholders with a persuasive business case that presents the rationale for a green-grey project, program or policy in terms that are relevant, credible, legitimate, and sustainable. A successful business case typically depends both on technical "facts" and "evidence", and on creating an effective process of stakeholder engagement, dialogue, and communication. Synchronized and massive information campaign is needed to communicate successes in GGI implementation to politicians, decision-makers, planners, scientists, or technical advisors, potential investors, users or service beneficiaries, taxpayers, and local communities, including indigenous/ethnic groups. If the benefits are clearly appreciated these groups can be advocates of GGI adoption and expanded implementation.

The project aimed to promote and advance the adoption and implementation of green-grey infrastructure in three levels: (1) in Northern Iloilo and Panay; (2) national level especially in other small islands where there are existing projects that aim to address climate change challenges and restore and protect marine and coastal biodiversity (Visayas, Palawan, Southern Luzon) ; and (3) globally through networks in order to reinforce resilience to climate change and the protection of ecosystems in tropical areas. The results in these three levels are presented below:

## Promoting GGI at the Local Level (Northern Iloilo and Panay)

### Support to the Updating of the Local Climate Change Action Plans

The Philippine Republic Act (RA) 9729[46] and RA 10174[47] mandates the preparation of the Local Climate Change Action Plan (LCCAP). However, it is clear from the laws that the LCCAP should not be considered independent from the Rationalized Planning System

[46] Philippine Climate Change Act of 2009

[47] Establishing the People's Survival Fund to provide long-term financing to enable the Government

(JMC 2007-1)[48] of the Philippines. Thus, DILG issued a Memorandum Circular 2015-77[49] outlining the role of LCCAP relative to Local Development Planning.

As a partner of the Northern Iloilo LGUs, Conservation International commissioned a consultant, University of the Philippines in the Visayas Foundation, Inc (UPVFI) to provide technical assistance to two Local Government Units (LGUs) – Carles and Concepcion - in updating their LCCAP[50] (Figure 64). Specifically, the assistance supported the LGUs in identifying gaps and limitations in their current LCCAP as well as possible solutions to address them. Furthermore, the objective was to ensure that nature-based solutions such as ecosystem-based adaptation (EBA) and green-grey solutions are considered in the updated LCCAP. Due to the COVID-19 restrictions, workshops, and meetings with the

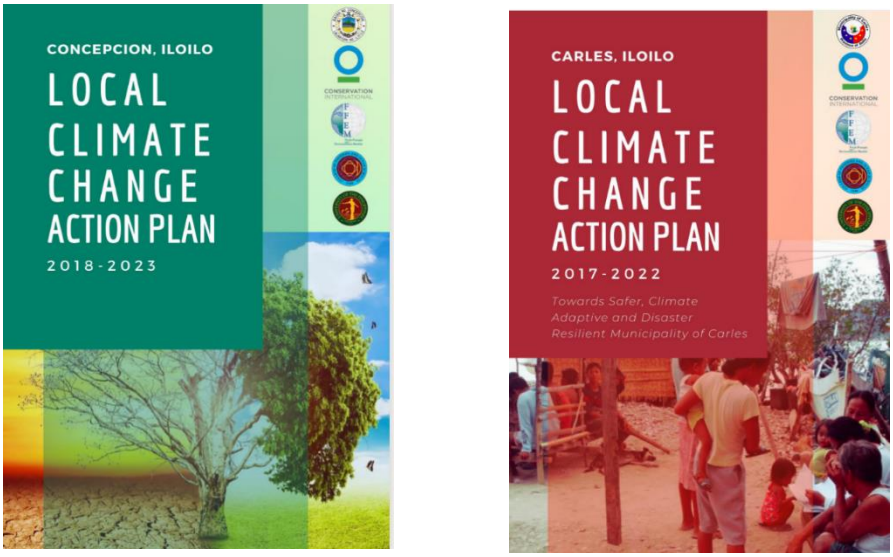



Figure 64. Local Climate Change Action Plan for Concepcion (left) and Carles (right)

LGUs and selected representatives from the communities were done virtually.

# Promoting GGI at the National Level

## Green-Grey Conceptual Designs with Local Governments

[48] Joint Memorandum Circular 2007 No.1 of the Department of the Interior and Local Government, National Economic and Development Authority Department of Budget and Management Department of Finance contains the Guidelines on the Harmonization of Local Planning, Investment Programming, Revenue Administration, Budgeting and Expenditure Management.

[49] Department of the Interior and Local Government (DILG) Memorandum Circular 2015-77 contain Guidelines on Mainstreaming Climate Change Adaptation and Disaster Risk Reduction in Local Development Planning.

[50] A LCCAP is the action plan formulated by local governments to address climate change concerns. It focuses on both climate change adaptation and mitigation and describes how LGUs plan to respond to the impacts of climate change and mainstream them into local development plans (i.e. land use plan, sectoral development plan, investment program).

CI Philippines intends to promote and expand Green-Grey Infrastructure solutions work in other areas in the Philippines. Thus, in 2019, CI Philippines initiated a scoping study to determine the feasibility and need for green-grey adaptation solutions to reduce climate disaster risks and increase resilience to climate change impacts in other towns in Iloilo Province. The study aimed to recommend sites feasible for the design and implementation of green-grey adaptation solutions in Iloilo Province. This was done through the support of CI's Seligmann Innovations Funds. From the scoping and consultations meetings with Bechtel, the municipalities of Carles and Estancia were identified as priority sites for coastal green-grey solutions. Four (4) initial design concepts were drafted for Estancia and two initial design concepts were drafted for Carles. The design concepts were shared with the Local Governments and have been presented in the Steering Committee meeting. CI Philippines aims to continuously share these design concepts with prospective donors and partners to explore possible funding and partnership opportunities, and local and regional governments are supportive of advancing the design and implementation process once funding is secured.

Additionally, in 2022, CI Philippines commissioned AECOM Philippines together with its Global Expert Panel to spearhead a project, called "Green-Grey Partnership Project", to develop Concept Strategies for green-grey infrastructure application in potential expansion sites from Concepcion, Iloilo to other coastal sites in the Philippines. Through a 12-week virtual sessions, AECOM and CI Philippines facilitated several workshops with the local government units in at least 10 c1ties and municipalities, which were selected based on the following criteria:

- Commitment to a Resilient Future
- Good track record and strong interest for pursuing a climate-resilient future for their locality
- Drivers of Change Positioned as municipal leaders for a sustainable future for the Philippines
- Rich and Diverse Natural Assets Representation of the abundant biodiversity of the Philippines.
- Vulnerability to Impacts of Climate Change Exposure to the impacts of climate change.

These resulted in the development of 11 Concept Designs for GGIs (Annex 3) for potential expansion sites that include LGU-signed Statements of Intent. These concept designs can be used by the LGUs for communicating with potential funders, soliciting technical support from partner organizations, and for LGU budget allocation to implement the projects.

Through this exercise, the formation of the local Community of Practice on Green-Grey in the Philippines was initiated with the 11 assisted LGUs considered as initial members. Though this is an informal arrangement, the local Community of Practice can provide an avenue for these LGUs to continue coordinating and learning from each other on green-grey project journey.

## Technical Seminars on Green-Grey

### *Training on Community, Engineering and Ecology*

CI Philippines organized two batches of virtual, blended 5-day Training on Community, Ecology and Engineering for an Integrated Green Grey Solution for the Local

Government, Government Agencies and Civil Society Organizations. The first batch was conducted with Region VI (Western Visayas) participants (Batch 1), on 7-14 September 2020 and, the second batch, with Region IV-A (CALABARZON) and IV-B (MIMAROPA) participants (Batch 2), on 30 September to 08 October 2020. Most participants were representatives of local government units and national government agencies in the said regions, but some came from civil society organizations, particularly in Region VI. Despite the challenges in online learning such as technical issues, participant distractions, sustaining participant interest and lack of in-person interaction, a total of 70 participants (38 males and 32 females) attended the virtual training (Figure 65). From the 70 participants, 24 participants were from Region VI training while 46 participants Region IV-A (CALABARZON) and IV-B (MIMAROPA)

Figure 65. Virtual Training on Community, Engineering and Ecology

The training sought to raise awareness, improve understanding, and initiate a community of practice among the participants on the use of green-grey solutions to address environmental adaptation issues in the country.

Conservation International brought together a team of resource speakers in the fields of Community Development, Engineering and Ecology to provide technical inputs[51] on the topic. The discussions were interspersed with case study workshops on community profiling, situational analysis, and mapping, and conceptualizing green-grey solutions to ensure that the participants can apply the green-grey concepts practically in addressing environmental issues affecting specific areas in their respective regions.

The training-workshop resulted in the crafting of profiles of communities affected by climate change in Batad and Concepcion in Iloilo, Baco in Oriental Mindoro, Romblon, Batangas, and Occidental Mindoro, as well as assessment of capacities, drawing up recommendations on Green-Grey intervention measures, and analysis of stakeholders in these areas. In Regions IV-A and IV-B, participants were able to develop action plans that can serve as guide once they initiate green-grey projects or continue existing climate change adaptation efforts in their respective areas. The workshop also provided a venue for the attendees to start a national community of practice in advocating and conducting Green-Grey initiatives in the Philippines, with CI as a convener and facilitator.

[51] Basic climate change science, basic ecology of coastal habitats for integrated green-grey solutions, ecosystem-based adaptation, human and environment interactions, green-grey engineering, and on community organizing, planning, and monitoring and evaluation relevant to building green-grey infrastructure and climate change adaptation

Additionally, CI Philippines provided virtual orientation on Green-Grey solutions to some local governments from Region VI and IV upon their request to increase understanding on green-grey and encourage support for integrated green-grey solutions for their municipalities. Moreover, CI Philippines continues to work with Department of Environment and Natural Resources-Climate Change Services Office (DENR-CCSO) to explore how green-grey infrastructure solutions can be integrated in DENR's work on the ground.

To boost interest on green-grey solutions, CI Philippines and the Technological Institute of the Philippines also published news articles on various printed media platforms such as national newspaper, CI and TIP's Facebook account and websites. These can be viewed on https://www.tip.edu.ph/article/TIP-as-trainer-Conservation-International-Philippines-green grey-program.html.

### *Mini-Seminars on Green-Grey*

Networking and engagement with government and other organizations also opened opportunities to promote and advance green-grey infrastructure solutions. CI Philippines was able to present its work on Ecosystems-Based Adaptation particularly on Green-Grey in several mini-seminars for government and private sector partners.

- 2020 November, NEDA Region Economic Development Committee
- 2021 August, Philippine KOICA Fellows Association in partnership with Regional DRRM Council VI (Western Visayas)
- 2021 October, Department of Tourism Talakayan (Discussion) Series (regional)

## Roundtable Discussion (RTD) on the Future and Prospects of Green-Grey Infrastructure Solutions

A Virtual Roundtable Discussion (RTD) on the Future and Prospects of Green-Grey Infrastructure Solutions was conducted on 10 February 2021 (Wednesday) as part of CI's initiative to develop and expand partnerships and encourage financing for green-grey initiatives. The RTD was organized to provide a venue to share and discuss the status of CI's Green-Grey Infrastructure initiatives globally and in the Philippines. The meeting was attended by 33 participants from government agencies, non-government organizations, academic institutions, donors, and the private sector such as from AECOM, Agence Française de Développement (AFD) in Manila, Asian Development Bank (ADB), Technological Institute of the Philippines, University of the Philippines-College of Engineering, Climate Change Commission (CCC), Bureau of Fisheries and Aquatic Resources (BFAR), Department of Environment and Natural Resources (DENR) – Climate Change Service Office, Ecosystems Research and Development (ERBD), Department of Public Works and Highways (DPWH), Blue You, EU Philippine Delegation, RARE, Wetlands International, Swiss Re, and GIZ (Figure 66).

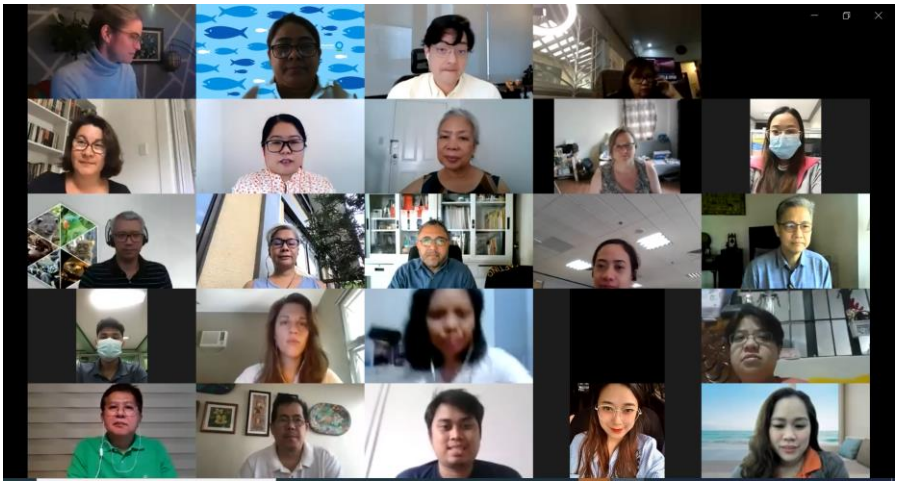


Figure 66. Roundtable Discussion (RTD) on the Future and Prospects of GGI Solutions

The updates on project initiatives on Green-Grey Infrastructure in Concepcion, Iloilo were shared with the partners. Near-term green-grey project and program priorities for the Philippines were also shared, specifically the initial concept design for Carles and Estancia, Iloilo. These were results of the scoping activities conducted to identify and develop prospective Green-Green Infrastructure solutions for Northern Iloilo.

## Policy Discussion on Green-Grey Infrastructure

Two policy discussions on Green-Grey Infrastructure were organized by the project team with relevant national, regional, and provincial government offices, civil society organizations and academic institutions working on ecosystems conservation and restoration, and infrastructure development. The activity discussed and explored opportunities for GGI for coastal and island communities and potentials for building resilience against climate change impacts in the Philippines, particularly in Western Visayas where Iloilo is located. It aimed to identify recommendations that could inform local and national policies on integrating and mainstreaming of green-grey approaches in building public infrastructures to support the resilience of communities and protection of coastal ecosystem.

The 1st GGI Policy Discussion was conducted on 09 December 2019, in Iloilo and was attended by 28 participants (13 female and 15 male) from regional line agencies, academic institutions and civil society organizations working in the Province of Iloilo. This includes regional government agencies who sits in the Project Regional Steering Committee.

Figure 67. Policy discussion on GGI Approach with government, NGO and academic institution partners in Iloilo

The 2nd GGI Policy Discussion was virtually held on 20 August 2020, where 31 participants (8 male and 23 female) from national line agencies, academic institutions and civil society organizations based in Metro Manila attended.

An overview on Green-Grey Infrastructure (GGI) as an Ecosystem-Based Adaptation approach was provided by Conservation International Philippines where the urgent need for innovative climate adaptation solution such as GGI particularly in coastal region was highlighted. Examples on GGI implementation globally and in the Philippines were also provided. The need to work with government, academe, civil society organizations and private sectors to advance GGI practice was highlighted to: (1) encourage innovations and development of pilot new green-grey approaches to increase resilience of climate vulnerable communities and build capacity in the engineering and conservation communities; (2) promote and increase awareness and understanding of green-grey's potential applications in a multitude of geographies and settings.

The overview was followed by a short feedbacks and inputs from a panel of reactors from the Department of Public Works and Highways (DPWH), Wetlands International Philippines, University of the Philippines Marine Science Institute, Climate Change Commission, Rare Philippines and the Department of Environment and Natural Resources. Open forum followed and the discussion was capped by short synthesis of the discussion.

# Media Initiatives on Green-Grey

## *News Articles and Features*

In 2016, CI published two articles about the project through it blog site Human Nature. The first one is the 'Roots from rubble: On Philippine coasts, rebuilding nature's barriers to stormier seas' (*http://blog.conservation.org/2015/11/roots-from-rubble-on-philippine-coasts-rebuilding-natures-barriers-to-stormier-seas/)* is about the experience of communities during Typhoon Haiyan and given the urgent threats that rising seas and more intense storms pose to human lives, nature-based solutions need to work in tandem with more conventional man-made constructions. The article used the platform Atavist that displays visuals beautifully while integrating them seamlessly with the text, like the style the New York Times has adopted for some of its recent in-depth stories.

The follow up article is 'Armed with nature, Philippines to boost defenses against stronger

storms' talks about the signing the agreement between CI and FFEM to implement the 1.6 million Euro green-grey adaptation project in Concepcion, Iloilo (http://blog.conservation.org/2015/12/armed-with-nature-philippines-to-boost-defenses-against-stronger-storms/).

In 2021, the partnership of CI Philippines and the Technological Institute of the Philippines on the conduct of the Training on Community, Engineering and Ecology was featured in three (3) print outlet:

| | |
|---|---|
| Business World | https://www.pressreader.com/philippines/business-world/20210121/281883005995754 |
| Gadgets Magazine | https://gadgetsmagazine.com.ph/lifestyle/education/t-i-p-tapped-as-trainer-for-green-grey-infrastructure-program-of-conservation-international-ph |
| Philippine Daily Inquirer, 25 January 2021 Issue: | TIP Tapped as Trainer for Conservation International Philippines Green-Grey Program (newspaper clipping provided) |

An online press release 'Green-Grey Climate Solutions: An innovation that leverages nature to protect vulnerable communities from climate change impacts' was also published at the Philippine Information Agency website (https://piagov.wordpress.com/2021/10/08/green-grey-climate-solutions-an-innovation-that-leverages-nature-to-protect-vulnerable-communities-from-climate-change-impacts/). The press release focused on the Green-grey project implementation and how it aimed in helping communities increase their resilience and adapt to the impacts of climate change.

Thirty-two (32) posts on the updates of the livelihood projects in the 5 project sites are also published on Facebook by CI Philippines and LGU Concepcion.

## *Radio Interview*

CI Philippines participated in three (3) radio interviews to promote and increase awareness and understanding on the practice of green-grey infrastructure. Two of which were through the Department of Environment and Natural Resources' weekly radio program "Ang Tinig Klima". The radio program was aimed at raising environment and climate change awareness of the different sectors of the society.

- First radio interview was conducted on 07 August 2020, where the featured topic is Nature as Resilient Infrastructure: Overview to Nature-based Solutions. The Undersecretary for Planning, Public and Private Partnership (PPP) and Information Management Service of the Department of Public Works and Highways was also one of the guest speakers. The topic covered the effectiveness of nature-based solutions for infrastructure to address climate change, the government's efforts, and the private sector's participation. During the interview, CI Philippines shared its Nature-Based Solutions for Adaptation Program, underscoring the Green-Grey Infrastructure projects in Concepcion, Iloilo including the initial outcomes from the project.


**Figure 68.** CI Philippines' Executive Director during the radio interview on Nature as Resilient Infrastructure

- Second radio interview was conducted on 06 November 2020 and the featured topic was Nature-based Solutions for Climate Crisis, where CI Philippines was able to highlight some of the Green-Grey Infrastructure project initiatives in Iloilo and how the project is assisting partners communities in identifying adaptation solutions to address their climate change challenges.


**Figure 69.** CI Philippines' Executive Director Radio Interview on Nature-based Solutions for Climate Crisis

- Third radio interview was conducted on 04 September 2021 and focused on the Green-Grey Solutions project highlighting some of the Green-Grey Infrastructure project initiatives in Iloilo and how the project is assisting partners communities in identifying adaptation solutions to address their climate change challenges.


**Figure 70.** GGI Project Manager's Radio Interview on Green-Grey Infrastructure

# Promoting GGI at the International Level

## Participation in international events and discussions

To promote, increase awareness and advance the implementation on Green-Grey globally, CI organized and/or participated in international events and discussions. Below were some of the international events organized by CI as well as events where CI has shared our work on Green-Grey.

### *United Nations Framework Convention on Climate Change (UNFCCC) – Conference of Parties (COP) 21*

November 2015, Paris, France

During UNFCCC-COP21, the FFEM organized an event for the signing of the grant agreement for the implementation of the GGI project in Typhoon Haiyan affected small islands in the Philippines. Director Theresa Mundita Lim of the Biodiversity Management Bureau Director and member of the Philippine delegation to UNFCCC-COP21, signed the agreement for the Philippine Government, together with FFEM and CI. The signing event helped promote GGI during COP21. This agreement delivered more than US$ 1.6 million to the Philippines to help the island communities become more resilient to such storms.

### *CI Green-Grey Workshop*

12-15 March 2019, Guayaquil, Ecuador

A Green-Grey Workshop was conducted for key Conservation International Field Programs to launch a CI-wide GGI Community of Practice on Green-Grey, united around a program vision that will provide a foundation for project funding and implementation success on Green-Grey work. Specifically, the workshop focused on the following:

- Agree on a GGI Definition that will provide a common understanding upon which CI's GGI program will be built
- Assess the status of GGI at CI to set a baseline of the who, what, and where GGI is being implemented or planned
- Review and Comment on Draft GGI Practical Guide Materials being developed in the Philippines
- Identify potential GGI projects, opportunities, partners, next steps

As a result of the discussion during the workshop, the participants agreed on the following next steps to advance green-grey infrastructure solutions within CI and to the other organizations.

- Identify key GGI thinkers and implementors outside CI
- Explore initiatives with field programs on the possibility of integrating GGI in the current and future programmatic work
- Conduct regular learning session on GGI for the field programs

- Identify other field programs that have GGI opportunities (e.g., Panama, Liberia)
- Build out other freshwater and terrestrial examples.
- Establish a GGI Science Initiative Working Group + separate policy working group

## *Fifth international Mangrove Macrobenthos & Management meeting*

1-5 July 2019, Singapore

Conservation International presented during the fifth international Mangrove Macrobenthos and Management meeting (MMM5). The event brought together researchers, practitioners, and NGOs from around the world to present their research on mangrove forests. MMM5 was the first MMM to be held in Southeast Asia, the biodiversity center for the mangrove ecosystem and home to more mangrove forests than anywhere else in the world. CI presented on the topic 'Building Coastal Resilience for Disaster Risk Reduction and Climate Change Adaptation Through Community Engaged Green-grey Infrastructure and Supplemental Livelihood Development' on 5 July 2019.

MMM is a series of international presentations focused on the understanding, conservation, and sustainable use of mangrove ecosystems worldwide. These meetings were launched in 2000 to raise awareness about the plight of mangroves, which remain one of the most threatened ecosystems on the planet. The MMM meetings are organized by mangrove scientists every 3 to 6 years in locations around the world where mangroves are a major component of the coastal landscape.

## *7th Ecosystem-Based Adaptation (Eba) Knowledge Day*

Overcoming Barriers to Adaptation: Employing Innovative EbA Approaches to Upscale Nature-based Solutions (NbS)
26 May 2021, Virtual

The EbA Knowledge Day focused on identifying and overcoming key barriers to adaptation planning and implementation through innovation in EbA, including through reaching across sectors and highlighting new approaches and opportunities. The event included remarks by high-level officials, a panel discussion, and in-depth interactive sessions. The documentation and links to recordings is available on the FEBA and Adaptation Community webpages (https://www.iucn.org/sites/dev/files/7th_eba_knowledge_day_documentation-compressed.pdf).

Conservation International along with AECOM, Green-Grey Community of Practice, FEBA and AECOM hosted the Green Grey Infrastructure Session. The recording of the session can be accessed through https://www.youtube.com/watch?v=dohWtjunjLI.

The session focused on the introduction to the Practical Guide to implementing Green-Grey infrastructure and interactive dialogue on how engineers and ecologists can work together – to plan, design and build green-grey solutions. This included the case study on Bacjawan Norte and Loong in Concepcion in the Province of Iloilo, Philippines.

The main takeaways of the session revolved how green-grey infrastructure solutions could draw upon the best of our engineering achievements to create hybrid solutions along the infrastructure spectrum. To be able to realize more green-grey projects, there is a need to: increase client awareness that green-grey solutions exist, invest in data collection to support green-grey design, create the enabling conditions for engineers to design for uncertainty without judgment, and prioritize

green-grey opportunities where ecosystems add much more than aesthetic benefits to project outcomes.

Any incentives for green-grey projects need to not artificially enable project implementation; projects need to be evaluated and justified based on an accounting of their real costs and benefits.

## *Ecosystems and Technology: Innovative Approaches to Strengthening Coastal and Ocean Adaptation*

Virtual side event during IUCN World Conservation Congress
6 September 2021

This side event was one of the series of events that took place in 2021 in celebration of Technology Day (TD). TD was launched on 30 November 2020 during the UN Climate Change Dialogues with the objective to promote innovative approaches to deploy, disseminate and scale up adaptation technologies in various key sectors. The first TD session in 2020 focused on innovative approaches for climate-smart agriculture.

The 2021 TD celebration included a session, i.e., *Ecosystems and Technology: Innovative Approaches to Strengthening Coastal And Ocean Adaptation* which was dedicated to GGI application in coastal and ocean environments. The objective was to present and discuss state-of-the-art learning and examples from integrating joint approaches of both technology and ecosystem-based adaptation in various policies and programs to build the resilience of oceans and coastal ecosystems and communities.

Speakers reflected on the fact that technology, conventional engineering approaches, and nature-based solutions had often been siloed through a false “either/or” dichotomy. Improper development results in competition for space, unmanaged human access to coastal areas, multiple and conflicting uses of resources, e.g., recreation, navigation, establishment of economic centers and facilities. In coastal settings, grey infrastructure like levees and seawalls become the usual solutions to protect investments in infrastructure development, The Resource Persons emphasized that we needed to break the siloes between technology, infrastructure, and nature-based solutions and move toward integrated measures that optimize for adaptation effectiveness, cost, durability, sustainability, and co-benefits for people and nature. Panelists also raised the potential for integrated approaches to bridge short- and long-term needs for coastal and ocean resources and space in the light of coastal development and urbanization.

One strong thread that ran through the discussion was that these integrated technologies and solutions often already exist but are not being implemented or mainstreamed at scale. Three global barriers to the uptake of integrated adaptation technologies were identified and discussed:

- Lack of robust evidence and data about the role of natural assets in underpinning resilience.
- Policy and regulatory environments and governance challenges limit the feasibility of implementing hybrid adaptation approaches.
- Limited access to finance for applying and scaling up integrated approaches.

## *World Economic Forum - Virtual Ocean Dialogues - Coastal Green-Grey Infrastructure for Climate Resilience*

05 June 2020, Geneva, Switzerland

This session was hosted by Conservation International and Bechtel. It was attended by leaders advancing hybrid green-grey solutions for coastal resilience within various industry. The dialogue focused long-term vision and near-term goals for collaboration and innovation to advance green-grey infrastructure. The deep dive discussion familiarized coastal communities, developers, policymakers, and financiers with coastal green-grey infrastructure– sharing perspectives from communities piloting these approaches and innovative finance mechanisms.

Key highlights of the dialogue were as follows:

- More information is needed about existing financial instruments to fund green-grey infrastructure; valuation of the relative benefit of green-grey versus grey-only infrastructure under various project scenarios and regional cases; quantification of the connection to the Sustainable Development Goals
- There is a strong call among the participants to establish a Global Grey-Grey Community of Practice. Most have committed to participate and provide technical contributions and inputs.

## Global Green-Grey Community of Practice

In March 2020, CI, along with AECOM and the Friends of Ecosystem-Based Adaptation (FEBA), initiated the establishment of the Global Green-Grey Community of Practice. The aim was to advance the practice of green-grey infrastructure, generate multi-disciplinary learning and innovation and scale-up green-grey adaptation solutions.

The Global Green-Grey Infrastructure Community of Practice is a forum for collaboration across the conservation, engineering, finance, and construction sectors to generate and scale-up green-grey climate adaptation solutions. As of 2021, the multi-disciplinary Community of Practice has 70 member organizations spanning the globe, representing non-profit, academic, government and private organizations (Figure 71).


**Figure 71.** Global Green-Grey Community of Practice member organizations

The objectives of the Community of Practice are work together to:

- share ideas and facilitate collaboration.
- innovate and pilot new approaches.
- expand science, engineering, and policy activity
- implement and learn from projects in a multitude of geographies and settings.

In the Global Green-Grey Community of Practice, the private sector, non-government organizations, and academics can share their needs and experiences, learning from one another about what works, what does not and what has not worked yet. Pre-competitive consortiums – such as the community of practice – create an opportunity to bring diverse stakeholders together and exchange perspectives that are integral to ensuring project success. By drawing on multidisciplinary expertise, collaborative outputs such as the Practical Guide can ensure the inclusion of diverse perspectives on ecological, social, economic, financial, policy, site assessment, design, engineering, construction, monitoring, and management considerations.

In addition, pooling resources generates buy-in from contributors, reduces costs, creates more universal and accessible tools, and can bolster the credibility of outputs and the communication of key messages and recommendations. The Global Green-Grey Community of Practice is a significant platform for consolidating learning and experiences on GGI implementation across the globe and in translating all these information into learning tools and materials for wide distribution and application. As an example, the GGI Practical Guide, which was published through the initiative and support the Community of Practice embodied the lessons learned and good practices in GGI implementation in Concepcion, Iloilo.

# Communication Materials

## *Green-Grey Website*

In 2018, CI developed a Green-Grey specific webpage to raise awareness on and understanding of the green-grey concepts and its benefit. The webpage aimed to connect with a general audience including government, donors and private sector organizations who can be a prospective advocates and partner of CI in advancing green-grey infrastructure solutions.

The Green-Grey webpage (https://www.conservation.org/projects/green-grey-infrastructure) is housed in the Conservation International website. The webpage contains the climate change challenges communities are facing and how CI is combining nature-based approaches to addressing the climate crisis with technical, engineering and science-based expertise. It also includes examples of Green-Grey projects implemented by CI across the globe including the project in Concepcion, Iloilo in the Philippines. CI Green-Grey publications, blogs and events are also featured in the webpage.

In addition to the Green-Grey webpage, CI was also able to develop other websites in partnership with other Green-Grey advocates such as Global Mangrove Alliance (GMA) and AECOM that also feature Green-Grey Infrastructure work. The GMA website features the Green-Grey Infrastructure work in Concepcion, Iloilo as well as CI's work in Indonesia and Liberia. The Philippine Green-Grey Community of Practice website (https://www.phgg.org/ ) features the results of the Green-Grey Partnership Project with eleven (11) Local Governments in the Philippines in developing 11 new Green-Grey Concept Designs with accompanying Statement of Intents from the LGUs. The aim of the website is to make the concept design more accessible to the partners LGUs as well as platform where the LGUs can also share their work and encourage other LGUs to design and develop Green-Grey projects.

## *Green-Grey Factsheet*

CI developed two (2) factsheets: (1) Green-Grey Storm Shelters factsheet (Figure 72) which briefly describes the green-grey infrastructure concept and the project in Concepcion and (2) Building the Next Generation of Resilient Infrastructure factsheet (Figure 73) which also describes green-grey solution and present some examples of ecosystems where green-grey solutions can be applied. The Building the Next Generation of Resilient Infrastructure factsheet was also produced in Hiligaynon[52]. These were uploaded in the Conservation International Philippines website. Copies were also disseminated to policy makers, partner government agencies, academic institutions, local governments, and private sector organizations at the national, regional, and local level.


**Figure 72.** Green-Grey Storm Shelter Factsheet

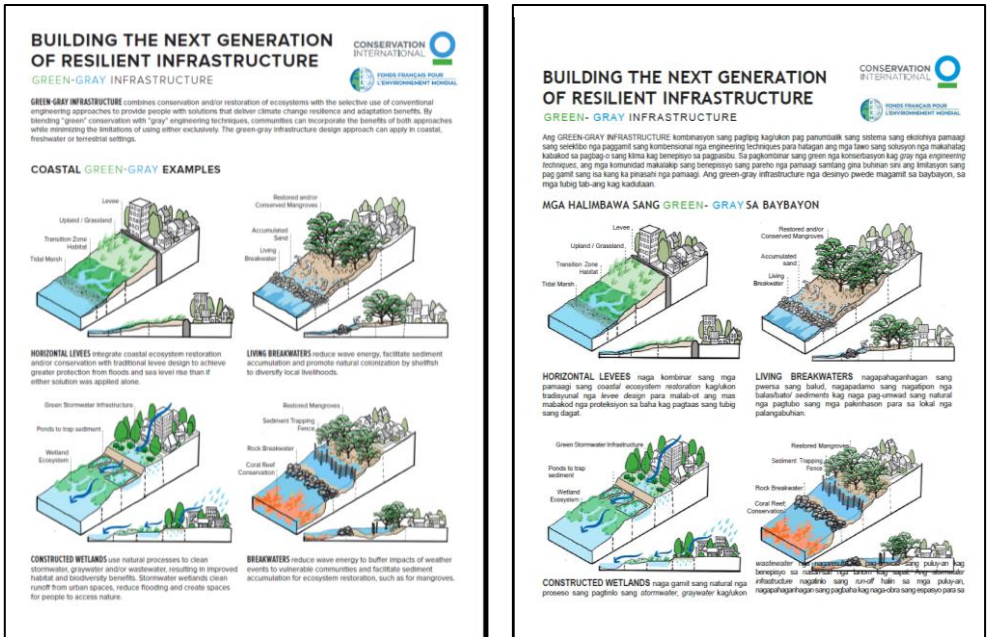



**Figure 73.** Building the Next Generation of Resilient Infrastructure factsheet (English and Hiligaynon)

[52] Hiligaynon is the dialect spoken in Region 6 (Western Visayas) which includes Iloilo

Additionally, the project was also able to produce a poster on Green-Grey: Climate Solutions (Figure 74) which presents specific goals where the solutions can be applied. This was produced as result of the input from the project team that posters are a more effective communication tool for wider audience – local or global communities. It can be displayed almost anywhere such as places where you have a "captive audience" such as LGU and barangay hall where people can see it and read it. A good poster can also have a staying power for years especially if its mounted.


Figure 74. Green-Grey Climate Solutions Poster

## *Practical Guide to Implementing Green-Grey Infrastructure*

To support capacity building for implementing green-grey infrastructure locally, nationally, and internationally, the project initially developed a Practical Guide to provide tools for identifying, planning, designing, constructing, and monitoring green-grey infrastructure projects with the goal of increasing the resilience of vulnerable communities in 2019. This guide includes 6 technical data sheets: (1) Overview on Green-Grey Infrastructure Solutions; (2)) Identifying Sites; (3) Site Selection Tool; (4) Design Development; (5) Construction and (6) Monitoring, Maintenance and Adaptive Management. The Practical Guide is based on Conservation International's (CI) field experiences in the Philippines and globally, and included input from local communities, local and national government, non-government partners, technical experts, and construction and engineering companies. This was intended as a tool for education and outreach, resource for selecting, designing, and implementing green-grey infrastructure projects, and for use by a broad and diverse audience. It can be used by local and national governments, consultants, and civil society organizations. Including local contractors, policy makers, non-government organizations (NGOs), engineers/ designers. It was distributed to these diverse audiences – within the Philippines and globally - using a variety of communication tools including workshops and a website portal.

In 2020, through the Global Green-Grey Community of Practice, which is led by Conservation International, AECOM and FEBA, put together a more comprehensive version – the Practical Guide to Implementing Green-Grey Infrastructure (Figure 75). The recent version is composed of ten (10) datasheets or topics: (1) Overview on Green-Grey Infrastructure Solutions; (2) Identifying and Selecting Sites: (3) Economic Evaluations; (4) Funding and Financing; (5) Engaging Stakeholders and Building a Business Case; (6) Design Development; (7) Engineering Guidance; (8) Construction; (9) Monitoring,

Maintenance and Adaptive Management and (10) Policy. The tools and 36 case studies included in the Guide are based on experiences of members from the Global Green-Grey Community of Practice, and included input from local communities, local and national governments. The green-grey projects in Bagongon and Bacjawan Norte are each highlighted as case studies within the guide, which has been downloaded over 1185 times from the CI Global Green-Grey Community website from January 2021 .


**Figure 75.** Practical Guide to Implementing Green-Grey Infrastructure

## *Green-Grey Videos*

CI produced short films on the Green-Grey project in Concepcion, Iloilo. The video contents were developed with local stakeholders about the GGI project components which included the actual implementation of the Green-Grey Solution, Livelihoods, and Technical and Organization Capacity Building. The video highlighted the purpose and goal of the Green-Grey Project. It included interviews with local people, documentation of outputs and outcomes of the project activities, particularly livelihoods interventions, capacity building and establishment of Green-Green solutions. The project was able to produce 1 long video and 3 shorter videos:

1. Building Resilience through Nature and Engineering", 12:20 minutes, in English with parts in Tagalog with English subtitles **(Figure 76)**
2. Green-grey Climate Solutions: Building Community Resilience and Restoring Coastal Ecosystems", 4:02 minutes, in English **(Figure 77)**
3. Building Community Resilience through Green-Grey Climate Solutions, 3:38 minutes **(Figure 78)**
4. Green-Grey Climate Solutions: An Innovation Protecting Today and future Generations", 3:15 minutes **(Figure 79)**


**Figure 76.** Building Resilience Through Nature and Engineering (long video)


**Figure 77.** Green-Grey: Building Community Resilience and Restoring Coastal Ecosystems (short video)


**Figure 78.** Green-Grey Disaster Risk Reduction and Climate Change Adaptation (short video)


**Figure 79.** Green-Grey Livelihoods (short video)

The second video was presented during the IUCN World Conservation Congress' side event 'Global pressures on mangroves and their communities: solutions from conservation, restoration and governance' held last 4 September 2021 in Marseille, France.

# Monitoring and Evaluation

CI Philippines monitored through time the performance of the project in terms of delivering to the targets in the logical framework (see **Table 9**, this report). There were 33 indicators, which measured the achievement of the targets. Based on these indicators, **20 targets were exceeded, 5 were met and 7 were adjusted** (**Table 10**). One (1) target which is the Project Closeout is scheduled in May 2022. CI Philippines has organized in One Drive over 600 documents arranged in folders by project component as means of verification (MOVs) for the achievement of targets in the logical framework.

**Table 10.** Summary of achievement of life of project targets based on the FFEM-GGI Project Logframe (Reference: **Table 9**, this report).

| Project Component | No. of Indicators | TARGETS | | | REFERENCE OF ADJUSTED TARGETS |
|---|---|---|---|---|---|
| | | Exceeded | Met | Adjusted | |
| **Component 1: Definition and implementation of GGI demonstration projects** | 9 | 8 | | 1 | Activity 1.4; Indicator 1.4.2 |
| **Component 2: Implementation of programme for development of subsistence resources** | 5 | 4 | 1 | 0 | No adjustments made |

| | | | | | |
|---|---|---|---|---|---|
| Component 3: Promotion of GGI at local, national and global levels | 14 | 7 | 2 | 4 | Activity 3.1; Indicator 3.1.1<br>Activity 3.2; Indicator 3.2.5<br>Activity 3.3; Indicator 3.3.1<br>Activity 3.4; Indicator 3.4.1 |
| Component 4: The management, coordination, monitoring, and assessment of the project | 5 | 1 | 2 | 2 | Activity 4.2; Indicator 4.2.1<br>Activity 4.2; Indicator 4.2.2 |
| TOTAL | **33** | **20** | **5** | **7** | 1 target (Activity 3.5. Indicator 3.5.3), Project Closeout activity is scheduled in May 2022 |

The adjustments made on the seven (7) targets were part of adaptive management, which considered the surrounding conditions that affected the achievement of these targets as explained below:

Component 1: Definition and implementation of GGI demonstration projects

- Activity 1.4: Implementation of the demonstration projects.
  - *Indicator 1.4.2. Number of people trained in implementing green-grey components.*
  - *Target = 2,262 participants; Achieved = 1,743 participants.*

The training involved here were on implementation of grey, green and livelihood components of the GGI Project. The total Target of 2,266 participants was for the planned training from 2016 to 2021 and was based on the usual number of participants sent by the barangay to past training in past projects. For the GGI Project, however, it was noted that not all targeted community members would be involved in all of the grey, green and livelihood projects. Thus, CI Philippines adjusted the number of participants according to the nature of their participation in the project and training needs.

Component 3: Promotion of GGI at local, national and global levels

- Activity 3.1: Consolidation of the institutions' capacities to adopt EbAs
  - *Indicator 3.1.1 Records of technical mini seminars.*
  - *Target = 12 sessions of mini-seminars in Manila for groups of not more than 20 people each, and 6 technical data sheets; Achieved = 1 presentation to mini-seminar (proxy) and 6 technical data sheets in a summarized GGI practical guide.*

As proxy target, CI Philippines presented “Ecosystem-based Adaptation and Green-Grey Infrastructure” in a seminar organized by the Asian Institute of Management Team Energy Center for Bridging Leaders’ Initiative for Climate Resilience in October 2020. Other climate resilience experts in the panel presentation were from the Climate Change Commission, DENR, Earth Security Group, WWF, and Rare Philippines. The development of the 6 technical data sheets on GGI did not have to go through 12 seminars because CI collaborated with experts from various organizations through the Global Green-Grey Community of Practice (COP). The COP is spearheaded by CI together with AECOM and FEBA. Through the collaboration, technical sheets were produced as basic materials for the development of the full Practical Guide to Implementing Green-Grey Infrastructure. The basic version of the Green-Grey Practical Guide embodied the experiences gained in identifying, designing, and implementing the FFEM-GGI projects in Concepcion, Iloilo, Philippines.

- Activity 3.2 Development and production of informative, educational and communication-based supporting materials.
    - *Indicator 3.2.5 Brochure presenting the project in English and Tagalog*.
    - *Target = 4-page brochure presenting the project in English and Tagalog (1000 copies); Achieved = 1 poster achieved (300 copies)*

It was a practical management decision to produce a poster, which was seen to be an effective communication tool for wider audience. Posters can be displayed almost anywhere, especially in places where you have a "captive audience" such as local government grounds and barangays hall where people can see it and take time to read it. As the target is wider audience, the poster produced is in English. But this is supplemented by a GGI Fact Sheet in English and Hiligaynon, which is the local language in Concepcion (Ref: Activity 3.2; Indicator 3.2.5).

- Activity 3.3 Production of complete RCC and ACC plans and notes explaining the intention of the project
    - *Indicator 3.3.1* RCC and ACC plans finalized and updated.
    - *Target* = 2-3 Regional Climate Change Plans and 2-3 Adaptation Climate Change Plans finalized and updated; *Achieved* = 2 ACC plans updated

The project team coordinated with Northern Iloilo municipalities on the possible assistance from the FFEM-GGI project to the crafting or updating of their Disaster Risk Reduction Management (DRRM or RCC) plans and Local Climate Change Adaptation (LCCA or ACC) plans. But most of the towns had just updated their DRRM plans. As for the LCCA plans, only the municipalities of Carles and Concepcion expressed interest for technical support. The other towns had either just crafted their LCCAP or did not have enough data and personnel to be involved in crafting their LCCAPs, the project team only focused on Carles and Concepcion and produced two (2) updated LCCAPs, which earned the acceptance of the local government units of these two municipalities

- Activity 3.4 Contribution to the formulation of the national coastal protection policy
    - *Indicator 3.4.1 Minutes of meetings and notes on special studies by the working parties*.
    - *Target = At least 2 meetings with a set of recommendations for green-grey solutions; Achieved = 1 meeting resulted in a Green-Grey Policy Briefer*

It took only 1 meeting, which was in the form of online roundtable discussion (RTD) with national government agencies to review the Green-Grey Policy Briefer produced by the FFEM-GGI Project and solicit comments/inputs. One of the objectives of the RTD was to identify recommendations that will inform local and national policies on integration and mainstreaming of green-grey approaches in building public infrastructures to support the resilience of communities and protection of coastal ecosystem.

Component 4: The management, coordination, monitoring, and assessment of the project

- Activity 4.2: Project management
  - *Indicator 4.2.1 Minutes of the piloting committees*.
  - *Target = 9 meetings of the Steering Committee; Achieved = 4 Meetings at the national and regional levels*

In the National Steering Committee meeting held on 05 December 2018, the participants from governments agreed that a Regional Steering Committee would be more effective in providing inputs on the project and explore ways how green-grey solutions can be promoted and eventually adopted as a strategy for coastal protection.

During project implementation, it was realized that local meetings were more needed and useful for moving the project forward than Steering Committee meetings. Then during the COVID-19 pandemic in 2020-2021 it became difficult to organize Steering Committee meetings as health concerns were given highest attention and priorities.

- Activity 4.2: Project management
  - *Indicator 4.2*.2 Number of meetings of the themed working parties.
  - *Target* = 16 meetings; *Achieved* = 10 Local Coordination Meetings.

In the move to form the Local Steering Committee, the Local Government of Concepcion saw that an LGU-NGO Coordination Group would be a better mechanism to implement the GGI Project to avoid duplication of efforts among other technical support providers in the area. The LGU-NGO Coordination Group was composed of representatives from LGU Concepcion (Municipal Planning and Development Office, Municipal Coastal Resource Management Office, Municipal Disaster Risk Reduction Office), non-government organizations implementing DRR-CCA projects in Concepcion, barangay officials and people's organization from the final project sites, and Environment and Natural Resource Office. It is to ensure that DRR-CCA efforts in the municipality are well-coordinated, resources are maximized and NGO DRR-CCA initiatives are complimenting each other. Since the start of the pandemic of the pandemic, however, meetings could not be organized as Concepcion was among the areas in the Philippines with recurring surges of COVID-19 cases. And online meetings could not be possible for local communities and barangay officials as internet connection was either nil or slow. Thus, only 10 local coordination meetings were conducted.

# CHAPTER 6. CHALLENGES, OPPORTUNITIES AND LESSONS LEARNED

The project experienced various challenges in its 6 years of implementation. Below were the challenges, opportunities and lessons learned by the project throughout its implementation.

Logistical challenges to project implementation. The occurrence of squalls, extremely strong monsoon winds and gale force winds hampered travel to and from the island. These disrupted project activities such as delivery of construction materials and construction of grey infrastructure. It has also increased difficulty of accessing activity locations and/or mobilizing local participation since some of the participants used small boats to travel to the center of the barangay where the project activities were generally conducted. To address this, the project team and the communities grabbed opportunities to conduct activities in the islands on days or week, when the weather was favorable for sea travel and conduct activities on the coasts such as grey construction.

In all the green-grey project sites, the construction work is dependent on the tide pattern and the intensity of the heat from the sun since most of the work were done outdoors in the intertidal area. Thus, construction work was conducted early morning during low tide until 10:00 AM. During southwest monsoon season, the low tide in the morning is shorter thus it was challenging for the workers since they must work double time to install more structures. After 10:00 AM, the workers trim and cut the bamboo poles or help in preparing the materials for the bamboo mats under the shade. The organization maintains a timesheet to keep track of work hours logged by each worker. Additionally, the strong monsoon winds and waves also posed challenges and made construction more difficult for the workers.

Road access to the coasts of the project sites in Concepcion mainland[53] were also difficult. Passage to these coastal areas were relatively narrow, unpaved roads made mostly of soil and some gravel and aggregate, which affected the delivery of stones. Unpaved roads like these, get damaged easier than pavement. The roads become muddy and slippery during rainy periods, which made the delivery of stones using big trucks challenging, thus delaying transport of stones.

COVID-19 pandemic. The COVID-19 pandemic also impacted the project implementation from 2020 until the end of field implementation in 2021. The following are some of the challenges experienced by the project team during this period.

- Limited participation of community partners in technical and organizational development activities in the project sites particularly Loong, Polopiňa and Bagongon resulted in delays in the conduct of project activities.
- Limited opportunity to market livelihoods products resulted in decrease in sales. Marketing and sales of coco-based products were higher during trade fairs and livelihood events organized by the Provincial Government of Iloilo or the Department of Trade and Industry Region 6 office. Since the onset of COVID-19 pandemic, few to nil fish traders to buy the fish products visited Concepcion. Tourism activities were also put to halt, so Mangrove Ecopark operation was also affected. Production of school uniforms

[53] Bacjawan Norte and Loong are coastal areas located in mainland of Concepcion, Iloilo.

and t-shirts, which is the main product of PROPAGAMPA, was also put on hold because face-to-face classes remained prohibited until the end of GGI Project implementation.
- Delay in the conduct of public hearings, by the Municipal Town Council, required to facilitate the approval of the Revised Municipal Fisheries Ordinance containing the project-enhanced MPA policies and regulations.
- Postponement of barangay activities such as regular sessions and meetings, thus support policies for protection and management of green-grey projects (mangrove rehabilitation and breakwater regulations) were not given due attention.

Travels of Manila-based staff to Concepcion have also been onerous since staff were required to submit Reverse Transcription Polymerase Chain Reaction (RT-PCR) for COVID-19 48-hours prior to travel. A 10-day quarantine period[54] was also required by the Provincial Government of Iloilo before project staff are allowed to go to Concepcion and conduct field visits.

Limited awareness and understanding of climate change and inadequate community organizational capacities. The stakeholders had familiarity with the effects of natural calamities and basic disaster risk management, as well as general information on climate change and the higher risks that this brought to their localities during typhoons. However, they were not able to connect the larger effects of climate change stressors to their environment, natural resources both on land and sea, and their well-being. Moreover, they had no understanding that climate change affected them throughout the year and the compounded effects could bring huge risks to their lives and social security. This was the case even if there had capacity building support along these provided by other development partners since Typhoon Yolanda hit Concepcion. These gaps in awareness became the focus of the GGI project in developing capacity building programs for the community partners under the GGI project. CI Philippines also noted the low retention capacity of the community partners for new information and learning. Thus, from the original four (4) general training programmed in the project to cover LGUs and community partners, the actual number of trainings was increased to >10 as it was necessary to conduct follow-up trainings in smaller groups and per community partner organization as necessary. Some training already included hands-on activities and development of action/management plans as part of the training. Adult learning has best been described as learning by doing as this enhances retention of new knowledge gained.

Additionally, climate change adaptation is yet to permeate broadly in the local government planning process. The partner BLGUs have better understanding of the importance of mangroves in mitigating climate change hazards but all BLGUs do not have a mangrove rehabilitation and management plan prior to the project. Through the GGI project and in partnership with the Barangay Government, mangrove rehabilitation plans were developed. Sustained technical capacity building and support from the local government, relevant government agencies and civil society organizations are needed to further develop the skills and knowledge of communities on climate change adaptation. Community-based climate change adaptation related plans and programs should be integrated in municipal level plans and programme to ensure technical and financial support for implementation.

Organizational Development. Despite the technical assistance from development and humanitarian organizations since Typhoon Yolanda hit Concepcion in 2013, the community-based organizations in the project sites had very limited capacities to become effective partners in the GGI project. Even if they had existed for more than a decade, CI Philippines noted the following weaknesses of the community organizations:

[54] Travelers are required to undergo a 5-day quarantine period in Iloilo City prior to entry to destination and then another 5-day quarantine period in the area of destination in the province.

- They have not completed the process of acquiring legal status thus they could not apply for bank accounts to receive funds from donors and partners.
- Their organizational Vision, Mission, and Goals (VMG) had to be reviewed and updated.
- Organizational leadership had to be re-activated for every new project.
- They have no established systems in place (i.e. simple financial management, recruitment and retention of members, benefit-sharing system in livelihood projects)

The GGI project provided for supplemental support to organizational development that meant to enhance capacities of community organizations particularly for the GGI project, it being a new approach in CCA in the sites. However, in view of the gaps highlighted above, the project provided major support to put the community organizations in shape that include achieving legal status, updating of VMG, strengthening leadership, providing training/mentoring on financial management, preparing manuals of operation.

Demonstrating social and ecological benefits of GGI project to ecosystems and communities. Most of the green-grey infrastructure which included the mangrove rehabilitation and MPA establishment were completed in the last year of the project. These were due to various factors mentioned above such as frequency of unfavorable weather and sea conditions to the project sites and COVID-19 restrictions, as well as the need to prioritize socialization and outreach, and technical and organizational capacity prior to implementation. Given the delays in the green-grey infrastructure establishment, the project team were not able to conduct periodic social and ecological monitoring as required by the project. Most of the outcomes cannot be measured within the lifespan of the GGI project as these benefits can only be demonstrated over longer period. The project team do not yet expect to observe a significant increase in fish abundance, biomass, and diversity from the CB-MPA before the end of the project. Fish populations typically begin to recover after approximately 3 years of protection depending on species life history (Molloy et al., 2009; Russ et al., 2008; Russ and Alcala, 1996; Stockwell et al., 2009). Larger, slower growing species require as much as 15 years to recover (Russ and Alcala, 2004). Mangrove growth and survival rate monitoring and replacement are part of the conservation agreement with the partner community-based organizations.

It should be put into context that resilience building, and the adaptive capacity of communities and institutions are often measured long after the project has been completed (around 5-10 years) and not in project cycles. So, while the project ended, CI and the partners recognized that the adaptive capacity building process should be an ongoing process and thus should go beyond the project end date. So, while the project ended, CI and the partners recognized that the adaptive capacity building process should be an ongoing process and thus should go beyond the project end date.

To measure and evaluate the project's intended and unintended outcomes from the combined green and grey solutions, it is necessary to have a clear and cohesive Monitoring and Evaluation Framework. Integrated monitoring of living ecosystems and grey infrastructure is integral to ensure GGI project function and longevity. However, the Monitoring, and Evaluation Framework specifically for an innovative approach such as GGI is not yet in place, although there are already various tools available that can be modified and used for this purpose. The Global GG Community of Practice has plans to develop a standard GGI Monitoring and Evaluation Framework that can be disseminated to current and prospective GGI practitioners. The development of this framework will be useful to document and understand the strengths and weaknesses of GGI implemented projects, to

inform future green-grey project design and implementation, catalyze further investments in GGI and support its broader adoption.

Obtaining Partner Support and Formation of a GGI Multidisciplinary team. Ownership of the project, support from the local government and national government agencies and the preparedness of the community to engage in the project were required for a successful GGI project. The formation of a multidisciplinary GGI team was also important to clearly define the problem the GGI solution is intending to address and develop design concepts with stakeholders' input, to meet the project goals. There is no "one size fits all" solution for DRR-CCA challenges, so no sites will have the exact same solution/s as one site. Therefore, it is vital to rely on the appropriate professional expertise and experience when it comes to project design and actual implementation, especially for combined solutions such as GGI.

Building a Business Case to advance GGI. Various actors have the potential to influence the adoption and implementation of GGI projects and policies (such as politicians, decision-makers, planners, scientists or technical advisors, potential investors, donors, etc). These stakeholders need to be fully convinced of the benefits of implementing a GGI approach, so they can ensure its viability, effectiveness, and sustainability. Thus, it was necessary to provide other stakeholders such as national government agencies and other CSOS with a convincing business case that presents the justification for the GGI project or GGI policy. Presenting a compelling business case for advancing GGI is needed to catalyze a paradigm shift in development towards GGI solution and to ensure financial sustainability and maintenance of GGI initiatives beyond project life.

Despite the challenges experienced by the project, the overall results were encouraging and showed the viability of green-grey infrastructure combined with other adaptation solutions to increase the resilience of communities and ecosystems. Potential for application of GGI to other ecosystems and context and scaling up is immense. Stakeholder interests and support have been motivating.

Thus, the lessons learned from the project can contribute to improving the implementation of similar projects in the future, not only in the Philippines but globally. In fact, the experiences in GGI implementation in Concepcion are already embodied in the published Practical Guide to Implementing Green-Grey Infrastructure.

# CHAPTER 7. SCALING UP GREEN-GREY SOLUTIONS

Green-grey infrastructure solutions are emerging as a disaster risk reduction and climate change adaptation approach, but not yet commonly used by engineers and practitioners in the Philippines as well as globally. As earlier stated, climate change is one of the most dangerous threats facing humanity. Its impacts have already caused devastation to communities in many parts of the world, affecting people's lives and infrastructure in an unprecedented manner. The number of climate-related disasters has tripled in the last 30 years and more than 20 million people a year are forced from their homes by climate change. The need to accelerate innovation and learning and apply nature-based solutions such as green-grey infrastructure as a climate adaptation and disaster risk reduction strategy is urgent. CI's goal is to innovate the next generation of climate resilient infrastructure in geographies where it works, particularly in vulnerable areas like the Philippines so that green grey will become a common and accepted infrastructure solution. The following must be undertaken to achieve the goal:

Generate robust evidence and data about the role of natural assets in underpinning resilience. While public and private sector actors, including those in engineering and architecture firms, may understand the potential for nature-based solutions, they often lack the data, design parameters, and construction standards needed to scale up hybrid approaches in the context of conventional infrastructure investments. There is a need to systematically measure and learn from the results of hybrid interventions to develop the evidence and data as well as make it accessible to practitioners.

Identify and catalog green-grey case studies. Learn from and increase awareness of existing green-grey projects by researching case studies to learn from the design approach, engineering details, biophysical modelling, and performance metrics, with direct links to engineering guidelines. Identifying, documenting, and socializing existing and additional pilot projects is an important step to catalyze the use and uptake of the green-grey approach. Whether small municipalities or larger ones, developed or developing nations, or the global north and south addressing differences in governance and priorities, decision-makers want to look at other examples and case studies of proven successes, before implementing green-grey.

Capitalizing on the experience and lessons learned from coastal green-grey pilots. Over the past few years, CI has demonstrated the efficacy of a green-grey infrastructure approach in partnership with other organizations in several coastal areas across the globe. CI will continue to expand and replicate the GGI approach by developing and implementing projects in other coastal areas in the Philippines to help demonstrate and validate effectiveness of green-grey solutions and capitalize on the risk reduction properties of nature like forests including mangroves. Mangroves shield coastlines from sea level rise and storm surges – and can be up to 50 times more cost-effective than cement seawalls at protecting coastlines. All while providing numerous co-benefits – for biodiversity, water, and food security – and carbon capture. CI plans to scale up through:

- Climate Smart Aquaculture. This approach shifts the paradigm of shrimp aquaculture as an agent of mangrove deforestation by coupling sustainable intensification of shrimp farming with restoration to provide biodiversity and community climate adaptation benefits alongside economic returns.
- Coastal Protection. Improve resiliency using lower-cost sea defense solutions that simultaneously increase biodiversity and improve livelihoods by combining

mangrove restoration and hard infrastructure, like sea walls and breakwaters, to reduce the impacts of storm surge and wave heights.

- Blended Finance Vehicle. A co-finance fund to incentivize green-grey project design and implementation, built specifically to overcome recognized implementation and financing obstacles. This fund has the potential to unlock funding globally for green-grey infrastructure projects.
- Building the Business Case. Design, prototype and launch an economic tool to compare costs-benefits of green, green-grey, grey infrastructure alternatives. The tool would compare the social, environmental, and economic costs and benefits of conventional grey-only projects to a green-grey alternative.

Multi-disciplinary approach to develop green-grey solutions. To help strengthen the concept and implementation of green-grey solutions, stakeholders from different backgrounds should collaborate. Policymakers can promote green-grey approaches through legislation; National and local government agencies can consider opportunities to integrate green-grey infrastructure approaches in development plans; service providers can expand traditional engineering approaches and incorporate green-grey solutions to infrastructures, sell innovative financing approaches, and develop supportive partnerships with civil society organizations and experts; and other stakeholders can prioritize support for green infrastructures.

Mechanisms that recognize/reward green and green-grey infrastructure. It has been previously suggested that incentive mechanisms and subsidies could be used as an incentive mechanism to promote green solutions. Considering that there are risks surrounding the implementation of green solutions, a scheme must be devised to mitigate the risks. Understandably, there is lack of confidence in the early stages of the green-grey solutions as there are only few documented examples of the application of this innovative approach. It is therefore imperative to start piloting in small-scale, as in communities, to demonstrate that the desired result benefitting ecosystems are achievable. Through pilot testings, information regarding GGI design may be generated and gathered to support the large-scale implementation of green solutions.

To support EbA in infrastructure, an insurance mechanism is being explored as a means of promoting green alternatives. The Restoration Insurance Services Company (RISCO) invests in conservation and restoration of mangroves by securing revenue from insurance companies. RISCO IS currently conducting market tests by piloting their model in the Philippines and Vietnam to demonstrate the commercial viability of alternative financing mechanisms (e.g. micro-insurance, blue carbon financing) to support mangrove conservation and restoration.

Post-Disaster Recovery Funding to Green-Grey. Green-Grey infrastructure plays an important role in the preparation and recovery from natural disasters. It only makes sense to allocate funding from disaster recovery to invest in GGI. Thus, after the COVID-19 pandemic, Conservation International recommends prioritizing investment in ecosystem restoration, sustainable agriculture, and future-proof infrastructure. If anything can be learned from the crisis caused by COVID-19, it is that there is a need for sustainable and innovative options in case of emergency situations, hence the need to consider resilient and sustainable solutions.

Creating an enabling environment to design and implement green-grey solutions. Enabling local, national, and even international policies, laws, and regulations are critical to drive the use of green-grey approaches, as well as for catalyzing the adoption of green-grey infrastructure at scale. Rigid regulatory and funding policies designed for grey infrastructure can hinder the uptake of green-grey infrastructure approaches. Recognizing this, CI and

other advocates of GGI should sustain engagement with governments to work on enabling policies for GGI implementation that include:

- updating existing regulatory frameworks, such as land-use planning and zoning.
- updating local ordinances and regulations.
- adopting Resiliency Master Planning standards; and
- mobilizing fiscal incentives for landowners/investors to invest in green-grey solutions

Scaling up of GGI and replication of good practices. To advance green-grey solutions, there is a need to work with government and private sector groups to encourage them to fund the design, construction, and monitoring of GGI projects and will support local capacity building to engage the active participation of the communities. Performance information from project components will be able to inform engineering guidance and design standard(s) development.

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# ANNEXES (in separate files)

**Annex 1. Summary of Project Monitoring Plan (PMP)**

**Annex 2. List of Trainings and Number of Participants per Training**

**Annex 3. Eleven GGI Concept Designs developed with partner city and municipal LGUs**