Ecoscape mosaics developing for The Bohol-Leyte Initiative - “Seashore Sunrise” (BLISS)

Special focus on Danajon Bank

BLISS

Iain C. Neish SeaKITShub Monograph 2 v.4
Draft of 23 December 2023

Image ICN: Aerial photo of Seaweed farmhouses near Danajon Islet, 1981

Preamble: BLISS region challenges and proposed solutions

The table right is a example product from decades of dedicated research into development issues pertinent to the BLISS region, especially with respect to Danajon Bank. Problems have been known for decades, but solutions have hardly been implemented and the socioeconomic situation in the region seems to get increasingly grim as the years go by. **We postulate that the key weakness of most suggested solutions is lack of enterprise engagement.** People in the region seek livelihoods through participation in commercial value chains in market systems … not through external interventions. Clearly, market systems have failed in the past, arguably because they failed to follow ecoeconomic principles and precipitated a "tragedy of the commons".

We assert that value chain support and governance institutions have key roles to play in development of sustainable development, but the key to sustainable development is to build profitable community-based enterprises through applied enterprise ecology and similar holistic ecosystem services approaches.

Source: Table 11; Christie P, Armada NB, White AM, Gulayan AM, de Dios HHY. 2006. Coastal environmental and fisheries profile of Danajon Bank, Bohol, Philippines.

Challenges	Potential solutions
Context issues:	
Unsustainable financing: heavy reliance on external funding for fisheries and coastal management	Endowment for Danajon Bank; taxation and permit fee system for coastal resource use AEE ?
Weak governance: corruption, unclear mandates	Multisectoral planning groups to encourage decisionmaking transparency, leadership development and community organization Applied Enterprise Ecology?
Institutional inertia Applied Enterprise Ecology?	Incentives to encourage relevant national agencies and LGUs to develop supporting policies, regulations and technical assistance for EBFM; education campaigns making public officials accountable to their constituencies
Legal framework is not conducive to EBFM: no clear legal framework for inter-LGU collaboration; commercial fishing operations consider municipal water boundaries to be arbitrary	Policy and legal initiatives, joint planning by LGUs, artisanal and commercial fishing interests Applied Enterprise Ecology?
Ignorance of impacts of environmentally damaging practices, such as illegal fishing, deforestation, shoreline hardening	Enforcement, education Applied Enterprise Ecology?
Resistance to change:	
Potential to lose community/LGU support while scaling up management efforts	Participatory planning, continued support of community-level projects
Conflict: between commercial and municipal fishers, between legal and illegal fishers, between fishing and tourism interests	Conflict resolution training, mediation by objective third party
Powerful and illegal fishing syndicates for live fish trade and trawling resistant to change	Enforcement at multiple levels, education, international pressure to regulate markets
Unwillingness to limit access/fishing effort due to poverty and ignorance	Targeted closures, education, alternative livelihood development

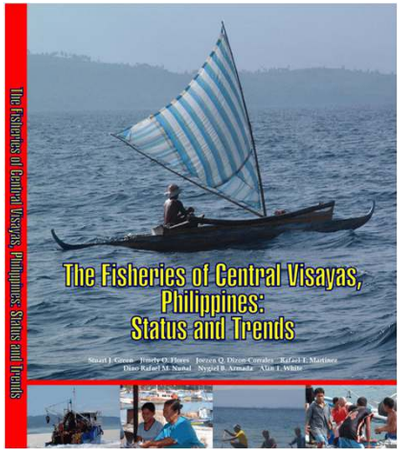
Introduction: A rich legacy from which to build AEE in BLISS

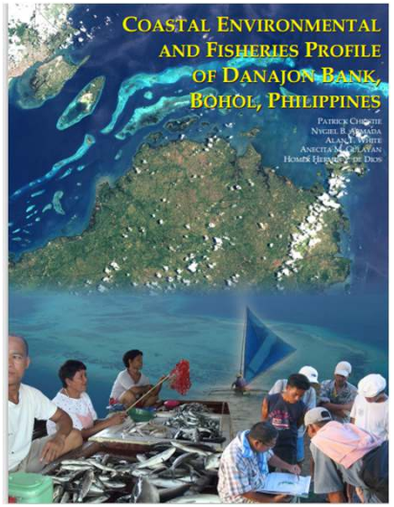
The references listed in this document, some of which have covers depicted right, provide a rich legacy from which to build BLISS. Much of this work was done decades ago and has languished in obscurity, but the time has come when these legacy insights will be applied.

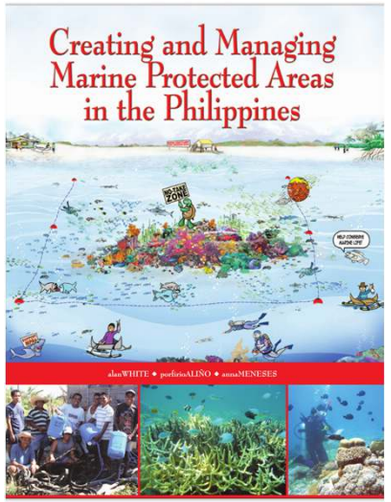
It has long been known that livelihood and the environment are inextricable issues, not only in Olango Island, but also elsewhere in the BLISS region.

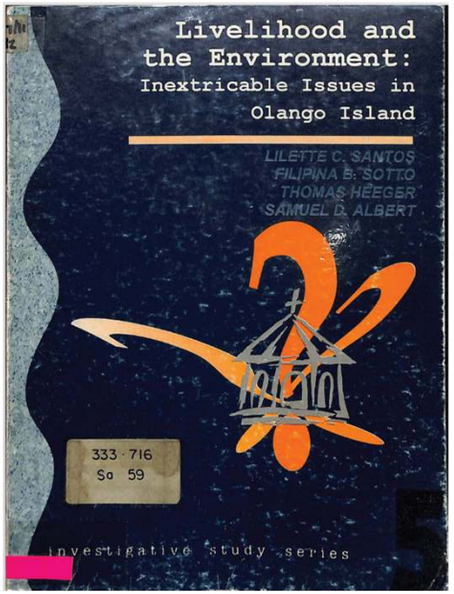
It has also been known that an ecosystem approach to management is the key to regeneration and sustainability.

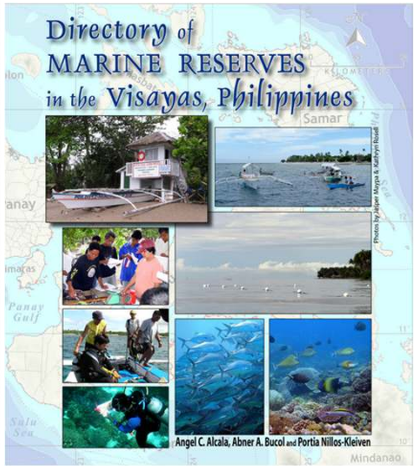
The time has arrived when enterprise ecology can be applied to realization of opportunities that have languished in the BLISS region, and such development will owe a great debt to those who have laid the groundwork.

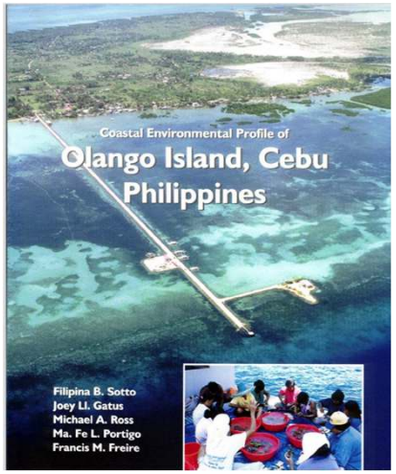




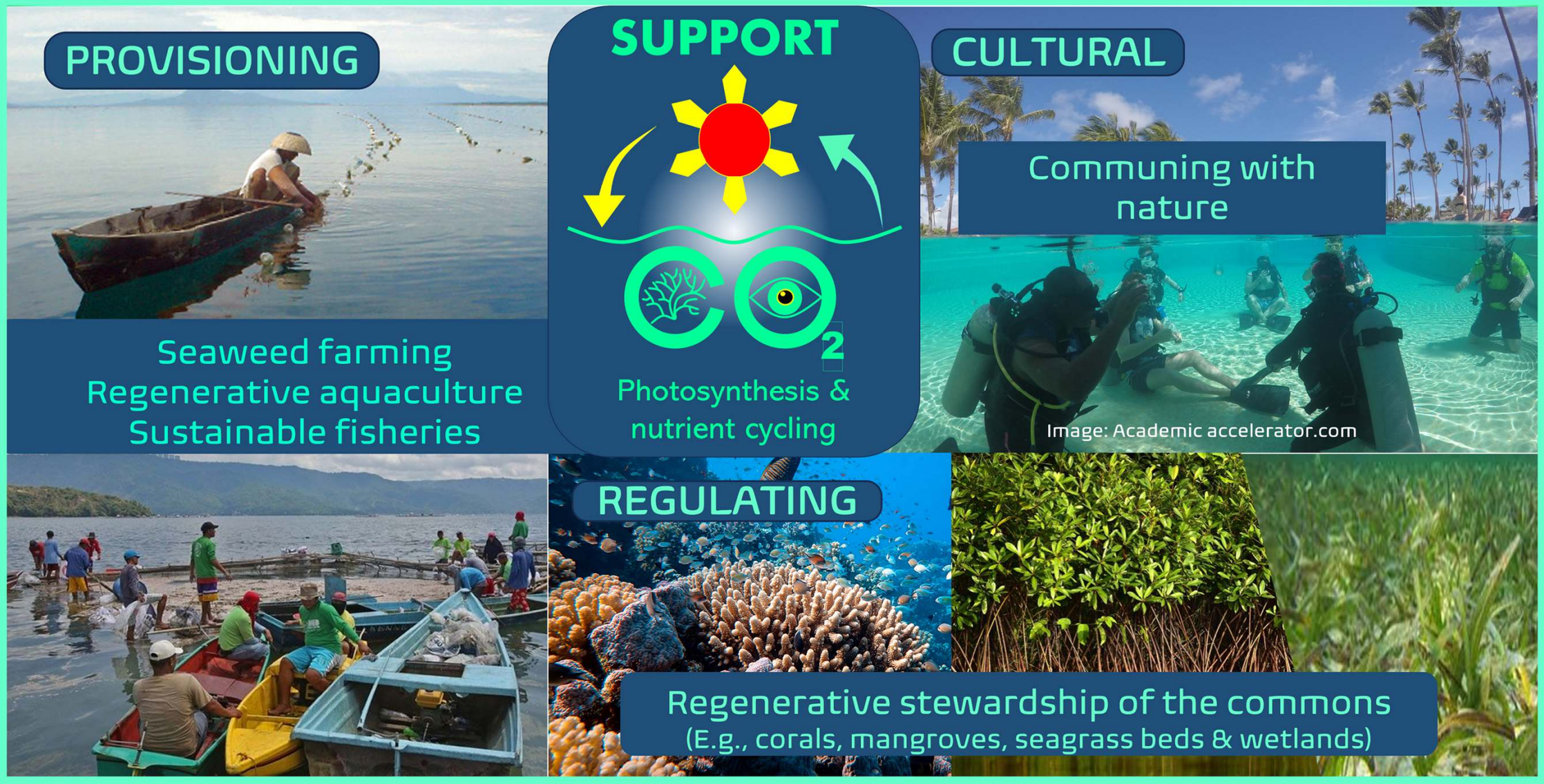








Frontispiece: Ecosystem services harmonized through enterprise ecology



Danajon Bank – only double barrier reef in the Philippines

Per Wikipedia, Danajon (A.k.a. Dawahon) Bank, in the Camotes Sea, is the only double barrier reef in the Philippines. It comprises two sets of large coral reefs formed on a submarine ridge under influence of tidal currents and coral growth patterns. The outer reef is known as the Caubian portion and the inner reef is the Calituban portion.

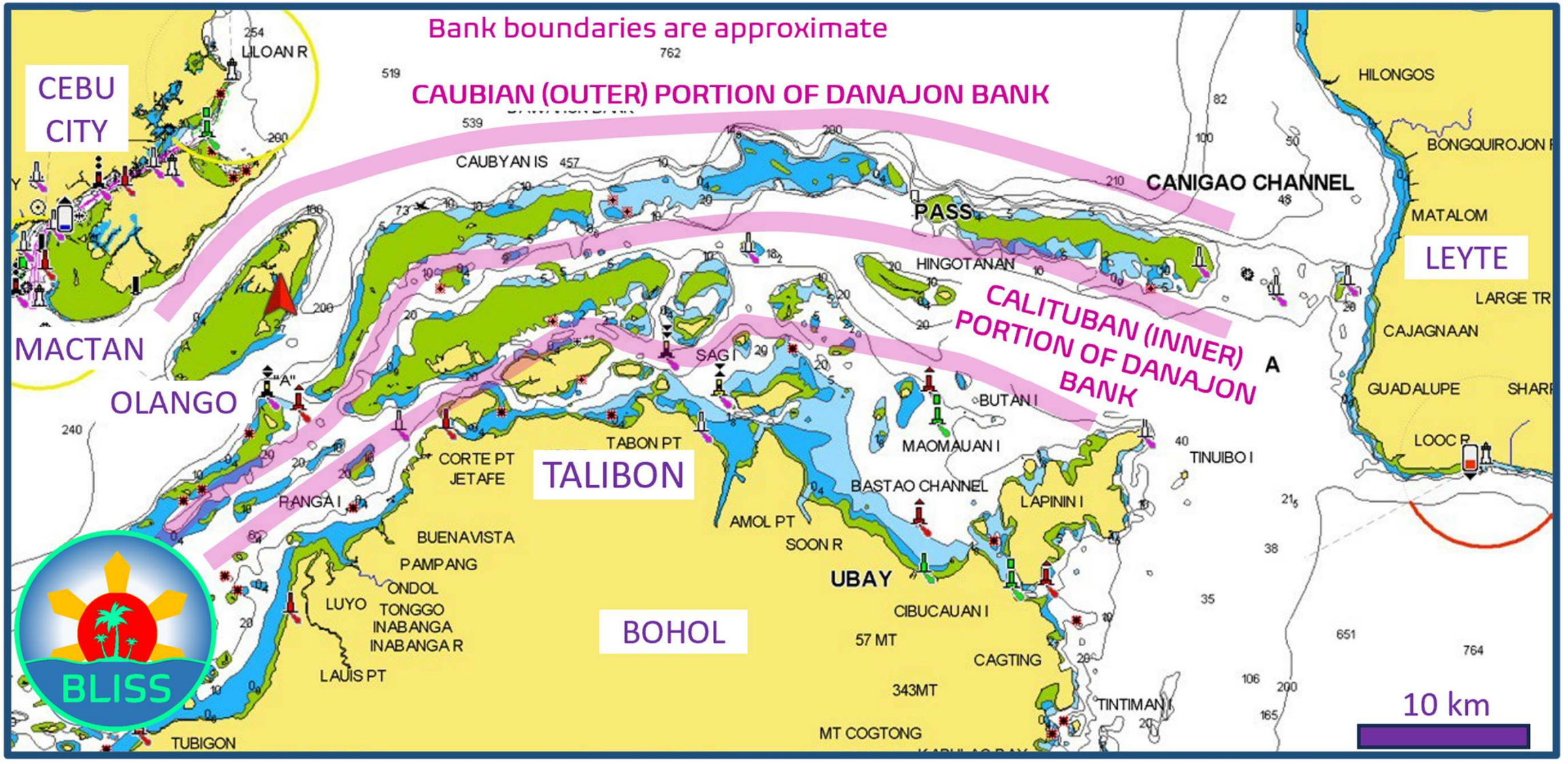
One of only six double barrier reefs in the world, Danajon Bank runs for 156 kilometers [97 miles] in the Central Visayas, between Bohol, Cebu, and Leyte.(Map 1) There are three major passages through this double reef in the northwest , the middle, and the northeast Pass. Dawahon Bank's overall area is 272 square kilometers, with an aggregate coastline of 699 kilometers, which includes 40 islands. Danajon Bank makes up over 1% of the total coral reef area of the Philippines.

Danajon Bank has a declining population of fish, and many upper-level predators have disappeared from it. Dynamite fishing is the preferred method of fishing there, and the fish catch has considerably dwindled due to the absence of the fish and the destruction of the various coral reef habitats. To counteract this, 34 Marine Protected Areas have been established.

Species such as flathead fish, anemonefish, parrotfish, angels, wrasses, blue-edged sole, and messmate pipefish are present in Dawahon Bank ecosystems. Large sea fans and sponges live in the areas with deeper water, as does branch coral. The reef is also home to three endangered coral species such as the mushroom coral, bubble coral, and elegance coral. Seahorses live in the reef and have become a popular attraction for environmentalists seeking to observe the animal in its natural habitat.

It is home to a vast array of commercially valuable reef fishes, shellfish, crustaceans, and invertebrates such as sea cucumbers and sea urchins. Its extensive seagrass beds are nursery and feeding grounds for various species of rabbitfish (siganids) and sea horses, while its mangroves are spawning habitats for crustaceans, shrimps, and various fishes. Almost all sea grasses that occur in the Republic of the Philippines are well represented in this double barrier reef.

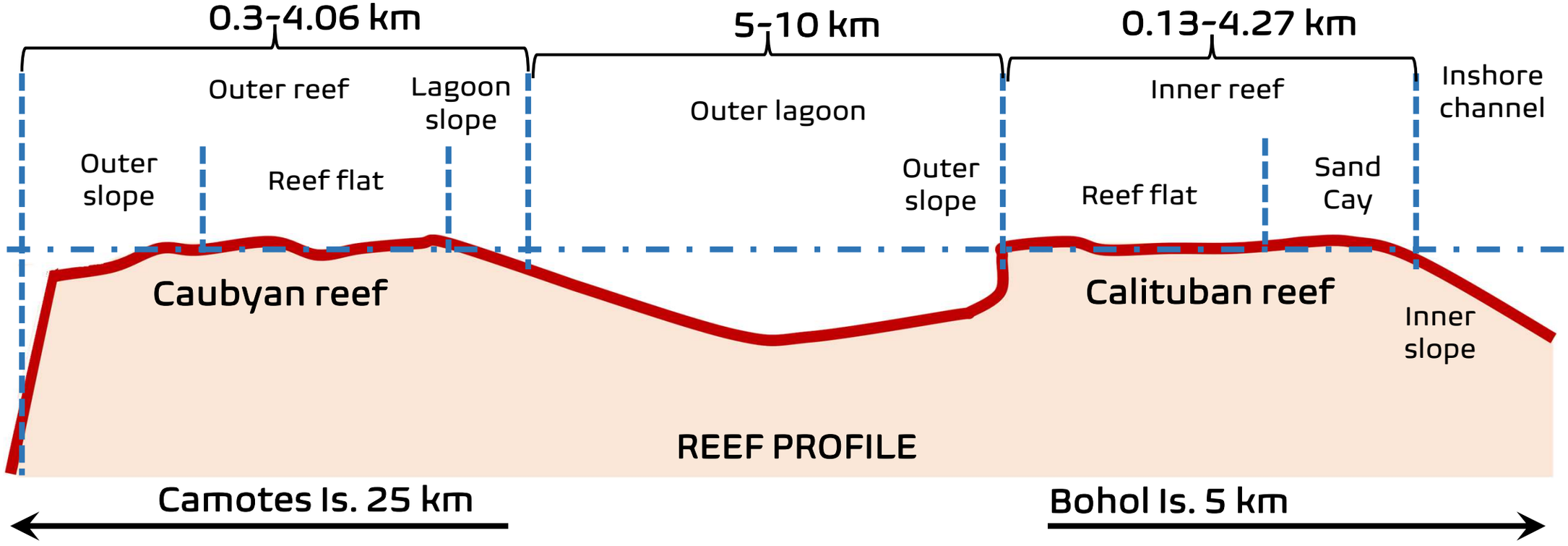
Map 1. Leyte-Bohol Initiative – Seaweed Sunrise (BLISS) area of operations



Danajon Bank profile and metrics

After White AJ. 2004?. Danajon Bank Double Barrier Reef: a Unique and valuable resource. Undated PowerPoint presentation online per 22 December 2023.

	Caubian (outer)	Calituban (inner)	Total Danajon Bank
Reef width	**0.3 to 4.06 km**	**0.13 to 4.27 km**	
Total area	**143.3 km²**	**128.4 km**	**271. km²**
Total length	**132.3 km**	**249.2 km**	**381.5 km**



Danajon Bank sourcing sites for major provisioning services

Focus on seaweeds:

Seaweeds could come much more from marine waters and avoid coral reefs of seagrass beds if floating systems are used.

. Data are sparse, but we know that the Danajon Islet area alone, used to produce over 300 dry tons of eucheumatoid seaweeds per month worth about 1,500 +/- 500 USD per ton in recent years.

We project that Danajon Bank could sustainably produce at least 500, and possibly more than 1,000 tons/month of dried red seaweeds worth an average of 500,000 – 2,000,000 USD/month

Source of figure:

G.P.B. Samonte et al. / Ocean & Coastal Management 122 (2016) 9–19

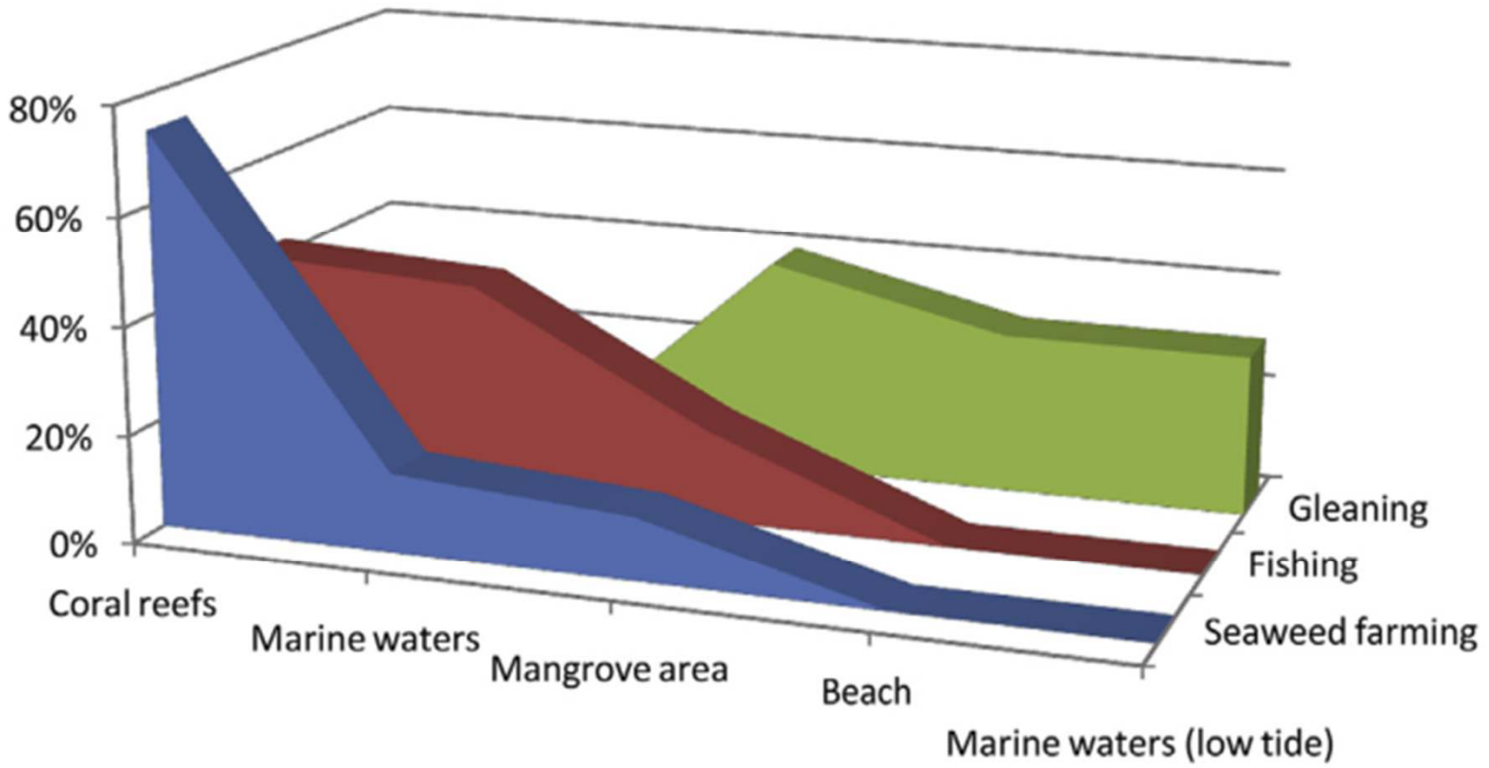


Fig. 3. Direct uses of the Danajon reefs and its associated ecosystems, n = 691.

Danajon Bank's tragedy of the commons

Danajon Bank is common property of the Philippines' people, consigned to jurisdiction by Local Government Units (LGU) of Cebu, Bohol and Leyte. Natural resources of the Danajon Bank commons have been devastated over the past 50 years by destructive actions and over-exploitation to the point where the region is no longer economically self-sufficient. Even supposedly "sustainable" economic activities such as the once-prolific seaweed farming had failed value chains by 2021.

The Danajon Banak situation is an environmental calamity of exhausted fisheries caused by enterprises and individuals using common-property resources without heeding the long-term consequences for present and future generations.

Unchecked use of common-property resources eventually leads to short-term benefits for a few at the expense of many, as resources are lost to all parties.

Images courtesy of Dave Cutler (artist) in per https://www.pnas.org/doi/

A remittance economy with a dystopian future?

Or rejuvenated seashore communities with sustainable self sufficiency and high quality of life!

A remittance economy?

Increasing human populations combined with destructive resource exploitation have left Danajon Bank communities substantially dependent on remittances from island people who have found employment in urban areas of the Philippines or in work abroad.

Since Typhoon Odette in December 2021, seaweed farms and many structures still lay in ruins the time of writing.

Are Danajon Bank and other BLISS communities destined to become dystopian relics for future generations?

Image from: https://www.coast.ph/ccef-news/

Opportunities long known

At least 25 years ago it was recognized that Danajon Bank livelihoods were inextricably intertwined with harmonious management of ecosystem services from the diverse biomass, the unique hydrosphere and the complex geosphere enjoyed by Danajon Bank. Unfortunately identified opportunities were degraded, rather than being developed toward a sustainable future.

Enterprise ecology solutions

Applied enterprise ecology (AEE), as proposed by SeaKITShub, strives to sustainably engage community enterprises in socioecological production ecoscapes to apply arts, sciences and technologies that influence, manage and control biosphere ecosystem services valorized through fair ecoeconomic market systems. AEE drives sustainable harmonization of ecosystem services.

Harmony results when optimized trade-offs build net enterprise profitability per ecoeconomic principles that support sustainable development of Danajon Bank and the entire BLISS region.

BLISS region core marine fisheries problems and underlying issues

Focus on seaweeds:

Seaweeds were a major cash crop for Danajon Bank seaweed farmers from 1977 until about 2013, then were virtually extinguished as a crop after Typhoon Odette in December 2021.

By 2021 seaweed farming had weak value chains and was using some unsustainable farming practices, so there was inadequate support for regenerating farming in the wake of Odette,

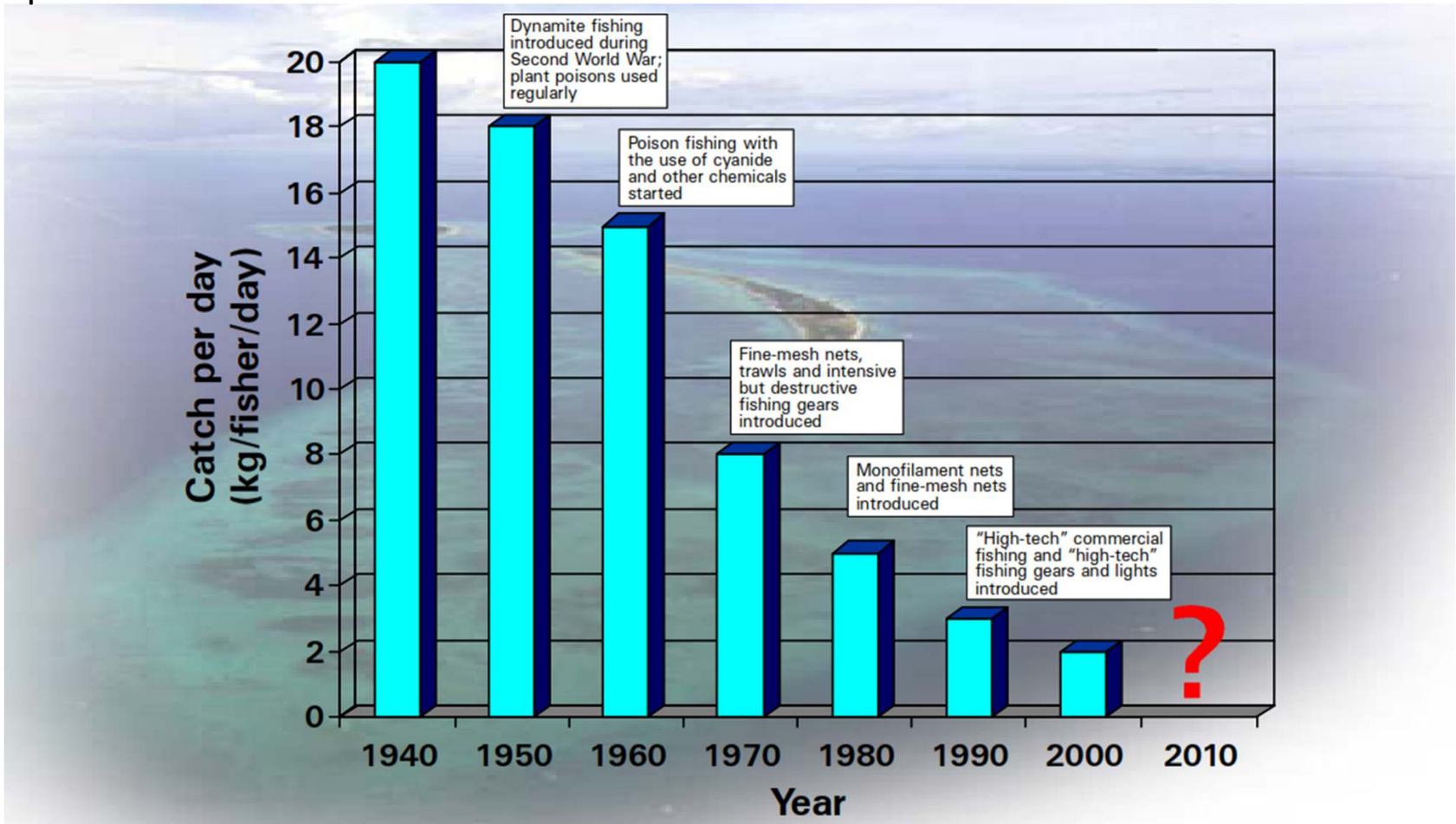
The author played a role in bringing seaweed farming to Danajon staring in 1977 and I propose that it can return as a major crop if value chains are repaired and if applied enterprise ecology is the framework for development.

Source: Table 1; Christie P, Armada NB, White AM, Gulayan AM, de Dios HHY. 2006. Coastal environmental and fisheries profile of Danajon Bank, Bohol, Philippines.

Core fisheries problems	Contributing factors
Declining fish stocks Loss of marine biodiversity Loss of revenues and benefits from fisheries and coastal resources	Overfishing Illegal and destructive fishing Coastal habitat degradation Siltation and pollution Post-harvest losses Inefficient marketing
Systemic underlying conditions	**Contributing factors**
Inequitable distribution of benefits from fisheries and coastal resource uses	Open access to marine resources Inter- and intra-sectoral conflicts Low awareness and participation in management Lack of employment/poverty among artisanal fishers
Rapid population growth	Low awareness of the implications of overpopulation to food security Lack of delivery mechanisms for reproductive health programs in rural coastal communities
Inconsistent policies and programs for sustainable fisheries	Continued investments in production-oriented programs Conflicting and fragmented national policies
Core fisheries problems	**Contributing factors**
Weak institutional and stakeholder capacity to plan and implement fisheries management	Absence of incentives and vision for institutional change to support sustainable fisheries Inadequate technical and financial support to LGU fisheries management intiatives Weak and inadequate law enforcement Inadequate interagency coordination mechanisms for fisheries and CRM
Lack of a constituency for sustainable fisheries	Low awareness and understanding of implications of overfishing on food security and economic development Polarization of stakeholders over means to achieve sustainable fishing

BLISS region catastrophic fisheries failure overview

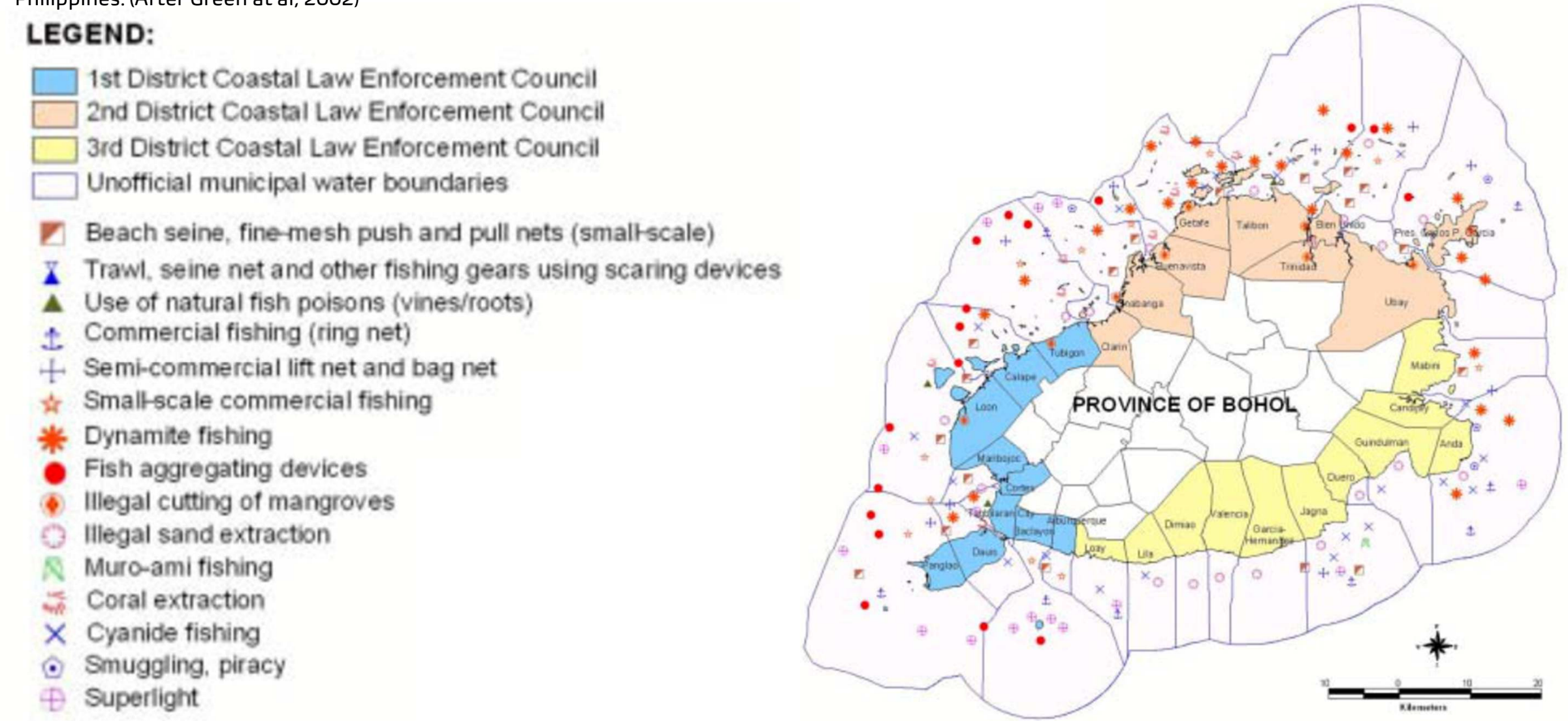
From White AJ. 2004?. Danajon Bank Double Barrier Reef: a Unique and valuable resource. Undated PowerPoint presentation online per 22 December 2023.



Graph shows decreasing fish catch of marginal fishers in Bohol, Cebu, Leyte and Southern Leyte as measured by catch per unit effort (kilograms per fisher per day) plotted against time.

Destructive fishing practices – devastating the commons

Source: Figure 6; Christie P, Armada NB, White AM, Gulayan AM, de Dios HHY. 2006. Coastal environmental and fisheries profile of Danajon Bank, Bohol, Philippines. (After Green at al, 2002)



BLISS region catastrophic seaweed production failure overview

Poor evidence base:

From my own experience and from occasional written accounts we know that from 1977, at various times, the BLISS region was home to hundreds of hectares of planted seaweed farm area where hundreds of farmers produced hundreds of tons of RDS per month. We also know from field visits that per November 2023 seaweed production from the area was negligible. **At the time of writing there were no known comprehensive seaweed production data or marine environment data that provide evidence of what happened from 1977-2023.**

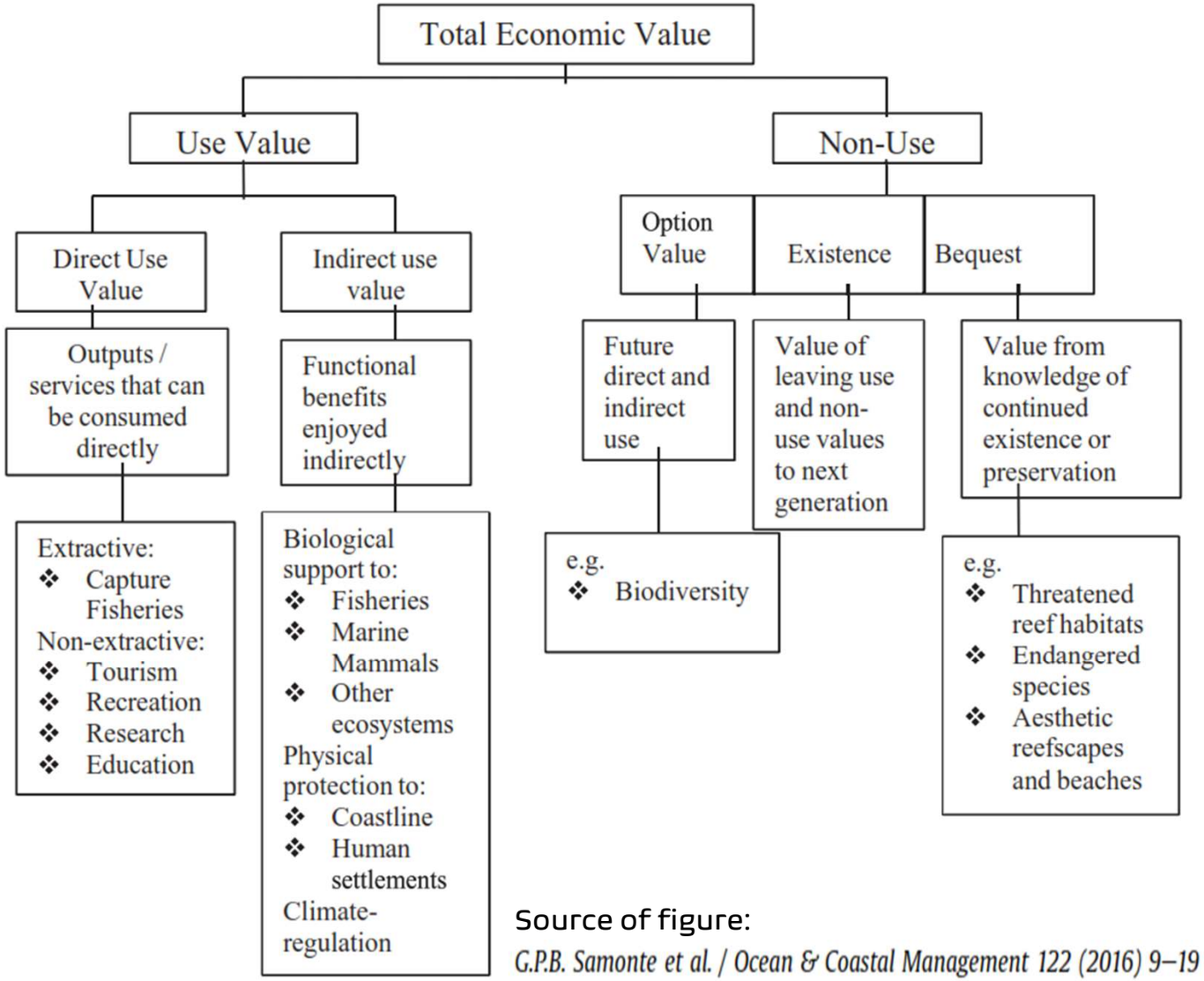
Untested hypotheses per causes of seaweed crop failures:

1. Damage from at least five “super typhoons” that caused destruction of most seaweed farms.
2. Damage from an earthquake in 2013 that allegedly was followed with poor seaweed growth.
3. Alleged climate-change impacts in addition to typhoons (but paucity of evidence).
4. Poorly understood seasonal variations in crop productivity both within years and between years (e.g., per El Niño and La Niña phenomena).
5. Alleged increase in pest and disease incidence (not known to be quantified).
6. Cultivar senescence and/or unsuitability for specific farm locations.
7. Site fatigue.
8. Alleged impacts from destructive fishing methods that utilized explosives and toxins (untested hypothesis?).
9. Deficient market system support (quality or implementation) for seaweed value chains.
10. Negative impacts of failed attempts at market system support and/or governance.

Toward BLISS region sustainable ecoeconomic prosperity?

The total economic valuation network (right) of Samonte et al (2016) provides a useful framework for valorizing and monetizing ecosystem services from the BLISS region.

Applied enterprise ecology systems will further evolve such ecoeconomic valuation systems toward effective accounting per coastal ecoscape enterprises in the region.



Source of figure:
G.P.B. Samonte et al. / Ocean & Coastal Management 122 (2016) 9–19

Baseline estimates of Danajon Bank economic value

Per Samonte el al *"The present value of the stream of net benefits derived from the marine resources of Danajon over a 20-year period using a 10% discount rate, amounts to USD 59.6 million. … If these coastal resources are not protected and destructive economic activities are allowed to continue, then present value economic losses equivalent to USD 6.4 million on an annualized basis will be incurred."*

Also, per Samonte et al: *"The global estimate of the total value of an average hectare of coral reefs ranges between USD490 – 350,000 USD/year for the total bundle of ecosystem services that can potentially be provided (De Groot et al., 2012)."*

Where will Danajon Bank fit into this range if it is developed using enterprise ecosystem principles?

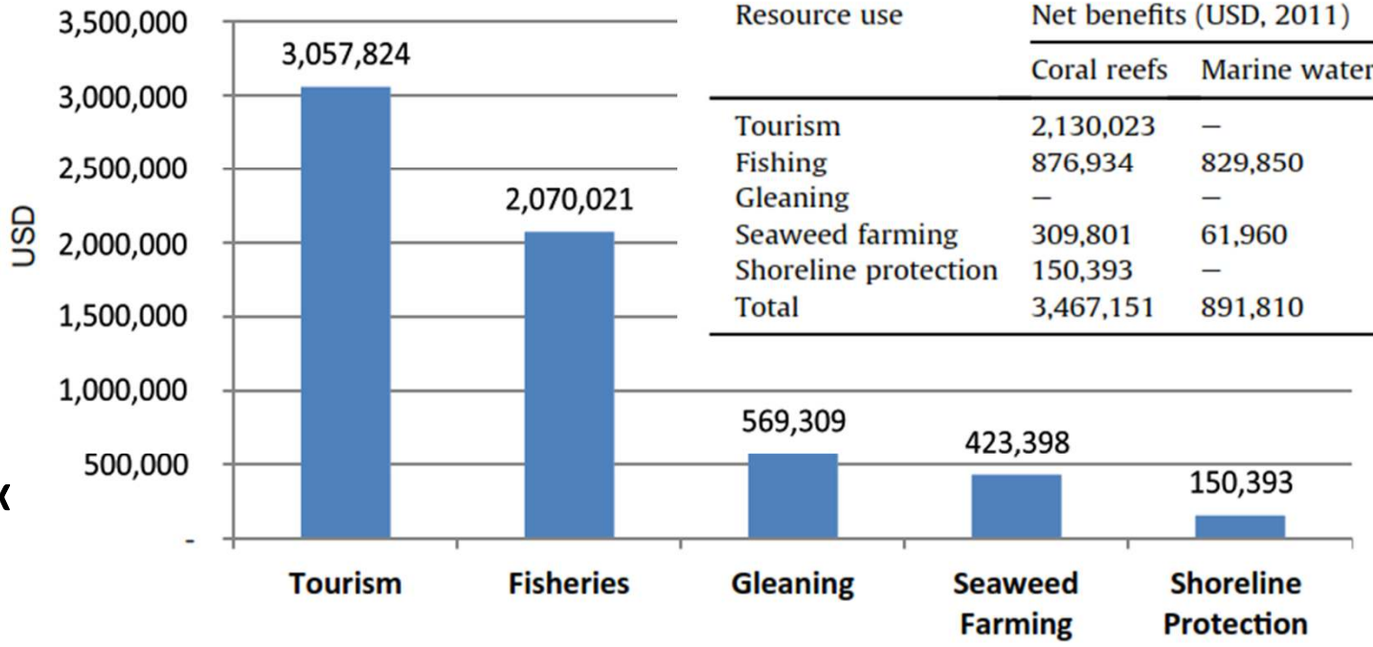


Table 6
Ecosystem values by habitat type.

Resource use	Net benefits (USD, 2011)			
	Coral reefs	Marine waters	Mangrove area	Beach
Tourism	2,130,023	–	304,289	608,578
Fishing	876,934	829,850	353,128	–
Gleaning	–	–	339,917	226,612
Seaweed farming	309,801	61,960	49,568	–
Shoreline protection	150,393	–	–	–
Total	3,467,151	891,810	1,046,902	835,190

Fig. 6. Annual net benefits from Danajon reefs, Philippines, 2011.

Source of figure & table: *G.P.B. Samonte et al. / Ocean & Coastal Management 122 (2016) 9–19*

Forces majeures BLISS region seaweed production failure events

Year	Month	Event	Impact
1981	March	Typhoon Bising (Nelson)	Wiped out over 100 farmhouses with unknown number of lives lost and almost all farms destroyed
1991	June	Typhoon Diding (Yunya)	Extensive farm damage
2013	October	Bohol earthquake	Many say that seaweeds would no longer grow at certain locations after the earthquake
2013	November	Super Typhoon Yolanda (Haiyan)	Extensive farm damage
2021	December	Super Typhoon Odette (Rai)	Extensive farm damage
2022	October	Tropical Storm Paeng (Nalgae)	Some farm damage

There was substantial farm recovery after the 1981 and 1991 typhoon events, but recovery was impaired after the 2013 earthquake + typhoon events. Farming did not substantially recover after the closely spaced 2021-2022 events.

Climate change? How do we make sense of it?

“Climate change” is an oft-cited, catch-all factor that is often cited as a farm failure issue but is seldom (if ever) linked to data that explain anything useful, except for typhoon data.

With poor seaweed production data and deficient environmental data, it is hard to support hypotheses of climate change impacts.

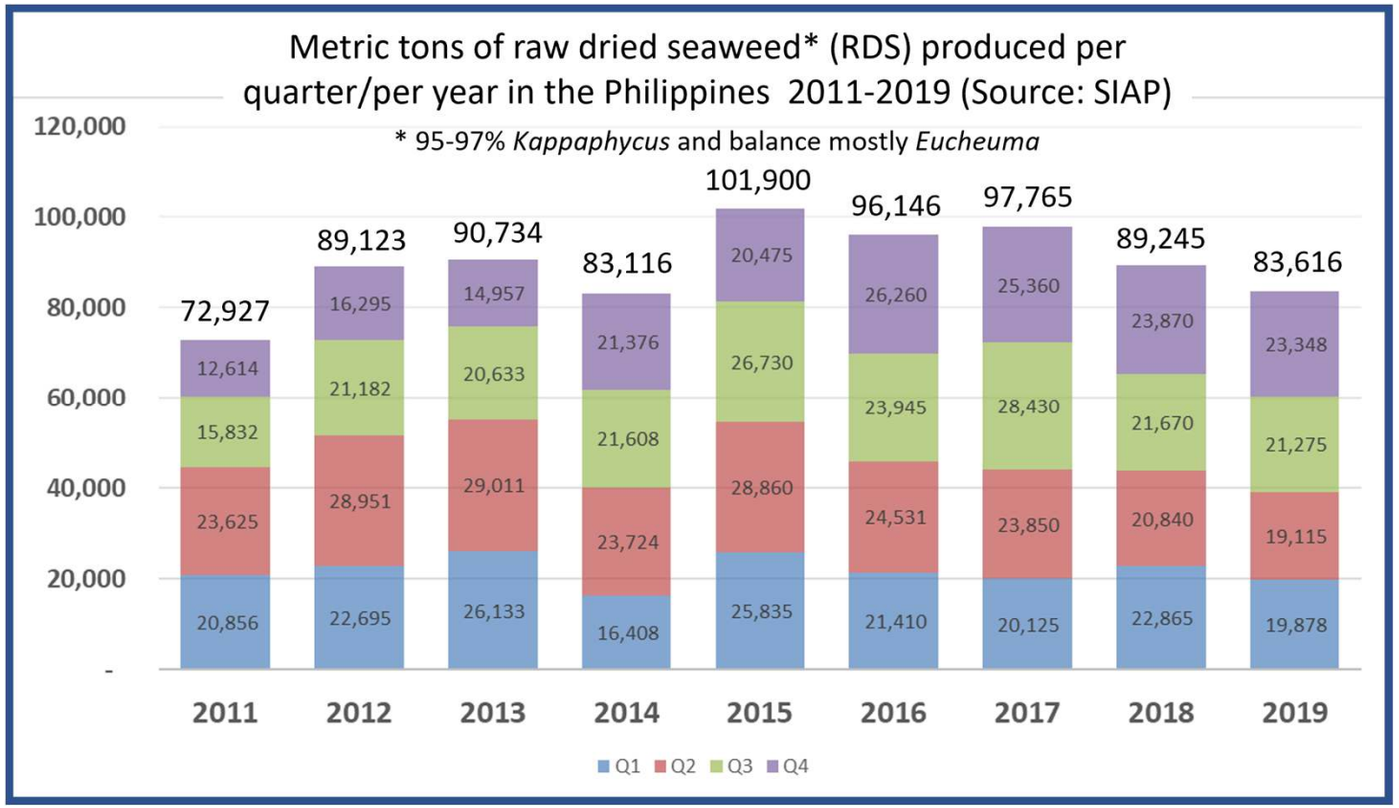
Here are some steps we can take:

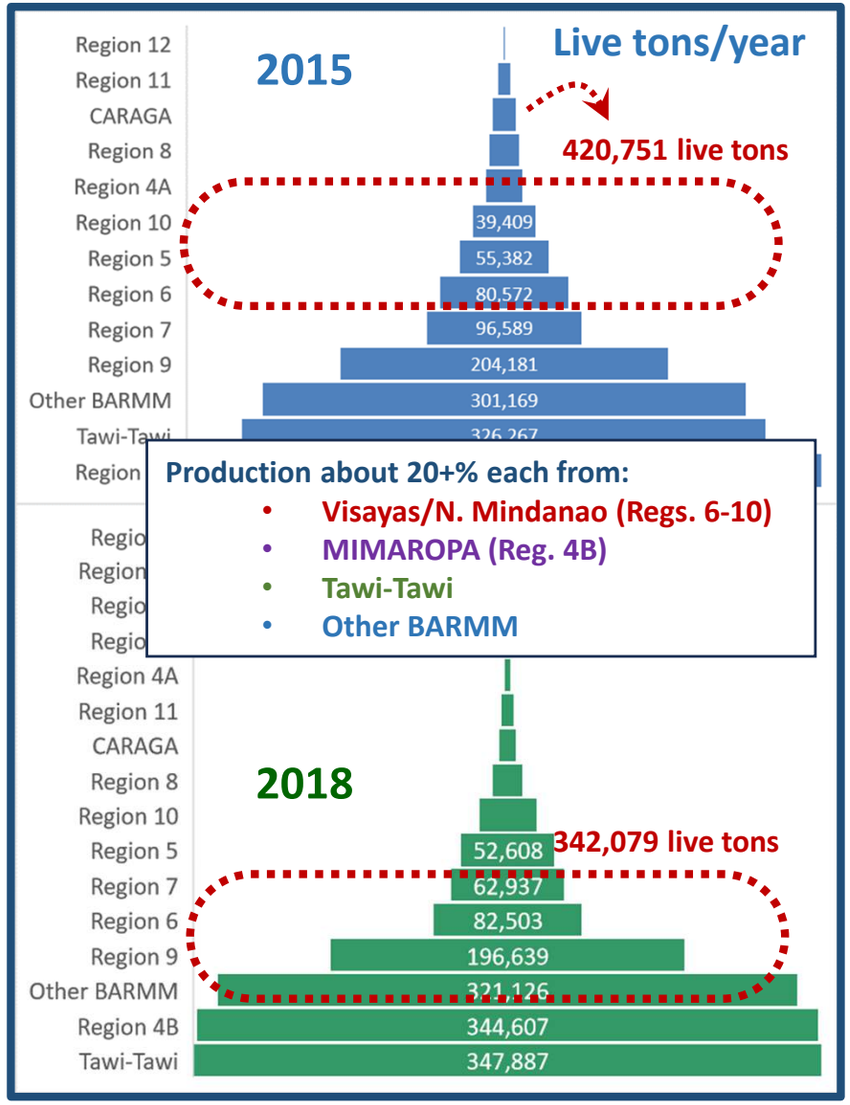
1. Keep hunting for studies that link seaweed productivity with climate phenomena.
2. Chart atmospheric weather data trends from PAGASA or other sources for the BLISS region since at least 1977.
3. Keep hunting for marine environment data from the past; and
4. be mindful of how marine environmental data could be supplied in the future.
5. Gather anecdotal accounts of inter-year and intra-year seasonal variability in crop production and associated environmental phenomena.

Seaweed production trends … local and national

I have some data such as shown here but we need data since 2019 and good to get more comprehensive data per source location especially for Region 7. Per 2019 Philippines production was in decline. Is that trend continuing?

What data sources are available? Still BFAR and SIAP?





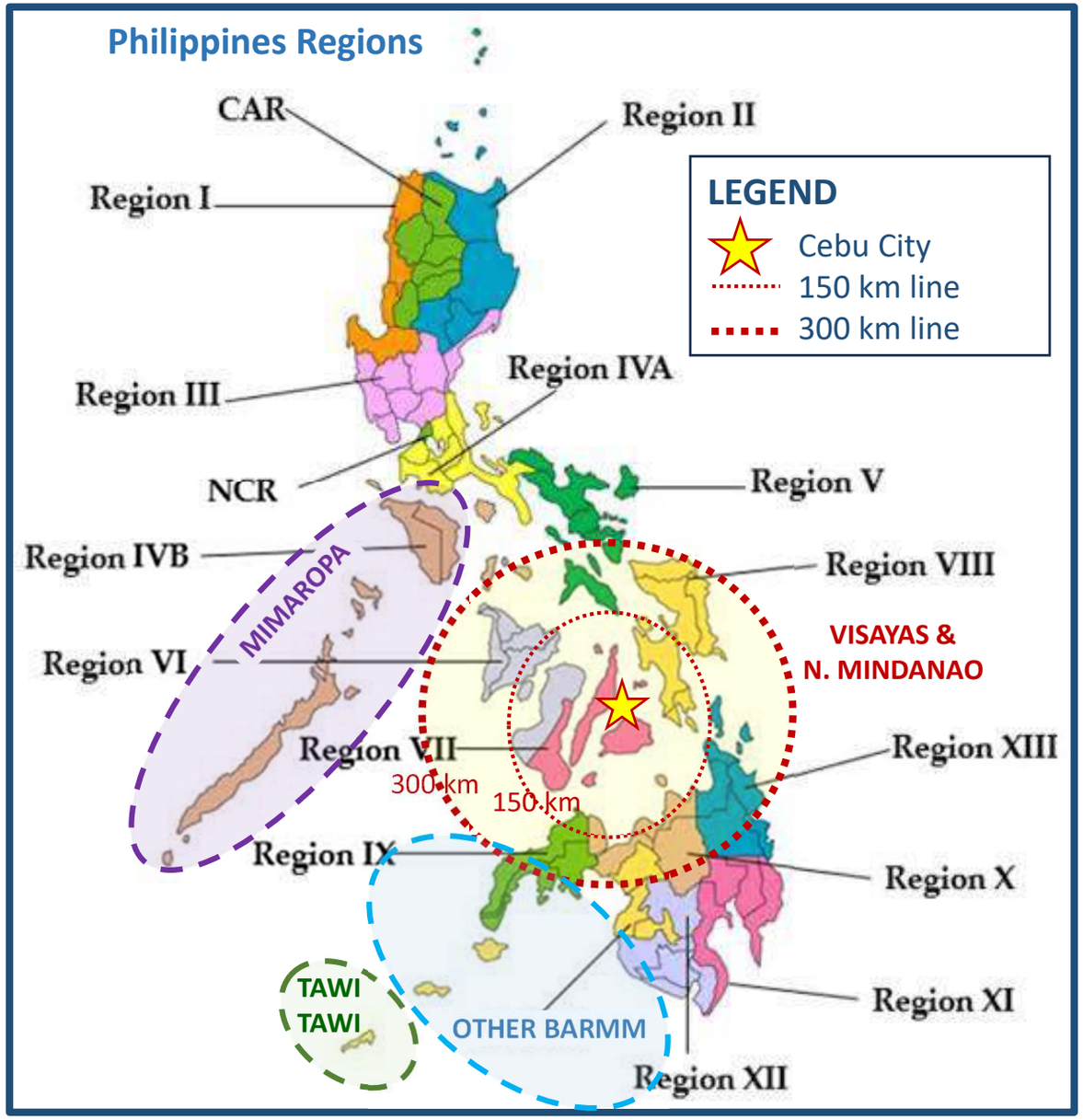
(Sources: Pedrosa 2017 & BFAR 2019)

Seaweed source regions

Based on 2015 + 2018 regional production data, little seaweed was produced from the northern Philippines (mainly Luzon). Production was more or less equally divided among these four regions:

1. **Visayas and northern Mindanao**
2. **MIMAROPA**
3. **Tawi Tawi**
4. **Other BARMM**

As we conduct a Philippines-wide value chain diagnostics analyses, more comprehensive data are being sought.



BLISS area municipalities and islands

Small islands are situated in the Dawahon Bank. Since the area is rich is marine resources, these islands are mostly populated with fisherfolks. Some of these islands are the most densely populated islands in the world.

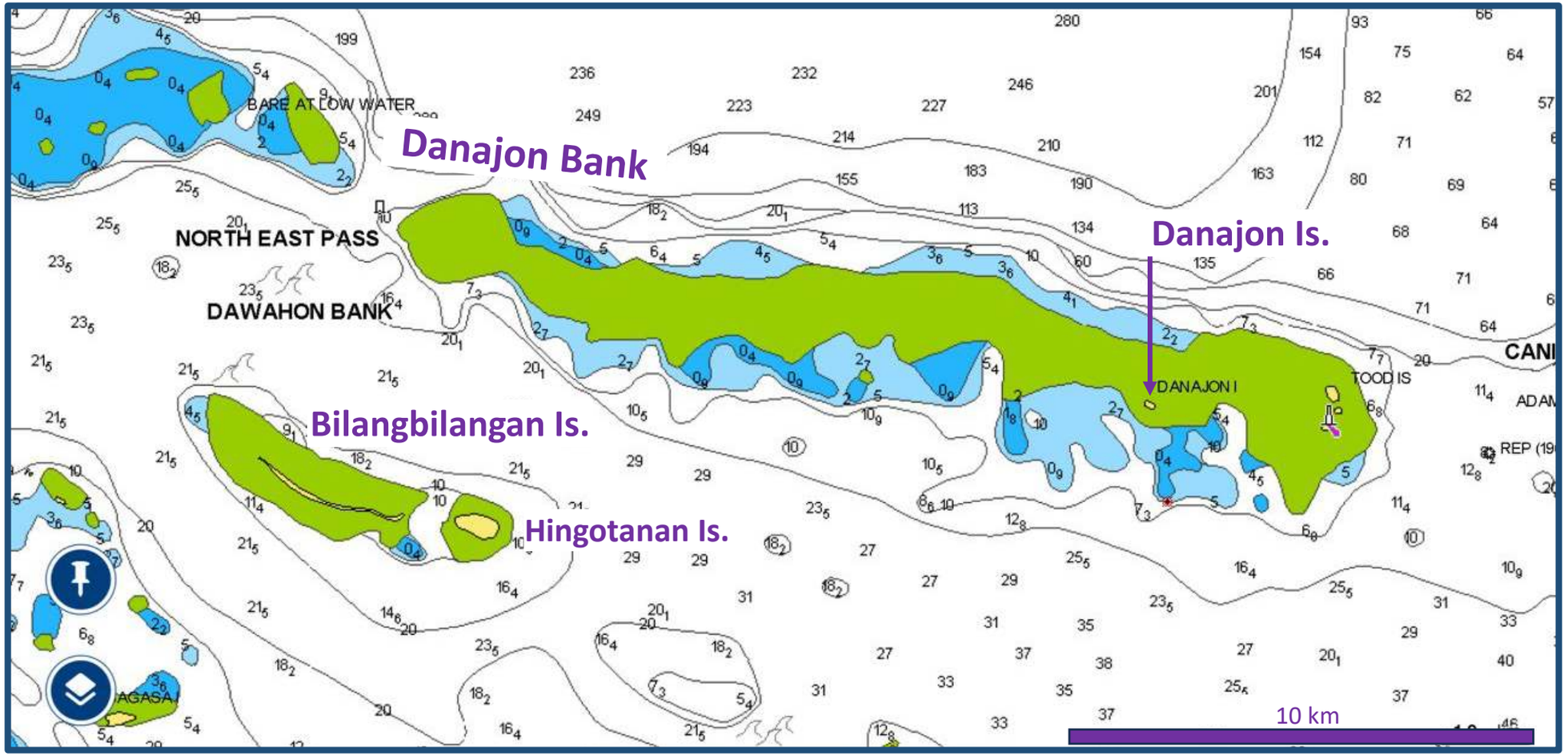
A memorandum of agreement was signed on September 7, 2022 for the creation of the Bohol Danajon Bank Double Barrier Reef Management Council (BDBDBRMC). This agreement was participated by the Department of Environment and Natural Resources, the Bureau of Fisheries and Aquatic Resources, the provincial government of Bohol and the municipal government units of Bien Unido, Buenavista, Clarin, Getafe, Inabanga, Pres. Carlos P. Garcia, Talibon, Trinidad, Tubigon and Ubay.

The formation of the management council aims to implement proper management, protection and conservation of the Danajon Bank barrier reef that has been the breeding ground of various marine creatures, ensure food security and livelihood for communities that depend on its fishing grounds and develop the area for ecotourism. We must follow up on what measures have been proposed or implemented by this council.

Note: spellings and names may differ among dialects and local usages

Bato, Leyte	Dawahon
Bien Unido, Bohol	Bilangbilangan East Hingotanan Malingin Sagasa
Buenavista, Bohol	Cabul-an
Calape, Bohol	Mantatao
Getafe, Bohol	Banacon Nasingin Pandanon
Inabanga, Bohol	Cuaming Hambongan
Lapu-Lapu City	Caubian Islands
Talibon, Bohol	Cataban Calituban Guindacpan Nocnocan
Tubigon, Bohol	Bagongbanwa Batasan Bilangbilangan Mocaboc Pangapasan Ubay Island

Map 2. BLISS area of historically most productive seaweed farms



Map 3. Dawahon green area had historically most productive seaweed farms

- **“Off-bottom” system most commonly used in green shaded area**
- **About 200 ha of farm area was reputed to produce 300+ tons RDS per month during past years**
- **More than 300 farmers in local association**
- **Blue areas probably suitable for floating systems for future development**

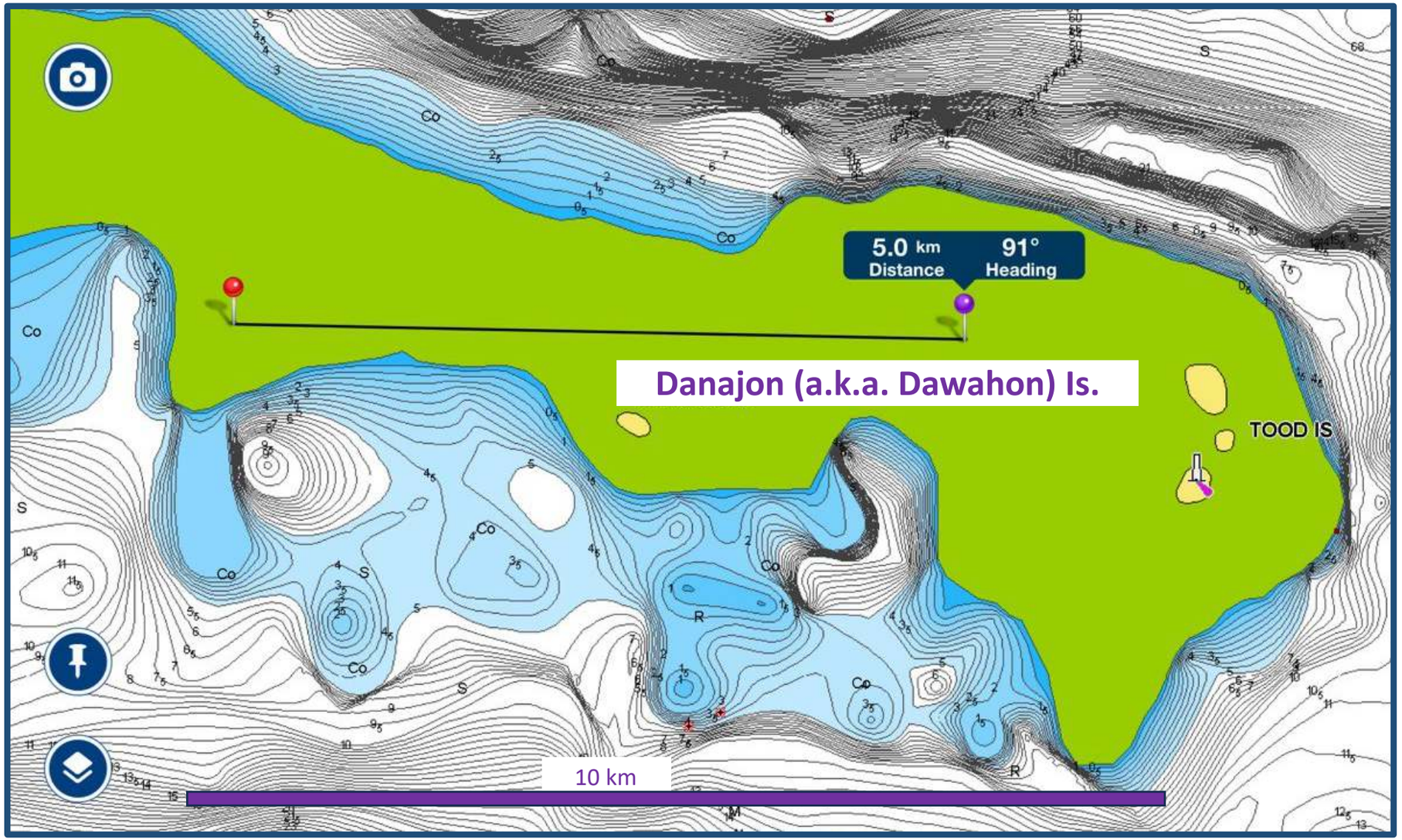
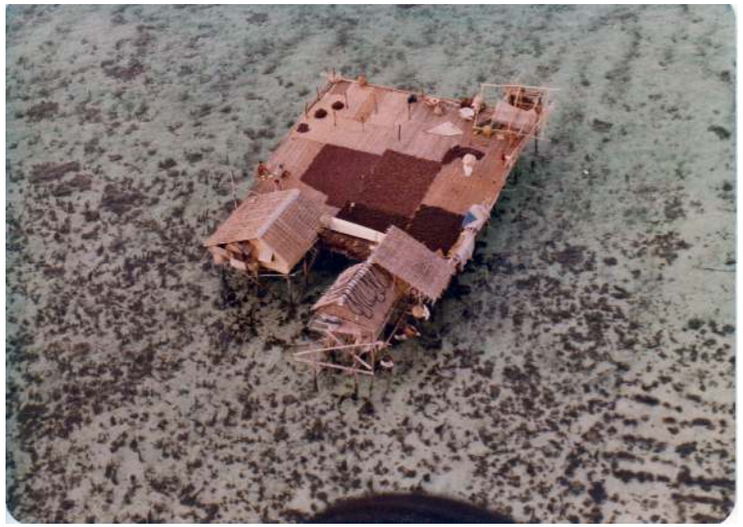


Plate 1. By late 1981 there were 114 pondohan (farmhouses) on Danajon Bank

During March 1982 all but one were destroyed by Typhoon Nelson (Local: Bising)

Plate 2. Some Danajon Bank pondohon per 1981






Images: ICN

Plate 3. Danajon Bank off-bottom farms per 1981

Images: ICN

Plate 4. Danajon Islet with seaweed farm plots to the east (ca. 2019)

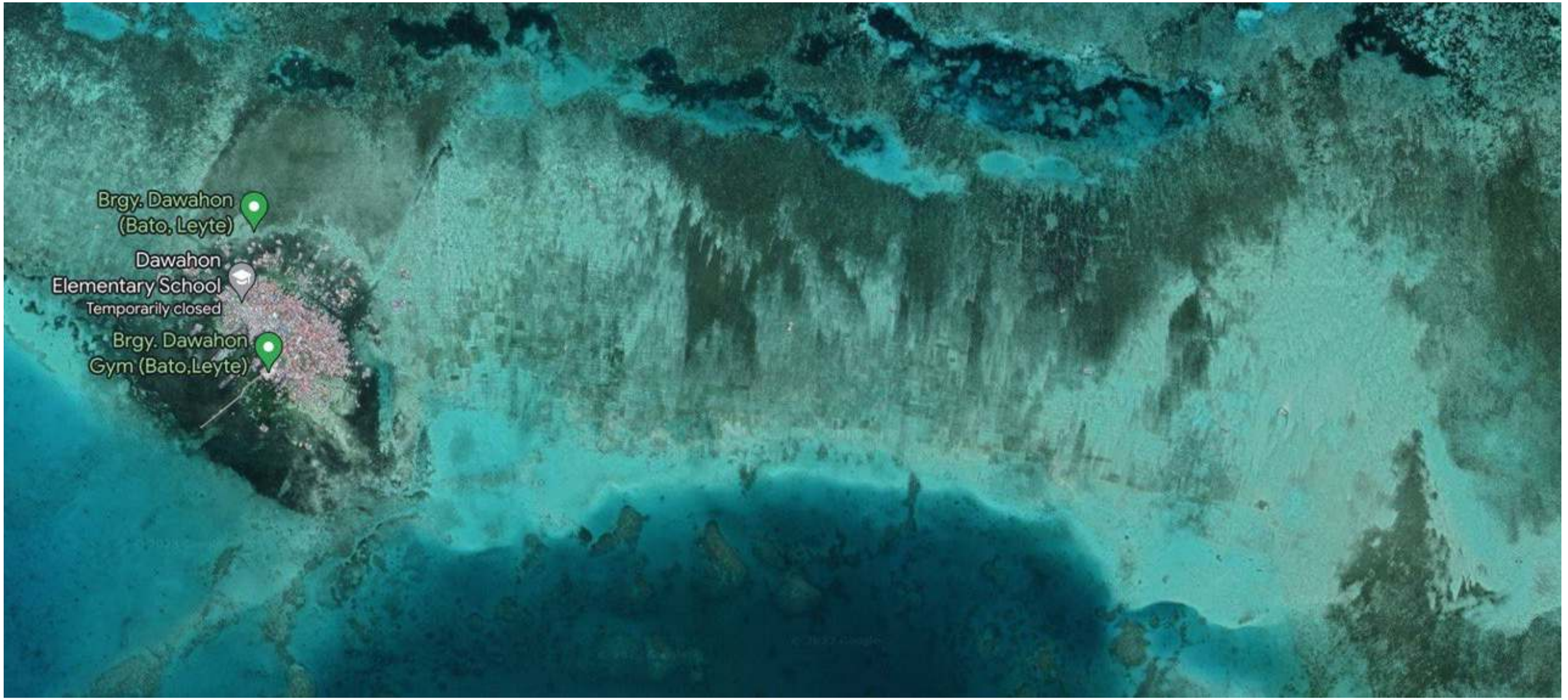


Plate 5. Danajon Islet seaweed farm plots to the east (ca. 2019)

Plate 6. Danajon Islet overview

Danajon (A.k.a. Dawahon)Islet, is in the Philippines is at the easternmost end of the Danajon Bank. Barangay Danajon, is under jurisdiction of the municipality of Bato, Leyte. Area of the islet is five hectares, and it had a population of about 3,230 per the 2020 census. Maximum elevations is 3 meters above sea level.

There is an elementary school, a church, two basketball courts, one small road, and one government medical clinic. The high school children are sent to Hingotanan Island, 10 kilometers away by boat. There is a weekly ferry service to Bato, Leyte, 24 km away. Other nearby islands include Bilanglangan Island, Gaus Island, & the Caubyan Islets, 43 km. to the east.

Geography	
Location	Danajon Bank
Coordinates	10.2644°N 124.61747°E
Adjacent to	Camotes Sea Canigao Channel
Area	5 ha (12 acres)
Highest elevation	3 m (10 ft)
Administration	
Philippines	
Region	Eastern Visayas
Province	Leyte
Municipality	Bato
Barangay	Dawahon
Demographics	
Population	3,230

Plate 7. Hingotanan Island overview

Coordinates: 10°14'21"N 124°29’8”E

The total land area of the entire island is only 32.7 hectares or roughly 327,000 sq. meters of pure sandy soil and coconut mangroves. The beach lines of its oval shaped geography is majestically ringed around by a sugar like textured white sand that most world renowned beaches are known for. Accessibility to the island is unfortunately only by sea with mechanized outriggers popularly known by the locales as "pumpboats". It is the only means of transportation to go in and out of the island in between its neighboring barangays and coastal towns of Bohol, Leyte and Cebu. Business and commerce are mostly done and engaged in by the local enterpreneurs in the City of Cebu where big traders are usually based. The island is composed of four sitios namely: 1) Lugating on the West, 2)Tunga on the North. These two sitios form Hingotanan East and the other two, 3) Lawis on the East and 4) Luyo at the South, belongs to Hingotanan West. Its inhabitants are predominantly Roman Catholics and very few are affiliated with either the Baptists or the Presbyterian Protestants of the United Church of Christ congregations.

Information: Wikimapia 27OCT23

Plate 8. Danajon Island visit 10 October 2023

Here you see Leah Gilig and Iain Neish with one of the last few seaweed farmers (name of Jun) still active on Dawahon (standing right) and other village people interested in seaweed farming. There is a 342-strong Dawahon Seaweeds Farmers Association that we will connect with.

Plate 9. Danajon Islet traces of seaweed remaining 10 October 2023

Proposed Danajon Islet gleaning project toward cultivar supplies

One thing I want to try is a “gleaning” project at Dawahon Bank, where loose eucheumatoid seaweed fronds are drifting around seagrass beds in the wake of failed farming efforts. I want to determine whether it makes sense to glean such material and screen it as a cultivar source for farm rejuvenation.

Coast 4C and Sea6 have both commenced actions aimed at setting up cultivar biomass networks, including collaboration with Maikee Roleda and others, so we must discuss ways forward. The most immediate need is for near-term test plots and nucleus farm startups … some of which are already well advanced by Coast 4C initiatives.

A rescue that did not gain traction … some press excerpts

Elmer Recuerdo, November 1 2022: evmailnews.net

The Bureau of Fisheries and Aquatic Resources (BFAR) Regional Office-8 said [Typhoon] Paeng damaged an estimated P16-million worth of crops and properties on the island, the second worst disaster since Odette, when total damages reached P200 million. “We haven’t even fully recovered from Typhoon Odette, then we have Paeng,” lamented Benjamin Tańo, the president of the 342-strong Dawahon Seaweeds Farmers Association.

For its response to Odette, BFAR-8 distributed 93 fiberglass boats with engines and complete accessories worth P4.6 million and P500,000 worth of propagules. Vicenta Projimo, BFAR-8 regional civic coordinator, said one boat will be shared by three seaweed farmers, while each farmer is provided with 100 kilograms of seaweed propagules.

To date a total of 220 hectares out of the 1,300 hectares of potential area for farming have been planted and replanted with seaweed propagules by its 578 earnest fisherfolks, some of them have started selling their seaweeds to consolidators and buyers in Leyte and Cebu.

Ruel Inoc, a barangay councilor and spokesman of the association, said he believes that the increasing frequency of destructive typhoons, as well as the emergence of seaweed diseases, such as “ice-ice,” is due to global warming. “We used to have a good harvest all year round. In recent years, we only have good harvest during habagat [southwest monsoon] from June to October,” Inoc added.

During habagat season, Inoc said he earns more than P200,000 per month selling them at P40 a kilogram.

REPLANTING. Seaweed farmers in Dawahon Islet in Bato, Leyte receive seedlings on Aug. 25, 2022. The Bureau of Fisheries and Aquatic Resources (BFAR) has distributed 17,629 seaweed seedlings to farmers in Dawahon to revive the seaweed industry within the year after it was wrecked by Typhoon Odette in late 2021. *(Photo courtesy of BFAR)*

By October 2023 there was no obvious trace of impacts from this initiative.

MPA can be powerful phycoecology ecoscape management tools

There are hundreds of MPA in the Philippines.

Coast 4C points out that:

"Larger and more effective community-based marine protected areas (MPAs) are essential tools for maintaining marine biodiversity and replenishing fish stocks, and can be integrated with seaweed farming for mutual benefit."

The Coast 4C solutions include:

- ✓ Appropriately integrating seaweed into MPAs supports habitat and fish stock recovery
- ✓ Increasing size and effectiveness of MPAs through our iMPA model
- ✓ Leveraging iMPAs to increase sustainable seaweed production and income

Baclayon to Calape
1 Balicasag Island Fish Sanctuary
2 Basdacu Fish Refuge and Sanctuary
3 Biking Marine Sanctuary
4 Bil-isan Fish Sanctuary
5 Bingag Marine Sanctuary
6 Bolod Fish Sanctuary
7 Bool Fish Sanctuary
8 Cabacongan Fish Sanctuary
9 Calayugan Norte Shell Garden & FS
10 Calayugan Sur Fish Sanctuary
11 Canhagdon Occidental Fish Refuge and Seagrass Sanctuary
12 Catarman Marine Sanctuary
13 Cogon Norte Shell Garden and Fish Refuge and Sanctuary
14 Cuasi Fish Refuge and Sanctuary
15 Danao Fish Sanctuary
16 Dao-San Isidro Marine Sanctuary
17 Doljo Fish Sanctuary
18 Guiwanon Punta Cruz MS
19 Lawis Fish Sanctuary
20 Liboron Seagrass Sanctuary
21 Lomboy-Kahayas Fish Sanctuary
22 Looc Marine Sanctuary
23 Mabaw Marine Sanctuary
24 Madangog Fish Sanctuary
25 Magtongtong Fish Sanctuary
26 Manga Marine Sanctuary
27 Mantatao Marine Sanctuary
28 Maraag Marine Sanctuary
29 Pamilacan Island Fish Sanctuary
30 Pantudlan Fish Sanctuary
31 Pig-ot Marine Sanctuary
32 Poblacion Marine Sanctuary
33 Pondol Is. Fish Sanctuary
34 San Isidro Marine Sanctuary
35 Sondol Fish Sanctuary
36 Song-on Fish Refuge and Sanctuary
37 Sta. Cruz Seagrass Sanctuary
38 Tabalong Marine Sanctuary
39 Talisay Marine Sanctuary
40 Tangnan Marine Sanctuary
41 Tawala Marine Sanctuary
42 Ubayon Marine Sanctuary

Tubigon to Talibon
43 Asinan Reef Fish Sanctuary
44 Banacon Island Marine Sanctuary
45 Batasan Island Marine Sanctuary
46 Bilang-bilangan Fish Sanctuary
47 Bonbon Seagrass Sanctuary
48 Cabulijan Marine Sanctuary
49 Cagawasan Seagrass Sanctuary
50 Calituban Fish Sanctuary
51 Campao Occidental Fish Sanctuary
52 Canlawron Marine Refuge & Sanc
53 Cataban Fish Sanctuary
54 Centro Marine Sanctuary
55 Corte-Baud Marine Sanctuary
56 Cuaming Marine Sanctuary
57 Eastern Cabul-an Marine Sanctuary
58 Guindacpan Marine Sanctuary
59 Hambongan Marine Sanctuary
60 Handumon Marine Sanctuary
61 Hayaan, Inanuran and Budlaan FS
62 Jagoliao Seagrass Sanctuary
63 Jandayan Norte Marine Sanctuary
64 Jandayan Sur Marine Refuge and Sanctuary
65 Lajog Marine Sanctuary
66 Lawis Seagrass Sanctuary
67 Macaas Marine Sanctuary
68 Mahaba Marine Sanctuary
69 Mahanay Marine Sanctuary
70 Majigpit Marine Sanctuary
71 Maomacuan Marine Sanctuary
72 Nahawan Seagrass Sanctuary
73 Nasinguin Marine Sanctuary
74 Nocnocan Marine Sanctuary
75 Ondol Seagrass Sanctuary
76 Pandanon Fish Sanctuary
77 Panggapasan Fish Sanctuary
78 Poblacion Marine Sanctuary
79 Sag Fish Sanctuary
80 Sagasa Marine Sanctuary
81 San Francisco Fish Sanctuary
82 Sto. Niño Fish Sanctuary
83 Sto. Niño Seagrass Sanctuary
84 Tangaran Seagrass and Shell Garden
85 Tanghaligue Marine Sanctuary
86 Tugas Marine Sanctuary
87 Tulang Marine Sanctuary
88 Ubay Marine Sanctuary
89 Western Cabul-an Marine Sanctuary

Bien Unido to Anda
90 Aguining Fish Sanctuary
91 Badiang Fish Sanctuary
92 Bantigue Marine Sanctuary
93 Bantiguian Marine Sanctuary
94 Basiao Marine Sanctuary
95 Baud Marine Sanctuary
96 Bilangbilangan East Marine Sanc
97 Bilangbilangan West Marine Sanc
98 Bogo Marine Sanctuary
99 Bonbonon Marine Sanctuary
100 Butan Marine Sanctuary
101 Campamanog Marine Sanc
102 Canmangao Marine Sanctuary
103 Gaus I Marine Sanctuary
104 Gaus II Marine Sanctuary
105 Hinongatan East Marine Sanc
106 Hinongatan West Marine Sanc
107 Humay-humay Marine Sanc
108 Kabangkalan Marine Sanctuary
109 Lapinig Island Fish Sanctuary
110 Liberty Marine Sanctuary
111 Linawan Municipal Fish Sanc
112 Lipata Marine Sanctuary
113 Lumayag Islet Marine Park
114 Lumislis Marine Sanctuary
115 Malinguin Fish Sanctuary
116 Mandawa Marine Sanctuary
117 Pasil (Kawasihan) Reef MS
118 Penarrgo Marine Sanctuary
119 Poblacion Marine Sanctuary
120 Poong-Garcia Marine Sanctuary
121 Popoo Marine Sanctuary
122 San Antonio Marine Sanctuary
123 Sibukawan Marine Sanctuary
124 Sidlakan Marine Sanctuary
125 Sinandigan Marine Sanctuary
126 Sto. Rosario Marine Sanctuary
127 Suba Marine Sanctuary
128 Talisay Fish Sanctuary
129 Talisay Marine Sanctuary
130 Tilmobo Marine Sanctuary
131 Tuburan Marine Sanctuary
132 Tugas Marine Sanctuary
133 Villa Milagrosa Marine Sanc

Guindulman to Alburquerque
134 Alejawan Marine Sanctuary
135 Anas Fish Sanctuary
136 Ban-ban Fishery Refuge and Sanctuary
137 Basdio Marine Sanctuary
138 Bonkokan Ubos Marine Sanc
139 Bunga Mar Marine Sanctuary
140 Cabantian Marine Sanctuary
141 Cantagay Marine Sanctuary
142 Can-uba Marine Sanctuary
143 Catugasan Marine Sanctuary
144 Cayam-Malinao Marine Sanctuary
145 Eastern Ulbujan-West Ulbujan Marine Sanctuary
146 Guinacot Marine Sanctuary
147 Guinsularan Marine Sanctuary
148 Ipil Marine Sanctuary
149 Itum Marine Sanctuary
150 Langkis Marine Sanctuary
151 Larapan Marine Sanctuary
152 Las Salinas Sur Marine Sanc
153 Madua Norte Marine Sanctuary
154 Madua Sur Marine Sanctuary
155 Malinao East Marine Sanctuary
156 Mawi Marine Sanctuary
157 Naatang Marine Sanctuary
158 Nagsulay Marine Sanctuary
159 Nausok Marine Sanctuary
160 Pangdan Marine Sanctuary
161 Poblacion Fish Sanctuary
162 Pulang Yuta Marine Sanctuary
163 San Antonio Marine Sanctuary
164 Sta. Felomina (Sta. Fe) MS
165 Taongon-Canandam MS
166 Taug-Tiguis Marine Sanctuary
167 Tayong Occidental MS
168 Tayong Oriental Marine Sanc
169 Tubod Mar Marine Sanctuary

Alan T. White and Coastal Conservation and Education Foundation MPA development https://www.coast.ph/

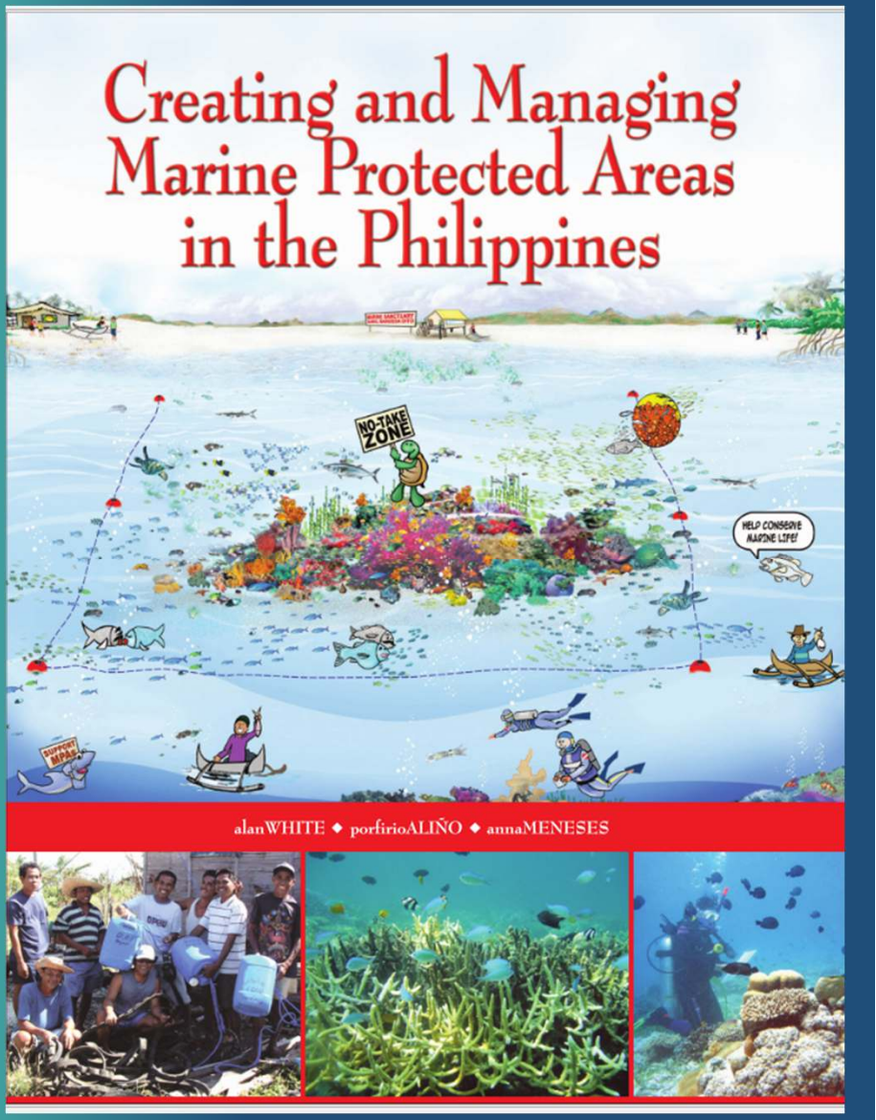
How can BLISS collaborate with CCEF initiatives?

Protect Danajon Project Launching Marks Milestone in Biodiversity Conservation and Sustainable Landscape

coastph - August 16, 2023 - CCEF News

CCEF Embarks on Bold Initiative to Safeguard the Philippines' only Double Barrier Reef

coastph - September 4, 2023 - CCEF News



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END

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Image ICN: Aerial photo of Seaweed farmhouses near Danajon Islet, 1981