MANUAL ON MANGROVE ECOPARKS

MANGROVE MANUAL SERIES NO. 4

Jurgenne H. Primavera and Josephine P. Savaris

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In behalf of
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
of the Federal Republic of Germany

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The Zoological Society of London (ZSL) is an international conservation charity working to create a world where wildlife thrives. From investigating the health threats facing animals to helping people and wildlife live alongside each other, ZSL is committed to bringing wildlife back from the brink of extinction. Our work is realized through our groundbreaking science, our field conservation around the world and engaging millions of people through our two zoos, ZSL London Zoo and ZSL Whipsnade Zoo.

In 2010, the ZSL-Philippines Country Office was established as a duly accredited nongovernment organization registered under the Securities and Exchange Commission as a local branch of a foreign charitable institution registered in UK. It holds its primary office in Iloilo City, Philippines with field offices in Cebu City and Tuguegarao City. Its current project areas are located within Cagayan Valley, Panay, Cebu, and Bohol islands and are rapidly expanding across the country. ZSL-Philippines is currently run by an all-Filipino project management team, advisors, and field personnel under the supervision of the ZSL Conservation Programme Department. For more information, visit www.zsl.org.

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The Department of Environment and Natural Resources Biodiversity Management Bureau (DENR BMB) envisions a "Philippine Biodiversity that provides natural resiliency and sustained benefits for all". Its primary mandate, as stated in the mission statement, is to "conserve and sustainably manage the country's biodiversity".

ProCoast Project

Sustainable Coastal Protection through Biodiversity Conservation in Coastal Ecosystems Affected by Typhoons in the Philippines.

Climate change continues to intensify and increase the frequency of typhoons and the Philippines is located in the region where the strongest storm events occur. In many places, ecosystems have lost their natural protective functions due to anthropogenic factors further exposing communities and wildlife to the destructive typhoon impacts.

Coastal protection in regions threatened by typhoons and biodiversity conservation are the primary targets of the ProCoast project. These can be achieved through capacity building, policy advice and development, and enhanced knowledge management. Best practices of the Centers of Learning in the sustainable management of mangroves, beach forests, seagrasses, coral reefs, and resource use planning can be adapted and replicated by stakeholders through exchange visits and hands-on training.

This project is part of the International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) supports this initiative on the basis of a decision adopted by the German Bundestag.

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Front Cover: Mangrove ecoparks, such as the Leganes Integrated Katunggan Ecopark (or LIKE, formerly called Katunggan Ecopark) in Barangays Nabitasan and Gua-an, Leganes, Iloilo, serve as excellent venues for trainings on mangrove conservation and rehabilitation. Photo by ZSL-Philippines.

Back Cover: This 1.8-km boardwalk provides visitors ease of access to the diverse mangrove forest (with 27 true mangrove species) in *Katunggan it Ibajay* (KII), Aklan. Photo by RJALoma/ZSL-Philippines

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FOREWORD

The conservation of biological diversity and the sustainable use of the components of biological diversity are intrinsically linked and two of the main objectives of the Convention on Biological Diversity (CBD). The CBD continues to be a guide for the work of governments, donors and organisations. The Government of the Federal Republic of Germany supports international climate action and biodiversity through the International Climate Initiative (IKI). On behalf of federal ministries and other commissioning parties, the *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) GmbH and its partners carry out projects, which support partner countries and regions in the implementation of their biodiversity strategies and in increasing capacity to adapt to the effects of climate change, among others.

The IKI-funded ProCoast Project aims to upscale measures on conserving and rehabilitating coastal ecosystems to restore their natural protective function, given that the country is one of the most vulnerable countries to the impacts of climate change. The project partners believe that these local experiences can be transferred, given adapted policy support, knowledge and capacities.

Among these ecosystems, healthy mangrove forests represent natural buffers against storm surges and are important for the adaptation to climate change. In this context, establishing a mangrove ecopark can be a strategic coastal protection and biodiversity conservation measure as it not only ensures conservation and rehabilitation of existing mangrove trees, but it also provides opportunities for local communities to be in the forefront of conservation and earn additional income from being involved in the different ecotourism services.

The project supports capacity development, which includes the development of manuals, to make replication of good practice more systematic and standardized. This manual on ecopark development is an excellent tool that provides guidance to those in charge of managing the country's coastal ecosystems. It includes insights into the establishment and management as well as facilitating and hindering factors in sustaining an ecopark based on actual experiences from practitioners.

The project supports the roll out of this manual by training potential users from government, academe, civil society and the private sector. I hope that this manual will be a helpful guide for mangrove conservation in nationally and locally declared sites across the country.

Franca Sprong
Biodiversity Cluster Coordinator
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On behalf of
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
of the Federal Republic of Germany

FOREWORD

Mangroves offer broad and inclusive services to coastal communities by supporting food supply, livelihood, and fishing stock replenishment. These also offer physical protection to vulnerable communities against impacts of climate change such as storm surge, strong winds and coastal erosion. In hindsight, these services are only recognized as priceless when mangroves are cleared for fishponds, infrastructure and other development, and a typhoon as strong as Odette ravages the coastal communities. Following these disasters, national agencies and local government units go back to the drawing board and develop plans to rehabilitate damaged mangroves. It is a cycle that comes to full circle every time a major typhoon strikes the country.

While there is no certainty as to the level of protection that the remaining thin line of mangrove forest can offer, one thing proven time and again, is that the broader the expanse of mangroves, the better the protection. Several testimonies from Typhoon Yolanda survivors are proof of this protection, including those from Suyac Island of Sagay Marine Reserve in Sagay City. In addition to protection, flourishing mangroves also offer coastal communities additional value through creation of mangrove ecoparks. These mangrove ecoparks are not only effective in physically and legally protecting mangroves but are also a powerful tool in education, awareness-raising and stimulating the sense of local pride. These ecoparks can also help create alternative and biodiversity-friendly jobs such as tour guiding, food catering, boat services for tourists, among others.

This manual is produced by ProCoast, a project supported by the German BMU, as part of IKI. It is especially designed for local government units, the private sector, and the academic communities who plan to establish a mangrove ecopark. It describes the key steps in identifying sites, developing a master plan and engaging the communities. It also cites specific cases of successful mangrove ecoparks established in various part of the country, including winners and participants in the 2019 and 2021 Best Mangrove Award.

Let us use this manual as a practical guide to support vulnerable coastal communities in their struggle for a sustainable, and biodiversity-friendly livelihood. Achieving a level of success equivalent to those of BMA winners is a long way for new mangrove sites as these required capital investments, strong political will, and broad community support. To establish a mangrove ecopark will be a long and arduous journey, but it is a step in the right direction and will be worth your while, now and for generations to come.

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Country Director
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This manual has been made possible by funding under the Sustainable Coastal Protection through Biodiversity Conservation in Coastal Ecosystems Affected by Typhoons in the Philippines (ProCoast) Project, from the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) in partnership with *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) GmbH. The authors would also like to give thanks to the Zoological Society of London – Philippines for additional financial and human resource support in the completion of this publication.

Although most of the photos in this manual come from the ZSL library, many have been shared by local government officials and other staff of BMA winners, e.g., Silonay, Calapan City; Balanga, Bataan; Del Carmen, Siargao; Suyac Is., Negros Occidental; Tres Marias, Palompon, Leyte; and Prieto Diaz, Sorsogon. May we also highlight our rewarding relationships over the years of ecopark establishment with our partner local government units (LGUs) and people's organizations (POs) in Ibajay, Aklan, and in Ajuy and Leganes, both in Iloilo. In particular we would like to thank the Leganes Municipal Environment Officer and Disney Conservation Hero Wilson Batislaon, who has been an LGU champion for mangroves since 2009. And from the ranks of local community folk, may we honor the memory of the late, long serving Ajuy PO President Elmer Babiera who selflessly and unwaveringly led the Barangay Pedada Fisherfolks Association in pioneering the first ever Green-Gray Engineering project in the country combining mangroves and breakwaters. Our appreciation also goes to colleagues in the scientific community – Dixon Gevana, Ariel Blanco, Jon Altamirano, Junemie Lebata, Lewis LeVay, Ben Thompson, Clare Duncan, and others – who provided citations of ecopark and other mangrove papers.

Most of all, we are indebted to our ZSL co-workers – Heather Koldewey for insightful comments and valuable edits, Venus Calanda and Nene Yap for help with data retrieval, Jofel Coching for more edits, and the tireless Apol Loma for preparatory presswork and tying up the ever so many loose ends attendant to the making of a book.

Finally, as we both go into partial and full retirement, respectively, may we express our deepest gratitude to ZSL for being a very meaningful and productive part of our lives.

Jurgenne Primavera and Josephine Savaris

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ACRONYMS AND ABBREVIATIONS

ANR	Assisted Natural Regeneration
AO	Administrative Order
BFA	Bugtongbato Fisherfolk Association
BFAR	Bureau of Fisheries and Aquatic Resources
BlueCARES	Comprehensive Assessment of Blue Carbon Ecosystems and their Services in the Coral Triangle
BMA	Best Mangrove Awards
BMU	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
BPFA	Barangay Pedada Fisherfolk Association
CBFMA	Community Based Forest Management Agreement
CBMSGA	Coastal Barangay Mangrove Seedling Growers' Association
CENRO	City Environment and Natural Resources Office
CLUP	Comprehensive Land Use Plan
CMRP	Community Based Mangrove Rehabilitation Project
CRM	Coastal Resource Management
CSO	civil society organization
DENR	Department of Environment and Natural Resources
BMB	Biodiversity Management Bureau
DPWH	Department of Public Works and Highways
EC- CAMS	European Commission–Culture and Management of *Scylla* spp.
E-NIPAS	Expanded National Integrated Protected Areas System
EU	European Union
FLA	Fishpond Lease Agreement
GIZ	*Deutsche Gesellschaft für Internationale Zusammenarbeit* GmbH
ha	hectares
ICM	Integrated Coastal Management
IKI	German International Climate Initiative
INREM	Integrated Natural Resource and Environment Management
KII	*Katunggan It Ibajay*
LGU	local government unit
LIKE	Leganes Integrated Katunggan Ecopark
masl	meters above sea level
MENRO	Municipal Environment Natural Resources Office
MOA	Memorandum of Agreement
MSc	Master of Science
NAMAO	Naisud Mangrove and Aquatic Organization
NGA	national government agency
NGO	non-government organization
NIPAS	National Integrated Protected Areas System
NOAA	National Oceanic and Atmospheric Administration
OMAGIECA	Oboob Mangrove Garden Integrated Ecotourism Conservation Association
PA	public address

PAMB	Protected Area Management Board
PENRO	Provincial Environment and Natural Resources Office
Ph.D.	Doctor of Philosophy
PhP	Philippine Peso
PO	peoples' organization
ProCoast	Sustainable Coastal Protection through Biodiversity Conservation in Coastal Ecosystems Affected by Typhoons in the Philippines
PVC	polyvinyl chloride
QR	Quick Response
R&D	Research and Development
RA	Republic Act
SB	Sangguniang Bayan (Local Legislative Council)
SEAFDEC AQD	Southeast Asian Fisheries Development Center Aquaculture Department
SNPS	Sama-samang Nagkakaisang Pamayanan ng Silonay
TIEZA	Tourism Infrastructure and Enterprise Zone Authority
TV	television
TWG	Technical Working Group
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organization
UP	University of the Philippines
USA	United States of America
ZSL	Zoological Society of London

EXECUTIVE SUMMARY

1. Mangrove ecosystems provide many goods and services, e.g., coastal protection and fisheries production critical to the wellbeing of coastal communities and the larger society during normal times, more so in a changing climate.

2. There is therefore urgent need to rehabilitate degraded mangroves and to protect remaining stands in the country. Protection by strict enforcement of environmental laws will restore mangrove services, but establishing ecoparks provides an important bonus. This is access to these physically challenging habitats that enhances public awareness and facilitates mangrove research.

3. The main criteria for establishing a mangrove ecopark are healthy mangroves, whether natural or planted, with minimum area of 10-20 hectares, and buy-in of the local government and community.

4. In the Philippines, governance of mangroves and their ecoparks is vested in the government, as embodied in national laws and local ordinances.

5. Although the initial financing for ecopark infrastructure is usually provided by governments, both national agencies and local units, contributions from companies, civil society organizations (CSOs) and other partners are also significant. Basic infrastructure includes a footwalk for easy access to mangroves, and a multipurpose center for visitors (e.g., entry, information, catering).

6. Initial maintenance and operating expenses of ecoparks may also be covered by funding from government, CSO, and private sector contributions. However, sustainability requires that the park generates its own income.

7. Income generating opportunities include tours of the mangroves and associated wildlife (birds, bats), as well as mangrove nurseries, beekeeping and honey production. The former addresses the public awareness objective of ecoparks, in addition to student field trips and research. A Business Plan will help ensure financial sustainability for the ecopark.

8. The ecopark should have management and tourism plans that are either standalone or embedded in the general Coastal Resource Management (CRM) Plan, Marine Protected Area (MPA) Plan, Comprehensive Land Use Plan (CLUP), and other plans that cover the protected area, municipality, province, or island. These various plans are in consonance with national and local environmental legislation.

9. Supplementing these mangrove laws are specific ecopark guidelines to protect both the visiting public (e.g., from falling into the mud) and wildlife (e.g., from poaching). These guidelines may be general (opening hours, entrance fees) or behavioral (no littering, noisy behavior, alcoholic drinks).

10. Despite ecopark problems of funding and tenure, mangroves that are protected and thriving can restore fisheries productivity, while providing storm protection and carbon sequestration, services all so vital in this time of climate change. Ecoparks also build local, regional and national support for mangroves, including community pride. The Best Mangrove Awards (BMA) provides a growing list of outstanding mangrove ecoparks among the dozens established across the Philippines since the 1990s.

CHAPTER 1 INTRODUCTION

The vital roles of coastal protection and carbon sequestration place mangroves in the forefront of Climate Change Adaptation and Mitigation. Mangroves protect against sea level rise, increasing storm intensity and frequency, and other negative impacts of the changing climate. They provide goods (fisheries and forestry products) and services (erosion control, flood regulation, nutrient recycling, wildlife habitat) that have contributed to the well-being of coastal communities and the wider society.

As the center of the center of Marine (and other) Biodiversity, the Philippines is blessed to have wide stretches of mangroves – up to 500,000 ha in the early 20th Century – lining its 36,300 km of coastline. But official (and ill-advised) conversion to brackishwater fishponds for food production and unregulated cutting had reduced these to only 139,725 ha by the late 1980s (Primavera, 1995).

Mangrove planting by local fishers back to the 1960s, and continuing thereafter, on a massive scale by government projects (Primavera and Esteban, 2008) had almost doubled mangrove area to more than 256,000 ha by 2000 (Long and Giri, 2011). But some, if not most, new hectarage has been inappropriately planted on seagrass beds and also tidal flats (Primavera and Esteban, 2008). The resulting mangrove stands away from the mainland and cannot provide storm protection, flood regulation and other services to coastal communities and undermine other important marine habitats.

Fig. 1. KII Ecopark, Aklan: a) Welcome sign – access from main highway is convenient; b) renovated façade; c) bridge across tidal creek; d) multipurpose hall leading to boardwalk; and e) training course lecture.

Therefore, there is need to protect some 100,000 ha of remaining natural stands, and indeed, this is provided by law (Chapter 3). But such coverage is often only on paper and very few sites enjoy actual protection, such as the contiguous stands covering thousands of hectares in the islands of Palawan and Siargao, northern Mindanao. Mangrove awareness is sadly lacking among many coastal dwellers and the greater society. This is because for so long mangroves and other wetlands have been considered wastelands such that continuous degradation has reduced many mainland mangroves to an insignificant marginal fringe. An effective way to introduce and expose the general public to these critical habitats is through ecotourism and ecoparks. A number of these are already in existence in the Philippines, e.g., *Katunggan It Ibajay* (KII) and *Bakaw* Ecopark in Aklan and Leganes Integrated *Katunggan* Ecopark (LIKE) in Iloilo (Figs. 1, 2; Appendix 1).

Ecotourism has been defined as "responsible travel to natural areas that conserves and sustains well-being of local people" by the International Ecotourism Society in 1991 (Wood, 2002). The components of ecotourism are:

- Conservation of biodiversity
- Well-being of local people
- Interpretative/learning experience
- Responsible action on the part of tourists and the tourism industry
- Delivered primarily to small groups by small-scale businesses
- Lowest possible consumption of non-renewable resources
- Local participation, ownership, and business opportunities, particularly for rural people

Based on the above principles, mangrove ecoparks are established for the following objectives:

1. To provide the general public, including students, a convenient way to know mangroves (Figs. 1, 2).

Fig. 2. Leganes Integrated Katunggan Ecopark, Iloilo: a-b) The nipa-bamboo hut and watch tower c) were inaugurated as Katunggan Ecopark in 2014; d) they were replaced by a concrete structure and renamed LIKE, 2021; and e) planting of mangrove seedlings by the U.K. ambassador, LGU and ZSL officials, 2021.

Fig. 3. Students: a) Students in KII, Aklan; b) elementary school pupils on Tangalan, Aklan footwalk; c & f) ecopark staff giving lectures in LIKE, Iloilo, and Balanga Wetland Sanctuary; d) bird watching from view deck, Balanga; and e) high school students in Bakaw Ecopark, Aklan awaiting the boat to ferry them across.

2. To serve as center of learning for students and researchers interested in studying various aspects of mangrove biology and ecology (Fig. 3)
3. To initiate and support income-generating activities that are environment-friendly (Fig. 4)
4. To provide mangroves in the area the protection that can be enforced and resourced through sustainable tourism.

The Philippine Country Office of the Zoological Society of London (ZSL) was established in 2010 with the unique mandate to protect and conserve mangroves. In contrast, other ZSL country offices focus on specific animal groups like tigers. Since then, ZSL Philippines has promoted mangrove conservation and rehabilitation, including the development of mangrove ecoparks in Panay Is., central Philippines where it is based. It has also collaborated with other organizations to develop, initiate, and host the Best Mangrove Awards (BMA) as an adjunct activity of the Para El Mar celebration held every two years (Fig. 19).

This Manual is based mainly on the learnings of ZSL Philippines in setting up ecoparks in collaboration with partner local government units (LGUs) and people's organizations (POs) in Ibajay, Aklan; and Ajuy and Leganes, both in Iloilo (Figs. 1, 2). It also captures experiences from other ecoparks, particularly the winners of the Best Mangrove Award (BMA), namely, Del Carmen in Siargao; Balanga City Wetland and Nature Park in Bataan; Silonay Mangrove Conservation Ecopark in Oriental Mindoro; and Suyac Is. in Negros Occidental (Appendices 1, 1a–1h). While not completely comprehensive, the content is gleaned from over a decade of practical experience and knowledge-exchange from other national,

Fig. 4. Ecopark income-generating activities: a) Rafting or boating and e) nipa weaving in Mabini, Bohol; b) catering d) by P.O. members in KII; c) beekeeping and honey production, and f-g) mangrove nursery, in Silonay.

and also international, mangrove ecoparks. This Manual is therefore addressed to mangrove stakeholders – LGUs, POs, and NGOs who wish to conserve mangroves in their respective areas by means of ecotourism that is educational, enjoyable, and sustainable. It is divided into four major chapters – Establishing an Ecopark; Governance; Operations and Maintenance; and Conclusion – and includes References, Glossary and Appendices of relevant documents.

CHAPTER 2 HOW TO ESTABLISH A MANGROVE ECOPARK

The presence of an outstanding mangrove stand in an area is often known only to local fisherfolk and other residents. Only when researchers from academe or environmental NGOs "discover" and make reports of such sites do local and/or national government agencies become aware of their presence and potential as ecoparks. An excellent example is the basin mangrove of KII, Aklan which had been saved from fishpond development by 'People Power' in the 1980s (Fig. 1; Box 1). Afterwards, local folk kept away from the mangrove patch for fear of disturbing "forest spirits", while other townspeople remained unaware of the magnificent stand until researchers from the Aquaculture Department of the Southeast Asian Fisheries Development Center "discovered" it in 1996.

Not only natural stands like KII, but also regenerating mangroves in abandoned ponds, e.g., the Leganes Integrated *Katunggan* Ecopark (LIKE) in Iloilo (Boxes 2 and 5; Primavera et al., 2013) are potential ecopark sites. Portions of other ecoparks may also be fishponds under Fishpond Lease Agreements (FLAs) whose leases have been cancelled due to non-submission of requirements. Examples of such ponds reverted to mangroves are found in Bongsanglay Natural Park, Masbate; KII, Aklan; and Leganes, Iloilo (Boxes 1 and 5).

BOX 1. KII, Ibajay Timeline of Events
(Primavera, 2002; Primavera, 2018)

1980s – "People Power" organized by local leaders to prevent chainsaws from cutting mangroves in Bugtongbato-Naisud area for conversion to fishponds by FLA holder Mr. Ongkiko. Collage shows remains of fishpond gate (left) and dike (right) constructed in the eastern side of KII (photos by RJ Loma/ ZSL, 2016).

1996/97 – Pristine mangroves of Bugtongbato-Naisud 'discovered' during visits by researchers from the Southeast Asian Fisheries Development Center Aquaculture Department (SEAFDEC AQD)

1998 – SEAFDEC AQD seminar-workshop in Tangalan, Aklan to assess the socio-economic resources of Ibajay and Tangalan, with participants from LGUs, POs, NGOs and research community

1999 – Memorandum of Agreement (MOA) signed between SEAFDEC AQD and Ibajay LGU to develop and pilot-test mangrove-friendly aquaculture

(Continued on next page)

(Box 1 Continued)

2000 – Technical Working Group created by Aklan Prov. Govt. to formulate Coastal Resource Management and Area Development Program, including Ibajay mangroves
– MOA signing between Aklan Prov. Govt. and SEAFDEC AQD for implementation of research and other projects in Ibajay

2001 – Publication by SEAFDEC AQD of *An Assessment of the Coastal Resources of Ibajay and Tangalan, Aklan: Implications for Managemen*t

2002 – Ongoing field work in Ibajay and elsewhere in Aklan and Panay Is. for mangrove handbook

2003 – Initial plans to build a mangrove footwalk for ecotourism in Ibajay

2004 – Publication of *Handbook of Mangroves in the Philippines – Panay* based mainly on KII mangroves by SEAFDEC AQD and UNESCO

2005 – Research study on fisheries and stock enhancement of the mud crabs *Scylla* spp. in the mangroves of Ibajay and Kalibo, Aklan under the EC-CAMS Project of SEAFDEC AQD
– Signing of MOA on Mangrove Conservation between Ibajay LGU and Pew Marine Conservation Fellow J.H. Primavera
– Plans for construction of mangrove footwalk in Bugtongbato-Naisud

2008 – DENR survey of total mangrove area within timberland established at 44.22 ha
– Introduction of Community-Based Mangrove Rehabilitation Project (CMRP) with ZSL support

2009 – MOA signed between LGU Ibajay LGU and ZSL regarding CMRP implementation
– Regular team meetings of KII TWG for implementation of mangrove ecopark activities
– Municipal Ordinance No. 92 declaring 44.22 hectares of mangroves in Barangays Bugtongbato and Naisud, Ibajay, Aklan as Mangrove Eco-tourism Park
– Organizational formation of 2 POs: Bugtongbato Fisherfolk Association (BFA) and Naisud Mangrove and Aquatic Organization (NAMAO)
– Construction of bamboo-nipa Welcome Center, and additional 870 m of footwalk: 670 m funded by the Ibajay LGU, 120 m constructed by the POs, and 80 m by ZSL
– Processing of the CBFMA PO application for 25-yr management of Bugtongbato-Naisud mangroves
– MOA signed between Ibajay LGU, ZSL and Aklan State University for training on value adding to food products for ecotourism

2010 – Inauguration of the *Katunggan It Ibajay* (KII) Eco-tourism Park

2012 – Funding of PhP9 million from TIEZA, Phase I to construct wooden footwalk (replacing bamboo structure) and concrete Multipurpose Hall (replacing bamboo-nipa Center), and PhP500,000 from BFAR to improve footwalk

2016 – funding of PhP7.5 million from TIEZA, Phase II to improve Multipurpose Hall and Boardwalk; delineation of pathway for return loop of boardwalk

2018 – KII established as one of the Centers of Learning under the ProCoast Project of GiZ and ZSL
– Funding of PhP10 million from Sen. Loren Legarda through DENR Region 6 to rehabilitate and complete return loop of the boardwalk

2021 – KII adjudged 2nd Runner-up, 2021 Para El Mar Best Mangrove Awards

Fig. 5. Publications and plans. KII-based mangrove publications: a) Handbook, b) Elementary school module, c) Field guide, h) Postcard, and d) Waterbird Survey of Panay sites. Action plans for e) Biodiversity – Negros Is., f) MPA management – Silonay, Oriental Mindoro, and g) 10-yr ICM plan – Prieto Diaz, Sorsogon.

Mangroves are under the administrative jurisdiction of government (but with local communities as *de facto* managers), so any developments or interventions must engage the government sector, at both local and national levels. Once a mangrove site has been identified as having ecotourism potential, the following steps may be followed:

A. SITE EVALUATION

The features to be assessed are:

1. Mangroves

a. Area – minimum of 10-15 ha; for wider natural stands, e.g., more than 100 ha, a smaller area that is more feasible to manage may be delineated. For example, KII in Ibajay, Aklan covers only 44 ha of a ~100-ha mangrove.

b. Age – stands of growing mangroves (planted or natural) as young as 5 years may be suitable provided they are healthy, as in the case of LIKE Ecopark in Iloilo (Fig. 2; Box 2).

c. Species composition – natural mangroves may have 10-20 mangrove species as in KII (Fig. 5a; Primavera et al., 2004; Primavera et al., 2016), and plantations will be limited to the species planted (and maybe some natural recruits), but mangrove condition is more important than total number of species present. Regular mangrove monitoring to check for growth and survival of

BOX 2. LIKE Ecopark: From Mangroves to (Abandoned) Fishpond, Back to Mangrove Greenbelt

The Leganes Integrated Katunggan Ecopark (LIKE) in Iloilo, central Philippines covers 15 ha of mangroves regenerated in former fishponds (previously cleared from mangroves) and is administered by the municipal government of Leganes. More than a simple ecopark, the LIKE story is that of a pioneering pond-to-mangrove reversion case study whose overwhelming success is underpinned by the following critical factors: a) **science-based protocols**, b) **Assisted Natural Regeneration** (ANR), c) **volunteer planting** and networking, and d) **political will** and governance (Primavera et al., 2018).

Fishpond regeneration started in a 2009 collaboration between the Leganes municipal government and the Zoological Society of London. ZSL promoted ANR through the planting of abundant wildlings of the naturally dominant *Avicennia marina* (vs *Rhizophora* species long favored for their easy availability and planting) (Primavera et al., 2012, 2013; World Seas). Over the 4-year project, 80,000 wildings (out of 90,000 collected) were bagged for nursery conditioning, and another 10,000 directly outplanted in vacant pond spaces by students, government employees, local communities and other volunteers (Primavera et al., 2012b). Full mangrove cover was achieved in only 3 years, in contrast to 15-20 years observed for Natural Regeneration. In volunteer planting, the contribution of labor from planters such as local folk gives them *de facto* mangrove ownership and commits them to ensuring survival of the plants to maturity. In contrast, paid planting often becomes a mere business transaction which ends when planters are paid for their efforts, and plant survival becomes of minor concern.

Government support has been consistent despite the change in local executives after each of two elections, with a yearly allocation from LGU funds to the Ecopark of PhP147,000 in 2011, PhP250,000 in 2014 to PhP710,000 in 2016. More recently, the DPWH spent PhP10.5 million to build a 526-meter access road from the national highway to LIKE. The very convenient 20-minute car ride from downtown Iloilo City to the Info Center has made LIKE a popular destination among local folk and out-of-town guests alike (Figs. 2, 6).

(Continued on next page)

(Box 2 Continued)

The Ecopark has also received external funding from the DENR, Ayala Foundation and other companies. The project was greatly facilitated by the creation of a Municipal Environment and Natural Resources Office and passage of Municipal Ord. No. 227 (2011) declaring all mangroves in Leganes protected. Aside from local political will, the ecopark also showcases higher level national governance through the implementation of two national mandates pertaining to mangroves – the establishment of coastal greenbelts ranging from two m to 100 m wide, and the reversion of abandoned ponds to mangroves (DENR and BFAR AOs going back to 1975).

Such achievements have been recognized at various levels – provincial (Iloilo Governor's Prize, Blue Water Competition), national (LGU-Integrated Natural Resource and Environment Management Award at the 2nd International INREM Conference), and international (Disney Conservation Hero awarded to the MENRO Head). The Ecopark also received Special Recognition as Excellent Learning destination during the 2017 Para El Mar Awards and as a Center of Learning by GIZ and ZSL. In this context, training course participants and graduate students have conducted mangrove field trips and research, respectively, in LIKE (see front cover).

Recent gains of LIKE include formation of the CBMSGA, a PO of local fishers/seedling growers. The Ecopark has given local stakeholders pride of place, and more significantly, a 200-meter wide greenbelt that protects households and adjacent fishponds from storms (Primavera, 2012b). The hundreds of deaths and billions of pesos of agricultural and infrastructure damage inflicted in December 2021 by Super Typhoon Odette are tragic and unnecessary reminders of the urgency of coastal bioshields.

trees, especially in plantations, and diseases/infestations, is recommended. Examples are the KII and Bongsanglay Natural Park (Chapter 4, C). It must be noted that monoculture plantations should not be planted as a means to develop mangrove ecoparks. But where monoculture ecoparks have been established as in *Bakaw* Ecopark (Primavera, 2002a; Appendix 1), educational materials should be provided to explain the diversity of mangrove species and what a natural forest looks like.

d. Other wildlife (Fig. 6) – some mangrove sites are wide enough to support wildlife such as birds and reptiles -- the endemic monitor lizard *Varanus mabitang* was found for the first time in a mangrove forest (see Chapter 4, C). With collaboration from academic institutions and environmental NGOs, it is useful to develop an inventory of species present (whether resident or migratory, in the case of birds) and to prepare leaflets featuring lists of local fauna, e.g., in Palompon, Leyte; Silonay, Mindoro Oriental; Suyac Is., Negros Occidental; Leganes, Iloilo; and KII, Aklan (Flores et al., 2019).

2. Access to mangrove site

Mangrove access will depend on mangrove type, whether fringing, island, basin and others (Lugo and Snedaker, 1974).

a. by car/other land vehicle – common for fringing and basin mangroves which are located in the mainland with a nearby road by which the ecopark can be

Fig. 6. Ecopark biodiversity. a) Monitor lizard *Varanus mabitang*, KII (camera trap, by Sursti Shruthi); b) mangrove lobster *Thalassina anomala*, KII (photo by Agatha Bedi); c) shipworm (Teredinidae), Bakaw Ecopark (Rex Sadaba); d) dead dugong *Dugong dugon*, Leganes, Iloilo near LIKE (Michael Vinluan); e) fiddler crab *Uca* sp., KII (Arnel Telesforo); and f) clam *Polymesoda* sp., Bakaw Ecopark (ZSL).

accessed (e.g., KII and LIKE: Figs. 1, 2); maximizes the short travel time for mangrove enthusiasts who only have a few hours to spare.

b. by boat ride via sea or river – for estuarine and island mangroves which are not connected to the mainland, and may take 10 min to one hour or more of travel time, e.g., Tres Marias, Leyte and Suyac Is., Negros Occidental. In case of long boat trips, the tour must include other activities (e.g., bird watching, snorkeling) to maximize the travel expense and effort.

B. COMMUNITY ENGAGEMENT

Discussions on a possible ecotourism project may be initiated by academe (schools, universities) or environmental NGOs that share R&D findings about promising mangrove sites (e.g., KII: Box 1), or by LGUs and POs (Fig. 7). Often it is the presence of pristine and healthy mangroves as documented by school reports and NGO projects that provide the stimulus for LGU interventions. When a potential ecopark site has been identified, the LGU can proactively look into past and ongoing activities in the site, for example, making a list of land claimants and examining the validity of supporting documents, e.g., Tax Declaration certificates from the Municipal Assessor, and Fishpond Lease Agreements (FLAs) from the Bureau of Fisheries and Aquatic Resources (BFAR). Although government has the right to eject such private claimants from public land, resolving conflicts

in a politically and socially correct manner should first be tried in government consultations.

An example is *Nypa fruticans*, the only palm among the mangrove species. Its proliferation in KII can be traced to active planting by local residents (Primavera, 2002) – both legally (based on Tax Declaration certificates issued by the LGU), and illegally. To restore biodiversity, these wide and extensive nipa stands needed to be removed so other mangrove species could recolonize vacant areas. The list of nipa claimants in KII, Aklan was prioritized by the LGU and validated by community members. The right to first harvest of nipa clumps was given to claimants in the validated list, then any remaining unharvested stands were made available to other interested PO members.

Public consultations are also required when the LGU or DENR (in case of NIPAS sites) present their ecotourism plans, including the ecopark, for the local community and other stakeholders to express their approval or air any concerns. Conversely, the LGU can bring up problems such as damage by goats and other animals to mangrove seedlings planted in LIKE, Iloilo. The Leganes municipal council resolved the problem by passing an ordinance banning stray animals from public places (Appendix 2). Dialogues and problem solving are only two of the many activities that fall under Community Organizing, which is necessary for PO formation (Savaris et al., 2021).

Fig. 7. Community engagement. a) PO members of Culajao, Roxas City greet LGU officials on ecopark launching; b) dozens of students, government/private sector employees and other volunteer planters, and d) partner organizations of LIKE, Iloilo; c, f) community consultation and g) MOA signing re KII Ecopark; and e) high school students observing mangrove lobsters in KII.

C. PROJECT DESIGN

A mangrove area of 10 to 50 ha will be easy to manage as an ecopark. For mangrove sites 100 ha and wider, a smaller section will need to be delineated for more convenient operations. Identify target visitors and users so that ecopark design and infrastructure can be correspondingly planned. Wheelchair access can be made available for persons with disabilities. Any infrastructure should be ecologically and socially appropriate, and support the objectives of ecotourism, education, research and conservation.

To maximize the Nature learning experience, infrastructure should include the following:

1. Multipurpose hall (Fig. 1) – Located at the park entrance, this may serve as an information/registration center with audiovisual facilities for briefing guests and giving lectures (wider space for student groups: Fig. 3). For security purposes, park visitors should exit at the same point of entry. Toilets and a kitchenette are essential, whereas a shop for selling refreshments, souvenirs, and guidebooks to mangroves, birds, other wildlife (or renting out the books) would be helpful. A small library may hold other books, monographs and manuals on mangroves (Fig. 5).

2. Footwalk (also called boardwalk, if made of wooden planks or boards) – Mangrove habitats are physically challenging because tidal range in the

Fig. 8. Boardwalk types. a) Damaged bamboo, Masbate and b) wooden planks, Puerto Princesa; c) bamboo replaced by concrete, Badian, Cebu; d) wooden boardwalk without railing, Zamboanga City; e) floating boardwalk with railing, Mai Po, HK; f) concrete footwalk, Silonay, Mindoro Or.; and g) composite wood decking boardwalk, Sungei Buloh, Singapore. Photos by J.H. Primavera.

Fig. 9. Boardwalk features in SE Asian mangrove ecoparks. a) Map of Silonay, Oriental Mindoro Ecopark showing boardwalk, watchtower and other facilities; b) boardwalk encircling *Rhizophora* trees, and f) toilet and bridge across tidal creek, Selirong, Brunei Darussalam Mangrove Forest; c) garbage bin in Kota Kinabalu Wetland Centre, Indonesia; d) QR codes for tech-savvy visitors and e) tension wires tied to concrete posts for additional boardwalk support in Sungei Buloh, Singapore. Photos by J.H. Primavera.

Philippines is 2.1 meters. The most basic requirement to see mangroves up close and personal is via access provided by a boardwalk to avoid getting wet at high tide or muddy during low tide, and maneuvering through dense, and sometimes thorny, vegetation. Figs. 8 and 9 show the different types of boardwalks and highlight some important features.

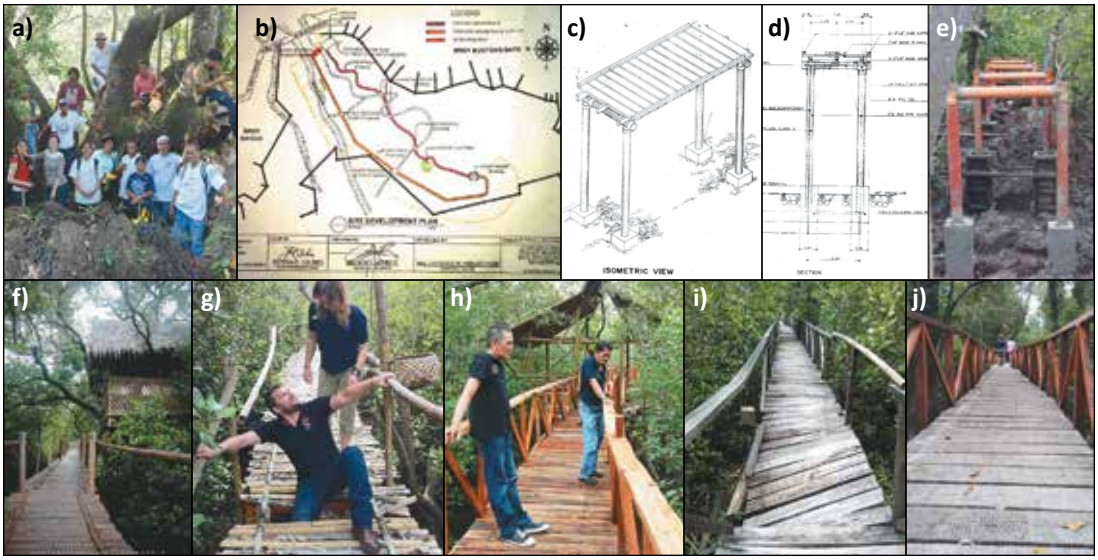
a) The inputs of *a botanist/biologist and architect or engineer*, among other experts, will be useful in planning a footwalk, e.g., locating where various mangrove species are found.

b) *Satellite maps or aerial photographs* of the area can used as base maps on which notable features and footwalk points can be pencilled in by the team delineating the park boundaries (Box 3). The route should be planned to avoid straight lines by locating and passing near outstanding features of the ecopark. For example, the KII boardwalk passes by the 3.5-meter diameter *Avicennia rumphiana* (aka the Avatar Tree), allowing enough distance between the subject and camera for taking satisfactory photographs (Fig. 10). A similar sized *A. marina* in Queensland, Australia was estimated by radiometric carbon dating to be 738 years (Norman Duke, James Cook University, personal communication), hence the "guesstimate" of around 700-800 years for the Avatar Tree.

c) *Height* of the footwalk should be ~10 cm above the highest tide level in the area. *Width* should be ~1.5 m, to allow for safe passage and because a

BOX 3. Planning, Construction and Renovation of KII Footwalk.

In 2007, a composite team of SEAFDEC AQD scientists, and LGU and PO members surveyed the KII area (a) noting outstanding features. They delineated a 1-km footwalk that would connect the entrance to the iconic Avatar Tree (upper dark blue line in b). The basic prototype (c, d) sent by a scientist from the National Marine Fisheries Service, NOAA (USA) was a boardwalk with posts made of concrete poured in PVC pipes (e) – an inert material with no problems of decomposition nor settlement by oysters, etc. Construction started in 2009 and was finished in time for the 2010 launching (f).



Initially, the limited budget could only afford bamboo which lasted for a few years, breaking in sections (g, Jan. 2013). With funding from TIEZA, the bamboo was replaced by freshly cut, untreated hardwood (h, May 2013), despite technical advice to use treated wood. Expectedly, the wood suffered from fungal rot in just a few years (i, Aug. 2016; Meaures, unpub.), and is gradually being replaced by concrete slabs (j, Sep. 2021).

Through the years, other lessons have been learned to protect the biodiversity and pristine air and water quality of KII. These have been to limit the daily number of visitors (Chapter 4, D); and to prohibit a) overnight lodging facilities such as cabanas (Chapter 2, C), b) piped-in music and other introduced sounds, and c) exotic and otherwise inappropriate plants (Chapter 4, C).

wider footwalk will encourage groups of more than 10 to 15 per tour guide. Those at the margins of such large groups cannot hear the guide (Chapter 4, D; Fig. 10).

d) *Construction materials* – Most mangrove footwalks in the Philippines use bamboo poles for posts and split bamboo for flooring because they are the cheapest materials available. But even treated bamboo can only last a few years, requiring regular, expensive repairs – the LIKE Ecopark allocated PhP75,000 for the yearly repairs of a 628-meter bamboo footwalk. Alternative materials are hardwood, composite wood decking, and concrete slabs, depending on park budget and availability of materials (Fig. 8d-g). Box 3 traces the boardwalk experience of one ZSL-assisted ecopark in using different materials for initial construction and renovation.

e) *Posts* can be made of concrete (Fig. 8f) or a PVC + concrete combination (Box 3) found effective because the inert PVC plastic is not affected by oysters and other marine fauna that attach to substrates. Bamboo and untreated wood may be cheaper but are not so durable (Fig. 8a-c).

Bridges should be built across tidal creeks (Figs. 1c, 9f). Footwalk construction should bypass trees to avoid cutting them, in the process producing a curved walk which is more interesting than a straight one. If a tree cannot be avoided, damage should be minimal to trees along the path, and signs should highlight this environment-friendly practice (Fig. 16d, e).

3. Signs – Found along the footwalk and elsewhere in the ecopark, signs should be short, simple and in big letters that are easily read. They should be made of weather resistant materials, e.g., fiber cement boards (Box 4) and regularly repaired or replaced. Signs are of two kinds:
   a) *general information* (Chapter 4, D; Figs. 11d, 16) – name of ecopark, guidelines, and prescribed behavior or Dos and Donts to protect both mangroves and visitors.
   b) *plant/animal names* – mostly mangrove species (Box 4) in the area and commonly observed fauna, to include scientific, local and/or common name.

4. View decks or observation towers (Fig. 13) – popular with children, students for bird watching or getting a panoramic view of the park.

Fig. 10. Ecopark tips: a) Footwalks should have setback from landmark trees b) for satisfactory photography; c) numerous visitors that exceed carrying capacity have a negative impact; d) old and fallen signs should be replaced; e) exotic plants, e.g., bromeliads should not be introduced; and f) strangling figs *Ficus* spp. gradually kill host trees, and g) need early removal (yellow circle).

5. Rest huts – should be located along the footwalk for high visibility (Fig. 13a), and not in remote areas of the park; likewise, they should be open shelters without walls, to avoid untoward incidents.

6. Others – Trash bins/containers distributed along the footwalk will help keep the park clean (Fig. 9c). The impact of all waste types must be considered as part of an environmental impact assessment of the ecopark. Toilets should be strategically located along the boardwalk (Fig. 9f) so guests need not go back to the park entrance (information center) for a Nature break. Some ecoparks have "dry" toilets which do not require water.

   The 2011 proposal of the Tourism Infrastructure and Enterprise Zone Authority (TIEZA) to construct cabanas (for overnight lodging of guests) in KII as part of its PhP9 million grant is a cautionary tale. Concerned that mangroves are fragile habitats and that the "cabanas may exceed the carrying capacity [of the ecopark]… and cause problems of solid waste disposal and noise pollution…", ZSL scientists met with LGU officials and also wrote them and TIEZA about their concerns. With no response, they forwarded their letters to the Parks and Wildlife Bureau (in the DENR Central Office) which promptly contacted the local CENRO in Aklan. The latter found that no Environmental Impact Assessment had been conducted for the cabanas, and therefore recommended non-approval.

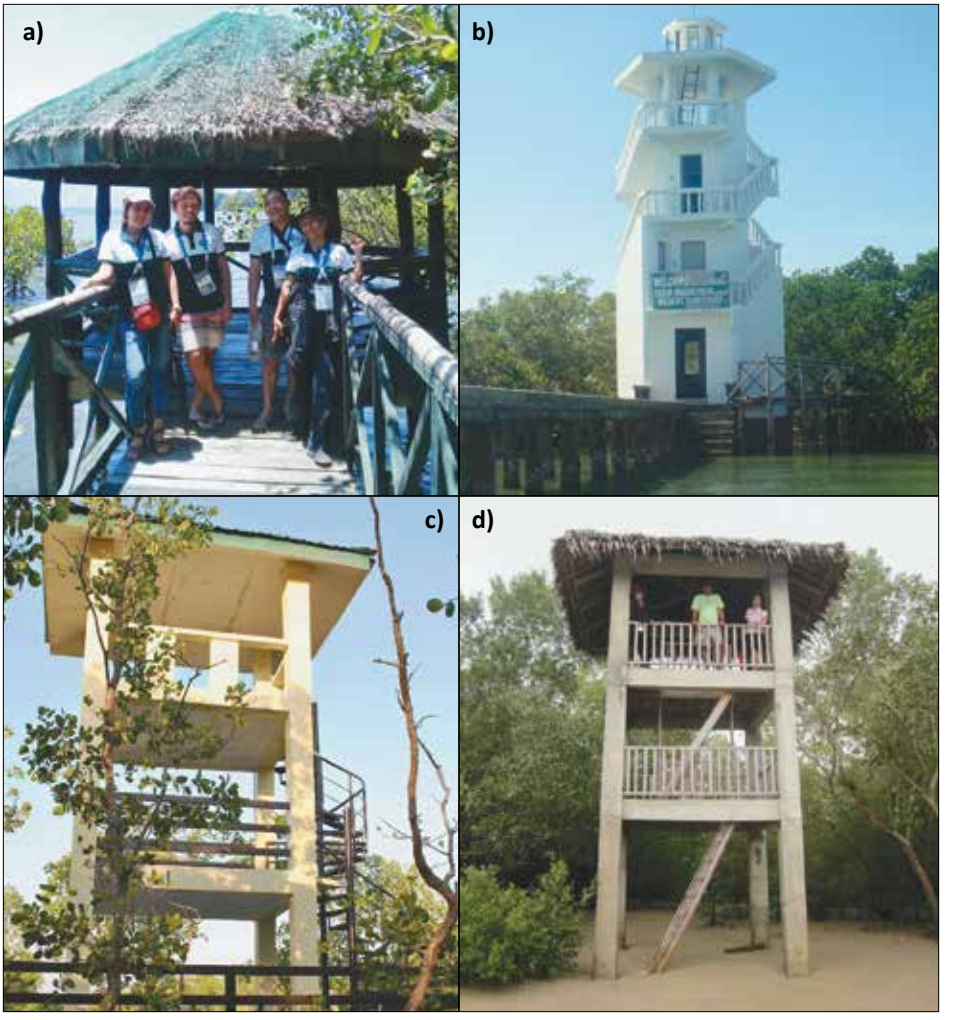
Fig. 11. Ecopark uses: The many uses of ecoparks for various ecotours, a-b) announcement of local ordinances, e.g., Plastic Bans and Coastal Cleanup Day; and c) as venue for extracurricular activities of schoolchildren need to be regulated by d) Ecopark guidelines. Ecoparks may also f) collaborate with nature-themed museums; and e) join town celebrations, e.g., the mangrove-decorated KII float in the local Ati-ati procession in Ibajay, Aklan.

BOX 4. Types of Name Tags for Mangrove Trees
(Primavera et al., 2012)

In a mangrove ecopark, names of trees on tags will be useful – from common or local names, for the average park visitor, to more technical scientific names and family names for students and researchers. Common names may be in English or in the local language or dialect. Scientific names are in Latin (or Latinized) and therefore written in italics.

Various materials may be used, depending on available budget and duration of use. In order of increasing cost, they are: a) laminated tags printed on thick paper, b) tarpaulin, c) fiber cement board (commercial name HardieFlex), d) thin metal sheets, and e) made-to-order metal tags. Laminated tags may also be attached to a wooden frame f) as a signboard on the ground (instead of on the tree). In order of increasing durability, they are: b) tarpaulin (a few months), a, f) laminated tags (0.5-1 yr), d) painted metal sheet (depends on paint quality), c) fiber cement board (up to 5 yr), and e) metal tags (decades). Tags should be attached using sturdy materials that do not easily break nor harm the trunk and branches, and are flexible enough to allow for growth, e.g., metal spring (e).

▲**Fig. 12. Signs:** a) To protect visitors (KII), b) trees (Biliran Ecopark), and c) bird wildlife (Silonay); d-e) to highlight minimal damage to trees (KII); and f) to advertise mangrove delicacies, e.g., shipworm or *tamiluk* (Bakaw Ecopark).



◄**Fig. 13. Watch towers and huts.** a) Rest hut in Triboa, Subic Mangrove Forest; and towers/view decks for bird watching, etc. in b) Palompon, Leyte; c) Silonay, Oriental Mindoro; and d) Calatagan, Batangas.

CHAPTER 3 GOVERNANCE

Mangroves in the Philippines are covered by national laws and local ordinances (Appendix 2).

A. NATIONAL LAWS

Among the laws that provide mangrove protection are RA 7161, RA 7586, and RA 7942 (Primavera et al., 2013). These provide general guidelines but may not be widely disseminated so there is need to formulate plans down to the local level through the promulgation of local ordinances. Moreover, mangroves are theoretically covered by future laws pertaining to marine areas, e.g., on Integrated Coastal Management (ICM) or Coastal Resource Management (CRM).

Another layer of protection is provided under the National Integrated Protected Area System or NIPAS (RA 7586 of 2000) and the E-NIPAS (or Extended-NIPAS: RA 11038 of 2018) whose sites include a number of mangrove areas. Some examples are the Bongsanglay Natural Park in Masbate and Siargao Protected Seascape and Landscape in Surigao del Norte whose management is under the jurisdiction of their respective Protected Area Management Body (PAMB). Further protection is granted by laws covering specific sites, e.g., RA 113651 (declaring the Balanga Wetland and Nature Park as Ecotourism Zone), and RA 9106 (Sagay Marine Reserve Law of 2001).

B. LOCAL ORDINANCES

In local governments, mangrove matters often fall under the Municipal Agriculturist/Fisheries Office, as these are linked to fishpond concerns, and mangrove ecoparks may be assigned to the Municipal Tourism Office. Clearly, they should be under the jurisdiction of the Municipal Environment and Natural Resources Office (MENRO), but most LGUs often do not have such an office. Leganes, Iloilo is an exception. Part of the success of their mangrove ecopark is the establishment of a separate MENRO dedicated fulltime to mangrove concerns (Boxes 2, 5). Aside from the designation of a MENRO, LGUs have passed ordinances and resolutions pertaining to the ecopark (delineation of area, management guidelines, fees, etc.) and other protected areas and sanctuaries, protection of mangroves and wildlife, fisheries management, pro-environment laws, e.g., banning of plastics in the Balanga Wetland and Nature Park (Appendix 2).

Fig. 14. Law enforcement: Includes personnel such as a) Palompon, Leyte Bantay Dagat and f) Kaligkasan volunteers, Suyac Is.; b) Palompon station house; and logbook documentation of regular patrolling: c) by boat, Palompon (2000), and d-e) on land, Silonay (2004).

CHAPTER 4 OPERATIONS AND MAINTENANCE

National laws and local ordinances provide the legal framework by which mangroves are administered in the Philippines. But a mangrove ecopark needs a Management Board or Council to set ecopark policies, prepare management/ business/other plans that include activities, required budget and staffing.

For ecoparks established by the LGU, ecopark management can be assigned to the MENRO as with LIKE, Iloilo and the Tres Marias Mangrove Area in Leyte (Box 5; Appendix 1h), or the Community Environment and Natural Resources Office (CENRO), as with the Balanga City Wetland and Nature Park (Appendix 1a). Mangrove areas covered by the E-NIPAS law, such as the Bongsanglay Natural Park, Siargao Protected Landscapes and Seascapes, and Suyac Mangrove Forest (Appendix 1b, c, g) have their respective PAMBs comprising the DENR Regional Director and representatives from the LGUs, NGOs, POs and other stakeholders in the area, as specified by law.

Unlike government-managed ecoparks, the Silonay Mangrove Conservation Ecopark (1st Runner-up in the 2019 Best Mangrove Awards: Appendix 1f) is managed by the local community through the PO *Sama-samang Nagkakaisang Pamayanan ng Silonay* (SNPS) which retains close ties to the LGU. Its organizational structure comprises a General Assembly with a Board of Directors which sets policies implemented by a management staff. The latter oversees various activities that fall under Conservation and Sustainable Production and Biodiversity-Friendly Enterprises.

Whether government- or PO-based, the members of the Management Board should represent the LGU, PO/s, academe and any relevant NGOs. But the leadership and secretariat should preferably be from the LGU which has access to facilities for meetings, communications and the like. Apart from its members, the Board may also draw on the technical expertise of scientists and other authorities in mangroves, forestry, ecotourism and other fields relevant to the operations of the ecopark.

A. POLICIES

Policies for ecopark management may include any or all of the following:

1. Community/multistakeholder engagement (Fig. 7) – this ranges from involvement in regular activities, e.g., clean-up, patrolling (PO members) to one-time donations and/or mangrove planting (commercial enterprises and company employees; Box 5)

2. Capacity building – of ecopark staff, e.g., in mangrove species identification, ecotour guiding, leadership training, conflict resolution, food preparation (Table 1; Box 5)

3. Awareness and education campaign – about mangrove and other environmental issues, may be internal (for local community, LGU) or for external visitors

4. Marketing and tourism to encourage visitors to the ecopark (Fig. 4; section B, below)

5. Mangrove protection and rehabilitation using science-based protocols (Primavera et al., 2012)

6. Biodiversity conservation (Fig. 6) – Removal of exotic plants (and animals) will protect biodiversity. A misguided manager introduced ornamental, but exotic, bromeliads along the KII footwalk (Fig. 10e) and planted the anahaw palm *Saribus rotundifolius* beside the Avatar Tree. He also installed a public address (PA) system for piped-in Jurassic sounds to enliven the "quiet and boring" atmosphere of KII. When brought to the mayor's attention, the inappropriate plants and PA system were removed.

7. Law enforcement (Fig. 14) – Enforcement of ecopark guidelines and local ordinances (Appendix 2) is the responsibility of ecopark staff, and park/forest wardens locally called *Bantay Gubat*.

B. FORMULATION OF PLANS

The policies described above are embodied in plans jointly formulated by the LGU and Management Board, with inputs from other stakeholders. Various

TABLE 1. List of training of PO members for mangrove ecopark management in Aklan and Iloilo (organized by ZSL).

PO	Training Course	Date	No. of attendees
BFA and NAMAO (Katunggan It Ibajay Ecopark)	Basic Leadership Training	16-17 Jun 2009	23
	Leadership Skills Training	29-30 July 2009	22
	Empowering Dispute Resolution Management Processes	26 Aug 2009	26
	Interpretative Tour guiding	4-6 May 2010	20
	Financial Systems	8 Oct 2011	10
	Basic Concepts/ Principles in Tourism	2012	20
	Tourist Service Skills training	30 May-1 June 2012	20
BPFA (Pedada Integrated Mangrove Ecopark)	Basic Leadership Training	24-25 Jul 2009	32
	Leadership Skills Training	11-12 Sept 2009	32
	Empowering Dispute Resolution Management Processes	13-14 Nov 2009	34
	Interpretative Tour Guiding	4-6 May 2010	9
	Financial Systems	2011	10
	Training on Tour Guiding	23-25 May 2012	9
	Tourist Service Skills Training	30 May-1 June 2012	11

management plans have been developed by the 2019 and 2021 BMA winners – Balanga Wetland Nature Park, Bongsanlay Natural Park, Del Carmen Mangroves, Siargao, Silonay Mangrove Conservation Ecopark, Suyac Is. Ecopark, and Tres Marias Mangrove Islets (Fig. 5; Appendices 1a-1h).

The most basic kind is the Management Plan which may focus on fisheries or tourism alone, or encompass a wider Environmental Management Plan or Comprehensive Land Use Plan (CLUP). The CRM or MPA Biodiversity Management Plan usually covers the whole island or municipality, e.g., Prieto Diaz, Sorsogon or Del Carmen, Siargao (Appendix 3; Figs. 5e-g). In contrast, the Business Plan generally applies to the ecopark alone. It is needed to determine income based on user fees and other inflows (sales of souvenirs, mangrove seedlings, etc.) vs. expenses (maintenance and operations, including staff), and establish profit or loss of the ecopark.

Fig. 15. Ecotours: Seaside boardwalks with docking facilities in a) Suyac, and b-c) Paraiso Mangrove Ecopark, Tacloban provide convenient access by boat, aside from a unique view of both sea and mangroves; d-e) boating (Suyac) and rafting (KII) give an enjoyable view from the water. N.B. Life vests were subsequently required on boat trips in d).

C. ACTIVITIES

Aside from infrastructure maintenance, regular activities of ecoparks include repair of damaged boardwalks, replacement of old signs, and clean-up of dead leaves, branches, and twigs. Others are related to tours, education, research, mangrove planting, and income generation.

1. Tours (Fig. 10a, b; Fig. 15) – generally a guided activity focusing on mangroves and mangrove associates found along the footwalk (Primavera et al., 2004;

Fig. 16. Student activities in Silonay, Oriental Mindoro and Suyac, Negros Occidental ecoparks: a) coastal cleanup; b) and f) poster making; c) kayaking; d) mural painting; and e) slogan making.

Primavera, 2009; Primavera and Sadaba, 2012), and also birds (Flores et al., 2019) and other wildlife (Fig. 6). Some mangrove sites offer bat watching and firefly watching during night hours. Still others have paddle boat or kayak tours for physical exercise and/or to observe shallow-water seagrass and coral reef habitats adjoining the mangroves. Trained tour guides are remunerated on a per hour or per group basis. Boatmen/women are paid separate fees.

2. Education/awareness raising – Educational activities in mangrove ecoparks range from one-day field trips to week-long training courses.

   Participants of the National Mangrove Conferences in 2012, 2015 and 2018 observed mangrove species diversity and rehabilitation protocols during field trips to KII and LIKE, respectively. Likewise primary, secondary and college students of Biology/Botany/related fields from Iloilo and Aklan visit these ecoparks for field trips required in their curriculum (Fig. 3). Named by ZSL as a Laboratory for Mangrove Biology, Rehabilitation and Conservation, the LIKE Ecopark received close to 200,000 students in the 2014-2019 period before the Covid 19 pandemic (Fig. 7b, Box 2). Many of these students also planted mangrove seedlings produced by the PO.

   Longer visits up to one week provide live-in training course participants (Fig. 17) more opportunities to identify mangrove species (Appendix 5), document flowering and fruiting, learn mangrove nursery and outplanting techniques, and observe community/PO meetings (Fig. 3a; Primavera et al., 2015). Therefore signage attached to landmark trees (Box 4) or posters of commonly observed birds in the area (Fig. 12c) will greatly facilitate the learning experience. It will also be helpful if the Information center has leaflets of local flora and fauna (mangroves, birds, reptiles) as free handouts, and even books on the same

species (e.g., *Handbook of Mangroves in the Philippines – Panay*) that may be for rent or for sale (Fig. 5).

3. Research - The short exposure of a few days may inspire and challenge undergraduate and graduate students to do a more longterm special problem and M.S./Ph.D. thesis on mangroves. The student must request permission from park management and the relevant government agencies to undertake research on a specific topic for a given period of time. Said request should be endorsed by the respective academic/research institution.

   The access and amenities provided by ecoparks also facilitate the conduct of both individual research and major multilateral research projects. Examples of the latter are the EU-funded "Culture and management of *Scylla* spp." (EC-CAMS) with the SEAFDEC Aquaculture Department and University of Wales Bangor, and the "Comprehensive Assessment of Blue Carbon Ecosystems and their Services in the Coral Triangle" (BlueCARES) of the UP Marine Science Institute, and funded by the Japan International Cooperation Agency.

   Over the years, researches conducted in mangrove ecoparks in Aklan have produced significant and substantial information on the mangrove crabs *Scylla* spp. (fisheries and stock enhancement), mangrove rehabilitation (mollusc assemblages, indicator species, pond-mangrove reversion), and other biophysical and socioeconomic aspects of Philippine mangroves. Appendix 4 lists both scientific publications and unpublished research conducted in ecoparks. Field guides and other ZSL knowledge products are partly based on R&D conducted in ecoparks (Appendix 5).

   A thesis research done in KII provided the first record ever of the mangrove lobster *Thalassina spinosa* in the Philippines (Fig. 6f; Bedi and Primavera, 2018). Another M.Sc. thesis on the amphibian and herpetofauna of KII is noteworthy for its documentation of the following (S. Suresh, unpub.):
   a. First report of the endangered Panay monitor lizard *Varanus mabitang* in a mangrove (Fig. 6a). This arboreal species is rarely sighted on the ground and has not been reported below 500 masl (meters above sea level), and
   b. Four amphibians recorded, with the only native species *Fejervarya cancrivora* outnumbered in collections 13 to 1 by the invasive cane toad *Rhinella marina* formerly known as *Bufo marinus*.

   These findings highlight both the biodiversity present (Fig. 6), but also the threat of invasive species (Fig. 10e) in the supposedly pristine KII Ecopark. Hence, mangrove ecoparks also need to be declared wildlife sanctuaries for both invertebrates (e.g., molluscs, crustaceans) and vertebrates (birds, reptiles, amphibians) by means of local ordinances. Such legislation must be based on field surveys to monitor species present and their abundance. Such species inventories in ecoparks may also be published (Fig. 5; Flores et al., 2019).

4. Income-generating activities (Fig. 4) – These include beekeeping and honey production; sale of *tamiluk* and other delicacies (Fig. 12f); rent of ecopark

facilities for weddings (Fig. 16a), baptisms and filming (OMAGIECA Ecopark: Appendix 1); catering for receptions; mangrove nursery production, and mangrove planting offered to guests (charging a nominal fee to cover seedling costs). Sharing of sales and fees should be agreed on by the ecopark management, PO members (some are park employees) and the onsite LGU.

5. Mangrove planting (by ecopark staff or guests) - For ecoparks with degraded mangrove areas needing rehabilitation, planting of nursery-reared seedlings is an added feature of ecotours. Guests may be charged seedling costs for income generation. Some ecoparks have abandoned ponds, e.g., KII and Bongsanglay Natural Park where the pond areas have naturally reverted to mangroves over the years (Box 1). In contrast, the 15-ha area of abandoned ponds in LIKE Ecopark required the active planting of thousands of mangrove wildlings or nursery seedlings (Boxes 2 and 5; Fig. 2e).

   The batches of plantings in LIKE were documented, including date, species and numbers planted, etc. After initial planting, growth and survival were monitored on a regular basis. Not only plantations but also natural mangrove stands, e.g., Bongsanglay Natural Park (Appendix 1b), are assessed regularly to keep track of mangrove trends – areal size, any infestations. For ecoparks with trained personnel, the Mangrove Community Structure analysis is an excellent tool for monitoring mangrove health (English et al., 1994).

6. Others – Management staff in ecoparks popularly visited by students have been creative in planning activities that develop the students' potentials and cater to their interests. These include sports (marathon runs, kayaking), environmental (coastal clean-up) and artistic (mural painting, poster/slogan making) activities (Fig. 17).

D. GUIDELINES

For many people, the ecopark visit will be their first up close experience with mangroves, so protocols are necessary to assure their safety and also protection of the park mangroves, other flora and fauna. These guidelines pertain to general aspects (hours, fees) and conduct or behavior in the park (Fig. 11d).

1. General

   a. Hours: opening hours at 8:00-9:00 a.m. and closing by 5:00 p.m. Ecopark staff should check that everyone has left (based on inspection and logbook entries) to avoid extended presence without knowledge of park personnel (that may lead to untoward incidents of violence, physical intimacy, etc.).

   b. Hours will be adjusted to early evening for firefly and bat watching activities.

   c. Entrance/user fees may follow a double-tiered system with lower rates for Filipinos vs higher rates for foreigners, and also offer discounts for students and senior citizens.

d. Trained ecopark guides may be hired by guests at hourly or daily rates.

e. For boat/paddle tours, life vests and jackets (Fig. 15d) should be provided by the management.

f. Following the concept of carrying capacity, and dependent on the ecopark infrastructure, the number of guests should be limited to:
   - 10 to 15 persons per guide on the footwalk tour (Fig. 10c)
   - 1-5 persons for small, wooden bridges across mangrove creeks (Figs. 1c, 9f)
   - 5 to 20 passengers per boat, according to boat capacity

   Shortly after it opened in 2010, the KII without prior notice received around 900 elementary and high school students in only one day. Concerned for the children's safety, the park management requested LGU officials to deploy forest guards. Following this experience, the KII set a daily maximum of 200 park visitors.

   For emergencies, the ecopark office (information/registration center) should have First Aid kits and trained staff (for medical cases) and an internal/external communications system. The latter includes a mobile phone (for sending and receiving messages and calls within and outside the ecopark to/from hospitals, police, etc.).

2. Behavioral

   a. Empty bottles, food wrappers, and other trash should be placed in trash bins/containers provided along the footwalk (Fig. 9c) and not thrown in the ecopark.
   b. No cutting, breaking or twisting of leaves, twigs and branches (Fig. 12b)
   c. No collection of any plants and animals observed along the way, except for previously approved research projects. Only taking photographs is allowed.
   d. No loud noises or unruly behavior.
   e. No bringing of food or alcoholic drinks, only drinking water is allowed.

   Ecopark laws and local ordinances are enforced by park staff, land-based patrols (called *Bantay Gubat* or *Bantay Bakhaw*) and sea patrols (*Bantay Dagat*) composed of hired personnel and/or volunteers (Fig. 14). Assistance is also provided by local branches of the Philippine National Police, Philippine Coast Guard and Philippine Navy. Patrols are conducted 24/7, so a *Bantay Dagat* station-rest house is very convenient for patrollers. Daily recording of activities in logbooks is important in the prosecution of illegal mangrove cutters and other violators (Fig. 14c-e). Regular, if not daily, land and sea patrols (Fig. 14a) and their documentation (Fig. 9c, d) are effective in preventing illegal activities and apprehending and prosecuting violations.

E. FUNDING AND PARTNERS

The initial funding to build park facilities (i.e., multipurpose hall, boardwalk) can come from LGU funds alone, then later supplemented by NGO grants (e.g., LIKE: Fig. 2, Box 2; KII: Fig. 1, Box 1). For LIKE in Iloilo, the municipal and provincial LGU allocated PhP147,000 in 2010 (Box 5), PhP250,000 in 2014, and PhP700,000 in 2016 to build the bamboo hut, footwalk and watch tower. In the case of NIPAS sites, funding comes mainly from the DENR, with contributions from the onsite LGU.

Even when basic facilities have been constructed, regular financial inputs are needed to maintain the ecopark and hire staff. This can be provided mainly by the LGU (e.g., PhP400,00/year for the Del Carmen, Siargao mangrove park) or by the DENR for NIPAs sites (e.g., PhP2 million for the Bongsanglay Natural Park, Masbate in 2016). Either way, supplementary funding can be in the form of donations (from other government agencies or the private sector). For example, the Del Carmen, Siargao LGU solicited approximately PhP64.5 million for their Mangrove Rehabilitation and Conservation Program over the 2010-2018 period.

But the initial establishment and continuing operations of the ecopark will depend on a supportive network of partners from within and outside government, including:

1. LGUs – barangay, city/municipal, provincial levels
2. NGAs – the regional/local offices of DENR, BFAR, Philippine National Police, Philippine Coast Guard
3. Academe – government and private universities and colleges, high schools, and elementary/grade schools
4. NGOs – especially those with marine/environmental programs and mandates
5. POs – fisherfolk, women
6. Private companies
7. Other groups – church, military

The LIKE Ecopark in Iloilo is an excellent example with its network of 142 partners as of late 2021 (Fig. 7e) – mostly private companies, schools and government agencies which contributed both funding and volunteer labor to restore mangrove cover and improve park facilities.

The ecopark can also draw from park-generated income aside from donations, as follows (Fig. 4):

1. user/entrance fees
2. ecotour fees – boat/paddle tour, bird/bat watching
3. mangrove nursery – sales of seedlings to outside buyers or to park guests who want to plant
4. sales of honey and other specialties like *tamiluk* (Fig. 12f)
5. souvenir shops – ecofriendly items such as preserved leaf skeletons, keyholders made from bitaog shells
6. rental of ecopark facilities for weddings and other receptions
7. serving refreshments (to park guests) or catering for receptions

Aside from the income that goes to the PO and LGU, individual PO members can also earn fees by serving as mangrove/bird/bat tour guide, or as boatman. A good example of effective income generation is the Suyac Is. Mangrove Ecopark (Table 2) which earned a total gross income of PhP4.6 million from 46,855 visitors over a 5-year period (2013-2018). Rough calculations show that each guest spent almost PhP100 per visit to Suyac. The sharing of ecopark income will have to be mutually agreed on between the LGU and management (including the PO). For example, the 2018 net income of PhP141,800 of the Silonay Mangrove Ecopark was divided thus – 90% to the PO (SNPS) and 10% to the barangay LGU. In the case of the Coastal Barangays Mangrove Seedling Growers Association affiliated with LIKE, the income from sales of mangrove seedlings is equally divided among PO members.

TABLE 2. Yearly visitor arrivals and gross income in Suyac Is., 2013-2018.

Year	No. of Visitors	Gross Income (PhP)
2013	4, 875	249, 076.00
2014	6, 797	488, 770.00
2015	8, 256	587, 754.00
2016	7, 595	766, 810.50
2017	8, 892	1, 034, 038.00
2018	10, 440	1, 442, 391.00
Total	**46,855**	**4, 568, 839.50**

Fig. 17. Avatar Tree. Arguably the most photographed mangrove in the country, this centuries' old *Avicennia rumphiana* (aka the Avatar Tree) in Ibajay, Aklan provides a most in-demand background for local newlyweds (photo by Mayk V. Pericon) and ZSL mangrove trainees alike.

Box 5. Timeline of mangrove activities in Leganes, Iloilo (2009-2021). Katunggan Ecopark (LIKE) launched in 2014.

LEGANES INTEGRATED KATUNGGAN ECOPARK (LIKE)

The Leganes Katunggan Integrated Ecopark (LIKE) of Brgy. Nabitasan, Leganes is a 9.5 ha abandoned fishpond reverted back to a healthy mangrove ecosystem through assisted natural regeneration (ANR) and active monitoring and maintenance. This successful partnership between the municipal government of Leganes and the Community-based Mangrove Rehabilitation Project of the Zoological Society of London (ZSL-CMRP) started back in 2009.

JANUARY - MARCH
Exploratory talks between ZSL-CMRP and Leganes LGU

SEPTEMBER
Mangrove ecology, biology, and management training for Nabitasan high school students, teachers and Leganes LGU staff

JULY
Joint survey of abandoned ponds in Brgy. Nabitasan by ZSL-CMRP and Leganes LGU

SEPTEMBER
Reorientation with Leganes LGU on mangrove rehabilitation project

MAY
ZSL's first mangrove training course with Nabitasan, Leganes featured as a learning destination.

JANUARY
Deputation of Bantay-Dagat for Leganes.

JUNE
Launching of Katunggan Ecopark inspired by a cross-visit of the Leganes LGU to Kil Ecopark in Ibajay, Aklan

APRIL
Municipal Environment and Natural Resources Office (MENRO) was created.

Leganes Katunggan Ecopark was identified as a Center of Learning for capacity building of mangrove conservation practitioners on reversion of abandoned ponds, green-gray engineering.

Municipal Ordinance 2021-502 series of 2021 was passed establishing the Leganes Katunggan Integrated Ecopark. In the same year, the Adolfo Jaen Sr. Biodiversity Center was completed with support from the ProCoast Project of the Zoological Society of London - Philippines and the Deutsche Gesellschaft für Internationale

2009 | **2010** | **2011** | **2012** | **2014** | **2015** | **2019** | **2020** | **2021**

AUGUST
MOA signing between Leganes LGU and ZSL to revert a 9.5 ha abandoned fishpond to mangroves

JANUARY
MLGU allocated Php 147,000 for mangrove rehabilitation project.

AUGUST
Leganes Mangrove Ordinance No. 2011-227 establishing regulations for mangrove conservation and protection and providing penalties for violations.

3 adults and 1 baby dugong were sighted in seagrass bed next to the ecopark.

MAY
Dead dugong was found ~3 km away from the ecopark.

Cemented access road was completed with funding support from the Department of Public Works and Highways and the Provincial Government of Iloilo.

MAY
Mangrove rehabilitation plan for Brgys. Bigke and Nabitasan mainstreamed in 2009-2019 Coastal Resource Management Plan of Leganes

SEPTEMBER 2009 - 2015
66,000 mangrove seedlings were bagged and 82,000 mangrove seedlings were outplanted by various volunteer groups, students, LGU officials, and ZSL.

Continuous monitoring and maintenance activities ensure survival of mangrove seedlings.

MARCH
Construction of bamboo hut as reception and rest area for volunteer groups.

AUGUST 2012 - FEBRUARY 2013
LGU Leganes allowed use of 400 m² of abandoned fishpond adjacent to 9.5ha CMRP reverted fishpond for planting experiments of the ZSL-GIZ project; seedlings planted.

CHAPTER 5 CONCLUSION

Healthy and functioning mangroves do not need to be developed as ecoparks to deliver their ecosystem services of fisheries production, coastal protection and carbon sequestration. Consider the mangroves of Prieto Diaz, Sorsogon adjudged Grand Champion of the 2021 Best Mangrove Award (Fig. 19; Appendix 1). It was recognized for its increased fish supply, improved household incomes, and effective typhoon protection provided to local communities. These resulted from the convergence and successful implementation of mangrove conservation initiatives over 500 ha of mangroves by the PO and LGU, with support from national government agencies.

But ecoparks greatly improve public awareness of mangroves and facilitate the conduct of mangrove research by providing convenient access through boardwalks and other infrastructure. Such increased awareness is evidenced by coverage in print, radio, TV and social media as shown by the KII (Fig. 18). The Bakaw, Del Carmen, Silonay, and Suyac mangrove ecoparks have enjoyed a similar high profile in print, TV and social media. Outstanding mangrove ecoparks have received national awards recognizing their excellence in marine conservation and environmental management, tourism, and governance from the Department of Interior and Local Governments, Department of Tourism, League of Municipalities in the Philippines and other similar agencies. Internationally, the 2016 Disney Conservation Hero Award was given to the MENRO Head of Leganes, Iloilo

Fig. 18. Media coverage a) Del Carmen, Siargao, *Sun Star*; b) KII, *Philippine Daily Inquirer*; c) Silonay, Mindoro, *Inquirer* Net; d) KII, British Broadcasting Corp. interview; e) Sagay City-Suyac Is., First Time Travels; and f) KII, Knowledge Channel interview.

Fig. 19. Best Mangrove Awards 2019 & 2021 winners: a) Para El Mar BMA poster; b) Bongsanglay, Masbate; c) Del Carmen, Siargao LGU officials accept 2019 Grand Championship Award; d) Prieto Diaz, Sorsogon; e) Silonay, Oriental Mindoro; f) Balanga, Bataan; g) Tres Marias, Leyte; h) Suyac, Negros Occid.; and j) *Katunggan It Ibajay*, Aklan.

primarily for his pivotal role in establishing LIKE in Iloilo. This ecopark has provided the most successful case study so far of pond-mangrove reversion using Assisted Natural Regeneration and volunteer labor (Box 2).

Yet challenges remain for mangrove ecoparks. A major concern is funding for maintenance and operations, but earnings from user fees, ecotours, mangrove nursey production and the like should solve this problem eventually. Of equal concern is the issue of tenure, unique to PO-managed ecoparks, which can be facilitated if the bureaucratic red tape at DENR can be reduced. More problematic are the planned industrial-economic zones of some LGUs which may be in the vicinity of their mangroves and ecoparks, as the case of Leganes, Iloilo. But in the wake of the damage wrought by Typhoon Odette and the need for coastal protection, the greenbelt that is its ecopark also serves as a center of learning and generator of income. Thus the LIKE Ecopark (Box 5) is a beacon of hope to the islands big and small across the archipelago – hope that greenbelts can be restored and that they protect future generations from countless storms yet to come. Surely, their life-saving role is of greater value than any profits that industrial-economic activity might bring.

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GLOSSARY

adaptation – a course of action dealing with the impacts of climate change

Bantay Bakhaw – forest guards deputized by the local government unit to safeguard and enforce laws in a mangrove protected area

Bantay Gubat – forest guards or Wildlife Enforcement Officers (WEO) who are deputized by the local government unit or the Department of Environment and Natural Resources to safeguard and enforce laws in a protected area

basin mangroves – mangrove forest type found in inland areas with low elevation and inundated by seawater

biodiversity – refers to the variety of life on Earth at all its levels, from genes to ecosystems

ecopark or ecological park – a green space that is characterized by its special care of vegetation, ecosystems and the species that inhabit it

ecotourism – responsible travel to natural areas that conserves and sustains the well-being of local people

estuarine mangroves – mangrove forest type found near river mouths where fresh water mixes with salt water

fringing mangroves – a mangrove forest type that occurs along shorelines

island or overwash mangroves – mangroves on small islands that are frequently washed by the tides

mangrove stand – an assemblage of mangrove trees

mitigation – a course of action dealing with the causes of climate change

radiometric carbon dating – a method of dating geological or archaeological specimens by determining the relative proportions of radioactive isotopes present in a sample

riverine mangroves – a mangrove forest type that occurs along rivers and creeks

sequestration – process of removing carbon dioxide from the atmosphere

sustainable tourism – tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment, and host communities

APPENDIX 1. DIRECTORY OF MANGROVE ECOPARKS

Name of Ecopark		Location	Total Area (ha)	
			Natural	Planted
Luzon				
2	Balanga City Wetland and Nature Park (2010)	Brgy. Tortugas, Balanga City, Bataan	128.43	
			25.43	103
3	Bangrin Marine Protected Area (1990)	Brgys. Aporao and San Miguel, Bani, Pangasinan	42.25	
5	Bongsanglay Natural Park (2017)	Brgys. Royroy and Gibraltar, Batuan, Masbate	168	
7	Calatagan Mangrove Forest Conservation Park ('Ang Pulo') (2009)	Brgy. Quilitasin, Calatagan, Batangas	17.5	
9	Maidlang Ecotourism Park (2015)	Brgy. Maidlang, Calapan City, Oriental Mindoro	52	
			16	36
13	Prieto Diaz Mangrove Ecosystem (1995)	Prieto Diaz, Sorsogon	1034	
			767	267
14	Puerto Galera Mangrove Conservation and Eco-tourism Area (2015)	Sitio, Sigayan, Brgy. Tabinay, Puerto Galera, Oriental Mindoro	4.1	
15	San Juan Mangrove Forest Conservation Area and Bird Sanctuary (2009)	Brgys. Poctol, Pinagba-yanan, Catmon, Ticalan, Imelda, Barualte, Bataan, Nagsaulay, Subukin, San Juan, Batangas	496	
			472	24
16	Silonay Mangrove Conservation and Ecopark (2011)	Brgy. Silonay, Calapan City, Oriental Mindoro	41	
			38	3
17	Triboa Bay Mangrove Park (1990)	Ilanin Forest Area, Subic, Olongapo, Zambales	2	
18	Tubbataha Reef Natural Park (2010)	Cagayancillo, Palawan,	97,030	
Visayas				
19	Bais Bird Sanctuary and Mangrove Park (1985)	Bais City, Negros Oriental	400	

IN THE PHILIPPINES

Office In-charge | Address	E-mail Address | Telephone Number	Other Remarks; Website
City Agriculturist & City ENRO | LGU Balanga City, Bataan	agriculture.cob1@gmail.com	3rd Runner-up, 2021 Para El MAR - Best Mangrove Award
Mayor's Office | LGU Bani, Pangasinan	info@bani.gov.ph, breathtakingbani01@gmail.com | (075) 5532010, (075) 632-8562	https://asensopangasinan.com/2019/06/23/bangrin-mangrove-farm-marine-protected-area/
PAMB | Protected Area Management and Biodiversity Section, Conservation and Development Division, DENR Regional Office V, Legazpi City, Albay	red_reg5@yahoo.com, protectedareas5@gmail.com, denrcenrosj@gmail.com	2nd Runner-up, 2019 Para El MAR - Best Mangrove Award
Pro-Mangrove Alliance and Implementing Team and Arm as Kilitisan's Advocates of Nature (PALITIKAN) | Quilitasin, Calatagan, Batangas	angpulo2019@gmail.com, agri.menrocalatagan@gmail.com	Top 6, 2019 Para El MAR - Best Mangrove Award
DENR-PENRO | DENR Calapan City, Oriental Mindoro	penro_orientalmin@yahoo.com | (043)2883017	Nominee, 2021 Para El MAR - Best Mangrove Award
Mayor's Office | LGU Prieto Diaz	denr_sorcity@yahoo.com.ph	Champion, 2021 Para El MAR - Best Mangrove Award https://www.facebook.com/menro.prietodiazsorsogon
Chairperson| Puerto Galera Mangrove Conservation and Eco-tourism Area Manage-ment Council, Puerto Galera, Oriental Mindoro		Nominee, 2019 Para El MAR - Best Mangrove Award
Municipal Agriculture Office | LGU San Juan, Batangas	pgenrobatangas.bmd@gmail.com	Top 6, 2021 Para El MAR - Best Mangrove Award
CRM and MPA Coordinator Office | LGU Calapan, Oriental Mindoro	(043) 288-1492 / (043) 441-3205	1st Runner-up, 2019 Para El MAR - Best Mangrove Award https://www.facebook.com/menro.prietodiazsorsogon
Mayor's Office | LGU Olongapo, Zambales	(047) 2524242, 2524154, 2524655	http://www.localphilippines.com/attractions/triboa-bay-mangrove-park
Tubbataha Management Office| Bgy. Milagrosa, Puerto Princesa City, Palawan	tmo@tubbatahareefs.org | (048) 716-1631	http://tubbatahareefs.org/
Tourism Office | LGU Bais, Negros Oriental	(035) 5415161/4028174, fax (035) 4028181	https://www.facebook.com/itsmorefuninbais/posts/talabong-mangrove-park-and-bird-sanc-tuary-the-remaining-largest-mangrove-in-the-/449810541893316/

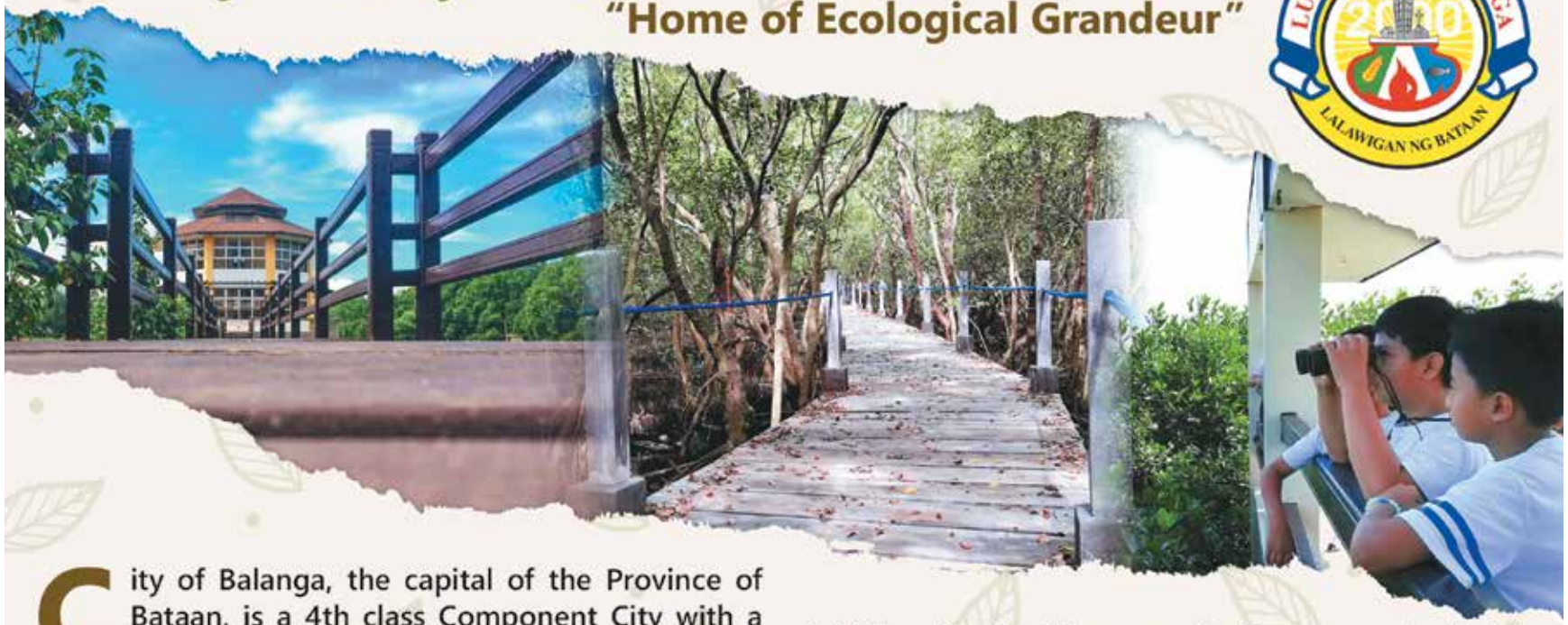
20	Bakawan Ecopark (1989)	Brgy. New Buswang, Kalibo, Aklan	220	
			121	99
21	Balaring, Silay Mangrove Park (1997)	Brgy. Balaring, Silay City, Negros Occidental	50	
23	Cabucgayan Boardwalk (2017)	Brgy. Looc, Cabucgayan, Biliran	18	
24	Culajao Mangrove Ecopark (2008)	Brgy. Culajao, Roxas City, Capiz		
			5	
25	JB Lacson Igang Bay Marine Sanctuary (2006)	Brgy. Sta. Ana, Nueva Valencia, Guimaras	3	
26	*Katunggan It Ibajay* Mangrove Ecopark (2009)	Brgys. Bugtong-bato and Naisud, Ibajay, Aklan	44.22	
28	Leganes Integrated Katunggan Ecopark (2014)	Brgys. Nabitasan and Gua-an, Leganes, Iloilo	9.5	
34	Obo-ob Mangrove Ecopark, (2005)	Brgy. Obo-ob, Bantayan, Cebu	116.5	
35	Olango Island Wildlife Sanctuary (1992)	Olango Island, Lapu- Lapu City, Cebu	920	
36	Pedada Integrated Mangrove Ecopark (2010)	Brgy. Pedada, Ajuy, Iloilo	29.5	
			26.7	2.8
38	SAVIMA Mangrove Adventure Tour (1999)	Brgy. San Vicente, Maribojoc, Bohol	56.25	
40	Silagon Mangrove Ecopark (2019)	Brgy. Silagon, Ajuy, Iloilo	20	
41	Suyac Island Mangrove Forest (2012)	Brgy. Taba-ao, Sagay City, Negros Occidental	15.59	
			15.5	0.09
42	Talibon Mangrove Co-Management Area (2004)	Brgys. San Agustin, San Roque, Balintawak and San Isidro, Talibon, Bohol	580	
43	Tambaliza Mangrove Ecopark (2008)	Brgy. Tambaliza, Concepcion, Iloilo	17	
			16	1
44	Tanjay City Mangrove Forest (1990)	Brgy. Luca, Tanjay City, Negros Oriental	38.28	
45	Tres Marias Mangrove Islets (1996)	Brgys. Parilla, Cambinoy and Ipil III, Palompon, Leyte	449.55	
Mindanao				
46	Del Carmen Mangroves (2011)	Del Carmen, Siargao	4871	
54	Tubajon Aquamarine Park (1998)	Brgy. Lubajon, Laguindingan, Misamis Oriental	50	

Chairman/ED Office | Kalibo Save the Mangroves Association, New Buswang, Kalibo		Top 6, 2019 Para El MAR - Best Mangrove Award
Mayor's Office | LGU Silay City, Negros Occidental	(034) 4950068, 4950587 or 4955269	https://earthniversity.word-press.com/2018/01/06/ balaring-mangrove-park/
Mayor's Office | LGU Cabucgayan, Biliran	(053) 5029062	https://www.facebook.com/biliranisland
President's Office | Katunggan sa Culajao Salbaron Association, Inc. (KACUSA), Roxas City, Capiz	(036) 6210500 local 306	https://www.facebook.com/ culajaomangroveecopark
JB Lacson Foundation Maritime University | Nueva Valencia, Guimaras	(033) 3940024	https://www.facebook.com/ advocateofchange2010/
Tourism Office | LGU Ibajay, Aklan	lguibajay@yahoo.com	https://www.facebook.com/ Turismo-Ibajay-525092870887157/
MENR Office | LGU Leganes, Iloilo	menrolguleganes@gmail.com	Nominee, 2021 Para El MAR - Best Mangrove Award
OMAGIECA | Obo-ob Mangrove Garden Integrated Ecotourism and Conservation Association, Bantayan, Cebu	09460069566, 09072387668	https://www.facebook.com/omagieca/
Mayor's Office | LGU Lapu- Lapu City, Cebu	(032) 3411280, 3400656	http://www.olangowildlifesanctuary.org/
MENR Office | LGU Ajuy, Iloilo	ajuy_lgu@yahoo.com	
Brgy Chairman | BLGU San Vicente, Maribojoc, Bohol		http://www.boholtourismph.com/ savima-mangrove-adventure-tour/
Brgy Chairman | BLGU Silagon, Ajuy, Iloilo		https://www.facebook.com/Silagon-Mangrove-Eco-Park-101390694731399
City Information and Tourism Office | LGU Sagay City, Negros Occidental	sagaycityinfo@yahoo.com, sagaymarinereserve@ yahoo.com, cenrosagaycity@gmail.com	3rd Runner-up, 2019 Para El MAR - Best Mangrove Award
Mayor's Office | LGU Talibon, Bohol	(038) 5150051, 5159047	https://www.facebook.com/ TalibonOfficialPage/
Municipal Agriculture Office | LGU Concepcion, Iloilo	da.concepcion@yahoo.com	Nominee, 2019 Para El MAR - Best Mangrove Award
Mayor's Office | LGU Tanjay City, Negros Oriental	(035) 5270823, 4158456	https://www.facebook.com/Tourism Tanjay
Mayor's Office | LGU Palompon, Leyte	palomponmayorsoffice@ gmail.com | (053) 555 - 0564	1st Runner-up, 2021 Para El MAR - Best Mangrove Award
Mayor's Office | LGU Del Carmen, Siargao, Surigao del Norte	gmbmenro.1501@gmail.com	Champion, 2019 Para El MAR - Best Mangrove Award
Municipal Agriculture Office | LGU Laguindingan, Misamis Oriental DENR-PENRO Misamis Oriental	(088) 855 2318	Nominee, 2019 Para El MAR - Best Mangrove Award

APPENDIX 1A

Balanga City Wetland & Nature Park

"Home of Ecological Grandeur"



City of Balanga, the capital of the Province of Bataan, is a 4th class Component City with a total land area of 11,163 hectares and a sea area of 1,230 hectares. The sea jurisdiction of the City --- which caters to small-scale sustenance fishing --- is part of the Manila Bay.

The Balanga Mangrove Forest covers about 128.43 hectares with seafront and landward planting sites. There are six (6) mangrove species found in Balanga dominated by three main species: Rhizophora Mucronata (Bakhaw Babae), Rhizophora Aniculata

Additionally, the **Mangrove Trail** was constructed in 2015. This was undertaken to protect the mangroves that serve as habitat of marine species, display the beauty of a mangrove forest, and showcase the area as one of the tourist destinations in the Province of Bataan.

To maintain the cleanliness of the mangrove area and mangrove trail, a daily coastal clean-up activity is conducted under the **ABKD Program (Ayusin,**

Mucronata (Bakhaw Babae), Rhizophora Apiculata (Bakhaw Lalaki), and Sonneratia Alba (Pagatpat). The mangrove forest serves as the natural habitat of marine resources, and rare and endangered species of flora and fauna both in marine, wetland, and terrestrial areas. It also serves as nesting and roosting ground of migratory birds which come in large numbers between the months of September to January.

In 2010, as part of its tourism project, the City Government established in Barangay Tortugas the Balanga City Wetland and Nature Park where the mangrove forest and a mangrove trail are located. While promoting the area as a tourism site, the city government has also undertaken measures to protect the mangrove areas and mudflats.

To emphasize the importance of keeping a balanced ecosystem, the City government conducts regular mangrove-planting activities that are participated in by various sectors in the community. These activities have resulted in 1,066,237 propagules planted in the coastal areas of the City.

The City Fisheries and Aquatic Resources Management Council acts as the City's caretaker of the Mangrove Nursery. This is to ensure both a sustainable supply of mangrove propagules to support the reforestation program, and a high survival rate (85%) of mangroves planted in the coastal areas.

conducted under the **ABKD Program (Ayusin, Buhayin, Kalingain...Daluyan ng Tubig Natin)** through the collaborative efforts of CENRO employees, volunteer workers from the City Fisheries and Aquatic Resources Management Council, Barangay Officials together with the City River Cleaners, and Task Force Kalikasan. Because of this initiative, 60.69% of wastes had been reduced in just a span of one year.

Task Force Kalikasan, which enjoys a strong partnership with the Bantay-Dagat and the PNP, serves as the Law-Enforcement Team which is responsible for conducting regular monitoring of the coastal areas of the city. It is also in charge of apprehending violators of illegal fishing and logging. Their efforts have increased fisher folk's fish catch by 33.91%. Also, there has been zero (0) incident of illegal fishing and logging activities from 2018 up to present.

BALANGA CITY WETLAND & NATURE PARK

Information, Education and Communication materials like leaflets and brochures are distributed to every household in the barangay. Posters and tarpaulins are installed in strategic locations in the City to raise public awareness on environmental protection and conservation.

To strengthen this, the City Government implements the **Lakbay-Kalikasan for students** --- a learning program designed to validate theoretical classroom learning about the environment by applying it in the real world. The City's **Ibong Dayo Festival,** one of the city's major festivals, is celebrated each December. It aims to raise the bar of awareness about bird life, promote public participation in conservation, and encourage the creation of more public green spaces.

Because of the effective implementation of environmental protection, conservation and rehabilitation, the City was recognized by

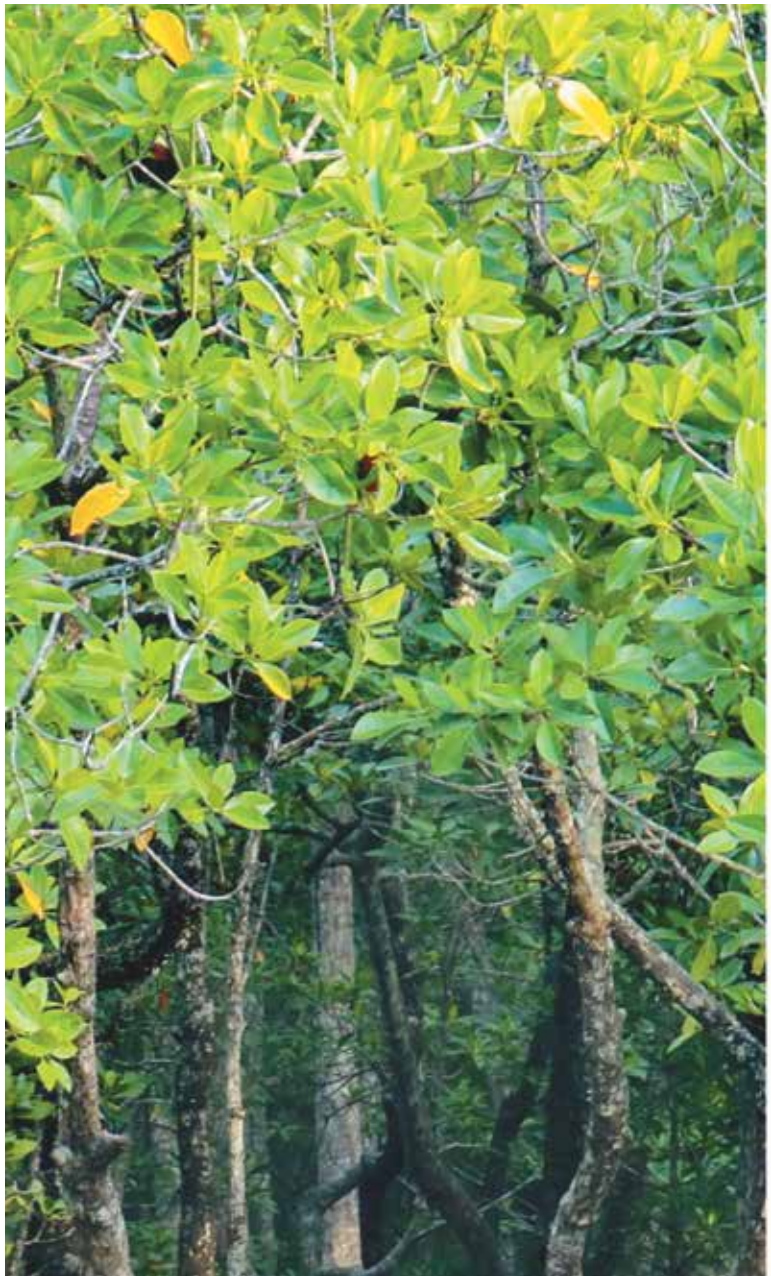
The success of the program banks on the active participation of the community, academe, NGO's, and NGAs with assistance from the Department of

rehabilitation, the City was recognized by different award giving bodies both at the Regional and National levels. Among these awards are:

- 2021 Outstanding Practices on Material Recovery Facility Operations given by the DENR/EMB
- 2021 Regional Winner, Fisheries Compliance Audit given by the DILG
- 2020 one of the Top 5 Finalists, National Manila BAYani Award
- 2019 3rd Place, National Manila BAYani award
- 2018 National Winner, Manila BAYani Award
- 2016-2020 consistent winner of the Regional Manila BAYani award given by the Department of Interior and Local Government
- 2016 1st Runner-up, Regional Search for Malinis at Masaganang Karagatan given by the Bureau of Fisheries and Aquatic Resources

NGAs with assistance from the Department of Environment and Natural Resources and Wild Bird Club of the Philippines. The active involvement and participation of multi-sector groups has elicited environmental responsibility in monitoring and taking care of our God-given bounty.

Balanga is one of the cities with the Best Mangrove area in the Philippines.



APPENDIX 1B

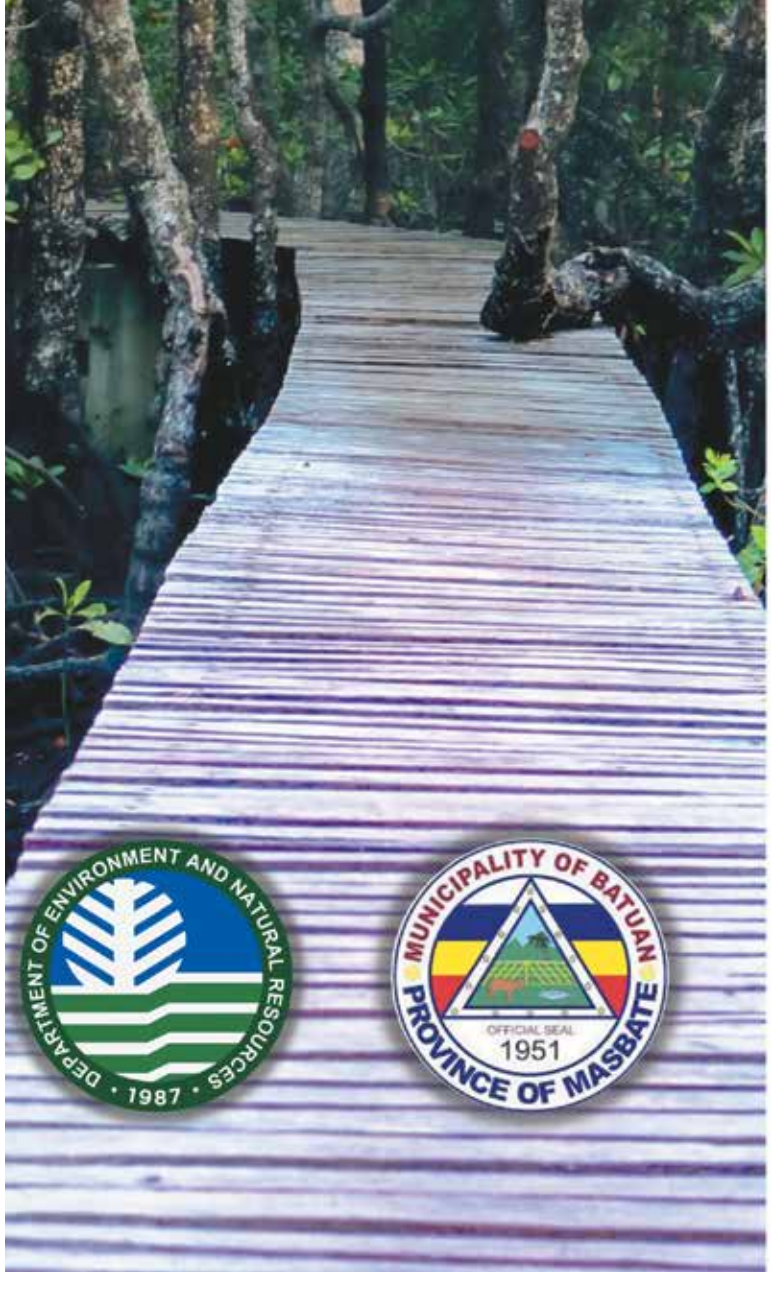
2019 PARA EL MAR Best Mangrove Award Finalist

BONGSANGLAY NATURAL PARK

Batuan, Masbate

The Bongsanglay Natural Park (BongNP) was declared first as Bongsanglay Mangrove Forest Reserve thru Presidential Proclamation No. 2152 on December 29, 1981. Then, on May 31, 2000, it has been declared as Bongsanglay Natural Park pursuant to Republic Act 7586 or the National Integrated Protected Area System (NIPAS) Proclamation No. 319. Moreover, with the enactment of Republic Act 10038 otherwise known as the Expanded NIPAS Act of 2018, BongNP was one of the 107 in the entire Philippines and one of the eleven (11) legislated Protected Areas in Bicol region.

It has a total area of 518.9 hectares and covers the barangays of Royroy and Gibraltar, municipality of Batuan, Ticao Island, Province of Masbate. Its unique features include the diverse old growth beach and mangrove forests which composed the last remaining primary growth of mangrove forests in the region. Several brackish rivers run across its mangrove forest and has white sand beaches at the upper northwestern and lower south-eastern portions of its coastline or foreshore areas.



Environmental

BongNP is ecologically rich in marine and coastal habitats such as mangrove and beach forest, seagrass, coral reef, beach/offshore sandbar and other abundant resources such as shrimp, crab, shell, and anchovy. Aside from the old growth forest, BongNP is also a home to the biggest mangrove tree in Bicol Region, the Api-api (*Avicennia officinalis*), locally known as Miyapi. It stands at a height of 7.6 meters and has a diameter of 1.35 meters. The recognition was made during the Search for the Biggest Centennial Tree in 1998 Celebration of Environment Month. Likewise, the Park also possesses high diversity of mangrove species. In fact, according to the latest inventory conducted by the DENR, a total of 26 true mangrove species and 32 mangrove associates are known to exist within the area. In addition, during the recently conducted Para El Mar site validation, experts identified Rhizophora sp, specifically Bakauan Lalaki, and Octopus tree (*Heliotropium foertherianum*) which are believed to be the biggest in the country. Biologically important flora and fauna like the endangered and threatened species of Bantigue, Gapas-gapas, sailfin lizard Visayan fanged frog can still be found in the area, notwithstanding the presence of Hoya flowers.

On the other hand, under the National Greening Program- Mangrove and Beach Forest Development Project (NGP-MBFDP), a total of 14.47 hectares of mangrove area were planted with Bakawan in year 2015. Monitoring reports of the said activity showed that the seedlings planted are well adapted to the planting site and has an average survival rate of 86% to 95 % as of December 2018.

Governance

The Department of Environment and Natural Resources (DENR) thru its field Offices, the Provincial Environment and Natural Resources Office in Masbate City and the Community Environment and Natural Resources Office (CENRO) in San Jacinto, Masbate has the administrative jurisdiction of the protected area. Likewise, a Protected Area Management and Biodiversity Conservation Unit (PAMBCU), headed by a Protected Area Superintendent (PASu), duly assisted by the Assistant PASu are designated/assigned to supervise the day to day management, protection and administration of the protected area. On the other hand, the Protected Area Management Board (PAMB) is the governing body of the PA, consisting mainly of the key officials in barangay and municipal Local Government Unit (LGU), representatives from academe, NGO, PO, NGAs and other stakeholders, with the DENR Regional Executive Director as the Chairman and the Protected Area Superintendent (PASu) as Secretariat. The PAMB convenes every quarter to discuss operational matters and issues. Proposed projects and resolutions are approved during PAMB meetings.

Resource Mobilization and Sustainability Initiatives

The DENR provides annual budget allocation for the Bong NP with corresponding target activities like PAMB meetings conducted, construction of boardwalk, look-out tower, directional signboards/signages among others. Regular Biodiversity Monitoring Survey (BMS) and LAWIN Patrolling are being conducted to monitor the biodiversity status and ensure law enforcement in the PA. Livelihood opportunities to the

the Biodiversity Friendly Enterprise (BDFE). Continuous capacity and learning events were undertaken in collaboration with concerned agencies like BFAR, DOT, DOST, DTI to the POs for the successful implementation of same. Some of the BDFE projects are oyster farming, motorized boat, floating cottage rental, production/selling of souvenir items like t shirt, ref magnet etc. The POs contribute to the sustainability of the PA through a benefit sharing scheme. The LGU of Batuan is also allocating funds from their annual budget for BongNP activities in consonance with their Integrated Coastal Resource Management Plan (ICRMP), CLUP, Ecotourism Plans etc.

Awareness Raising

Various Communication, Education and Public Awareness (CEPA) strategies were undertaken to create and increase the level of awareness of the local communities in coastal and marine resources and protected areas. Activities include barangay assemblies, production and distribution of flyers, brochures, lectures, radio programs mangrove planting activities, coastal clean-up, and citizen science activities. In addition, BongNP have facilities such as PASu Management Office and multiple use hall/kiosk as venue for these activities/ learning events and IEC. This year, orientations on sustainable eco-tourism and climate change adaptation were conducted and attended by protected area occupants, women, children and representatives from LGU and academe.

The recognition of BONGSANGLAY NATURAL PARK as one of the top 4 finalists in the Para El Mar Best Mangrove Award is both

law enforcement in the PA. Livelihood opportunities to the marginalized fisherfolks and communities were prioritized thru

top 4 finalists in the Para Ei Mal Best Mangrove Award is both an opportunity and challenge to sustainably develop and manage the area for the future generations.

DEL CARMEN MANGROVE SITE

DEL CARMEN, SIARGAO ISLANDS, SURIGAO DEL NORTE

Del Carmen is a fifth-class coastal town and one of the nine municipalities of Siargao Island part of Surigao del Norte which is also a protected landscape and seascape area under the Republic Act 11038, the E-NIPAS Act of 2018. Siargao Island has a total mangrove forest of 8,600 hectares and of these, a single forest block consisting of 4,871 hectares (one of the largest contiguous area of mangrove forests in the Philippines) is found in Del Carmen. The Del Carmen Mangrove Forest is the habitat of marine resources, migratory birds, rare and endangered species of flora and fauna both in marine, wetland, and terrestrial areas and also the Philippine Saltwater Crocodile (Crocodylus Porosus). There are 27 mangrove species found in Del Carmen and these are dominated by three main species, Rhizophora mucronata, Lumnitzera racemosa, Sonnetaria alba and Bruguiera gymnorrhiza, which are major components of the mangrove vegetation in many parts of the municipality of

Del Carmen.

In 2011, the local government unit of Del Carmen launched a Social Tourism program approach to tourism development focusing on partnerships with various organizations, environmental protection campaigns and social service delivery improvement through tourism. This became the symbol of Del Carmen Tourism and in 2013, we launched what is now known as Siargao It Up! The Del Carmen Mangrove Management Program. Its vision is to have a wholistic approach to the management of the Del Carmen Mangrove Forest, to help the illegal fishers and illegal mangrove cutters into dignified fisherfolks with better income and alleviated from poverty, and to collaborate with various stakeholders for the implementation of the Del Carmen Mangrove Management Plan. The plan was science-based as the municipality partnered with the academe to effectively preserve the mangrove forest and the plan goes bad. Another highlight of the plan was the monitoring and evaluation mechanism set in place to measure the success of the various activities.

4,871

HECTARES OF MANGROVE

FAST FACTS

27

MANGROVE SPECIES

Leading to its inception in 2013, the municipality and various organizations in 2012 conducted numerous information, education, and communication (IEC) campaign activities, using various media including film to inform people of the hazards of mangrove cutting and illegal fishing as well as its long-term impact to the livelihood of the communities. Through its partnership with people's organizations, the municipality conducted regular mangrove planting and rehabilitation in partnership with the Department of Environment and Natural Resources (DENR). The Mangrove Management programs innovative approaches to mangrove rehabilitation such as the use of mangrove propagules with coconut husks. It was found that the mangrove had a 90% survival rate with the coconut husks instead of polyethylene plastic bag and had a better and stable root system. A nursery was established for a stable supply of mangrove propagules to support the rehabilitation program. The use of this simple innovative technology resulted in an average survival rate of 80% per area planted. Bantay Dagat activities to implement law enforcement penalties and their efforts led to a 200% fish stock increase. The program also paved the way for the development of the community-based mangrove tours that provided alternative livelihood to 248 beneficiaries and

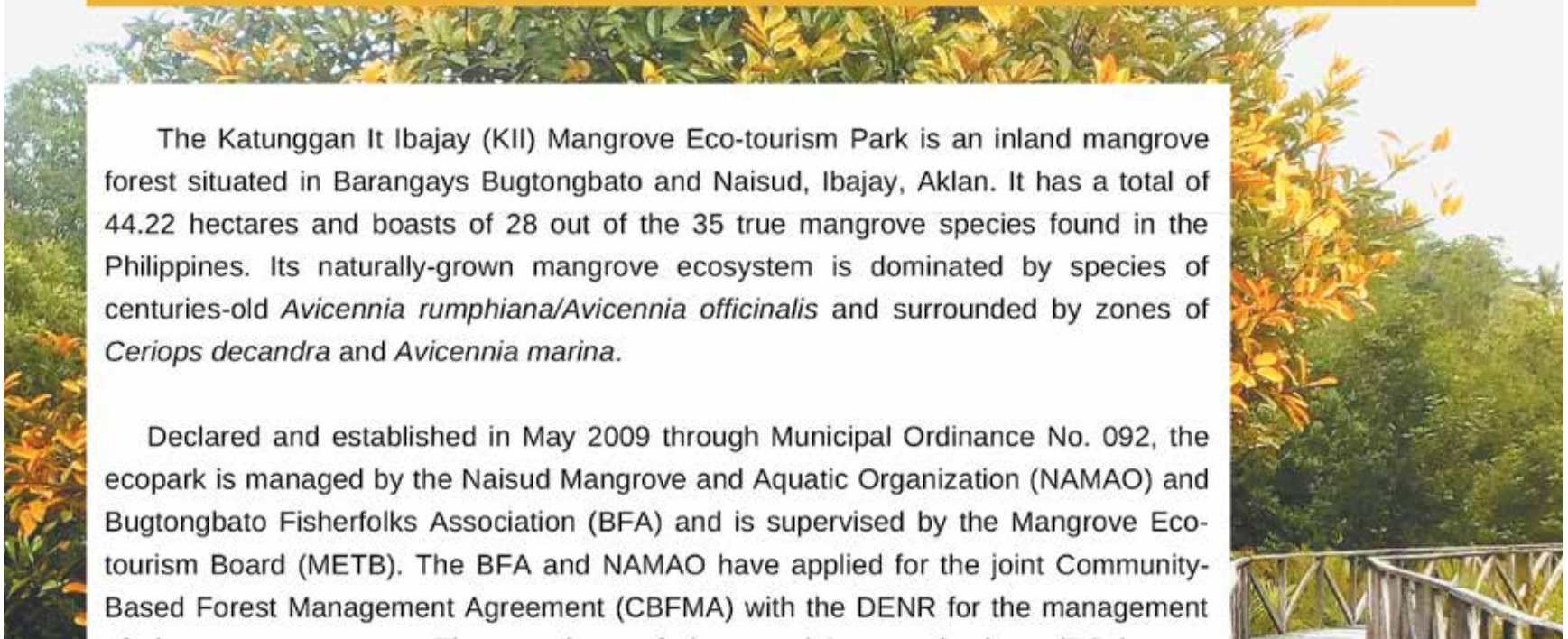
1,000 families, who are either illegal mangrove cutters and fisherfolk and those affected by commercial fishing. Mangrove eco-guides were also trained in 2016 with the support of Shore It Up and MPIC Foundation for them to be DOT certificate holders. Mangrove Protection and Information Center (MPIC) was established to serve as the tourism receiving center or the jump off point for the mangrove forest tourism tours where educational and art installations were placed about the mangrove forest, its importance and preservation.

The various initiatives under the program led to the 95% threat reduction of mangrove cutting and 90% decrease in illegal fishing based on a report of Bantay Dagat from 2014-2018. Currently, the Municipality of Del Carmen received several key recognitions such as DILG Seal of Good Local Governance for 2016, 2017, and 2018; GGGI Climate Champion for Mangrove Management for 2015; DOT/ATOP 2nd Best Tourism Event of Pearl Awards in 2014 and the 2018 Galing Pook Awards on Mangrove Management thru Social Tourism. During the 2019 United Nations General Assembly and Climate Week, LGU Del Carmen shared its story of the mangrove and fishery program in various events and forums.

APPENDIX 1D

KATUNGGAN IT IBAJAY (KII) MANGROVE ECO-TOURISM PARK

Bugtongbato-Naisud, Ibajay, Aklan



The Katunggan It Ibajay (KII) Mangrove Eco-tourism Park is an inland mangrove forest situated in Barangays Bugtongbato and Naisud, Ibajay, Aklan. It has a total of 44.22 hectares and boasts of 28 out of the 35 true mangrove species found in the Philippines. Its naturally-grown mangrove ecosystem is dominated by species of centuries-old *Avicennia rumphiana/Avicennia officinalis* and surrounded by zones of *Ceriops decandra* and *Avicennia marina*.

Declared and established in May 2009 through Municipal Ordinance No. 092, the ecopark is managed by the Naisud Mangrove and Aquatic Organization (NAMAO) and Bugtongbato Fisherfolks Association (BFA) and is supervised by the Mangrove Eco-tourism Board (METB). The BFA and NAMAO have applied for the joint Community-Based Forest Management Agreement (CBFMA) with the DENR for the management

of the mangrove area. The members of the people's organizations (POs) are fishermen, housewives and barangay officials. Both POs are registered with the Department of Labor and Employment (DOLE).

These POs are capacitated with trainings on mangrove identification and tagging, catering, tour guiding, bookkeeping, and marketing of souvenir items by our partners, the Zoological Society of London (ZSL) and the Aklan State University (ASU).

POs obtain income through their share from entrance fees, tour guiding services, catering services, selling of souvenir items, selling of mangrove seedlings, and selling of boat fuels to local fishers.

Launched in January 2010, the ecopark is visited by local and foreign tourists, students, researchers, scientists and local residents. Research studies have been conducted by the Southeast Asian Fisheries Development Center-Aquaculture Department, Zoological Society of London (ZSL), Aklan State University (ASU), Department of Environment and Natural Resources (DENR) and other research institutions in the area. Because of its diverse ecological assets, it has become one of the Centers of Learning (CoL) of the ZSL.

The KII is one of the major tourist attractions in the Municipality of Ibajay and the local government continues to promote it through brochures, posters, social media (Turismo Ibajay Facebook Page), participation in tourism fairs and production of promotional videos.

KII's 2- kilometer footbridge invites guests to take an informative and enjoyable eco-friendly walk along the footbridge and to go sightseeing on the different characteristics of the various mangrove species. The piag-ao (*Xylocarpus moluccensis*) leaves turn yellow orange and red, and the foliage eventually sheds in January. Tabigi (*Xylocarpus granatum*) seeds, when opened, have a maze-like feature.

At the innermost part of the park, beside the footbridge, is an avenue of about 60 large, centuries-old *Avicennia rumphiana* trees locally known as Bungalon/Apiapi/Piyapi. One of it is the crown jewel that stands vigorously with a girth of 8 meters (26 feet) and height of 20 meters (66 feet) and is about 750 years old.

Aside from watching fiddler crabs, mud skippers, mud lobster, lobster mounds, and birds along the walk, guests may also try boating and fishing in the ecopark.

KII's footbridge was initially constructed by the local government. Financial assistance from the SEAFDEC, ZSL, Provincial Government of Aklan, TIEZA, and the

Office of Senator Loren Legarda, as well as the contributions of the POs in labor has realized the completion of the project.

The KII also has a Multi-purpose Function Hall constructed by the Tourism Infrastructure and Enterprise Zone Authority (TIEZA). It serves as the entrance/information area for guests. The function hall can accommodate hundreds of visitors and also serve as venue for meetings, conferences, wedding reception, and birthday parties for a fee.

KII not only serves as habitat for various flora and fauna but studies proved that its mangrove could sequester and store substantial amount of carbon in the soil which contributes to environmental conservation and helps in mitigating the impacts of climate change and habitat loss.

Giving importance to its ecological value, the local government continues to create sustainable programs, intensify information and education campaign (IEC), enforce legal actions, strategize promotion, and train enough manpower to conserve and protect this pristine mangrove forest.

APPENDIX 1E

PRIETO DIAZ MANGROVE ECOSYSTEM
Protected Area

A joint publication of DENR – PENRO, Sorsogon, LGU-Prieto Diaz, Sorsogon and SEAMANCOR Ecodeveloper's, Inc., August 25, 2021.

The Municipality of Prieto Diaz is a fifth-class town in the province of Sorsogon, Philippines, situated in the northeastern tip with coordinates 13°00' – 13°12' East longitude and 124°10'– 124°11'North latitude. It is bounded in the west by Bacon District in Sorsogon City, south by the Municipality of Gubat, and in northern and eastern side by the Philippine Sea. It is 615 km southeast of Manila and 20 km north-north east of Sorsogon City, the provincial capital.

Prieto Diaz Mangrove Ecosystem –Protected Area

Prieto Diaz is endowed with vast mangrove forest that can be found in its 19 coastal barangays that are cared for by the local fishermen, Local Government Unit (LGU), NGAs, NGOs, POs including the **SEAMANCOR Eco-Developers, Inc.**, the community and environmental advocates. The mangrove area of Prieto Diaz covers 1,034 hectares and has two ecosystems: the natural mangrove stand and the mangrove plantation. There are 28 species of mangroves which belong to 11 genera and are rated EXCELLENT in condition based on the evaluation done during the **Participatory Resource and Socio-economic Assessment** (**PRSA**) by the FishCoral Project and Bicol University, Legazpi City in CY 2019. Bungalon, scientifically named ***Avicennia marina*** dominates the plantation by covering 35% of the total individuals species measured in the natural stand.

The top three (3) abundant species of mangroves are Bakawan Bato *or Rhizophora stylosa,* Pagatpat *or Sonneratia caseolaris and* Bungalon or *Avicennia marina.* While the most unique flora are *Gapas – gapas, Bakauan*

babae and Bakauan bato. Gapas-gapas or *Camptostemon philippinensis (Vidal) Becc. Is endangered species based on IUCN category and list of endangered species.*

The MOTHER of the Sea

Prieto Diaz Mangrove Ecosystem - Protected Area is considered the widest mangrove forest in the entire Bicol Region. The presence of the three major marine ecosystems — the mangrove, sea grass and coral reefs - make it a rich breeding ground for fish and crustaceans. As the three ecosystems work together, they provide more protection and keep the coastal zones healthy.

The people of Prieto Diaz treat the mangrove forest as **"mother of the sea"**. Like mothers, the mangroves provide shelter to more juvenile fishes and provide them a great source of livelihood. Prieto Diaz is known for the **Ananakla** *(Crayfish)*, **An-it** or **King Crab (***Mangrove Crab***), Lobster, Kamuntaha** *(Mantis shrimp)* **and Danggit** *(Rabbit Fish)*, and many **shell fishes.**

Likewise, as Mother of the sea, it provides shelter to marine life forms, and serves as natural barrier and buffer to communities during typhoons and storm surges; it also prevents coastal erosion and filters wastes from the upland. It belongs to the community, and in return, the people embraces it with honor and pride.

*Google Map Link: https://www.google.com/maps/d/u/0/edit?mid=1Z8BzefiCLUtbVXVUNgAkUhD1O3RdA_AY&usp=sharing

25-year Mangrove Stewardship Agreement to SEAMANCOR Eco-Developers Inc.

On December 17, 1995, the DENR through its research arm, the Ecosystems Research and Development Service (ERDS) awarded a 25-year Mangrove Stewardship Agreement (MSA) to SEAMANCOR Eco-Developers Inc., for a co-management agreement with the LGU towards protection, conservation, management of the mangrove ecosystem. The MSA covers an area of 500 hectares, within which the people's organization, the SEAMANCOR provides rehabilitation, reforestation and protection. Today, that 500-hectare mangrove forest provides a home to diverse species of flora and fauna: 21 mangroves species and 31 beach forest trees and associates and more sea fishes. At present, SEAMANCOR is one of the successful PO's to have sustained its livelihood projects of selling of propagules, danggit processing and promotion, catering services, educational and eco-adventure tour and tour packaging.

SUSTAINABLE MANAGEMENT STRATEGIES

The Municipal Mayor, Benito L. Doma has a strong belief that "the best resources managers are the community themselves; they have access and control over the resources and as a result, they reap the benefits and gain from the resources they manage and protect."

Employed management Strategies are:

Community Organizing which allows the locals / community to embrace the responsibility of protecting, conserving and managing the resources;

Information, education and communication including Capability Building and Advocacy Campaigns which increase the knowledge and level of awareness of the community and stakeholders;

Research and Development which regularly monitors status of the resources. R and D pave the way to the establishment of Seed Production Area (SPA) which is the source of quality propagules and establishment of MANGROVETUM, a

place where different species of mangroves thrive;

Livelihood development and promotion which provide alternative sources of income and deviation of community from too much dependency on mangroves and coastal resources;

Monitoring and Evaluation recommend actions, improvement, and ways forward aiming for sustainability of resources;

Policy Formulation which leads to passing of ordinances and resolutions, as well as, local proclamation of the Protected Area; and

Law Enforcement coupled with **Political Will** which significantly decreases rate of cases to zero apprehension and confiscation cases (2021).

IMPACT

In 1993, the municipality of Prieto Diaz had pressing issues and problems. The late RTD Pobleo M. Florece of DENR 5, Legazpi City, in his publication entitled, *"People Empowerment: Means and End of Coastal Resources Management in Prieto Diaz, Sorsogon"* attested that the residents in the project site generally lack knowledge about the resources and the sensitivity of their resources; thus, they are unable to effectively conserve them.

Furthermore, he said that environmental problems are serious which included violation of forestry laws. However, today we see the community empowered. There is a high degree of social acceptability on the environmental dynamics. People have a strong commitment for sustainable resources management and had established self - reliance by developing eco- friendly enterprises, thus generating income from therein.

A strong partnership through convergent effort with different sectors provided their respective input towards the sustainability of the program. This concerted effort significantly contributes to biodiversity improvement; therefore there is an abundance of marine products and an increase in yield.

Today, the coastal communities in Prieto Diaz are enjoying the honor and pride for what they had achieved. This is a big boost to their morale, and consequently, the dignity of the fishermen and their families continues to be upheld. (Judy Gavarra - Doma, PLOIII, PENRO Sorsogon)

APPENDIX 1F

Silonay Mangrove Conservation Ecopark

Barangay Silonay - Calapan City
Oriental Mindoro

Open 7:00am - 5:00pm Daily

A COMMUNITY MANAGED ECOPARK

Creating an Ecopark

Established by a City Fisheries Ordinance in 2011, Silonay Mangrove Conservation Ecopark is largest of its kind in Oriental Mindoro. It is a proud part of the provincial and Verde Island Passage-wide (VIP) network of marine protected areas. Located a mere 5 km from Calapan City Port, this ecopark covers 41 hectares in barangay Silonay. Silonay is host to a high amount of biodiversity: 15 recorded species of mangrove dominated by (*Sonneratia alba*), 29 species of birds 7 of which are endemic to the Philippines (Philippine Duck, White-eared Brown Dove, Philippine Coucal, Philippine Nightjar, Pygmy swiftlet, Lemon-throated Leaf-warbler and Colet), 2 species of bats (the Long-tongued Nectar Bat and Musky Fruit Bat), and 5 species of amphibian and reptile. Biodiversity Friendly Enterprises include a mangrove walkway tour complete with a watchtower, kayaking, mangrove nursery and planting activities, and an ever-expanding list of close-to-nature activities that are managed by a community-based people's organization with support from NGO's and the local government.

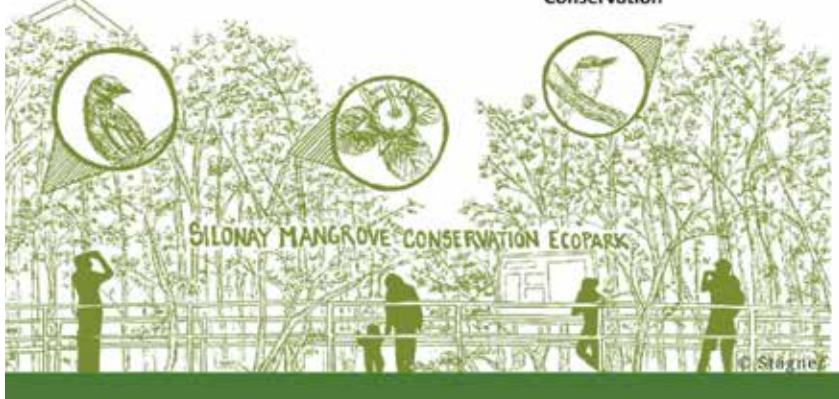
PLANTING SEEDS OF CONSERVATION

Together in Community

Sama-samang Nagkakaisang Pamayanan ng Silonay (SNPS) which roughly translates to 'a community united in helping one another' is the local people's organization in-charge of Silonay Mangrove Conservation Ecopark. SNPS is composed of fishers, barangay officials, Bantay Bakawan (mangrove guardians), housewives, youth and senior citizens. Established in 2007, SNPS is cultivating this ecopark to be an ideal model for ecosystem-based adaptation to climate change and conservation.

The SNPS Mission

. Protect and enrich the environment and biodiversity
. Improve the quality of life and local livelihoods
. Instill a love for nature among the youth
. Empower women and facilitate their development
. Develop the skills and capacity to adapt to climate change



Environmental Education

Silonay Mangrove Conservation Ecopark is the venue for the City Fisheries Management Office's Environmental Awareness Time (EAT). Beginning in 2014, these EATs are an opportunity to educate more than 500 local students annually about a variety of environmental subjects. Beginning with a lesson on Calapan City's three MPAs: Silonay Mangrove Conservation Ecopark (41 ha), Calero-Salong Seagrass and Corals MPA (107 ha), and Harka Piloto Fish Sanctuary (37 ha) Then moving to the importance of critical marine ecosystems: mangroves, seagrass beds, and corals, their function, importance, intrinsic value, livelihood potential, and the detrimental effects of anthropogenic activities, students get a fully immersive environmental education within the nature we hope they will aspire to protect. There is a section on Solid Waste Management (SWM) focusing on the four R's (Refuse, Reduce, Recycle, Reuse) and finish with a lesson on climate change. Being the venue for EATs is important because it gives direct context for what conservation can achieve. If your group or institution is interested in Environmental Education, please contact us and we will happily arrange a meeting.

BIODIVERSITY FRIENDLY ENTERPRISES

Mangrove Ecotours

Our 350 m concrete **mangrove walkway** entices guests to immerse themselves in the beauty of our mangrove forest in an eco-friendly way. The walkway ends at a three-story watchtower with a spiral staircase which allows visitors to rise above the mangrove canopy and experience a breathtaking sprawling view of more than half a million mangrove trees.

For those interested in learning more about wildlife we also offer **birdwatching tours**, led by one of our knowledgeable ecotourism guides. To enhance your birding venture binoculars are available for rent upon request at our visitor center.

Perhaps your dream visit also includes something a little more adventurous? We have you covered with our guided **kayaking tours**. Kayak through the rivers of our ecopark and all the way to the ocean while the sun filters through the arching branches of our mangroves. Kayaking in a forest is truly a magical experience.

By offering a variety of engaging activities that promote proper ecosystem care and management we hope to inspire a reverence for nature.

Honey Production

One ecologically vital and agro-based enterprise practice featured at the Ecopark is meliponiculture, or the raising of stingless bees (*Trigona biroi*). This has been a wonderful addition to the sustainability efforts of SNPS staff. With a gathering range of 500 m and an average lifespan of 3-5 days, worker bees are able to live comfortably in the flowering plant-rich environment of Silonay's mangrove forest. An individual bee colony is able to produce ~3 kilograms of honey annually and is harvested every 5 months. The mangrove honey is bottled onsite, and given the name Lukot Honey for its unique stingless bee origins.

Eco-Conscious Catering

'Kainan sa Bakawan' or Food in the Mangroves, is the SNPS catering service available for those who wish to have their event either in our outdoor covered meeting area or enjoyed offsite. Every effort is made to minimize the use of single use plastics. Food is served buffet style while snacks are wrapped in banana leaves or paper. Savor the cool crisp sweetness of our very own signature drink while relaxing in the knowledge that your event is being handled in an eco-conscious way.

Mangrove Nursery

More than 50% of mangroves have been lost in the Philippines because of land development, pollution, deforestation for fuel and climate change according to the Zoological Society of London. We implement a science-based mangrove rehabilitation program to assist in combating this staggering habitat loss. We offer workshops in mangrove nursery establishment and management workshops and offer seedlings and propagules for purchase.

A DYNAMIC VENUE

Event Hosting

An array of events can be held at Silonay Mangrove Conservation Ecopark, our outside covered meeting area is perfect for sunny or rainy weather and can accommodate up to 50 people comfortably and if you require additional seating the boardwalk itself has served as seating for larger events. We have held private, public, educational, and government events.

COMBATING CLIMATE CHANGE

Blue Carbon

Located on the Verde Island Passage, Silonay is an ideal demonstration site for blue carbon. Blue carbon is the term for carbon capured by marine ecosystems. In a recent study by Conservation International Philippines the forests of Silonay have an average carbon stock of 579.73 Mg C/ha. Silonay's coastal mangroves are particularly carbon-dense storing 4-5x the amount of carbon as terrestrial forests. Carbon sequestering is vital to combating global climate change.

CONTACT US

Silonay Mangrove Conservation Ecopark

0915 572 6064 / 0917 855 5854

APPENDIX 1G

1ST BEST MANGROVE AWARD
FINALIST

SUYAC ISLAND
MANGROVE FOREST
SAGAY MARINE RESERVE

Brgy. Taba-ao, Sagay City
Negros Occidental, Region VI

Sagay City is the home of the 32,000 hectares protected seascape, Sagay Marine Reserve where the project site - Suyac Island Mangrove Forest is also located.

It is a pro-environment, pro-community eco-tourism project in line with the sustainable tourism program of the City. This is the first mangrove eco-park and community-based eco-tourism project in Sagay City recommended by Dr. Jurgenne Primavera.

Suyac Island in Sagay City is a 1.8-hectare island surrounded by a 15.5 mangrove forest cover consisting of nine mangrove species, 6 seagrass species, more than 2 thousand flying foxes and a population of 751 with 138 households mostly dependent on fishing.

Through this project, it has helped stir up conservation change in the community, promoted sense of pride of place, raised up community champions for the environment, increased appreciation of the mangrove ecosystem, and promoted sustainable development in the island. It also has partnered with the local school to further promote inter-generational thinking towards making the island, destination for the next generations.

Objectives:

- To protect this very important ecosystem ; a bio-diversity conservation strategy
- To raise up community champions for the environment.
- To have the paradigm shift – from bench warmers to active participators of community development.
- To have a sustainable, bio-diversity friendly livelihood enterprise.
- A start-up laboratory for sustainable tourism program.
- To be a center of learning

True community-based eco-tourism framework incorporates three major components: nature-based, educational and

Among our environmental programs:

- Conduct of regular patrolling of the area
- Implementation of No cutting of mangrove trees
- Conduct of bat counts regularly
- Conduct of mangrove assessment regularly
- Implementation of responsible tourism policy.
- Establishment of mangrove nursery and crafting of mangrove rehabilitation plan
- Launching of Social Marketing Pride Campaign
- Conduct of yearly evaluation and assessment to all members (Written, Oral and Practical)

Economic . Suyac Island Mangrove Eco Park is being managed by a community Association who are residents of the island. Total gross income from 2013 to 2018 is P4,568.839.00 with savings in the bank in the amount of P582,409.75.

Sustainability. Sagay City embarked on sustainable tourism development and Suyac Island Mangrove Eco-Park, a community-based eco-tourism project is the result of this thrust. Our guiding principle "tourism enriches, protects and helps build communities." Suyac is a pilot site because we plan to

three major components: "nature based, educational and sustainable management. Using these parameters as to the level effectiveness and efficiency in the implementation, the descriptions are:

Nature-based. Suyac Island is the home of one of the beautiful mangrove forest with more than a thousand bats roosting on this island. It is part of the 32,000 hectare protected seascape and is under the NIPAS Protected Area, and Sagay Marine Reserve law. This site was strongly recommended to be a priority site by Dr. Jurgenne Primavera during her visit in Sagay in 2010.

Educational. Eco-tourism seeks to promote responsible travel; hence education here means promotion of responsible travel. Rules and regulations and code of conduct were discussed and instituted. The Association members are enforcing responsible travel policy and are trained to conduct briefing for every guests to ensure this valuable information presented.

Sustainable Management. There are at least four significant issues of sustainability. These are:

Environment. Environmental preservation and sustained resource management are crucial in this project. Site development requires strictly no cutting of mangroves during construction. Implement low volume, high value policy, observes consider carrying capacity, conduct of responsible paddling tour, garbage in and out, basic responsible tourism rule and empowering the community to become protectors of these resources. With the launching of social marketing pride campaign in 2013 with the help of GIZ and Rare aided us in our efforts to sustain the environmental advocacy, we saw the behavioral change of the residents. The Association members were also trained by the Philippine Bio-diversity Conservation Foundation how to do bat monitoring and counting. The Zoological Society of London, SMR and DENR have also helped train members and have been conducting resource assessment, crafting of mangrove rehabilitation plan and protection.

build communities." Suyac is a pilot site because we plan to replicate the program to other loops to be created within the reserve which has compelling natural attractions and the existence of community residents. To ensure sustainability, we have these gains:

Local Community Involvement. At first the community were overly apprehensive of this project to the point we felt unwelcome. They feared of the negative impacts of tourism as they saw it in more popular places. They also felt that the LGU will grab the island from them. We went down to the grassroots level and presented the project during the consultation. Initially only 20 enlisted but later it grew to 45. Majority of the community were involved in the whole process: from planning,
information gathering, consultation, implementation, etc. This participatory approach ensures sense of ownership.

Decision Making. The members of the Association were given the call to make all the decisions with the following guiding questions: *Is it good for the environment? Is it good for the community? Is it good for the Association?*

Social Protection. Respecting the sensibility of the community in the eco-park and in the island is being strictly observed. We are working on making the eco-park Child Safe as we don't allow drinking of liquor no wearing of skimpy two-piece swim apparel, protection of women and children among others.

Resiliency. Initiated planning and training on disaster preparedness. Conducted Drowning Prevention Awareness Workshop among others.

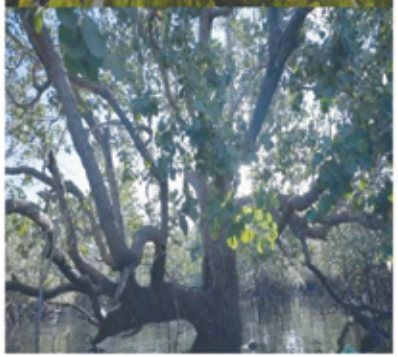
We have mainstreamed bio-diversity conservation and knowledge to the community and have raised them to become active participators in the management of the said mangrove eco-park.In our partnership with the Suyac Elementary School, we have also institutionalized student program dubbed as "Suyac Junior Eco-patrol" and have trained them as young advocates and have raised the awareness on the appreciation of the precious ecosystem. The crux of the program is the community – from being grossly negative to that of having the heart for the environment. This is the intangible milestone of the gains of the program.

The program was also awarded by ATOP DOT Best Tourism Practices Award in 2017 and 2018.

APPENDIX 1H

The Mangroves of Tres Marias in Palompon: Resurgence and Resilience

The Tres Marias are a group of islets fronting the southern coastal shores of the Municipality of Palompon, namely: *Tabuk, Gumalac* and *Cabgan*. The islets cover about 449 hectares with its surrounding lands and foreshore flats uncovered during low tides that are home to 9 species of mangrove forest trees predominated by *Soneratia alba (Pagatpat*), *Avicenia marina (Miapi), Rhizphora apiculata (Bakhaw lalaki), R. mucronata (Bakhaw babaye), and R. stylosa (Bakhaw bato), 8* species of seagrass including *Cymodocea serrulata, halodule uninervis*, (CLUP, 2018), 36 hard coral genera with 4 species listed in the ZSL's Evolutionary Distinct and Globally Endangered (EDGE) hard coral species list (Tuang-tuang, 2021), giant clams, imbao and helmet shellfish, *23* seaweeds species of economic value, 40 species of migratory and endemic birds including asian curlews, sandpipers, mongolian plovers, chinese egret, whimbrels, mallards and herons (SNS, 2000), and 6 species of fruit bats including the largest species, the golden-crowned flying fox (*acerodon jubatos*). Palompon itself is derivative of the visayan word "*paungpong*" or cluster, as in cluster of mangrove propagules. An over-washed type of mangrove forest with excellent water quality value of seas, Tres Marias serve as a rich source of food, a natural barrier and protective shield from storm surge, destructive winds and extreme events.



Responding to Creeping Environmental Crisis

Decades of wanton harvesting, indiscriminate tree cutting, utilizing mangroves as firewood and charcoal, and uprooting of young mangroves in order to collect shellfish, have put Palompon on the verge of environmental catastrophe. The long years of human abuse and government neglect have taken a toll at Tres Marias: deforested, denuded and degraded. Fishers complained of low fish catch. Consumers grumble on the high market prices of fish. Past efforts of enforcing laws were marred with controversies and questions.

Things began to change in 1995. Focused initiatives on coastal environment and fishery resource management were implemented. The guardians of the sea, the Human and Ecological Security (HES) Commission, now Group, was organized and deputized as Fish Wardens.

Innovative legislations were enacted, namely: *Declaring Tabuk as Marine Park and Fish and Bird Sanctuary* (now Wildlife Sanctuary), designating the island as a No Take Zone area, the *Banning of Catching Danggit (siganid) during its Spawning Season*, the *Regulations on Superlight and Other Destructive Fishing Methods and Practices*, and *Total Ban on the Extraction of Sand and Corals in Tabuk and Banbanon or Gumalac Islets*. Extensive efforts at raising public consciousness on nature conservation and sustainable development were pursued to address the pockets of resistance and fears of the affected locals and fishers. Enforcement was dedicated to educating marginal fishers with violators reprimanded and censured then later on, sanctions were imposed with cases filed and won. Wide consultations were also conducted and sustained. *Alay Lakad* was transformed into a regular garbage removal activity. Mobilizing support from the public gained traction, and continually sustained through participatory approaches, all these years.

Bantay Danggit is observed, and still done annually, on the 4th, 5th, and 6th moon of February, March and April, with volunteers tarrying, to ensure no fishing. The municipality organized communities and provided technical support and financial assistance for supplementary livelihood endeavors. People from all walks of life participated in *Alay Tanim sa Gumalac*. Though barely 1% survived, such was a pleasant realization that mangrove growing requires ample knowledge on seedling production, nursery management and site-appropriate specie selection. Thence, reforestation efforts improved with higher survival rates and more trees grown. In 2000, the Municipal Environment and Natural Resources Office (MENRO) was established as full department with regular personnel complement and adequate budget ensuring program continuity and sustainability.

Amazing Results and Awards Received

With serious attention, destructive fishing methods stopped. Cutting of mangroves addressed. Mature mangroves protected. Trees grown and forest cover expanded. Resource use effectively managed. Marine life abounded. Yield improved. Fish catch per unit effort increased. Surprisingly, wildlife teemed. Biodiversity enhanced. Birds flying the East Asian Migration flyway feed and roost in Tres Marias, making it as site for ornithological exploration and of international importance for shorebirds. Tabuk is now a refuge of fruit bats. Civil servants, eco-travelers, bird watchers and dive enthusiasts visit to learn about the miracle at sea.

Education is now integral in the coastal environment program with schools fully engaged. Barangays have established their marine sanctuaries with barangay tanods serving as force multiplier in sea patrols. New

policies on coastal and fishery resources are put in place. Civil society groups continue to do their share in environmental affairs. DENR recommended Tres Marias as Protected Seascape under NIPAS. In 2013, resilience was tested when typhoon Yolanda destroyed everything in its path but ***Tres Marias protected Palomponganons from the onslaught of storm surge and, while the mangroves were damaged, Tres Marias recovered fast***. The initiative of Palompon has evolved from simply stopping illegal fishing to pursuing nature conservation to ensuring fishery production to attaining ecological restoration to achieving social amelioration and to securing sustainably liberating development.

Palompon was recognized Outstanding Municipality, twice recognized for Gawad Galing Pook, Best Community-based Resource Management Project, Best Coastal Municipality of the Philippines, Seal of Good Local Governance, CLAD Award, Best Tourism-oriented Municipality, Malinis and Masaganang Karagatan (MMK) national winner for sustainable fisheries management. CSC recognized the HES with Pag-asa Award. Tres Marias is a learning site on environmental governance, a study area of the academe including foreign universities and the preferred eco-destination. The experience of Palompon has been shared in many government events, conferences, and training-workshops. It has been featured in blogs, print and broadcast media, including PDI, PhilStar, Sunstar dailies, the Probe Team, Born To Be Wild, I-Witness programs of GMA 7, the Living Asia Channel, then ABS-CBN Channel 2 and NBN/PTV 4.

With purposive governmental action and meaningful community participation, nature in Tres Marias showed its resurgence and resilience with its healthy ecosystems - *colorful corals, magnificent mangroves and soft-bottom communities of seagrass beds* – **functionally support life-sustaining processes**. Notably, **people now, with an improved quality of life, demonstrate appreciative care for the natural environment**.

When people seriously involve and work for nature, beneficial results are truly amazing!

APPENDIX 2. LAWS ON MANGROVE PROTECTION AND MANGROVE ECOPARKS

A. NATIONAL LAWS

General: Mangrove Protection, etc.

BFD AO 2 (1979) – Minimum 25% of given mangrove forest declared completely protected as mangrove Wilderness Areas

Pres. Proc. 2146 (1982) – Prohibition on mangrove cutting throughout country

RA 7161 (1991) – Internal Revenue Code: Ban on cutting of all mangrove species

RA No 7586 (1992) – Pursued the protection of the remaining mangrove resources through the declaration of several mangrove wilderness areas and mangrove swamp forest reserves as protected areas

RA 7942 – Provides restrictions on areas closed to mining such as old growth or virgin forest reserves, wilderness areas, mangrove forests, mossy forests, national parks, provincial/ municipal forests, parks, greenbelts, game refuge and bird sanctuaries as defined by law and in areas prohibited by NIPAS and penalties

RA 8550 (1998) – Fisheries Code: Prohibits mangrove conversion to fishponds, etc.; mangroves suitable for fishery use shall not be disposed or alienated; current FLA leases entitled to 25-yr extension, thereafter preference to fisherfolk and small/ medium enterprises; DENR with DA, LGUs, etc. to determine abandoned, underdeveloped or underutilized FLA ponds for reversion

RA 11038 (2018) E-NIPAS – Declaring Protected Areas and Providing for their Management, Amending … Republic Act No. 7586, Otherwise Known as the … NIPAS Act of 1992

For Specific Areas

RA 366 (1946) - Granting to the Municipality of Leganes, Province of Iloilo, the usufruct of a certain parcel of land of the public domain situated in the said province, for communal purposes

Pres. Proc. 2151 & 2152 (1981) – Declaration of 4,326 ha of mangrove as wilderness areas and 74,767 ha (including entire Palawan province) as forest reserves

RA 9106 (Sagay Marine Reserve Law, 2001)

RA 113651 (2018) declaring the Balanga Wetland and Nature Park as Ecotourism Zone

B. LOCAL ORDINANCES

Balanga City, Bataan

SP Resolution No. 34 (2011) - Endorsing 8.64 hectares in Bgy. Tortugas, city of Balanga as Critical Habitat

City Ordinance No. 24 (2019) - Amending City Ordinance No. 184, s. 2006, otherwise known as "an ordinance declaring the coastal areas of Barangay Sibacan, Pto. Rivas Ibaba and Tortugas, City of Balanga, Bataan, as birds and fish sanctuary"

SP Resolution No. 092 (2019) - Endorsing and promoting the use of baskets and other reusable bags at the Balanga City public market

SP Resolution No. 113 (2019) - Declaring everyday as Plastic Holiday

Del Carmen, Siargao

Resolution No. 70 (2012) – Bakhaw Festival as the official festivity of the municipality of Del Carmen, province of Surigao del Norte every 16th day of July every year

Resolution No. 1 (2013) – Declaring the whole Del Carmen Mangrove Forest measured 4,180 hectares … as a Crocodile Sanctuary in the Municipality of Del Carmen, Province of Surigao del Norte

Resolution No. 34 (2019) – Adopting the 3-year Coastal Resource Management Plan CY 2016-2018 of the Municipality of Del Carmen, Province of Surigao del Norte

Resolution No. 1 (2013) – Adopting the 3-year Management Plan CY 2016-2018 of the Municipality of Del Carmen, Province of Surigao del Norte

Ibajay, Aklan

Municipal Ordinance 092 (2009) – Declaring and establishing the forty four and 22/100 (44.22) hectares of mangroves in Barangays Bugtongbato and Naisud, this Municipality (20 May 2009)

Municipal Ordinance 196 (2011) – Prescribing the fees and charges at the Katunggan It Ibajay (Mangrove Eco-Tourism Park), Bugtongbato-Naisud, Ibajay, Aklan (2 Nov. 2011)

Leganes, Iloilo

SB Resolution No. 99-129 (1999) – Approving Ordinance 004 impounding stray animals such as dogs, goats, etc., from roaming in all places in Poblacion Leganes, Iloilo

SB Ordinance 2011-227 (2011) – Declaring the mangrove protected areas in the municipality of Leganes

SB Ordinance 2021-502 (2021) – Declaring and establishing the Leganes Integrated Ecopark in Barangays Nabitasan and Gua-an, Leganes, Iloilo

Palompon, Leyte

Municipal Ordinance 228-021095 - Declaring Tabuk Is. as Marine Park and Wildlife Sanctuary

Municipal Ordinance 228-081203 - Comprehensive Municipal Fisheries Code

Silonay, Calapan, Oriental Mindoro

Barangay Ordinance No. 09 (2017) – "*Ipagbawal ang pagpasok sa* Marine Protected Area (MPA) *ng Barangay Silonay sa hindi tamang pasukan at walang pahintulot ng Barangay.*"

Calapan City, Oriental Mindoro

Calapan City Resolution No. 390, Ord. No. 10, Sec. 10 – Marine Protected Area/ Mangrove Forest

Calapan City Fisheries Ordinance (2011) – established Silonay Mangrove Conservation Ecopark

RA – Republic Act, SB – Sangguniang Bayan, SP - Sangguniang Panlungsod

APPENDIX 3

APPENDIX 3 - CRM PLAN, MPA PLAN & MANGROVE MANAGEMENT PLAN OF DEL CARMEN, SURIGAO DEL NORTE, 2019-2022 (page 1 only)

Del Carmen Coastal Resource Management Plan 2019-2022

OBJECTIVE 1: To promote IEC Advocacy through Radio Kabakhawan and increased environmental awareness campaign.

ACTIVITIES	INDICATOR	OUTPUT	USE OF OUTPUT	TIME FRAME	RESPONSIBLE PERSON/ AGENCY	RESOURCES NEEDED	BUDGETARY REQUIREMENT (P)
Radio Broadcasting	Active community and school participation and involvement	Increased number in participants Awareness on environmental issues	Information transfer to family members and communities	January 2019-2022	Extension Service Officer (SSCT)	Radio Station, Anchor	50,000.00/Year
Lecture through school programs						Speaker/ Resource Person	
Design and Develop IEC Materials	Developed and posted 20 signage's and billboards (Stop Illegal Fishing Activities)				SSCT-IT	Computer Unit, Printer, papers, Paper markers	
Annual Bakhaw Festival	15 CSO's participated in the Annual Bakhaw Festival			July 2019-2022	PO's, MAFARMC, Academe, MAO, BLGU's		10,000.00/Year

Marine Protected Area Plan of Del Carmen

2019-2022

Objective 1: To promote IEC advocacy and increased community awareness

Activities	Indicator	Output	Use of Output	Time Frame	Responsible Person/Agency	Resources Needed	Budgetary Requirement (P)
Design and develop IEC materials	Developed and posted 4 billboards	Increased in number of participants awareness on marine protected areas	Transfer of information to communities and other constituents	January 2019-2022	SSCT-IT	Computer unit, printer, papers, paper markers	50,000.00/ year
Installation of marker buoys & flag lets in the area	Installed 20 market buoys and 30 s flag lets				PO's, BLGU & PO's	Tarpaulin, computer unit	
Coordinate Enforcement/ Bantay-dagat in visibility patrolling (monitoring) of MPA	Reduced illegal activities by 97%	*Eradicate illegal activities *increased awareness especially to the illegal fishers			Bantay-dagat,PO's, Resource Management committee	Pump boat, fuel, search light, night vision, binoculars, raincoats	48,000.00/year
Coordinate BLGU to include MPA Orientation during the barangay assembly	At least 80% of the community member oriented about	Increased in number of participants awareness on marine protected areas			BLGU, Resource Management Committee, PO's	Venue, sound system, snacks, projector	10,000.00

Mangrove Management Plan of Del Carmen

2019-2022

Objective 1:
To promote IEC through social medias, posters and lectures and increase awareness on mangrove management

Activities	Indicator	Output	Use of Output	Time Frame	Responsible Person/Agency	Resources Needed	Budgetary Requirement (P)
Lectures through school and barangay activities/programs	Active community and school participation	Increased number of participants that are being aware on mangrove management issues	Transferred of information to family members and communities	January 2019-2022	MMC, PO's, MENRO, BLGU officials, academe	Speakers, foods, transpo, logistics	50,000.00/year
Develop IEC's Materials	Developed & posted 20 signages and posters (Help to Protect our mangrove areas)				SSCT-IT	Computer unit, printer, papers,	

APPENDIX 4. PUBLISHED AND UNPUBLISHED RESEARCH CONDUCTED IN MANGROVE ECOPARKS

A. Aklan – Bakawan Ecopark; *Katunggan it Ibajay* (KII) Ecopark; Jawili, Tangalan Ecopark

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APPENDIX 5. KNOWLEDGE PRODUCTS OF ZSL-PHILIPPINES

I. Webinar Series (recordings)

Mangrove Biology and Uses (https://youtu.be/7S34YkAeblQ)
Mangrove Rehabilitation (https://youtu.be/ExfgfHLeIrU)
Green-Gray Engineering (https://youtu.be/lTSTYbZSzmw)
Abandoned Pond to Mangrove Reversion & Blue Carbon (https://www.youtube.com/watch?v=RNjKa70s5c0&t =144s)
Mangrove Eco-parks (https://youtu.be/NsvJ-T2GgD8)
Beach Forest Species – Coastal Protection, Reforestation, Landscaping and Other Uses (https://youtu.be/PEURL-3bXmc)
Introduction to Beach Forests (https://youtu.be/BQk-FYMwoXE)
Beach Forest Nursery Establishment Part 1 (https://youtu.be/fgIGIfZHhEA)
Beach Forest Nursery Establishment Part 2 (https://youtu.be/xUrUtzl49w8)
Beach Forest Outplanting (https://youtu.be/K8HIArLCY84)
Heritage Trees (https://youtu.be/lzG6OxhWzp0)

II. Manuals and Field Guides (in chronological order; available weblinks provided)

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