



**Establishment and Operation of a Regional System of
Fisheries *Refugia* in the South China Sea and Gulf of Thailand**

BOLINAO FISHERIES REFUGIA MANAGEMENT PLAN

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BOLINAO FISHERIES REFUGIA MANAGEMENT PLAN



**Municipality of Bolinao
Province of Pangasinan**

CHAPTER 1. INTRODUCTION

Rationale

The establishment of the Fisheries Refugia will enable the local government units to manage their fisheries and marine resources as well as the coastal habitats sustainably. Most, if not all of the issues and problems that beset the fisheries and coastal management will be addressed through the broader perspective of ecological, human and governance aspects of management.

Scope of the Plan

The Plan will cover the contiguous coastal barangays identified in Coron, Palawan. The management of these areas will involve the partnerships among and between the LGUs, the academe, the private sector, the fishers and others who are either direct or indirect beneficiaries.

Legal Basis

The Fisheries Code and the Local Government Code are the two major laws that promote the establishment of the Fisheries Refugia. There are other environmental laws that also ensure the protection of fisheries and marine resources. Specifically, the LGUs are mandated to enact fisheries ordinances that will protect the resources in their areas of jurisdiction.

Vision

Bolinao is a model fishery management area (community) with abundant & sustainable resources and managed environment, equitably enjoyed by empowered and law abiding citizens guided by a dynamic, efficient and responsible governance.”

A responsible community enjoying and sharing the bounty of sustainably-managed marine resources and environment governed by the rule of laws.

Mission

The Municipality of Bolinao shall implement the spatial and temporal management of the fisheries resources and marine critical habitat to protect, conserve, and manage the marine environment and rational utilization of the fishery resources towards the sustainable growth of fisheries productivity thru the community-based collective mechanism.

Implement the spatial & temporal management of the marine fisheries resources and protect, conserve, manage the marine environment to accelerate the sustainable growth of fisheries industry productivity towards an economic growth of Bolinao Municipality.

Goals

Main Goal:

People of Bolinao enjoy the economic benefit on sustainable coastal fishery resources utilization through the integration of Fisheries and habitat management.

Specific Goals:

Ecological well-being

- Increased resilience of fish stocks to the effect of fishing.
- Ecosystem health protected and sustained.

Human well-being

- Improved quality of life of the municipal fisherfolks in particular and the community in general

Good Governance

- Relevant policies, rules and regulations enacted and properly implemented.
- Fisheries and habitat management conducted in an integrated manner.

Objectives

- Ecological Well-Being Component
 1. Maintain the target species and other commercial species at the level necessary to ensure fisheries productivity
 2. Minimize the impacts of fishing on the environment
 3. Improve coordination between fisheries and environment agencies and organizations regarding fisheries management interactions between fisheries and critical marine habitats.
 4. Improve understanding amongst stakeholders, including fisherfolks, scientists, policy-makers and fisheries managers of ecosystem and fishery linkages as a basis for integrated fisheries and ecosystem/habitat management,
- Human Well-Being Component
 1. Maximize the net incomes of the fisherfolks, employment opportunities for those dependent on fishery for their livelihood.
- Good Governance Component
 1. Enact and enforce relevant policies, rules, and regulations and full applications of the laws.
 2. Provide financial and material assistance to law enforcement.
 3. Link with other local government units in the protection of coastal municipalities

Strategies

A. Ecological Well-Being Component

A.1 Resources Management

1. Safeguard the spawning and nursery areas and commercial species within these areas at critical stages of their life cycle
2. Enhancement of fisheries resources and their habitats
3. Prevention of habitat degradation and commercial extinction of important fishery species
4. Improve coordination between fisheries and environment agencies and organizations
5. Improve use of zoning in fisheries management
6. Improve incorporation of species-specific life history characteristics in fisheries management system
7. Improve understanding amongst stakeholders, including fisherfolks. Scientists, policy-makers and fisheries managers of ecosystem and fishery linkages
8. Promotion of the role of refugia in enhancing the resilience of fisheries systems

Action

1. Fishers, fishing gears and fishing boats licensing improved.
2. Fish corrals, and other fishing gears/activities that may occupy space in the refugia/coastal waters are properly located in specific zones.
3. Fishery monitoring mechanism on the enforcement of environmental and fishery laws strengthened.
4. Aquaculture properly implemented and managed

A.2 Coastal Habitat Management

1. Identify, eliminate and/or reduce sources of coastal habitat destruction/degradation (Pollution, logging, dredging, draining of wetlands, coastal development, tourism development, etc.)

Strategies

1. Deployment, use of and access to artificial reefs regulated
2. Mangrove Forest management under the Community-Based Forest Management (CBFM) framework established
3. Seagrass meadows and algal beds protected and conserved
4. Coral reefs protected and conserved
5. Follow /adhere to the water and Land used Plan of the Municipality
6. Fishing activities and use of gear regulated/managed
7. Sand and coral mining regulated
8. Coastal development managed

A.3 Solid Waste Management

1. Identify and assess activities that have potential environmental impact from the generation of waste

Strategies

1. Ecological Solid Waste Management Program to harmonize/complement with the existing Ecological Solid Waste Management Code established.
2. Disposal of ecological solid waste to different bodies of water such as sea, rivers and streams prohibited.
3. Environmental Compliance Certificate (ECC) requirements issued by the Environmental Management Bureau-DENR, specifically on the required installation of wastewater treatment facilities by fishery-related and similar industries situated along coastal areas enforced.

A.4 Climate Change Mitigation, Adaptation and Disaster Risk Reduction and Management

1. Condition of marine habitat, fisheries and community determined.
2. Damaged critical coastal and marine habitats rehabilitated.
3. Vulnerable critical coastal and marine habitats protected and conserved.
4. Environment friendly and green technology adopted and promoted in the municipality.
5. Climate change adaptive and disaster resilient communities established.

B. Human Well-Being Component

B.1 Livelihood & Enterprise Development

1. Environment friendly alternative/supplemental livelihood identified and implemented.
2. Coastal aquaculture sustainably managed.

B.2 Coastal Eco-Tourism Development

1. Island hopping and dive tour activities established and managed.
2. Baywalk park established with appropriate management system and properly implemented.

C. Good Governance

C.1 Legal Arrangement and Institutional Development

1. Fisheries Refugia Management Plan institutionalized.
2. People's organization (POs) strengthened.

C.2 Information, Education and Communication Campaign

1. Tri-media IEC materials on ecosystem approach in fisheries refugia and habitat management designed and developed.
2. Community awareness/information drive on ecosystem approach in fisheries refugia and habitat management regularly conducted (promotion, dissemination).

CHAPTER 2. PROFILE OF THE FISHERIES REFUGIA

Bolinao Fisheries *Refugia*

A Fisheries *Refugia* site is located in Bolinao, Pangasinan. The province is under the Ilocos Region or Region 1 composed of 4 provinces namely: Ilocos Norte, Ilocos Sur, La Union and Pangasinan (Figure 1).



Municipal Profile

- **Geographical location**

Bolinao is located in the northwestern part of Pangasinan with geographical coordinates of 16.36° - 16.46°N and 119.8° - 119.97°E. The municipal center of Bolinao is situated at approximately 16° 23' North, 119°. The municipality's elevation is 53.3 feet above mean sea level.

- **Site information**

Geography

The municipality's geological characteristic has three categories namely 1) Alluvium, 2) Coralline Limestone, 3) Sandstone and shale. Under the category 1 characteristic are the following barangays: Patar, Ilog-Malino, Estanza, Balingasay, Arnedo, Concordia, Lambes, Catungi, Culang, Luna, Luciente II and a big part of Santiago Island. Category 2 are some areas in barangays Lambes, Zaragoza and Catungi and the rest of the other barangays are under the

category 3-Sandstone and Shale.

History and demography

There is no exact record when Bolinao was created. However, based on oral history, the present municipality of Bolinao was a small settlement in what is now called barangay Binabalian in Santiago Island. This was based on an oral history where a small settlement was established by Captain Pedro Lombi in 1575 with around 100 families/settlers. The creation of Bolinao was probably by virtue of a Royal Decree of Spain in that year. Later on, the settlement was transferred to the present Bolinao mainland due to pirates' violence.

The name of Bolinao was assumed to have come from three accounts. In the early days Bolinao was a remote fishing village. The name Bolinao came from the catch of the fish species which the villagers called "monamon". However, this fish species is called by the Tagalogs, Bicolanos and the Visayans as "Bolinao" that was eventually adopted by the villagers. Another story where the name Bolinao could have taken was from the tree that grows abundantly along the beaches of the island called "Pamulinawen". Another story was associated with the name of a couple Bolido and Anao. By combining their names, Boli and nao lead to the name of the town Bolinao.

On November 30, 1903, by virtue of Public Act No. 1004, Bolinao became part of the province of Pangasinan together with the other seven municipalities from the province of Zambales. On September 19, 1988, the Municipal Council of Bolinao passed Resolution No. 104 adopting July 25, 1575 as the Foundation Day of Bolinao in honor of the Patron Saint of the town, St. James the Great.

Bolinao is a coastal municipality and is located at the northwestern part of Pangasinan bounded by the West Philippine Sea/South China Sea and the Lingayen Gulf (Figure 3). The total land area of Bolinao based on the Cadastral Survey of the Municipality (CAD 559-D) is 197.2314 square kilometers or 19,723.1426 hectares which represents 3.82% of the total land area of Pangasinan. The municipality of Bolinao is composed of 30 Barangays (Barangay is an administrative or political subdivision of the municipality in the Philippines and is the native Filipino term for a village, district or ward) and out of these barangays, 20 are coastal barangays. Based on the 2015 census the population of Bolinao was 82,084 (census are done every 5 years) which represents 2.78% of the total population of Pangasinan. The population density was 416 residents per square kilometer or 1,078 dwellers per square mile.

Bolinao is a first class municipality, having an average annual income for the past four calendar years of at least Fifty-Five Million Pesos (P55,000,000). The annual regular revenue of Bolinao in 2016 was about P185,680,903. Bolinao is known for its rich fisheries resources from aquaculture and marine capture fisheries. Fishing and farming are the major sources of income for the people of Bolinao. The municipality supplies fish and other fishery products to other municipalities of Pangasinan, as well as its neighboring provinces up to Metro Manila. Aquaculture and mariculture provide better sources of income and livelihood for the majority of the population. Other sources of income of the communities are small-scale cottage industries, salt making, shell craft, bagoong (fish paste) making, dried fish, buri palm mat weaving, charcoal making, bamboo and woodcrafts.

The Fisheries Refugia site covers the eight coastal barangays located in mainland Bolinao namely: Arnedo, Balingasay, Concordia, Estanza, Germinal, Ilog Malino, Luciente I, Tupa and the four coastal barangays in Santiago Island - Binabalian, Dewey, Goyoden and Lucero. The municipality has delineated their marine waters into different purposes for better use and management (Table 1).

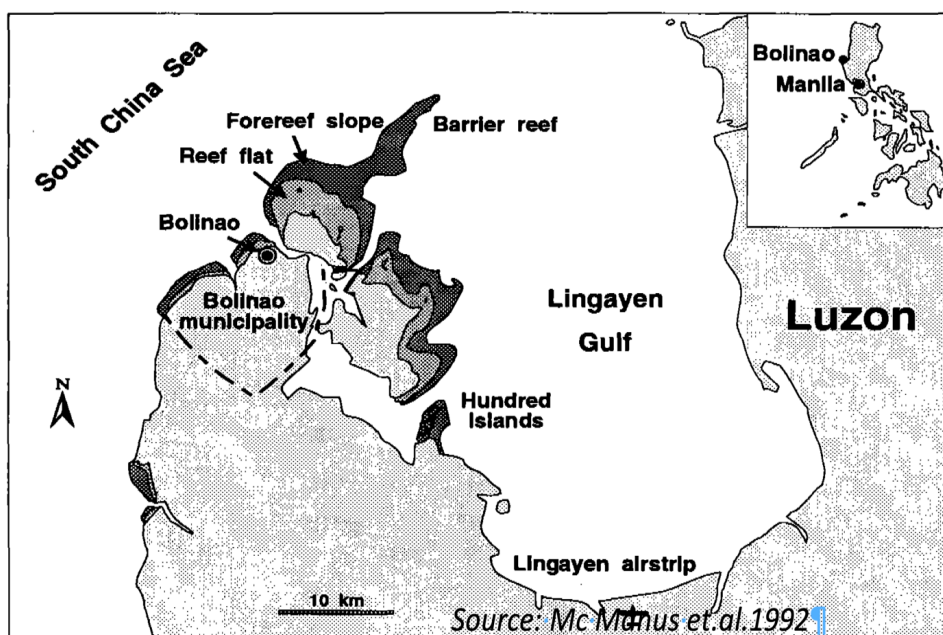
Table 1. Municipal waters division per grouping use in hectares

Municipal Waters Uses		
Classification	Hectares	Percentage (%)
Municipal Fishing	37,605.98	48.98
Commercial Fishing	26,765.53	34.86
Sea/Navigational Lane	2,453.77	3.19
Mariculture/Aquaculture	646.41	0.84
Delta/Estuary	6.65	0.01
Fishery Refuge/Sanctuary	190.04	0.25
Fishery Reserve (Coral)	5,493.66	7.15
Fishery Reserve (Seagrass)	3,308.25	4.31
Mangrove area	145.50	0.19
Foreshore land	168.00	0.22
Total	76,783.79	100.0

Source: Bolinao Comprehensive Land Use Plan

Important coastal habitats in the area

Bolinao is bounded by seagrass, mangroves, corals and reefs. The mangroves cover an area of 145.50 hectares of the municipal waters. Seagrass beds and corals are mostly found in Santiago Island. The coral reefs cover an area of about 5,493.7 hectares while the seagrass beds have an area of about 3,308 hectares of the municipal waters. The fringing coral reef system surrounds the entire Bolinao coastal area and covers a large portion of the reef flat.



Seagrass

Seven species of seagrass are recorded in Bolinao namely: *Enhalus acoroides*, *Thalassia hemprichii*, *Cymodocea rotundata*, *Cymodocea serrulata*, *Halodule univervis*, *Halophila ovalis* and *Syringodium isoetifolium*. The two dominant species found in Bolinao are *Thalassia hemprichii* and *Enhalus acoroides*. The seagrass beds are home to the different species of rabbitfish, mostly the *Siganus fuscenscens* species. Bolinao coastal waters are known to be the major source of siganid fry.

Mangroves

Mangrove areas are located in the coastal waters of 11 Barangays namely: Arnedo, Balingasay, Binabalian, Dewey, Goyoden, Lucero, Luciente II, Luna, Pilar, Salud, and Victory. The refugia site covers the first 6 coastal Barangays.

Number and types of fishing vessels operating in the refugia sites

Fishing in Bolinao is done in the West Philippine Sea (South China Sea) and Lingayen Gulf both for the commercial and municipal fishing sectors. The municipal fishing sector are fishing vessel less than 3-gross tonnage and are operating within the municipal waters whose boundary is 15 kilometers from the shoreline outward. The commercial fishing sector are fishing vessels with more than 3-gross tonnage operating beyond the 15 kilometers and are not allowed to fish in the municipal waters. There are four major fishing gears used by the municipal fisherfolk namely: bottom set gillnet, handline, multiple hook & line and spear gun. Fishing is all year round.

Only fishing vessels with three gross tonnage and below are allowed to operate in municipal waters. The total registered municipal fishing vessels are 1,094 units. This figure represents only the major gear used by a single boat. Several fishing boats used several gears in fishing. Some boats used up to five different fishing gear in a single fishing operation. The approximate count of the other gears used during fishing were estimated to be around 80 to 100 units.

Records also showed that only 312 registered fishing boats have complete records such as boat name, boat owner, fishing gear and gross tonnage among others. The rest are registered but no record of gear type and fishing vessel name, etc.

There are 1,094 registered municipal fishing gear in Bolinao in 2019. This figure represents only the major gear used by a single boat. Several fishing boats used several gears in fishing. Some boats used up to five different fishing gear in a single fishing operation. Approximate count of the other gears used during fishing were estimated to be around 80 to 100 units. The Registered fishing boats are either motorized or non-motorized (Table 2).

Table 2. Numbers of fishing boats by type in Bolinao

Type	Number
Bottom set gillnet	159

Handline	40
Multiple handline	39
Spear gun	35
Drift long line	17
Surface set gillnet	9
Fish lift net (Basing)/Bagnet	5
Octopus/Squid luring device/	4
Crab lift net (Bintol)/pot	2
Squid pot	2
Motorized with gear tonnage but no gear type	316
Motorized no tonnage no gear type	28
Non-motorized no gear type	438
Total	1,876

The total registered fisherfolk in Bolinao are 7,085 composed of 5,198 males and 1,887 females based on the 2015 census (Table 3). The total fisherfolk in the 12 *refugia* site coastal barangays (Arnedo, Balingasay, Concordia, Estanza, Germinal, Ilog-Malino, Luciente I, Tupa, Binabalian, Lucero Dewey and Goyoden are 4,735 composed of 3,530 males and 1,205 females (Table 3). The fisherfolk in the *refugia* site represent 66.83 % of the total registered fisherfolk in Bolinao.

Table 3. Number of registered fisherfolk by barangay and gender

Barangay	Number of Fisherfolk	Male	Female
Arnedo	247	172	75
Balingasay	570	430	140
Binabalian	350	282	68
Cabuyao	5	3	2
Catuday	1	1	-
Catungi	142	100	42
Concordia (Poblacion)	370	253	117
Culang	149	88	61
Dewey	491	386	105
Estanza	239	174	65
Germinal (Poblacion)	326	165	161
Goyoden	473	346	127
Ilog Malino	278	193	85

Lambes	150	116	34
Liwa-liwa	4	4	-
Lucero	508	454	54
Luciente 1.0	715	543	172
Luciente 2.0	171	151	20
Luna	211	164	47
Patar	177	107	70
Pilar	440	263	177
Salud	372	255	117
Samang Sur	3		3
Sampaloc	52	52	-
San Roque	1	-	1
Tara	97	89	8
Tupa	168	132	36
Victory	184	121	63
Zaragoza	191	154	37
Total	7085	5198	1887

Table 4. Number of registered fisherfolk in the *refugia* site by gender

Barangay	Number of Fisherfolk	Male	Female
Arnedo	247	172	75
Balingasay	570	430	140
Binabalian	350	282	68
Concordia	370	253	117
Dewey	491	386	105
Estanza	239	174	65
Germinal	326	165	161
Goyoden	473	346	127
Ilog Malino	278	193	85
Lucero	508	454	54
Luciente I	715	543	172
Tupa	168	132	36
Total	4,735	3,530	1,205

The species and size selectivity of the principal fishing gear used

There are 1,094 registered municipal fishing gears in Bolinao in 2019. This figure represents only the major gear used by a single boat. Several fishing boats used several gears in fishing. Some boats used up to five different fishing gears in a single fishing operation. Approximate count of the other gears used during fishing were estimated to be around 80 to 100 units. The Registered fishing boats are either motorized or non-motorized.

Table 5. The different types, classification and number of fishing gears used in Bolinao

Gear	Number of units
Surface set gillnet	9
Fish lift net (<i>Basing</i>)	5
Bottom set gillnet	159
Squid pot	2
Spear gun	35
Simple handline	40
Multiple handline	39
Octopus/Squid luring device/gaff hook	3
Gaff hook	1
Fyke net/filter net	1
Drift long line	17
Fish corral	
Crab lift net (<i>Bintol</i>)	1
Motorized with gear tonnage but no gear type	316
Motorized no tonnage no gear type	28
Non-motorized no gear type	438
Total	1,094

The widely used fishing gears in Santiago Island are the traps, spear guns and different kinds of gillnets. Fish corrals were also observed in most of the shallow portions of the coast of the Island. The dominant fish species caught by the major gears used are the *Siganus fuscescens*, *Choerodon anchorago*, *Scarus ghobban* and *Plotosus canius*.

Table 6. Catch by family, species, barangay, gear in Barangay Goyoden and Binabalian

Target Species			Barangay Goyoden		Binabalian	All
			Gear	Gear	Gear	Gear
Family	Species	Local name	Trap	Fish Corral	Spear gun	Gillnet
Apogonidae	<i>Apogon sp.</i>	Bagsang	-	4	-	-
Gerridae	<i>Gerres oyena</i>	Lumalanang	-	+	+	1
Labridae	<i>Choerodon anchorago</i>	Molmol mangipen	23	+	1	1

Lethrinidae	<i>Lethrinus harak</i>	Rogso	2	1	2	3
Loligonidae	<i>Sepioteuthis lessoniana</i>	Pusit	-	2	4	1
Octopodidae	<i>Octopus spp.</i>	Corita	-	+	5	-
Plotosidae	<i>Plotosus canius</i>	Ito	+	18	+	+
Plotosidae	<i>Plotosus lineatus</i>	Ito	+	5	+	-
Portunidae	<i>Portunos pelagicus</i>	Barisaway	-	2	4	1
Scaridae	<i>Scarus ghobban</i>	Molmol	19	+	+	+
Scaridae	<i>Scarus rhoduropterus</i>	Molmol	11	3	+	+
Scaridae	<i>Leptoscarus vaigiensis</i>	Molmol tarektek	2	7	2	2
Scaridae	<i>Calotomus japonicus</i>	Molmol	11	1	+	1
Siganidae	<i>Siganus fuscescens</i>	Barangen	+	26	60	74

Table 7. Known Critical Spawning and Nursery Areas for Significant Fish Species in Lingayen Gulf, Bolinao, Pangasinan

Site Name	Geographical Location	Species Known to utilize the Site	Known Usage of the site		Information Sources
			Nursery	Spawning	
Lingayen Gulf	16°12'42" 120°08'17"	Threadfin bream (<i>Nemipterus spp.</i>)	√	√	Fisheries & habitat reports
		Mangrove red snapper (<i>Lutjanus argentimaculatus</i>)	√		Fisheries & habitat reports
		Brownstripe red snapper (<i>Lutjanus vitta</i>)	√		Fisheries & habitat reports
		Leopard Coralgrouper (<i>Plectropomus leopardus</i>)	√	√	Fisheries & habitat reports
		White-spotted spinefoot (<i>Siganus canaliculatus</i>) (Rabbitfish)	√	√	Fisheries & habitat reports
		Mottled spinefoot (<i>Siganus fuscescens</i>) (Rabbitfish)	√	√	Fisheries & habitat reports
		Sixbar grouper	√	√	Fisheries &

	(<i>Epinephelus sexfasciatus</i>)			habitat reports
	Greasy grouper (<i>Epinephelus tauvina</i>)	√	√	Fisheries & habitat reports
	Frigate tuna (<i>Auxis thazard</i>)	√		Fisheries & habitat reports
	Bullet tuna (<i>Auxis rocheii</i>)	√		
	Spanish mackerel (<i>Scomberomorus commersoni</i>)	√		Fisheries & habitat reports
	Short mackerel (<i>Rastrelliger brachysoma</i>)	√		Fisheries & habitat reports

Socio-Economic Profile

Number of fishing communities in the area

The Municipality of Bolinao is composed of 30 Barangays or villages, consisting of 23 coastal barangays and seven non-coastal barangays (Table 8). There are four urban coastal barangays where the bigger fish landings centers are located both for the municipal and commercial fishing vessels. The fisheries refugia sites are located in the 12 coastal barangay of Bolinao.

Table 8. Total population of the municipality of Bolinao per Barangay, land area and classification

No.	Barangay	Land Area (has)	Classification		2015 Population
1	Arnedo	429.12	Urban	Coastal	5,354
2	Balingasay	823.56	Rural	Coastal	4,435
3	Binabalian	603.34	Rural	Coastal	4,039
4	Cabuyao	707.96	Rural	Non-coastal	2,607
5	Catuday	2,714.28	Rural	Non-coastal	2,752
6	Catungi	905.97	Rural	Coastal	1,594
7	Concordia	96.96	Urban	Coastal	4,307
8	Culang	1,000.00	Rural	Coastal	1,676
9	Dewey	38.00	Rural	Coastal	1,984
10	Estanza	793.07	Rural	Coastal	1,892
11	Germinal	161.43	Urban	Coastal	3,668
12	Goyoden	238.01	Rural	Coastal	2,691
13	Ilog-Malino	983.53	Rural	Coastal	2,660
14	Lambes	183.80	Rural	Coastal	1,158
15	Liwa-liwa	556.54	Rural	Non-coastal	2,601
16	Lucero	475.13	Rural	Coastal	3,168
17	Luciente I	360.13	Urban	Coastal	5,366
18	Luciente II	798.89	Rural	Coastal	3,822
19	Luna	975.13	Rural	Coastal	3,355

20	Patar	841.20	Rural	Coastal	1,397
21	Pilar	155.60	Rural	Coastal	2,788
22	Salud	492.33	Rural	Coastal	3,188
23	Samang Norte	998.02	Rural	Non-coastal	1,084
24	Samang Sur	569.49	Rural	Non-coastal	1,191
25	Sampaloc	774.29	Rural	Non-coastal	2,940
26	San Roque	753.67	Rural	Non-coastal	905
27	Tara	552.91	Rural	Coastal	2,733
28	Tupa	1,302.40	Rural	Coastal	2,231
29	Victory	235.25	Rural	Coastal	1,320
30	Zaragoza	1,016.34	Rural	Coastal	3,178
Total		20,536.35			82,084

The total population in the 12 fisheries *refugia* sites are 41,795 or 50.92% of the total population (82,084) of Bolinao as of the 2015 population census (Table 9). The population in the urban barangays is 18,695, or 44.73% while the rural barangays have a total population of 23,100 or 55.27%. The land area of the urban barangay in the *refugia* site is 1,047.64 hectares while that of the rural barangay in the *refugia* site is 5,257.04 hectares.

Table 9. Land area, classification and the 2015 population of the 12 coastal barangay of the Bolinao *refugia* site

No.	Barangay	Land Area (has)	Classification		2015 Population
1	Arnedo	429.12	Urban	Coastal	5,354
2	Balingasay	823.56	Rural	Coastal	4,435
3	Binabalian	603.34	Rural	Coastal	4,039
4	Concordia	96.96	Urban	Coastal	4,307
5	Dewey	38.00	Rural	Coastal	1,984
6	Estanza	793.07	Rural	Coastal	1,892
7	Germinal	161.43	Urban	Coastal	3,668
8	Goyoden	238.01	Rural	Coastal	2,691
9	Ilog-Malino	983.53	Rural	Coastal	2,660
10	Lucero	475.13	Rural	Coastal	3,168
11	Luciente I	360.13	Urban	Coastal	5,366
12	Tupa	1,302.40	Rural	Coastal	2,231
	Total	6,304.68			41,795

Existing fisheries management measure in the area of the site

Fisheries management measures enacted by the Congress of the Philippines are the main policies followed in fisheries management at the Local Government Unit (LGU). This is true to the three *refugia* sites of the project. Therefore, Fisheries management measures of LGU are primarily based on National Laws or Republic Act (RA). Some of the services and responsibilities are already devolved to the LGUs, like the management of the coastal waters within the 15 kilometers distance from the shoreline.

Some of the policies under the Philippine Republic Acts or National Law relevant to fisheries management include:

- Decentralization of the management of near-shore fisheries resources to municipalities and local code of 1998 fishing communities under Republic Act 8550 or the Philippine Fisheries as amended by RA 10546.
- Strengthening of fisheries law enforcement by organizing municipal-based inter-agency law enforcement teams composed of representatives from fisherfolk association, NGOs, LGUs, Philippine Maritime Police (PMP), PCG, BFAR, DENR, the private sector, and other concerned agencies or institutions.
- Promotion of community-based initiatives to rehabilitate, conserve, and the coastal resources.
- Diversification of the source of income of fisherfolk toward other income opportunities.
- Expansion of extension services to form closer linkages between and among the fisherfolk, research institutes, and other beneficiaries.

The Philippine Fisheries Code of 1998 or RA 8550 mandates LGUs to establish the Municipal Fisheries and Aquatic Resources Management Council (MFARMC) and the Integrated Fisheries and Aquatic Resources Management Council (IFARMC) as needed in waters where several LGUs used the same body of waters in fishing or enclose fishing areas bounded by several municipalities. The head of the management council is the local Chief Executive or the Municipal Mayor. In case of the IFARMC the mayors will elect their Chairperson on a rotation basis. The Local Government Code of 1991 or RA. 7160 An Act providing for a Local Government Code of 1991 also provides provisions related to the management of municipal waters and marine resources. Executive Order 533, s. 2006 entitled **“Adopting Integrated Coastal Management as a National Strategy to Ensure the Sustainable Development of the Country’s Coastal and Marine Environment and Resources and Establishing Supporting Mechanisms for its Implementation”** served as one of the national management policy frameworks to promote sustainable development of the country.

Users and Beneficiaries of the Fisheries Refugia

1. Marginal fishermen
2. Seaweed farmers
3. Gleaners
4. Research institutions/academe
5. Tourists/visitors
6. Fish vendors
7. Fish consumers
8. Fish processors
9. Ice plants
10. Food establishments

The Fisheries Management Area (FMA)

The FMA approach in fisheries management was established by the Bureau of Fisheries and Aquatic Resources (BFAR) under Fisheries Office Order (FOO) Number 263 Series of 2019

(Annex B). The FOO covers the marine waters of the Philippines as defined under the Presidential Decree 1599 (1978), RA 9522 (2009) An Act to Amend Certain Provisions of RA no. 3046 (1961).

The most recent management measure used by the municipality of Bolinao is the Comprehensive Land Use Plan covering the period 2017-2026 (Table 10). The Plan includes sections on: Existing Water Uses (15 km Municipal Waters), Municipal fishing, Commercial fishing, Mariculture/aquaculture Areas, establishment of Fishery Refuge/Sanctuary, Fishery Reserve, among others.

Table 10. Management measures at the Bolinao Fisheries *Refugia* Site

Municipal Ordinance, EO, Resolution	Description
Ordinance No. -1 Series of 1999	An Ordinance Providing for the Sustainable Management, Development and Conservation of the Bolinao Municipal Waters and its Coastal and Fishery Resources, Harmonizing and Integrating All Ordinances Pertinent Thereto and For Other Purposes
Resolution No. 217-47	Adopting the Comprehensive Land Use Plan Covering the Period 2017-2026 of the Municipality of Bolinao, Pangasinan

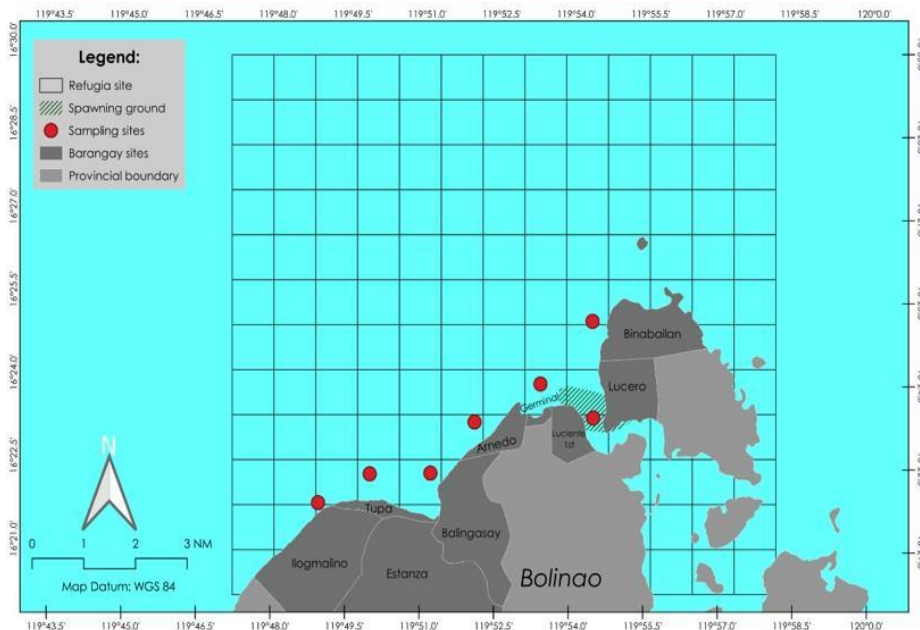


Figure 3. Map of the Bolinao Fisheries *Refugia* Site

Fishing area by fishing gear

By the classification of the municipal waters, municipal fishermen can operate within the coastal waters of their barangay using different gears. There is no specific gear designation per municipal waters. However, municipal fisherfolk cannot operate in other coastal waters of the nearby or adjacent municipality without a permit from the adjacent municipality.

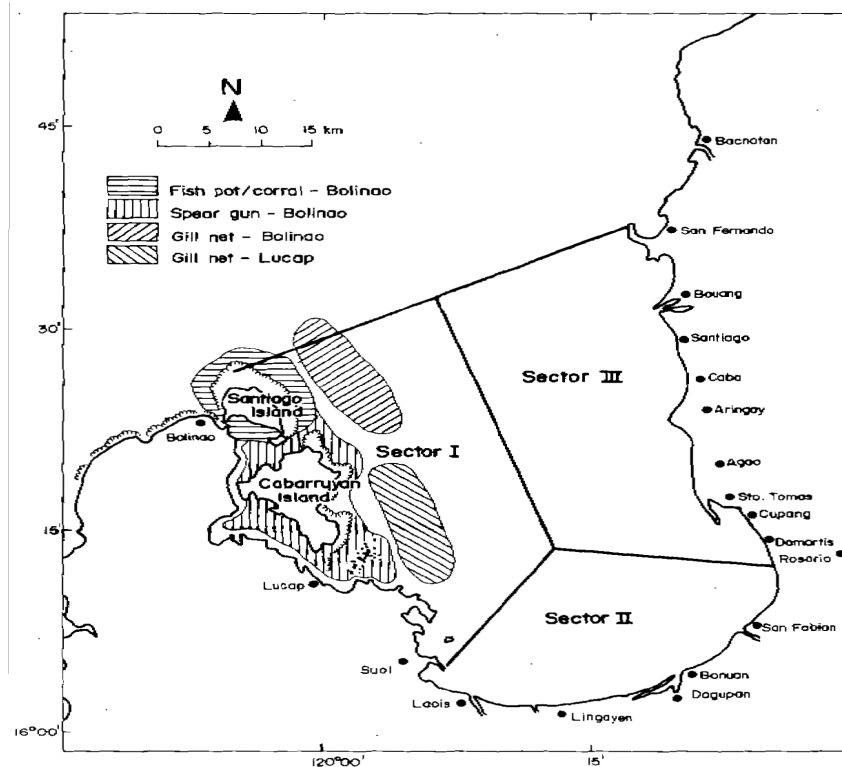


Figure 4. Map of Lingayen Gulf showing portion of Bolinao fishing area by gear type in Sector I

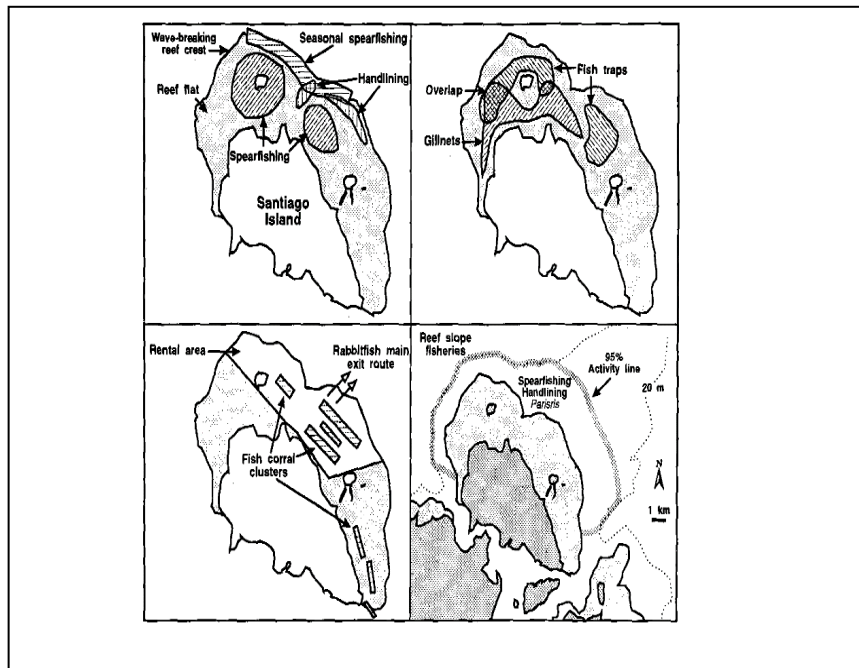


Figure 5. Different habitats used by the fisherfolk of Bolinao using specific fishing gears.

CHAPTER 3. FISHERIES REFUGIA MANAGEMENT PLAN

The Fisheries Refugia Management Process at the municipal level follows the process identified in the National Plan for Fisheries Refugia. However, the difference among municipalities like Bolinao are the issues and problems which are particularly present in each of the areas.

Management Issues and Problems

Ecological well-Being

- a. Fisheries Management
 1. Overfishing
 2. Destructive/illegal fishing practices (dynamite, cyanide, troll fishing; poaching, etc.)
- b. Coastal Habitat Management
 1. Coastal habitat destruction (mangroves, seagrasses and coral reefs)
 2. Vulnerability of coastal habitats from irresponsible human interference
- c. Coastal Zoning and Shoreline Management
 1. Improper utilization of coastal and shoreline
 2. Coastal and shoreline encroachment
 3. Squatting along the shoreline
- d. Waste Management
 1. Excessive use of chemicals in agriculture and fishpond operation
 2. Improper solid and liquid waste disposal from upland
 3. Agricultural and river run-off
 4. Improper solid waste disposal by boats and big vessels
 5. Siltation, particularly run-off water from mining activities
- e. Climate Change Mitigation, Adaptation and Disaster Risk Reduction and Management
 1. Beach erosion
 2. Vulnerability of habitat, fishery and communities to climate change and disaster risk

Human Well-Being

- a. Livelihood and Enterprise Development
 1. Lack of alternative livelihood
 2. Lack of appropriate fishing gears, boats and other equipment
 3. Lack of capital
- b. Coastal Eco-Tourism Development
 1. Lack of alternative livelihood from eco-tourism
 2. Negative impact of Fisheries Refugia Site

3. Improper utilization of coastal and marine resources for eco-tourism purpose

Good Governance

- a. Legal Arrangement and Institutional Development
 1. Lack of logistical support for law enforcement
 2. Poor coordination between and among government agencies
 3. Intrusion of non-resident fishers (commercial fishing) in the municipal waters
 4. Limit/prohibition of public access to foreshore access

- b. Information, Education and Communication Campaign
 1. Lack of proper information about the importance and inter-relationship of marine habitats, fishery and communities in coastal areas
 2. Low level of participation of the communities in the coastal and fishery management

Management Interventions (with strategies and activities)

1. Habitat Management
2. Management Zones (Coastal Zoning and Shoreline Management)
3. Business and Financial Plan (Livelihood)
4. Disaster Risk Reduction (Vulnerability/Resilience of Habitat and Resources, Social Vulnerability)
5. Compliance and Enforcement

6. Monitoring and Evaluation

MONITORING AND EVALUATION

Monitoring

Monitoring the fisheries refugia throughout the management process is essential. With baseline data at hand there must be an assessment of key biological and governance indicators. Fisheries stock and diversity both inside and outside the refugia site must be determined to measure the value of conserving the stock within the area. Standard list of governance indicators will reveal how well the fisheries refugia is being managed. The results will be collected and negative results will be evaluated to identify management interventions.

Evaluation on a regular basis will be done to determine the effectiveness of the management process and to determine future directions. Questions to be answered are: (1) Were the objectives of the project met ;(2) How well is the fisheries refugia doing and (3) What are the reasons for the success/failure of the fisheries refugia? To do this, the identified indicators of the project goals and objectives will be used to determine success or failure.

Table 11 showing the reports to be generated including the data, tools and methodologies to be used, institutional and scheduling arrangements and budgetary and equipment requirements.

Name of Reports	Tool/ Forms	Methodology	Responsible Person	Frequency of Data Gathering	Budgetary and Equipment Requirements
1. Accomplishment Reports	Form	Accomplishment Documentation	Focal Person	Monthly	
2. Financial Report	Form	Financial Transaction Recording	Focal Person	Monthly	
3. Apprehension Report	Form	Daily log, Recording	Focal Persons	Monthly	
4. Conditions of Coral Reefs, Seagrass and Mangroves	Form	Research/surveys	LGU and BFAR	Every 2 years	
5. Fish Catch Reports	Form	Daily Catch Recording	Technical Focal Persons	Annually	
Economic report					
1. Marginal Fishermen Income Report	Form	One on one interview or survey	FISHERIES REFUGIA Coordinators/Managers	Annually	
2. Socio-Economic Condition Report	Form	One on one interview or survey	FISHERIES REFUGIA Coordinators/Managers	Annually	
3. Performance Management Evaluation Report	Form	Group Discussion/ Evaluation	FISHERIES REFUGIA Committee TWG	Annually	