A photograph of a mangrove forest with dense green foliage and trees reflected in the water. The text is overlaid in the upper half of the image.

# **STORIES OF RESILIENCE: A COMPENDIUM OF LOCAL CLIMATE ACTION IN THE PHILIPPINES**

Stories of Resilience: A Compendium of Local Climate Action in the Philippines  
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Printed in the Philippines

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# PREFACE

**T**he world has entered a crucial decade: the years in the lead up to 2030 mark humanity's last chance to avoid catastrophic climate change.

For countries like the Philippines, the stakes are higher. Being one of the most vulnerable countries in the most climate-vulnerable region in the world, failure to take substantial and decisive steps in this decade would mean worse disasters and extreme weather events, massive loss of lives and livelihood, and an unsure future.

With the immediate threat of the COVID-19 pandemic drawing focus and energy away from the urgent action we need to save the planet, prospects are grim. And yet there is still hope; across the country, we see communities leading the way in pursuing resilience and adaptation. We see local governments, organizations, and stakeholders pitching in, doing what they can, rising to the greatest challenge humanity has ever faced.

This Compendium of Local Climate Action in the Philippines shares the stories and experiences of these communities. From Batanes to Cotabato, from climate-smart farming and disaster resilience and recovery, to sustainable transport and ecotourism, these stories feature the origins of resilience and adaptation initiatives all over the country, share insights gleaned in their implementation, and trace the impact they have made within communities, and even beyond.

The stories featured in this Compendium capture the principles of locally-led adaptation—as articulated by the International Institute for Environment and Development—in action. For instance, its explorations of how Lanuza in Surigao del Sur built inclusion into its ridge-to-reef model—giving due space to indigenous communities and highlighting women's economic empowerment—and how Pasig City built a green city in the heart of Metro Manila while also ensuring women's livelihood both highlight the importance of addressing structural inequalities faced by women, youth, children, disabled and displaced people, indigenous peoples, and marginalized groups.

The need to build a robust understanding of climate risk and uncertainty, perfectly illustrated by how Dumangas in Iloilo put up a Climate Field School that blended technology and indigenous knowledge; how Batanes achieved zero-casualty in the face of a super typhoon by harnessing indigenous practices; how Monkayo in Davao de Oro partnered with indigenous communities for sustainable planting and farming; how the province of Bulacan mobilized schools to grow disaster preparedness and awareness; and how Zamboanga City manages unpredictable weather and climate hazards through a strong early warning system.

The principle of collaborative action and investment is also captured in Bulakan municipality's cash-for-work initiatives to clean rivers with the katuray plant; a youth-led creek rehabilitation project in Taytay, Rizal; and the inclusive and transformative climate actions being taken in Quezon City, ranging from community-led disaster risk reduction to innovative approaches to single-use plastics and waste management.

Meanwhile, the Compendium's features on how Camotes Island in Cebu harnessed the indigenous Purok System for waste management and disaster response and San Fernando's efforts to target plastic pollution starting from the household level illustrate the importance of devolving decision-making to the lowest appropriate level. On the other hand, the local government of Del Carmen's approach to climate in governance, along with its Climate Field School and its Blue Carbon initiative, shows the importance of ensuring transparency and accountability by highlighting climate change adaptation as a governance platform.

The principle of flexible programming and learning is also evident in the Compendium's features on how Gerona, Tarlac built resilient communities through stronger climate information; how Candon City in Ilocos Sur adapted to drought and water scarcity by equipping and educating farmers and turning to sloping agricultural landscape technology; how Cotabato fostered climate-resilient farming by encouraging life-long learning; how Sitio Pulo in Navotas City centered its flood resilience programming on the needs of residents, who eventually developed their own tools; and how Pandan in Antique adapted to surges in tourism by turning to ecotourism and eco-conservation.

Abra's experience in driving food security through solar power and Naga's inter-local initiatives for integrated emergency management also illustrate the benefits of investing in local capabilities to leave an institutional legacy. Meanwhile, the benefits of having patient and predictable funding that can be accessed more easily is evident in the gains made by Albay, a pioneer in disaster risk reduction, which received funding from the World Bank Country Assistance Program, and Marikina, which was recipient of a grant from the Global Environment Facility more than discussing best practices and providing workable models that may be replicated in other locales across the country, the Climate Change Commission hopes the stories of the communities in this Compendium provide hope—that more and more Filipinos are likewise rising to the challenge; that together we can solve the climate crisis; that we need not be locked into a future of tipping points and irreversible loss.

May these stories inspire stronger and more decisive collective action bring us closer to the future we aspire to: a greener, safer, more sustainable future.

# FOREWORD

**M**itigating and reversing climate change is the greatest challenge of our time. It will take decades, perhaps generations, to undo what unthinking industrialism has wrought on our planet.

While the Philippines only contributes 0.3 percent to the total global greenhouse gasses emissions, it is among the countries most vulnerable to the effects of global warming. Nevertheless, the country is more than ready to do more to mitigate this existential threat to humanity.

The Philippines is committed to reducing its greenhouse gas emissions by 75 percent by 2030. This is undoubtedly an ambitious target and a massive challenge. It will require a whole-of-nation approach as well as the most ingenious ideas of our people to achieve this goal. This bold move will not be accomplished in the large conferences regularly organized to talk about climate change. It is a challenge that will be met on the ground, in our communities, as we battle for a new economy sensitive to the welfare of the planet we inhabit.

We need to initiate resilience at the level of our communities. In this task, the leadership of the local governments is indispensable. It is at the level of our communities that practices must change, economies must evolve, and lifestyles must be altered.

We are not beginning with a blank slate. We have been working on building resilience for years. This book, titled “Stories of Resilience: A Compendium of Local Climate Action in the Philippines,” collects and documents those experiences and practices that will matter in the years to come. These practical approaches and projects should guide us in this unprecedented task of saving the only planet that we have.

**CARLOS G. DOMINGUEZ III**

Secretary, Department of Finance

Designated Representative of the Chairperson to the Climate Change Commission

## Message of Deputy Speaker Loren Legarda

**T**he Philippines is blessed with nature's wonders and bounty, but it is also a country that is burdened by extreme weather events and natural disasters. Typhoons, flashfloods, landslides, and droughts have led to massive losses of lives, livelihoods, properties, and to our economy.

Within the last decade, the Philippines has consistently ranked high among countries most vulnerable to climate change because of our country's archipelagic nature and geographical location along the typhoon belt in the Pacific. But one other major factor is our country's adaptive capacity to cope with and manage climate impacts.

We therefore pursue adaptation as our national strategy on climate action. While we continue to clamor for climate justice in the global arena, We have worked with the resources we have to fund projects, innovate programs, and enable the environment to help build resilience at the local level—where it is needed the most.

"Stories of Resilience: A Compendium of Local Climate Action in the Philippines" is about this journey of our people's survival, their aspirations, and of hope. This is a chronicle of our people's commitment to and leadership on local climate action.

I congratulate the Climate Change Commission for this publication, which puts the spotlight on some of our local governments, communities, organizations, and stakeholders, and their efforts in making our country and vulnerable populations safer and more resilient.

We truly cannot yearn for inclusive and sustainable development if we do not address our climate risks and hazards. May this book serve to raise awareness and inform action to address the growing challenges brought about by the global climate crisis.

I hope this would inspire many more local actors to start and realize their own stories of resilience.

### **LOREN LEGARDA**

Deputy Speaker and Representative,  
Lone District of Antique  
UN Global Champion for Resilience and  
National Adaptation Plan Champion



## Message from the National Panel of Technical Experts

**H**appy Climate Change Consciousness Week to all! Congratulations to the organizers of this event on the launching of *Stories of Resilience: A Compendium of Local Climate Action in the Philippines*.

The material which depicts the innate ingenuity of our local people and communities for survival in times of disasters and challenging moments should be serving as an effective reference and guide for other climate-prone, highly vulnerable, yet least-accessed communities in our country. As the late Ernie Baron would say, knowledge is really power. The very interesting local resilience stories just prove that local people with their knowledge, innovations, and best practices are good enough foundations of their resilience to climate change. This, however, should be supported by science to harness local innovations and practices, to heighten local resilience and eventually make them firmly prepared, able to competently respond and effectively recover by themselves with least interventions from external entities to climate-induced disasters.

The challenge, therefore, is for science to consider local knowledge and practices as its foundations in innovating customized technologies and approaches that local communities can fully understand and perform at their level of knowledge and capacities. Well, I'm wondering if this great creation can be expanded into presenting full stories of this wonderful local ingenuity to fight against the negative effects of climate change. Maybe full stories can be inputted in Local Climate Action Paper Series which stakeholders, such as the academe, can use as a reference material in their knowledge and capacity development venture for local government units and local communities.

Again, I wish to convey my thanks for giving me this opportunity to share my thoughts. And, my congratulations again to the CCC. Maraming salamat po!

### **DR. EDUARDO O. MANGAOANG**

University Professor  
Visayas State University

**I**would like to thank the Climate Change Commission for giving me this opportunity to share my thoughts on this publication. Congratulations to all the local governments and communities showcased in this compilation. Your stories and experiences of adaptation to climate change serve as inspiration to all of us, especially to other communities, to continue to pursue the path to adaptation and resilience.

We know that the Philippines is among the vulnerable countries in the world to climate change.

In the latest long-term Global Climate Risk Index published this year, we ranked 4th among the most vulnerable to climate change – this covers 20 years from 2000 to 2019. In these two decades, the Philippines experienced the highest number of extreme events at 317, or an average of 16 annually. It has been identified that adaptation to lessen the negative impacts of climate change should be localized at the level of communities.

For example, in 2018, we had 8 typhoons and one flooding which affected more than a hundred communities – that is according to EM-DAT: The International Disasters Database. So we see that impacts of climate change are felt most by communities. That is why climate action should be contextualized to their realities. A hazard may affect the whole region but the impacts will certainly be different among local communities within that region, because some are well-prepared, some are not. Some have higher poverty incidence or have lesser access to resources and livelihoods compared to others. Adaptation and climate action should address local needs, be suitable to local context, and acceptable to local people. Just like the strategies employed by our local communities in this local Compendium, the community-based disaster response in Camote Island, inclusion of indigenous knowledge in Climate Field School in Dumangas, Solar-Powered Irrigation System in Abra and Livelihood Adaptation with Dragon Fruit in every home in Candon City, just to mention a few.

I believe that the level of climate awareness of LGUs is generally high all over the country. The numerous projects, trainings, seminars, and fora organized by government, NGOs, international organizations, and academic institutions are more than enough for our LGUs to be well-informed on this issue, but it might be different when it comes to climate action. We can see that climate action among LGUs is actually uneven; some are more advanced while others are lagging behind. We expect that LGUs frequently experiencing hazards are most likely the ones with high levels of climate action. This disparity in levels of climate action at the local level can be due to the following:

- Climate change adaptation is not the priority of the LGU;
- They lack scientific information especially downscaled data on the climate risk specific to the community, city, or municipality; or
- Lack of resources or access to resources, or even competing uses for resources.

But everyone, however, must prepare for climate change impacts. Scientific evidence show and project a lot of changes or anomalies happening now and in the future. So, what can LGUs do to enhance science- and evidence-based actions against the climate crisis? I will just add two important [points]:

- One, foster partnerships with academic institutions, NGOs, and organizations that can help in capacity building and research on climate change for evidence-based decision-making. Successful climate action arises from collaborative efforts as we have seen in the various climate change adaptations of our communities.
- Invest in and set-up local climate-related databases. This is in recognition that information is power in the fight against climate change.

In closing, I reiterate that the best strategy to address the climate crisis is to localize science-based climate action for community resilience. The adaptation and resilience journeys of the communities highlighted in this Compendium attest to that. I salute the CCC and all the LGUs for this publication.

Magandang umaga sa inyong lahat. Isulong ang local climate change action! Thank you.

**DR. GAY DEFIESTA**

Professor V

University of the Philippines Visayas

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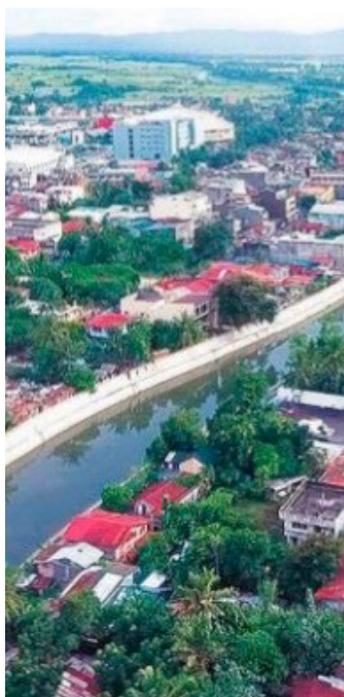
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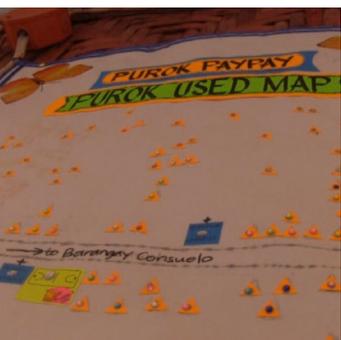
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# Abbreviations

A2C2	Albay in Action on Climate Change
ADB	Asian Development Bank
ADPC	Asian Disaster Preparedness Center
BINDS	Building Resilient and Adaptive Communities and Institutions in Mindanao
BSWM	Bureau of Soils and Water Management
BU	Bicol University
CBFMMP	Community-based Flood Mitigation and Management Program
CCA	Climate Change Adaptation
CCAF	Climate Change Adaptation Framework
CCC	Climate Change Commission
CFF	Cities Finance Facility
CFWS	Cooperation Fund for the Water Sector
CIRCA	Center for Initiatives and Research on Climate Adaptation
CORE	Communities of Resilience
CORDAID	Catholic Organization for Relief and Development Aid
CRF	Community Resilience Fund
CrFS	Climate Resiliency Field School
DA	Department of Agriculture
DAMPA	Damayan ng Maralitang Pilipinong Api, Inc. (Solidarity of Poor Filipinos)
DENR	Department of Environment and Natural Resources
DepEd	Department of Education
DFAT	Department of Foreign Affairs and Trade
DOLE	Department of Labor and Employment
DPWH	Department of Public Works and Highways
DRRM	Disaster Risk Reduction and Management
EMB	Environmental Management Bureau
ENCORE	Enhancing Community Resilience to Disasters
FAO	Food and Agriculture Organization
GCF	Green Climate Fund
GEF	Global Environment Facility
GIS	Geographic Information System

GO-FAR	Good Practices in Local Governance: Facility for Adaptation and Replication
HEI	Higher Educational Institution
ICLEI - SEAS	International Council for Local Environmental Initiatives - Local Governments for Sustainability Southeast Asia Secretariat
ICRAF	World Agroforestry Centre
ICSC	Institute for Climate and Sustainable Cities
LDRRMO	Local Disaster Risk Reduction and Management Office
LGU	Local Government Unit
LCCAP	Local Climate Change Action Plan
LLDA	Laguna Lake Development Authority
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PDA	Water Pilot and Demonstration Activities
PPP	Public-Private Partnership
PRFFWC	Pampanga River Flood Forecasting & Warning Center
PSF	People's Survival Fund
R1	Rice Watch and Action Network
RSDG	Recovery and Sustainable Development Group
SALT	Sloping Agricultural Landscape Technology
SCFSFF	Siargao Climate Field School for Farmers and Fisherfolks
SGP	Small Grants Program
SHINe	School Hydrological Information Network
SPIS	Solar-Powered Irrigation System
SSCT – DC	Surigao State College of Technology – Del Carmen
SSIP	Small-Scale Irrigation Project
TWG	Technical Working Group
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNISDR	United Nations International Strategy for Disaster Reduction
UPLB	University of the Philippines Los Baños
USAID	United States Agency for International Development
WDM	Water Demand Management
ZWAT	Zamboanga City Water District Water Audit Team

# KNOWLEDGE IS RESILIENCE: BUILDING RESILIENT COMMUNITIES THROUGH STRONGER CLIMATE INFORMATION IN GERONA



Agromet Weather Station forecaster Wilchita S. Melegrito explains to a visitor how the information center board helps farmers plan for planting and harvesting, under a program for local climate change adaptation practices in the Philippines.

**Photo courtesy of John Ernest M. Mateo.**

**T**he Municipality of Gerona in the province of Tarlac, located 139 kilometers north of Metro Manila, is a predominantly agricultural town with rice and sugar as its main produce.

Due to diverse weather conditions and the sheer number of tropical cyclones hitting Gerona in a year, the town experiences intense flooding that submerges standing crops underwater or extended dry spells and droughts which usually result in little to no irrigation water.

Thus, the Climate Resiliency Field School (CRFS) project was born, a partnership among the community, municipal government, the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), and non-government organization Rice Watch and Action Network (R1).

## Weather Forecasting using Local Data

The municipal government invested in the construction of the Agromet Weather Station Building and in manual (e.g. evaporating pan, thermometer shelter, standard rain gauge, tipping bucket, event recorder, and atmospheric barometer) and automatic (e.g. davies console, automatic davies sensor, and pipe pole with anemometer) weather instruments placed in the middle of rice fields. Staff manages and operates the station to gather data and forward them to PAGASA for processing. In turn, PAGASA sends back a ten-day weather information advisory.

## Climate Financing

### People's Survival Fund

Gerona is one of the first four recipient municipalities and the only one in Luzon to access the People's Survival Fund (PSF).

The ₱ 38.1-million PSF funding is allotted to programs and projects that would benefit mostly Gerona's farmers and vulnerable sectors. As Mayor Eloy C. Eclar said during the awarding of the fund, "the PSF will help improve the management of our water resources, due to the expected increase in severity and frequency of climate-induced drought and flooding." The municipality for its part provides the staffing for the Climate Resiliency Field School (CRFS).

## Trainings and Communication Platforms

The partner farmers and community are trained in the Climate Forum, a 16-week workshop facilitated by PAGASA on utilizing the data and forecasts produced from the project. PAGASA also presents a 3-4 month forecast followed by strategic planning in anticipation of any intervention that may be required.

Moreover, the partners are assisted in diversifying their produce. The farmers are informed of the data and risk management strategies through these announcement boards located at the Agromet Weather Station: (1) Climate Information Center, (2) LGU Climate Data Record, and (3) Climate Risks Analysis of Gerona's Agriculture. The ten-day forecast from PAGASA is sent through text messaging and a Facebook group.

## Future Plans

The farmers are organized into associations and produce organic fertilizer, calamansi concentrate, vinegar, and other goods depending on the abundant produce in their area. Barangay Sembrano, having satisfied the eligibility requirement of having a legal entity as an association, will receive equipment from the Department of Labor and Employment (DOLE). They also have a municipal federation with around 200 members.

# A TOWN REBORN:

## HOW GUIUAN BOUNCED BACK AFTER SUPER TYPHOON YOLANDA



### Barangay Tagpuro in Guiuan

is known for its production of root-crops particularly Palauan (Scientific Name: *Cyrtosperma merkusii*), a staple food discovered by Spanish missionaries the in early 1600s and was among the staple until the early 1980s in Guiuan.

Palauan, which thrives abundantly in wetlands, is one of the most reliable food crops that survives climatic hazards, including Typhoon Yolanda. In order to increase its production, the LGU is planning to establish a Palauan Root-crop Research and Development Center.



Residents of Sulu-an, Guiuan Eastern Samar installed solar panels on top of their community store. **Photo from Glinly Alvero/ICSC.**

**A** 2nd class municipality in the province of Eastern Samar, Guiuan is home to many white-sand beaches. It is predominantly a fishing community with 38.2% of its land being used for agriculture.

Being in the country's eastern seaboard, it was the first town hit when Super Typhoon Yolanda made landfall on November 8, 2013. Despite suffering from isolation from humanitarian relief and national support services for the first three days of the typhoon due to massive destruction of built infrastructure and farms, Guiuan has risen stronger and wiser.

### Creation of the Guiuan Recovery and Sustainable Development Group (RSDG)

Amid the influx of humanitarian aid from both national government and international institutions, Guiuan formed the Recovery and Sustainable Development Group (RSDG) through an executive order. The RSDG aimed to consult the communities and other stakeholders to find out their needs, and to coordinate all aid to respond to priority needs.

### The Roadmap to Resilience, Development and Progress

Learning from the successes of the RSDG in the recovery of the town, Guiuan crafted its Local Climate Change Action Plan (LCCAP), which was enhanced by its implementation of the Climate Change Adaptation Framework (CCAF).

The CCAF, as supported by the Catholic Organization for Relief and Development Aid (CORDAID) and the Institute for Climate and Sustainable Cities (ICSC), follows a bottom-up approach in setting down priority programs and actions for adaptation. For Guiuan, their identified needs revolved around attaining food security and water resource management.

### Incorporating Sustainability Measures to Livelihood

Some of the notable stories from Guiuan include the multi-stakeholder partnership and cooperation with regard to the declaration of some parts of Guiuan as marine protected areas. This was initially met with resistance from fisherfolk, but a compromise was eventually reached to allow regulated fishing.

By 2019, thousands of fisherfolk organized themselves into the Guiuan Fisherfolk Federation, which guards the marine reserves and operates fish cages that can be lowered before a storm. They work together to address the community's economic vulnerabilities and other social concerns. On food security, Guiuan is increasing its cultivation of the root crop Palauan, which thrives abundantly in wetlands as a reliable food source that survives climatic hazards. The municipal government of Guiuan is planning to establish a Palauan Root-crop Research and Development Center.

# SUSTAINING PARADISE:

## BUILDING CLIMATE INFORMATION AND DRIVING ADAPTATION THROUGH INCLUSIVE GOVERNANCE IN DEL CARMEN



Siargao Climate Field School for Farmers and Fisherfolks (SCFSFF), an institute focused mainly on developing innovative climate-adaptive technologies and strategies for agriculture and fisheries, and adopting the best science and process to educate the farmers and fisherfolks on sustainable production despite a changing climate. This facility is jointly funded by the PSF, the Local Government of Del Carmen, and the Surigao State College of Technology. *Photo courtesy of Del Carmen Mayor Alfredo Matugas Coro III (2018).*

**T**he municipality of Del Carmen is a 5th class municipality in the province of Surigao del Norte. It is located in Siargao island, known for Cloud 9, possibly the country's most famous surfing wave. Del Carmen boasts of 5,000-hectare mangrove forests and 44,000 hectares of municipal waters with farming, fishing, and tourism as the people's main sources of livelihood.

Siargao island, located on the eastern part of the Philippines, is often hit by typhoons. But these were also viewed by its local leaders as building blocks for a more resilient, developed, and progressive Del Carmen.

### The Siargao Climate Field School for Farmers and Fisherfolks

Partially funded by the PSF, the Siargao Climate Field School for Farmers and Fisherfolks (SCFSFF) is an institute focused mainly on improving agriculture and aquaculture – the main source of livelihood of the townspeople. This is an initiative of the Local Government Unit-Del Carmen and its implementing partner, the Surigao State College of Technology-Del Carmen (SSCT-DC) in response to the natural hazards posed by climate change.

### From Ecotown to Blue Carbon

In 2011, the Climate Change Commission (CCC) and Municipality of Del Carmen agreed to pilot the Ecotown Framework with a vision to create model communities for adaptation and mitigation practices

within and around boundaries of critical key biodiversity areas, which are at high risk because of climate change. The Ecotown Framework was created by the CCC to help LGUs integrate climate adaptation and mitigation actions into their land use and development plans with six components, namely: 1) natural resource assessment, 2) vulnerability assessment, 3) Environmental and Natural Resources accounting, 4) adaptation measures, 5) climate adaptation support service, and 6) finance scheme. As an Ecotown, the Municipality of Del Carmen worked to enhance the adaptive capacities of its communities and ecosystems while assuring its ecological stability and economic resilience.

In 2019, Del Carmen emerged as the first and only LGU with a technical working group (TWG) for the Blue Carbon Initiative and a local Center of Excellence (COE), composed of a network of higher educational institutions (HEIs). The COE will be the research arm of the TWG and will be responsible in coordinating and providing recommendations for the Blue Carbon Initiative in the municipality.

### Climate Change Adaptation as a Governance Platform

Del Carmen Vice Mayor Alfredo "JR" Matugas Coro III calls on his fellow leaders to put the environment and the people at the center of local governance. This requires having a long-term plan for climate change adaptation to address local vulnerabilities, utilizing knowledge on people's behavior towards the natural ecosystem. He encouraged local government units to converge with other sectors and maximize opportunities for fruitful partnerships.

## Climate Financing

### People's Survival Fund (PSF)

The municipality of Del Carmen proposed for the funding of a ₱ 95.6 million climate field school for farmers and fisherfolks under the PSF, with a counterpart funding of ₱ 14.9 million by the local government and the Surigao State College of Technology.

### Mainstreaming Climate Finance

Del Carmen Vice Mayor Alfredo Coro III highlighted the importance of tapping funding opportunities from different sectors.

### Public-Private Partnership (PPP)

Vice Mayor Coro also stressed the importance of tapping the private sector for climate change adaptation. An example would be a PPP for the Mangrove Protection and Information Center in Del Carmen, Surigao del Norte.

## Climate Financing

### People's Survival Fund

The municipality of San Francisco, Cebu was able to access ₱ 33.89 million from PSF to fund its initiatives to build resilience through community-based farming.

### The 2011 United Nations Sasakawa Award for Disaster Reduction Grant

San Francisco won \$50,000 or 2.1 million pesos from the United Nations International Strategy for Disaster Reduction (UNISDR) for its sustainable municipal development and efforts to uplift the economic condition of the poor.

# SMALL DISTRICTS, BIG RESULTS: HARNESSING THE INDIGENOUS PUROK SYSTEM FROM WASTE MANAGEMENT TO DISASTER RESPONSE IN THE CAMOTES ISLAND



*PUROK MAP. This map helps Purok Baybay visualize where its most disaster-vulnerable members are. Photo by Rappler.*

**C**amotes Islands is a group of islands classified as a 3rd class municipality in Cebu Province. Its capital, San Francisco, produces mainly agricultural produce such as corn, coconut, fruits, vegetables, livestock, and fish.

Among all towns where Typhoon Yolanda made landfall, only San Francisco registered 'zero casualty' despite the devastating loss suffered by its neighboring cities and towns in Leyte and Samar. Their use of the Purok System ("purok," or smallest political unit in Filipino) as the medium for cascading early warning has been identified as the game changer.

### The Purok System

In 2004, then Mayor Alfred "Al" Arquillano Jr. encouraged one purok to solve its own solid waste management problem. With the successful waste reduction and transformation in that first purok, others followed. He organized a purok beautification

contest, promising Php20,000 (approximately US\$395) to each purok that effectively maintained a solid waste management program, conducted regular member consultations, and planted a community vegetable garden. Some puroks even raised purok funds from member donations, which served as a capital fund from which members could draw micro-loans.

### Puroks as Vital Agents for Climate Change Adaptation

When news of any form of weather disturbance reaches the local disaster risk reduction and management office (LDRRMO), they inform the purok leaders, who then go around the village to announce the news by megaphone.

When evacuation is needed, purok leaders are guided by community profiles as they evacuate first the most vulnerable areas. Purok leaders have access to WiFi to continuously communicate with the LDRRMO.

# WHEN PAST AND FUTURE MEET: BLENDING TECHNOLOGY AND INDIGENOUS KNOWLEDGE FOR RESILIENCE IN DUMANGAS



**Dumangas Iloilo Climate Field School**  
Photo from: Maps123.net 2

**A** coastal town in the Visayas, Dumangas, Iloilo relies largely on agriculture and fisheries. The town suffers from drought and flooding in the dry and wet seasons, respectively. Its location at the tail end of the Jalaur River, a major river basin, renders it a catch basin during rainy seasons.

In order to help the farmers adjust to the adverse impacts of climate change, the municipality of Dumangas, together with the Asian Disaster Preparedness Center (ADPC), the United States Agency for International Development (USAID), the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), and the Iloilo Provincial Agricultural Office, adopted the Climate Field School (CFS) program in 2007, the first of its kind in the Philippines.

## The Climate Field School

The CFS aims to provide in-depth training and skills development to help farmers sustain their livelihood. Farmers are taught to interpret climate information and apply them in their farming and fishing practices. The components of CFS are training, infrastructure, and community organizing.

## The CFS Training

A 16-week course was developed by agricultural technologists, focusing on the importance of climate in plant growth and development, familiarization on forecast implementation, usage of climate parameters and instruments, learning to integrate weather and climate information with disaster management and agricultural planning, and creating awareness on disaster risk.

## Climate and Weather Forecast Station

In 2002, as a pilot project of PAGASA and the ADPC, the town established its Agro-Met station which had appropriate facilities to gather local weather data. PAGASA also trained local government personnel to translate weather information into understandable language which were disseminated to the local DRRM councils, farmers, and fishpond operators everyday. The farmers and fisherfolk now base their activities on the Agro-Met station advisories.

## Indigenous Knowledge with Technology

The secret to the success of CFS is its keen understanding that learning must begin at the level of knowledge of the end-user. The program did not seek to overstep, but instead, respectfully worked to enhance the community's indigenous ways, such as relying on insects to predict weather conditions. At the same time, the CFS continues to add new and scientific knowledge to the already rich knowledge and culture of the farmers and fisherfolk.

The municipality of Dumangas continues to receive recognition both locally and around the globe. Beyond the accolades, the farmers and fisherfolk have dramatically improved and diversified their productions leading to more produce, higher income, and resilient communities.

# FROM RIDGE TO REEF: IMPROVING LIVELIHOOD, EMPOWERING CITIZENS, AND BUILDING RESILIENT AND ADAPTIVE COMMUNITIES

## IN LANUZA



### Climate Financing

#### People's Survival Fund (PSF)

The municipality of Lanuza received a ₱ 39.08 million pesos grant from the PSF.

#### Australian Government's Department of Foreign Affairs and Trade (DFAT) with Oxfam as implementing partner

Oxfam, with the support of Australian Governments DFAT and together with other local partners, provided technical assistance in the development of Lanuza's PSF proposal.



*The rehabilitation and development of local mangrove and beach forests is a component of Lanuza's PSF project proposal. Mangrove forests act as a buffer against powerful waves caused by tsunamis and powerful storms, thus protecting inland areas. Mangrove trees also help accumulate silt and create a barrier against salt water. In Lanuza, as in other areas in the Philippines, many mangrove forests have been lost over the years due to wood harvesting and reclamation for agricultural purposes.*

**Photo by VJ Villafranca/Oxfam.**

Lanuza is a 4th class municipality in the province of Surigao del Sur in southern of the Philippines. Mainly dependent on agriculture, fishing, and eco-tourism, the local economy heightens with the arrival of both local and foreign surfers in November. It is, however, vulnerable due to its location along the eastern seaboard of Mindanao. It is also at risk of tidal surges and tsunamis from the Pacific Ocean.

From 2012 to 2014, Oxfam worked with the local government of Lanuza in the Australian Government-supported Building Resilient and Adaptive Communities and Institutions in Mindanao (BINDS) project. In 2013, Oxfam, together with local non-government organizations (NGOs), provided technical support in crafting the People's Survival Fund (PSF) proposal entitled "Disaster Risk Reduction and Management Response (Ridge-to-Reef Approach) as Adaptation Mechanism to Resiliency."

### Interconnected Components

The project touches on interrelated components, such as (1) the management of watersheds, ecosystems, and forests; (2) development of livelihood and capacity-building programs;

(3) development of climate-resilient agricultural and forest lands, and (4) strengthening citizens' resilience through more varied sources of income.

### Improved Livelihood

One target outcome is to increase the residents' income from nipa sugar and wine-making. In Sitio Ipil in Barangay Aksam, farmers were provided a new distillation facility that uses coconut husks, a more sustainable source of energy for nipa lambanog producers.

### Inclusive Governance

The model of Lanuza is also one of inclusion. It included its indigenous people in the project development process, and explored ways to provide its women additional sources of income, such as through the shift from growing bananas to growing abaca. Abaca is a climate-resilient crop, not easily damaged even with typhoons, and is easily replaced. Women in the indigenous community also manually strip abaca.

# A SUSTAINING SUN: DRIVING FOOD SECURITY THROUGH SOLAR POWER IN ABRA PROVINCE



A Solar-Powered Irrigation System (SPIS) is turned over to farmers' organizations in Mallabaga, La Paz, Abra. **Photo from the Office of the Governor, Province of Abra.**

The Province of Abra, located in the northern part of the Philippines, is hemmed in by the towering mountain ranges in the west. The Abra River runs from south to west and central areas, bisecting the whole Abra valley and joined by the Tineg River.

Abra's economy is agriculture-based with rice, corn, vegetables, and root crops as its major industry, with some production of livestock, coffee, tobacco, and coconut.

For generations, farmers in the uplands have been dependent on the rain for the irrigation of their rice fields. They could usually harvest only one crop a year because of the weather pattern.

## The Solar-Powered Irrigation System (SPIS)

All these changed with the installation and full operation of the Solar-Powered Irrigation System (SPIS) provided by the Department of Agriculture (DA), as part of its Small-Scale Irrigation Project (SSIP). The DA provided four SPIS in Abra situated in (1) San Vicente, (2) Piddocol, Malabbaga, La Paz, (3) Abot, Cabaruan, Danglas and (4) Bangbangcag, Bucay.

The water for the systems comes from the Abra and Tineg Rivers whose banks are deep, preventing the establishment of the traditional irrigation systems.

The SPIS uses solar energy to pump water from the source to the fields. The pumps used for transport are equipped with solar cells. The solar energy absorbed by the cells is then converted into electrical energy via a generator which then feeds an electric motor driving the pump.

## The National Government – Local Government – Farmers Organization Partnership

With the DA providing the SPIS facility, the local governments are expected to construct more tanks and connect these to the solar pumps. The farmers, on the other hand, can manage and properly distribute the water according to user needs. They are also trained to operate and troubleshoot the SPIS.

## Increased Produce for the Communities

With the SPIS installed, farmers increased their cropping cycle from 1 to 3 per year, increasing their produce and income. In effect, they are managing the effects of climate change and natural calamities on local agriculture and livelihood.

## Climate Financing

### The Department of Agriculture's Rice Program

The SPIS is the flagship program of the DA through the Bureau of Soils and Water Management (BSWM) under the Small-Scale Irrigation Project (SSIP).

The SPIS, amounting to approximately ₱ 6 million, can be availed through full grant. Some of the requirements include an organized group of farmers and sustainable water source, among others.

# FROM VATICAN OF DISASTERS TO GLOBAL MODEL: PIONEERING DISASTER RISK REDUCTION FOR “ZERO CASUALTY” IN ALBAY PROVINCE



## Climate Financing

### The World Bank Country Assistance Program

The World Bank funds projects that need engineering interventions such as flood control for flood plains, watershed protection and reforestation, and irrigation and rehabilitation.



*The Mayon Volcano, pride of Albay Province. Photo from Edgar Alan Zeta-Yap.*

**T**he second largest province in Bicol region with an area of 2,552 square kilometers, Albay has been known as the “Vatican of Disasters of the Philippines” because of the many typhoons, volcanic eruptions, tsunamis, and landslides that hit in any given year. Given the presence of various climate and geological hazards, Albay focused on climate adaptation and disaster risk reduction measures and has been recognized as successful in reducing its risks and vulnerabilities. It was cited as a “Global Local Government Unit (LGU) model for Climate Change Adaptation” by the United Nations Office for Disaster Risk Reduction (UNDRR)

### APSEMO

Albay is a pioneer when it comes to disaster risk reduction (DRR). It established its Provincial Disaster Risk Management Office (PDRMO) by order of the provincial legislative council in 1994. With the implementation of RA 10121 or the Philippine Disaster Risk Reduction and Management Act of 2010, Albay's PDRMO became the Albay Public Safety Emergency Management Office (APSEMO).

Through APSEMO, the province conducts social preparation programs to continuously train and educate the communities in dealing with climate change and disasters. Residents are trained on evacuation, community kitchen management, mountain survival skills, compass reading, and community risk mapping. This training has been credited for making Albay's mantra of “zero casualty” possible throughout numerous typhoons and Mayon's volcanic eruptions.

### The Center for Initiatives and Research on Climate Adaptation (CIRCA)

CIRCA was established in 2008 as a living research and training institution, through a collaboration among the provincial government of Albay, Department of Environment and Natural Resources - Environmental Management Bureau (EMB), World Agroforestry Centre (ICRAF), Bicol University (BU), and the University of the Philippines Los Banos (UPLB). It aims to strengthen the capacity for research and project and program implementation in sustainable agriculture, forestry, fisheries, energy, and eco-cultural tourism in light of the growing challenges from climate change.

### Mainstreaming Climate Change Adaptation

The province also implemented the Albay in Action on Climate Change (A2C2) program, which aims to embed adaptation and disaster risk reduction in education and local plans. Climate Change Adaptation (CCA) programs are integrated in the curricula of all schools in the province. More so, CCA was also largely considered in the province's formulation of a Comprehensive Land Use Plan (CLUP).

# A PARAGON OF POLISHED RESPONSE: BUILDING URBAN CLIMATE RESILIENCE: ROAD-SHARING IN MARIKINA CITY



*Bikers passing through a bike path beside the Marikina riverbank.  
Photo from broomieskywalker.blogspot.com.*

**M**arikina, known as the country's Shoe Capital, is the biggest manufacturer of quality locally made shoes. It is also home to commercial and industrial centers, local markets, and shopping centers.

With the Marikina River running along the western part of the city, and at risk of overflowing in times of heavy rains, the city has adopted an alarm system corresponding to the river's water level: (1) when the water is 15 meters above sea level, an alarm signals people to "prepare," (2) when the water is 16 meters above sea level, an alarm signals people to "evacuate," and (3) when the water is 18 meters above sea level, an alarm signals the start of "forced evacuation."



*Marikina Trash to Treasure Photo from: Rappler.com*



*Marikina Bikeable City Photo from: Travelup.com*



*Marikina Bikeable City Photo from: Travelup.com*

## Trash to Treasure

Marikina City also boasts successful solid waste management practices, such as the collection of restaurant food wastes and turning them into fertilizer. Another is the collection of household cooking oil, which is then mixed with plastic bags and styrofoam to make bricks.

## Walkable and Bicycle-Friendly / Investing on Infrastructure

The city has established 700 kms of cleared sidewalk, 52 kms of bikeways, and five bridges to ensure the safety of bikers and walkers. These provide low cost, healthy, and environment-friendly transport alternatives. The bikeways network successfully connects city residential areas, specifically low-income communities, to offices, markets, schools, government centers, and to the metro railway system.

## Climate Financing

### The Global Environment Facility (GEF) Grant from World Bank

The GEF grant financed 19 kilometers of sidewalks with a total funding of \$ 1.143 million with a local government counterpart of \$ 2 million

The GEF Small Grants Programme (SGP) provides financial and technical support to communities and civil society organizations to meet the overall objective of global environmental benefits secured through community-based initiatives and actions.

## Social Preparation

In promoting alternative modes of transportation and discouraging the use of private vehicles, the city integrated the bikeways network in programs for regular road improvement and widening. Strict and consistent implementation of traffic rules and regulations is important. Other initiatives include bicycle safety education, information dissemination and advocacy campaigns, granting of bicycle loans for city employees, lending of government bicycles, and holding annual cycling competitions and bicycle advocacy events.

# EMERGING VICTORIOUS:

## EMERGING VICTORIOUS: ZERO CASUALTY BATANES IN THE AFTERMATH OF TYPHOON FERDIE



### Communities for Resilience (CORE) Program

The **Communities for Resilience or CORE Program** is a flagship capacity-building program of the Climate Change Commission (CCC) for local governments launched in 2016. CORE aims to help local communities adapt to climate change, reduce disaster risk, and acquire enduring resilience.



*Batanes Photo from Oxfam Documentary*



*Photo by Rappler*



*Photo by Rappler*

**B**atanes is the smallest, northernmost province in the Philippines, composed of ten islands facing the Pacific and the West Philippine Sea.

On September 13, 2016, Super Typhoon Ferdie (Meranti) ravaged the province of Batanes. Ferdie brought one-minute sustained winds of 315 km/hr – making it one of the most intense tropical cyclones on record, with enough force to rip off Batan Island’s weather station. Despite being in the direct path of the super typhoon, Batanes emerged victorious with zero casualty.

### Preparedness Saves Lives

The people of Batanes or the Ivatans credit their ancestors with indigenous knowledge and ability to adapt to extreme weather. As they have endured typhoons through generations, tradition appears to have systematically converged with current good practices in disaster risk reduction such as pre-disaster risk assessments, pre-emptive evacuations, and early warning and speedy coordination of Local Disaster Risk Reduction and Management Councils (LDRRMCs).

### Forward Thinking Enduring Resilience Measures

The CCC has a Communities for Resilience (CORE) program to promote a risk- and science-based approach to climate change adaptation and mitigation planning among LGUs. This is a flagship capacity-building program launched in 2016 that helps local communities adapt to climate change, reduce disaster risk, and acquire enduring resilience.

# GREEN IN THE HEART OF THE METRO: INTEGRATING THE CLIMATE LENS IN POLICYMAKING IN PASIG CITY



Continuous rehabilitation in the Pasig River including the use of water hyacinth for livelihood program as part of the comprehensive program of Pasig Green City program. **Photo from Pasig River Coordinating Management Office (PRCMO) facebook page.**

**P**asig City, a highly urbanized city in Metro Manila, Philippines, is bustling with urban life and infrastructure. It is home to huge malls, office towers, and residential condominiums bringing in a huge number of residents, visitors, and vehicles in the city. This, however, brings a number of problems in the city, such as solid waste management, flooding, pollution, health problems, and environmental degradation.

## Policy Integration as Climate Change Adaptation Measure

The city enacted several regulations, including the requirement of an Environmental Permit to Operate and installation of anti-pollution devices. Green police volunteers numbering 500 were also trained and authorized to apprehend violators of environmental laws and ordinances. Commercial and business establishments also have their own environmental policies and green management principles. All these, partnered with strict and consistent implementation of the policies, resulted in Pasig City's air being classified as one of the cleanest in Metro Manila.

## Water Hyacinth: From Problematic to Source of Livelihood

The proliferation of water hyacinth, a free-floating perennial aquatic plant, considered pesky because of its broad, thick, glossy ovate leaves, used to cover Pasig River. It indicates that the water level in Laguna Lake is getting higher than Manila Bay's mean sea level. Given the abundance of water hyacinth during rainy seasons, the community used its stems as raw materials for a handloom weaving livelihood program. The material is then converted into table runners, fans, slippers, bracelets, and other products. The local government, on the other hand, trained women in crafting products from water hyacinth. These women were also hired in government-supported livelihood projects.

## Other Climate Change Adaptation Initiatives

True to its vision, the city installed solar-powered lights in the streets of Barangay Kapitolyo and within the Pasig City compound. Incandescent bulbs in the Pasig Mega market were also replaced with compact fluorescent lamps (CFL) as part of the Palit-Illaw Project. Lastly, 81 government-owned gasoline vehicles were converted into LPG-powered vehicles to contribute to cleaner air and sustainable urban transport.

# A DRAGON FRUIT IN EVERY HOME: ADAPTING TO DROUGHT AND WATER SCARCITY IN CANDON CITY, ILOCOS SUR



*Dragon fruit farming thrives in Ilocos Norte with farmers using adaptation measures.*

***Photos from Candon City's Office on Public Information***

**C**andon City is a 4th class component city in the northern province of Ilocos Sur. It is dubbed the “Tobacco Capital of the Philippines” as it is the country’s the largest producer of Virginia-type tobacco. Its climate is generally dry from October to May. The city is the center of trade and commerce in southern Ilocos Sur with industries such as manufacturing, agro-industry, and cottage industry. It also has a number of commercial infrastructure and service establishments.

With the city’s steadfast growth and urbanization, the city’s population is growing, and with it, the increasing problem on water supply. To address this, the local government of Candon established a 130-hectare agroforestry reserve in Barangays Palacapac, San Andres, and Amguid. An inter-agency group was also formed with the Department of Agriculture (DA), the Department of Environment and Natural Resources (DENR), the Department of Public Works and Highways (DPWH), the Department of Education (DepEd), and state universities and colleges to develop the area into a water reserve with people empowered to make a living despite water scarcity.

## **Solid Mapping of Barangay Palacapac**

The inter-agency group looked into the soil profile of Barangay Palacapac, which is primarily composed of agricultural land. Its soil has low fertility levels and is severely eroded, which leads to an inadequate supply of water and groundwater during the dry seasons.

## **The Farmer-Adopters**

The project started as a challenge to farmer-adopters to invest in a drought-resistant crop, the dragon fruit. Farmers were also advised to use vermicast, also called worm castings, worm humus, worm manure, or worm feces, which is the end-product of the breakdown of organic matter by earthworms. The use of vermicast results in reduced levels of contaminants and a higher saturation of nutrients. With additional knowledge from the Farmers Field School and the guidance of agricultural technicians, the farmers also learned different aspects of organic dragon fruit production. The sloping agricultural landscape technology (SALT) was also adopted to address soil erosion concerns. The process successfully rehabilitated the project area, converting the grassland into productive land.

## **Rain Water Storage**

Aside from potential organic farming for greenhouse gas reduction, organic agriculture increases the soil’s water holding capacity, thus reducing the impacts of water scarcity. Various technologies for water use efficiency were developed and promoted in the uplands. To directly address water shortage, rainwater storage was constructed to prepare for the summer or dry season. The infrastructure was also used as storage for harvested cogan. The strategy has been replicated in neighboring barangays which indicates its sustainability as adaptation practice.

# THE EVER-GROWING CITY:

## HOW COMPREHENSIVE URBAN PLANNING CONTINUES TO BUILD A MODEL CITY IN NAGA



*Aerial shot of Naga City highlighting Penafrancia Avenue.*

*Photo courtesy of CEPPIO, LGU-Naga.*

**N**aga City is a 2nd class independent component city located at the heart of the Bicol region in Luzon island. Considered the center of commerce and industry, it serves as a trade center of goods from the Visayas and Manila with a number of business districts, banking and finance institutions, shopping malls, and IT-business process outsourcing centers. It is also becoming a tourism sports hub among local and foreign sports enthusiasts.

The city became the first model city in the Philippines to embrace disaster management, primarily aimed at measures to reduce risks to typhoons and flooding. It incorporated climate change adaptation and disaster risk reduction in all potential hazards in city planning.

### Inter-local Initiatives

Through Naga City's creation of the Metro Naga Development Council, a collaboration among 19 neighboring municipalities defining the downstream Bicol River basin and most of the municipalities at the foothills of Mt. Isarog, localities are able to find solutions to support climate-resilient communities, solid waste management, and tourism development. These municipalities are: Bombon, Bula, Cabusao, Calabanga, Camaligan, Canaman, Gainza, Libmanan, Magarao, Milaor, Minalabac, Ocampo, Pili, Pamplona, Pasacao, Siruma, San Pascual (Masbate), San Fernando, and Tinambac. Another initiative is the development of the integrated emergency management system, which comprehensively defines activities before, during, and after emergency situations.

Naga City continues to lay its plans for a climate-resilient locality, ensuring the safety of lifeline facilities (communication, electricity, hospitals/clinics, airports, evacuation centers, and warehouses) and lifeline infrastructure (roads leading to facilities, levees, water systems, and waste disposal systems).

### The Geographic Information System (GIS)

The City of Naga utilizes the GIS as a tool to determine parts of the city that are most likely to get flooded together with other flood maps of other member municipalities, stitched together to holistically address the flooding within Metro Naga. It has the capacity to forecast flood levels with relative accuracy, which helps target the most vulnerable populations for evacuation. The GIS is also used in land use planning.

### Shifting the Center of Economic Activity

A long-term strategy deployed by Naga is to shift the center of economic activity from lowlands to more elevated areas. The city created growth centers and gave incentives to attract people and investors alike. The Kaantabay sa Kauswagan Program also provided socialized housing for informal settlers in high-risk areas and residents in flood-prone areas to elevated relocation sites with provisions for basic amenities. The abandoned properties are acquired by the government, elevated, and transformed into commercial and recreational facilities.

# SEIZING OPPORTUNITIES: BUILDING RESILIENCE THROUGH INCLUSIVE AND TRANSFORMATIVE CLIMATE ACTION IN QUEZON CITY



Representatives of Quezon City Government's Environmental Policy Management Council (QG-EPMC) convene to formulate the city's climate action plan. **Photo from ICLEAS Website.**

Quezon City is home to three million Filipinos and is the largest city in Metro Manila by land area. Harnessing its vast area and resources, the city has opened up boundless opportunities for climate action through an inclusive and transformative approach. Its Environment Policy Management Council developed a strategic appraisal of the city's Climate Action Plan baseline with support from C40 and the ICLEI Southeast Asia Secretariat. Its disaster risk reduction initiatives—from community-led work to address flood risk and solar power installations for better disaster risk management, to inclusive solutions addressing the problem of plastic waste—embody the same approach.

## Communities Take the Lead

Sitio Kislap is a flood-prone settlement at the northern tip of the city, home to 528 families living along a creek. The community assessed its own households based on risks and evacuation priority with aid from Damayan ng Maralitang Pilipinong Api Inc. (DAMPA), a network of 245 urban and rural poor communities and grassroots women leaders across the Philippines. The risk mapping helped identify three urgent strategies: better waste management, stronger early warning systems, and the reinforcement of structures. The community convinced the local government to reduce flood risk through canal dredging and creek riprapping.

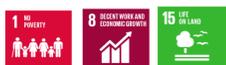
## Solar-Powered Disaster Risk Management

Quezon City also initiated the Solarization of Public Schools Project to lower consumption and help reduce emissions. A pilot was implemented in Commonwealth High School, with 380 panels, 20 inverters, and 160 batteries installed in five buildings within the school compound, which also serves as an evacuation area during disasters. The Solar Power Facility is projected to produce 146,000kWh per year—which would remove 88.07 tonnes of CO<sub>2</sub> per year from the city's total greenhouse gas emissions.

## Inclusion and innovation in tackling plastic waste

Being the most populous city in the country, it is not surprising that Quezon City also produces the most garbage daily. Knowing that a simple ban will not be enough to stem the tide of plastic waste, the city launched the innovative "Trash to Cashback" program with Basic Environmental Systems and Technologies, where recyclables can be traded into "environmental points," which can then be exchanged for basic commodities or used to pay for food deliveries through the bXTRA.com.ph platform. It also coordinated with foreign and local partners to implement the Social Inclusion and Alternative Livelihood for the Informal Waste Sector project as it moves to modernize its waste management system.

# LEARNING FOR LIFE: DRIVING RESILIENCE WITH CLIMATE-SMART FARMING IN COTABATO



*Woman farmer tends to a bitter gourd plant at the FAO Climate-Smart Farmer Field School. She is one of the more than 10,000 beneficiaries of the program. Photo from FAO.*

Cotabato, its name derived from a Maguindanao phrase which means stone fort, is a 9000 sq. km. of land at the center of Mindanao. While provinces with the highest poverty rates in the country and among the most vulnerable to climate change. Local adaptation to climate change is essential for vulnerable coastal and farming communities faced with increasing threats to livelihood and safety. Farming and fishing families in Mindanao, including in the province of Cotabato, are no stranger to both natural and human-induced threats. Aside from typhoons, drought, and flooding, these families are repeatedly displaced as a result of armed conflict. However, in recent years, the natural threats have worsened with stronger typhoons, widespread drought, and expansive flooding devastating crops and farm produce.

Through a US\$ 3 million grant from the Government of New Zealand, farmers and fishermen from five municipalities of Cotabato, namely, Aleosan, Kabacan, Midsayap, Pigkawayan and Pikit, were assisted by the Food and Agriculture Organization of the United Nations to restart their livelihoods and build their resilience to the effects of extreme weather events and armed conflict.

## Life-long Learning for Cotabato Farmers

As part of the program, climate-smart farmer field schools are made available for the farmers to learn new ways to produce rice, corn, and vegetables, understand innovative methods in fighting pests, and resolve other farming issues. More importantly, the field schools create a culture of knowledge-sharing within the community.

## Climate Resilient Farming

The local government, together with the Department of Agriculture and FAO, work on inputs on rice, corn, and vegetable seeds, fruit tree seedlings, fertilizer, drying nets, small farm machinery, post-harvest equipment, livestock and poultry, tilapia fingerlings, and gillnets. Since 2015, the stakeholders have been working on promoting inclusive, equitable, and sustainable growth by lifting smallholders out of subsistence, linking lagging areas to more progressive cities, and improving the resilience of agricultural livelihoods to crises and climate impacts.

# PROJECT SHINE: HYDROLOGICAL OBSERVATION FOR DISASTER PREPAREDNESS IN BULACAN

## Climate Financing

### National Government

As a center of PAGASA, PRFFWC receives funds from the National Government to implement its projects and initiatives.

### LGU Support

The local government units of Bulacan have been supporting the initiatives of Project SHINE.



The Provincial Disaster Risk Reduction and Management Office in collaboration with the Bulacan State University - Extension Office conducts a three-day training dubbed as the Climate and Disaster Risk Assessment Training of Trainers (CDRA-TOT), attended by Provincial, City and Municipal DRRM Officers and PDRRMC Technical Working Group on February 19-21, 2020 at the Bulacan State University. **Photo courtesy of Bulacan Provincial Public Affairs Office.**

**B**ulacan, lying on the northeastern shores of Manila Bay, is home to 3.3 million Filipinos and is part of the rice granary of the Philippines. While numerous industries have already developed in the province due to its proximity to Metro Manila, the majority of the rural areas still depend on agriculture and aquaculture. With this, monitoring of the river systems is of paramount importance for towns in Bulacan. In 2004, the Pampanga River Flood Forecasting and Warning Center (PRFFWC), a pilot river basin flood forecasting and warning center of the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), launched the Community-based Flood Mitigation and Management Program (CBFMMP). Two years later, a parallel program, known as SHINE or School Hydrological Information Network was launched, which aimed to address the issues on the effects of climate change, focusing on raising awareness on hydrometeorological-related hazards.

### Awareness, Coordination, and Sustainability

Project SHINE enhances the awareness of schools on climate-related hazards through weather monitoring and coordination, in support of the local government unit's flood warning systems and long-term strategies at the local and provincial levels. To date, there are 37 SHINE school beneficiaries in its 11th year of implementation. Yearly, SHINE visits reorientation and SHINE conferences are held.

### Growing the Network: Expanding Resilience

In the early part of 2013, the Provincial Government of Bulacan partnered with Save the Children's Project "ENCORE" (Enhancing Community Resilience to Disasters). More and more schools have become part of SHINE. The initiative was also replicated in 11 schools located in the Municipality of Baggao, Cagayan through the DILG's Good Practices in Local Governance: Facility for Adaptation and Replication (GO-FAR) program.

# BRINGING BACK “MANINGNING”: YOUTH-LED CREEK REHABILITATION AND CLIMATE-RESILIENT FARMING IN TAYTAY, RIZAL



Before and after images of Maningning Creek. **Photos from Angat Kabataan.**

**M**aningning is the Filipino term for shining. However, the Maningning Creek located in Taytay, Rizal was anything but shining seven years ago. The 3-km creek was polluted, clogged by garbage and water lilies, and reeking of sewage sludge. The rehabilitation project was initiated by Angat Kabataan, a youth group composed of residents of the municipality.

A rehabilitation project was initiated by Angat Kabataan, composed of youth from the municipality, after the devastating experience of Typhoon Ondoy in 2009. The group was awakened to address the problems of their hometown's waterways. From weekly clean-up activities and bamboo planting, the efforts of the group evolved to the use of Bokashi Balls, a Japanese technology using fermented organic batter filled with microorganisms to breakdown toxins and food waste in the water.

## A Community Effort

Local residents, the private sector, non-governmental organizations, and the local government helped in the rehabilitation project.

Soon, bigger institutions took part in the initiative. The Department of Environment and Natural Resources and the Philippine National Police sent hundreds of volunteers for clean-up drives of the creek. The Laguna Lake Development Authority (LLDA) also donated 100 bamboo seedlings.

More than a year after their first clean up, Maningning Creek has regained its clear waters and lost its foul odor. Tilapia, martiniko, mudfish, and other marine life also now thrive in the creek. Another positive result is the lowered incidence of dengue in the areas surrounding the creek.

## Climate Resilient Farming

Angat Kabataan was awarded as one of the Ten Accomplished Young Organizations for this project. The ASEAN also took notice of their effort. Their project has become a model for waterways rehabilitation, and has now been replicated in other waterways in different parts of Southeast Asia through a US \$10,000 grant from the Link, Engage, Activate and Develop (LEAD) ASEAN Youth Summit.

# FROM BENEFICIARIES TO CLIMATE LEADERS:

## COMMUNITY-LED FLOOD RESILIENCE IN SITIO PULO, NAVOTAS CITY

### Climate Financing

#### ADB Pilot Project

The Asian Development Bank provides funding for Water Pilot and Demonstration activities

Water pilot and demonstration activities (PDAs) are small-scale, short-term projects that test and validate innovative approaches, methodologies, and technologies for replication or scaling up.

The US\$ 50,000 grant was introduced as a program under the Cooperation Fund for the Water Sector (CFWS) in 2002 with the aim of promoting effective water management policies and practices.



*Isla Pulo is seen as a possible eco-tourism site, with its own unique beauty, birding sites, and flood resilience measures undertaken by the community and local government.*

**Sitio Pulo Navotas Photo from Ebonph.Wordpress**

**S**itio Pulo is a small fishing community off the shores of Navotas City, one of Metro Manila's cities. It is a low-lying island teeming with migratory birds and mangrove trees.

A narrow strip of land along the eastern shores of Manila Bay, Sitio Pulo is submerged in waist-deep water during high tide and heavy rains. As a recipient of the Asian Development Bank pilot project in 2013, locally designed innovations were tested to build the community's resilience to floods.

#### Working with the Community

The project originally focused on helping the community increase their flood preparedness through workshops on disaster risk reduction and assistance to construct a livelihood center on stilts, including a two-storey multipurpose center. Working with the community meant listening to the priorities identified by the residents themselves—constructing a 500-meter bamboo bridge and repairing a 13-meter long wooden bridge. The residents of Sitio Pulo helped in building the structures.

The elevated livelihood center provided storage for rice and fishing nets, while the multipurpose center houses the community library, workshop and tutorial center venue, and more importantly, an evacuation center in times of flood.



**Sitio Pulo Navotas Photo from Ebonph.Wordpress**

Perennial recipients of aid during times of disaster, the residents were able to pool their available resources to provide aid to those devastated by Typhoon Yolanda in spite of the challenges they faced due to poverty. During the span of the project, the community was able to develop a disaster risk assessment manual and toolkit for developing disaster-resilient construction materials and technologies in the local language.

Recently, the local government of Navotas assessed the risks in Sitio Pulo, declaring it as a danger zone. The residents were relocated and Sitio Pulo is now cleared of all structures and inhabitants. At present, the island is being monitored by DENR which is conducting an assessment to determine the island's ecological integrity.

# AHEAD OF THE CURVE:

## MANAGING UNPREDICTABLE WEATHER AND CLIMATE HAZARDS THROUGH EARLY WARNING SYSTEMS IN ZAMBOANGA CITY



Zamboanga City Disaster Risk Reduction and Management Office (ZCDRRMO) in partnership with the City Engineer's Office has initiated the installation of early warning signages in barangays. **Photos from ZCDRRMO**

**S**ituated at the southwestern tip of the Zamboanga Peninsula, Zamboanga City is exposed to coastal storm surges and flooding from heavy rains draining off nearby mountains and obstructing agricultural productivity and livelihood. These impacts of climate change are some of the major problems of that city's local government units need to address. They need to come up with plans to build up the city's resilience to resist, accommodate, and recover from these impacts. And its efforts to adapt and mitigate climate change, the city's LGU has partnered with different sectors and with community to implement various projects, activities, and programs.

### Working with a Plan

With unpredictable weather, Zamboanga City needs to stay alert to make sure they will not be heavily impacted by the climate change hazards. To ensure the preparedness of the community, the City Disaster Risk Reduction and Management Office (CDRRMO) in partnership with the City Engineer's Office has installed early warning signages in various areas of the city such as in landslide, flood and storm surge prone areas. These signages are installed in strategic locations in different barangays to help prepare and protect people and property as well as to take proactive measures in responding to calamities.

The city's government also established its own Text Message Alert System (TMAS) which aims to send out appropriate and direct information to the residents during disasters. The TMAS is capable of generating text messages within a radius of 3-5 kilometers and can send 1,000 to 1,500 messages per hour. It can also operate and send out messages even when all communication systems are down during the disaster.

### ALeRTO Protocol

The Automated Water-Level and Rain Monitoring Using Near-Real Time Observation (ALeRTO) is an early warning system device developed by Ateneo de Zamboanga University. It was programmed to monitor the critical water level and rain data from DOST-Advanced Science and Technology Institute, and the status of the hydrometeorological data, specifically in CARAGA, from the PAGASA. The device determines the threshold category of a river where it is installed, which is represented by the different color warnings. Once the device determines that a particular river has reached a certain threshold, it will automatically send out alert messages via SMS to registered users, specifically to LGUs. Fortunately, Zamboanga City is one of the LGUs wherein project was been piloted. Through ALeRTO, the city government of Zamboanga and its community can be more prepared for the rains and floods. Local authorities can decide more quickly on the course of action to save lives and properties. More importantly, the local authorities can be able to decide what course of action to take to reduce the risk of

# WORKING WITH NATURE: ECOTOURISM AND ECO-CONSERVATION IN PANDAN, ANTIQUE



## Climate Financing

### Partnership with the Department of Environment and Natural Resources (DENR)

The ₱30-million pesos Pandan Arboretum and Eco park is funded by the DENR and supported by the Municipal government of Pandan, Antique.



*The Pandan Arboretum and Eco Park protects and conserves species of trees that are considered endangered, while promoting biodiversity-friendly tourism activities and developing sustainable livelihood enterprises. **Photo from Pandan Arboretum and Eco Park facebook page.***

## Ecotourism and Eco-Conservation in Pandan, Antique

The municipality of Pandan in Antique Province, just 23 miles away from world-famous Boracay Island, boasts of its own white sand beaches along Pandan Bay in addition to other tourist attractions, like the Bugang River and Malumpati Cold Spring.

With the increasing number of tourists visiting the area, it recognizes the need to develop an ecotourism model that will attract more tourists and enthusiasts, maximize its ecotourism potentials, while protecting its rich natural resources and biodiversity.

### Pandan Arboretum and Eco park

The Pandan Arboretum and Eco Park in Barangay Sto. Rosario is an ecotourism area aiming to protect and conserve species of trees that are considered endangered.

It also aims to promote biodiversity-friendly tourism activities and develop sustainable livelihood enterprises. It has a total of 108,925 hectares where trees, shrubs, and herbaceous plants have been cultivated for scientific and educational purposes. The arboretum includes 82.38 hectares for old-growth trees, 9.28 hectares for a bambusetum (bamboo garden), 3.87 hectares for a palmetum (palm garden), 0.79 hectares for an orchidarium, 0.59 hectares for an herbarium, and 2.012 hectares for government buildings and other infrastructures.



***Pandan Antique Ecotourism from Municipality of Pandan***



This facility is considered the largest ecotourism site in Panay Island and was turned over to the municipal government of Pandan and Santo Rosario Multipurpose Cooperative, the People's Organization in the area.

# BREAKING THE WAVE OF PLASTIC: INNOVATING AND COLLABORATING TOWARDS A PLASTIC-FREE SAN FERNANDO



*The Clean Coasts Project, together with the DENR, Philippine National Police (PNP), Jaime V. Ongpin Foundation, Inc. and Philippine Coast Guard conducts Orientation and Coastal Clean-up in La Union. **Photo from Clean Coasts Project Facebook Page***

**S**an Fernando is a component city of La Union, a province known for its beaches and surfing spots. San Fernando relies mainly on agricultural production, with fishing in coastal and seashore areas as secondary means of livelihood. With plastic pollution threatening San Fernando and its coasts like many other parts of the country, the city turned to innovative and collaborative solutions to the problem of plastic.

One such initiative is the two-year Plastic Recovery and Recycling for Clean Coasts Project funded by The Coca-Cola Foundation and implemented by the Jaime V. Ongpin Foundation. The project is run by a broad range of partners including the Environmental Bureau Region 1, the San Fernando local government, the Bureau of Fisheries and Aquatic Resources of the Department of Agriculture, Don Mariano Marcos Memorial State University, Saint Louis College, Lupon ng mga Indibidwal na Nangangalaga sa Kalikasan, San Juan Resorts, Restaurant and Hotel Association, and the Bauang Tourism Council, among others. All partners commit to promote sustainable waste management through recycling and livelihood, increasing public awareness on waste management issues, and strengthening multi-stakeholder alliances. The project aims to promote plastic waste management along coastal barangays, ultimately benefiting the tourism sector, fisherfolk, residents and the public that partake of the bounty of the sea.

## Communities working together

Communities in San Fernando are also working together to address growing plastics pollution. The “Recycler’s Fair: Palit-Basura Project” is an innovative community-led initiative promoting proper waste segregation. Under a barter system, recyclable items are exchanged for grocery items, rice, and mobile phone load. The project targets the source of waste starting from the household level.



*DMMMSU implements Recycler's Fair: Palit Basura Project and recovers recyclable materials from various offices and facilities within the campus in exchange for goods. **Photo from Clean Coasts Project Facebook Page***

**S**ustainable Palengke: “Plastic-Free Palengke Drive” was first implemented in March 2018 in the city’s Public Wet Market. To ease the transition after a city ordinance regulated and fined plastics and Styrofoam, a group of students, out-of-school youth, and concerned citizens collaborated for an awareness drive that seeks to study single-use plastics usage, and educate market-goers on the positive impact of bringing reusable bags.

Working in groups, all volunteers were given specific roles. One group interviewed sellers to educate and convince them to follow the ordinance. Others put up posters around the market to convey how plastics make their way into the sea—and ultimately on our plates. Another group documented the number of plastics going out of the market while others took over stalls and sold products while educating buyers about why they should use reusable bags instead. Volunteers gave away eco-bags for free to buyers who opted to exchange their plastic bags. Plastic is deeply entrenched in our ways of life, but San Fernando’s experience proves the shift away from plastic is possible—and easier when communities work together.



*Youth leaders and volunteers raise awareness about their local ASUP ordinance and educate market-goers on the positive impact of bringing reusable bags. **Photo from feed.org.ph and spot.ph***



# REVIVING RIVERS AND COMMUNITIES: CASH-FOR-WORK INITIATIVES TO CLEAN RIVERS WITH KATURAY IN BULAKAN



Women leaders cut katuray branches that will be transferred and planted in the Katuray Nursery in Barangay Balubad, Bulakan.

*Photo from DSWD Region 3 Website.*

**R**ivers are the lifeblood of humanity—a truth that is more apparent in provinces like Bulakan, which is irrigated by many different rivers that once washed into fertile, thickly tree-lined banks. But the province faced a problem: its rivers were in critical condition because of heavy metal contamination.

## Partnering with the Academe

The state of the province's rivers came to light from a study by the Bulacan State University, which indicated worsening contamination as seen in water and soil samples. This has adverse effects especially on the province's coastal communities that depend on fishing for their livelihood. To address this, the study recommended the planting of Katuray trees (*Sesbania grandiflora* L.) for their phytoremediation properties that have the capacity to absorb pollutants in bodies of water.

The planting of Katuray cuttings near river banks became part of the community outreach of the university, an effort which also gained support from local groups and civil society organizations. Learnings from the BSU study led to the Phytoremediation and Ecosystem Restoration Ordinance issued in 2015 by the Municipality of Bulakan—a first class municipality that served as the province's first capital and which is among the oldest in the country. The following year, the municipal government worked on several Katuray planting projects with the help of the university.

## Reviving More Than Rivers

The Katuray Project is an initiative of the municipality in partnership with the Municipal Social Welfare and Development Office of Bulakan, the Solo Parents Federation, and Pag-asa Youth Association of the Philippines of Bulakan. The program is anchored on the Risk Resiliency Program - Climate Change Adaptation and Mitigation (RRP-CCAM) of the Department of Social Welfare and Development Region 3.

Notably, Bulakan's Katuray efforts helped revive more than rivers. The financial assistance program through a cash-for-work scheme has also provided an additional source of income for the residents of Bulakan. According to Municipal Social Welfare and Development Officer Maria Victoria Morelos, the project has also revitalized their community by giving an opportunity to bond, engage, and be more aware of the importance of sustainable practices and environmental restoration.

# PLANTING SEEDS OF EMPOWERMENT: PLANTING SEEDS OF EMPOWERMENT THROUGH CASH-FOR-WORK INITIATIVES



*Mandaya Tribe Leaders conduct training on farming for indigenous farmer-beneficiaries.*

***Photo from Mandaya Tribe Farming Association Facebook Group***

**M**onkayo is a first-class municipality in Davao de Oro. It is among the largest towns of the province, serving as home to over 94,000 people and comprising 15% of Davao de Oro's total land area. An agricultural town, Monkayo's land is mostly devoted to coconut, followed by corn and rice. Other major crops include rubber, banana, cacao, and oil palm. Gold-rich Mt. Diwata—popularly known as Diwalwal—is also officially a barangay of the municipality. Extensive mountain ranges, which are naturally endowed with rich forests, define Monkayo's topography.

Of the municipality's land, 55% or close to 37,000 hectares is classified as forestland. Around 39% comprising 27,070.49 hectares is also recognized as the ancestral domain of the Mandaya, Manobo, Mangguangan, and Dibabawon tribes. Called in 19th century anthropology as "the aristocracy of the Mindanao tribes," the Mandaya is regarded as an "elite tribe," and is among the "oldest and most illustrious of peoples" in the Davao region.

The few species of indigenous plants and wildlife that remain in Monkayo can only be found within these ancestral domains. Department of Environment and Natural Resources (DENR) inventories, conducted with the assistance of tribal leaders, found only 49 known species and three lesser known species of trees; abaca and other fibrous plants, rattan, and native palms are now endangered, and can only be found in forested areas within the ancestral domain.



Monkayo LGU distributes wages of farmer-beneficiaries who participated in the Cash-for-Work Program. **Photo from [www.nnc.gov.ph](http://www.nnc.gov.ph)**

### Empowering Tribes, Establishing Farming Models

In December 2020, under a joint Cash-for-Work Program, the Department of Agriculture and Department of Social Welfare and Development, together with the Monkayo local government, released wages for 186 farmer-beneficiaries from the Mandaya Tribe Natural Farmers Association after they planted materials received from DA Region XI.

Rosalinda McDowell, who heads the association, calls the initiative “a great blessing.” As many of the indigenous farmer-beneficiaries have not been able to finish formal education, McDowell believes the initiative can help them stay in their communities and earn a livelihood. More than just providing livelihood and generating income for the indigenous Mandaya community, however, the program also maximizes otherwise unutilized and unproductive land. At the same time, it equips farmers through trainings and empowers them to develop their ancestral domain sustainably.

The training provided by the project is enriched by the local and indigenous knowledge of the farmer-beneficiaries—and they hope all this will culminate in the creation of a model farm that will showcase the work of the indigenous peoples and farmers involved. With emerging evidence on the importance of indigenous knowledge for climate change adaptation, this partnership may plant so much more than trees in Monkayo—it may even plant the seeds of greater resilience and sustainability elsewhere in the country and beyond.

# BEYOND THE BOUNTY OF THE SEA: BUILDING NOT JUST CLIMATE BUT PANDEMIC RESILIENCE THROUGH MANGROVE REFORESTATION IN KABASALAN



Tourists and locals cruise the Siay-Kabasalan Wetlands surrounded by mangrove forest (left). KGMC leader Roberto Ballon educates communities on mangrove and marine life conservation (right). **Photo from Forest Foundation Philippines and taraletsanywhere.com.**

**R**oberto “Ka Dodoy” Ballon remembers when the waters of Kabasalan—a coastal town in Zamboanga Sibugay—teemed with fish. He recalls how fisherfolk used to catch so much fish in the 1960s and ‘70s that they did not know how to sell them anymore.

When fish population began to decline, Kapunungan sa mga Gagmay ng Mangingisda sa Concepcion (KGMC)—organized by Ka Dodoy and fellow fisherfolk in 1986—quickly saw the problem: mangrove destruction and illegal fishing. They saw that the fish disappeared when the mangroves did; but as people became desperate, they resorted to illegal fishing practices, which caused fish population and livelihoods to suffer even more. As a result, children were not able to go to school, poverty increased, and many families went hungry.

To remedy this, the group harnessed bayanihan for mangrove reforestation—and by 1994, they had already planted around 50 hectares. As the mangroves returned, so did the fish—but they brought back more than the bounty of the sea. The reforested mangrove has protected their communities especially during typhoons. Mangroves also have immense carbon sequestration capacity. Beyond climate resilience, as local communities found, they also brought pandemic resilience—the impact of the steep economic downturn on communities was cushioned by the livelihoods and resources they built in the course of protecting the environment.



*KGMC members conduct an assessment and monitoring of mangroves in Zamboanga Sibugay (left) and Ka Dodoy convenes the Coalition of Municipal Fisherfolk Associations of Zamboanga Sibugay (right). **Photo from Peace and Equity Foundation and Ramon Magsaysay Foundation.***

### **Growing resilience from within**

KGMC's initiative, however, was volunteer-driven from the start—and this meant members shouldered the costs. Their numbers dwindled: from 36 members, at one point they were down to just five. But their group kept looking for ways forward, bringing seedlings whenever they went to sea. In time, agencies noticed their efforts, which also meant funding. Their numbers grew tenfold to 300; guided by the mindset of not just taking but giving back to nature, their plans and programs expanded as well. Recognition and awards poured in even from outside the country—including, most recently, the 2021 Ramon Magsaysay Award for Ka Dodoy.

### **Reaching outward and to the future**

But as one barangay did well, it attracted others who went in to cut mangroves and illegally catch fish. And yet instead of having them imprisoned, KGMC reached out to educate them. It also started reaching out to other communities in Kabasalan—starting from just one barangay, and eventually reaching all others in the municipality. In 2013, the group created the Coalition of Municipal Fisherfolk Associations of Zamboanga Sibugay to replicate what they accomplished in the thirteen coastal municipalities of Zamboanga Sibugay. With the original members of the group already growing old, Ka Dodoy hopes to reach not just even more parts of the Philippines that can build on what they have achieved accomplishments, but generations of Filipinos of the future to continue tomorrow what they started today.



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