



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

MARSINLOC FISHERIES REFUGIA MANAGEMENT PLAN

MUNICIPALITY OF MASINLOC¹

LILIAN C. GARCIA²

JOEREN S. YLEANA³

AND

VALERIANO M. BORJA²

1. PROVINCE OF ZAMBALES, PHILIPPINES
2. NATIONAL FISHERIES RESEARCH AND DEVELOPMENT INSTITUTE (NFRDI)
3. BUREAU OF FISHERIES AND AQUATIC RESOURCES (BFAR)

**SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER
TRAINING DEPARTMENT**



First published in Phrasamutchedi, Samut Prakan, Thailand in December 2022 by the SEAFDEC-UNEP-GEF Fisheries Refugia Project, Training Department of the Southeast Asian Fisheries Development Center

Copyright © 2022, SEAFDEC-UNEP-GEF Fisheries *Refugia* Project

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder provided acknowledgement of the source is made. The SEAFDEC-UNEP-GEF Fisheries *Refugia* Project would appreciate receiving a copy of any publication that uses this publication as a source.

No use of this publication may be made for resale or for any other commercial purpose without prior permission in writing from the SEAFDEC Secretary-General at.

Southeast Asian Fisheries Development Center
Training Department
P.O.Box 97, Phrasamutchedi, Samut Prakan, Thailand
Tel: (66) 2 425 6100
Fax: (66) 2 425 6110
<https://fisheries-refugia.org> and
<https://seafdec.or.th>

DISCLAIMER:

The contents of this report do not necessarily reflect the views and policies of the Southeast Asian Fisheries Development Center, the United Nations Environment Programme, and the Global Environment Facility.

For citation purposes this document may be cited as:

Municipality of Masinloc/Zambales, Garcia, L.C., Yleana, J., and Borja, V.M., 2022. Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand, Masinloc Fisheries Refugia Management Plan. Southeast Asian Fisheries Development Center, Training Department, Samut Prakan, Thailand; FR/REP/PH83, 23 p.

MASINLOC FISHERIES REFUGIA MANAGEMENT PLAN



**Municipality of Masinloc
Province of Zambales**

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 be covering the contiguous coastal barangays identified in Masinloc, Zambales. 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

The people of Masinloc are united and empowered to participate dynamically in managing its fishery resources and coverage towards a more holistic approach that balances both human and ecological well-being through the process of good governance towards a sustainable development thus, enjoying a secure, peaceful and good quality of life from the bounties of a diverse and ecologically balanced coastal law and marine ecosystem

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

Mission

The Municipal Government of Masinloc through the inter-agency cooperation, active community participation, and effective governance shall harness the management of coastal and fishery resources anchored on the principle of sustainable development for the present and future generations.

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 Masinloc Municipality

Goals

Main Goal:

Conserving biodiversity maintaining fishery habitats, protecting important food chain functioning equitable and wise implementation

People of Masinloc enjoy the economic benefit on sustainable coastal fishery resources utilization through the integration of habitat and fisheries management

Specific Goals:

Ecological

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

Human well-being

- Improved the 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

Objectives

A. Ecological Well-Being Component

1. Maintain the target species and other commercial species at the level necessary to ensure fisheries productivity
2. Minimize the negative impacts of fishing on marine habitat
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,

B. Human Well-Being Component

1. Maximize the net incomes of the fisherfolks, employment opportunities for those dependent on fishery for their livelihood

C. Good Governance Component

1. Enact and enforce relevant policies, rules, and regulations and full applications of the laws

Strategies

A. Ecological Well-Being Component

A.1 Resources Management

1. Safeguard the spawning and nursery areas of fish species during 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
- 10 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 (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

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

New Strategies

- (i) assess the activities involved and determine the type, nature and estimated volumes of waste to be generated;
- (ii) identify any potential environmental impacts from the generation of waste at the site;
- (iii) recommend appropriate waste handling and disposal measures /routings in accordance with the current legislative and administrative requirements; and
- (iv) categorize waste material where practicable (inert material / waste fractions) for disposal considerations i.e. public filling areas / landfill.

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.3 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 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

Masinloc Fisheries *Refugia*

The Fisheries *Refugia* site is located in Masinloc, Zambales. Masinloc is one of the municipalities under the Administrative Region III or Central Luzon. Region III is composed of seven provinces namely: Aurora, Bataan, Bulacan, Pampanga, Nueva Ecija, Tarlac and Zambales in the central plain of Luzon Island.



Source: DENR (National Greening Program)
Figure 1. Map of Zambales with Masinloc highlighted

Municipal Profile

- Geographical location

Masinloc is located at the Northwestern part of Masinloc, Zambales. The municipality is at coordinates 15° 32' North, 119° 57' East.



Source: Wikipedia The free encyclopedia

Figure 2. Map of Zambales showing the different municipalities

History and demography

Masinloc is one of the coastal municipalities of Zambales province. The municipality is bounded by the municipality of Candelaria in the North, Tarlac province in the East, the municipality of Palauig in the South and the West Philippine Sea (South China Sea) in the West. The land area of Masinloc is 331.50 square kilometers or 127.99 square miles.

There were stories where the province's name Zambales was derived. One version was that the name Zambales came from the word zambal, a Hispanized term for Sambali. The hispanized zambal refers to the native language spoken by the Austronesian residents in the area during those time. The second version was that the name came from the word samba meaning worship because the Spanish found the native people during those time were highly superstitious in worshipping the spirits of their ancestors. Another account was that the name Zambales originated from the word Zambo, the term used by the Iberian (Spanish and Portuguese) empires to distinguish the people of African descent. The Aetas, who were the first inhabitants of Zambales prior to the colonization, have features similar to afro-ethnicity.

When the Spanish came to the Philippines in 1752 led by Juan de Salcedo, the first towns they founded in Zambales were Subic and Botolan. Then Masinloc in 1607, Iba in 1611 and Sta. Cruz in 1612. Masinloc became the first capital of Zambales. The capital was moved among the last three towns before finally transferred in Iba mainly due to its strategic location.

Based on the 2015 Census which is being done in the country every 5-year, the total

population of Masinloc is 47,719. This figure represents 8.08% of the total population of Zambales province. The population density of Masinloc is 144 individuals per square kilometers or 373 inhabitants per square mile.

The municipality of Masinloc is a first-class municipality whose income was more than the average 4-year annual income of 55 million pesos to be classified as a first-class municipality based on the Department of Finance classification of barangay. The economy of Masinloc is primarily dependent on agriculture, specifically crop production and fishing. Mining is also a source of Masinloc economy followed by service-based and tourism activities that can be found in urbanized barangays and coastal areas.

Important coastal habitats in the area

Mangroves

There are 23 true mangrove species and one hybrid mangrove species (*Rhizophora lamarckii*) recorded in the coastal waters of Masinloc. The different marine resources, birds and their numbers found in the mangrove areas are the following: 8 species of crustaceans, 14 species of bivalves, 35 species of gastropods, 16 species of fish, 44 species of birds and 57 species of migratory birds identified in the mangrove areas (Table 1).

Table 1. The different marine resources in Mangrove Areas

Species	Number of Species
Crustaceans	8
Bivalves	14
Gastropod species	35
Fish species	16
Bird species	44
Migratory bird species	57

The coastal areas of Masinloc are dominated by mangrove species such as *Rhizophora apiculata*, *Avicennia alba* and *A. officinalis*. “*Nipa*” and “*bakauan*” are located in small patches. Mangroves have an important role as breeding area for marine organisms. The mangrove forests provide food, shelter and protection of the coastline against erosion.

Mangroves are found in the coastal waters of the eleven coastal barangays. Barangays Bani and San Salvador have an excellent mangrove condition based on the assessment made by the BFAR. Good mangrove condition was found in barangay San Lorenzo and fair condition was observed in Bamban, Collat, Inhobol, Sto. Rosario, and Taltal. Poor condition was observed in the coastal areas of Balonganon, North Poblacion and South Poblacion.

Coral Reefs

Coral reefs are present in the marine waters of Masinloc except in Barangays Collat, North Poblacion and Taltal. Based on the assessment of the coral reefs condition using line intercept transect method made by DA-BFAR in 2009 in the eight coastal Barangay the following

barangays have fair coral reef condition: Baloganon, Bamban, Inhobol, San Lorenzo, San Salvador and Sto. Rosario, while Bani and South Poblacion have poor coral reef condition.

The coral reef and reef associated species recorded are 24 genera belonging to 10 families of corals or 40% of the total recorded in the South China Sea, 390 reef fish species belonging to 139 genera and 45 families and 110 species of algae belonging to 59 genera.

Seagrass

Seagrass are present in nine barangays out of the 11 coastal barangays of Masinloc namely: Baloganon, Bamban, Bani, Inhobol, San Lorenzo, San Salvador South Poblacion and Sto. Rosario. The seagrass beds cover in fair condition are the barangays Bani, San Lorenzo, San Salvador and South Poblacion. The other five barangays are in poor seagrass bed cover condition.

There are eight species of seagrass species identified in Masinloc out of the 16 species found in the Philippines. The seagrass beds are dominated by the genera – *Thalassia*, *Enhalus*, and *Halophila*. The seagrass thrive in the mudflats and shallow areas along the coasts of Masinloc.

Number and types of fishing vessels operating in the refugia sites

There are 127 municipal fishing vessels operating in the *refugia* site in Masinloc using different types of fishing gears such as bagnet, gillnet hook & line, multiple handline, scoop net and spear gun. The widely used gears are handline and gillnet and few other type of fishing gears as shown in table 2.

Table 2. Number and types of fishing vessel in Masinloc by Barangay

Barangay	Bagnet	Gillnet	Hook and Line	Multiple Handline	Scoop Net	Spear Gun	Total
Baloganon	-	9	4	-	-	-	13
Bamban	-	1	-	-	-	-	1
Bania	-	1	7	-	-	-	8
Collat *	-	-	17	-	-	-	17
Inhobol *	-	-	19	-	1	-	20
North Poblacion	-	-	7	-	-	-	7
San Lorenzo	-	9	-	-	-	-	9
San Salvador	1	7	13	2	3	4	30
Sta. Rita	-	-	-	-	-	-	-
Sto. Rosario*	-	11	2	-	1	-	14
South Poblacion	-	-	6	-	-	-	6
Taltal	-	-	2	-	-	4	6
Tapuac	-	-	-	-	-	-	-
Total	1	38	77	2	5	4	131

Source: Masinloc 2020 Boat registration

* Barangay using several gears in one fishing operation

The species and size selectivity of the principal fishing gear used

There is no available accurate record that will show the different fish species (Table 3) caught by the different municipal fishing boat using different fishing gears. The commonly used fishing gears in fishing are the bagnet, gillnet, ringnet and hook and line.

Table 3. The different fish species caught by the different fishing gears in Masinloc.

Species	Species
<i>Amblygaster sirm</i>	<i>Lutjanus decussatus</i>
<i>Auxis thazard</i>	<i>Lutjanus fulviflamma</i>
<i>Euthynnus affinis</i>	<i>Nemipterus japonicus</i>
<i>Katsuwonus pelamis</i>	<i>Pterocaesio tessellata</i>
<i>Thunnus albacares</i>	<i>Rastrelliger faughni</i>
<i>Thunnus obesus</i>	<i>Rastrelliger kanagurta</i>
<i>Decapterus macarellus</i>	<i>Sardinella gibbosa</i>
<i>Amblygaster sirm</i>	<i>Selar crumenophthalmus</i>
<i>Cephalopholis boenak</i>	<i>Sphyraena jello</i>
<i>Chanos chanos</i>	<i>Sphyraena obtusata</i>
<i>Encrasicholina punctifer</i>	<i>Terapon jarbua</i>
<i>Epinephelus corallicola</i>	<i>Trachinotus blochii</i>
<i>Gazza minuta</i>	<i>Openers vittatus</i>

Table 4. Known Critical Spawning and Nursery Areas for Significant Fish Species in Masinloc, Zambales

Site Name	Geographic Location	Species known to utilize the site	Known usage of the site		Information Sources
			Nursery	Spawning	
Masinloc	15°48'-15°59'N 119°89'-119°97'E	Skipjack tuna (<i>Katsuwonus pelamis</i>)	√	√	Fisheries & habitat reports
		Yellowfin tuna (<i>Thunnus albacares</i>)	√	√	Fisheries & habitat reports
		Bigeye tuna (<i>Thunnus obesus</i>)	√	√	Fisheries & habitat reports
		Round scads (<i>Decapterus spp.</i>)	√	√	Fisheries & habitat reports
		Frigate tuna (<i>Auxis thazard</i>)	√	√	Fisheries & habitat reports
		Bullet tuna (<i>Auxis rocheii</i>)	√	√	Fisheries & habitat reports
		Sardines (<i>Sardinella spp.</i>)	√	√	Fisheries & habitat reports

Number of fishing communities in the area

The Municipality of Masinloc is composed of 13 barangays or villages. Out of these, only two are non-coastal or landlocked barangays. Three barangays are classified as urban barangay and the rest are rural barangays. There are 4,535 registered fisherfolk in Masinloc. The fisherfolk in Masinloc is only 9.5% of the total population (Table 5). Inhobol is the most populated barangay as well as having the most number of fisherfolk.

Table 5. 2015 Population, land area, number of fisherfolk and classification by Barangay

Barangay	Land Area (ha)	2015 Population	2020 Number of Fisherfolk	Classification	
1. Baloganon	749	6,783	623	Rural	Coastal
2. Bamban	66	2,429	236	Rural	Coastal
3. Bani	698	3,972	342	Rural	Coastal
4. Collat	16	2,781	251	Rural	Coastal
5. Inhobol	29	8,409	1,228	Urban	Coastal
6. North Poblacion	542	1,681	110	Urban	Coastal
7. San Lorenzo	530	3,151	348	Rural	Coastal
8. San Salvador	540	2,214	651	Rural	Coastal
9. Santa Rita	230	2,840	2	Rural	Landlocked
10. Santo Rosario	676	2,102	242	Rural	Coastal
11. South Poblacion	230	4,112	275	Urban	Coastal
12. Taltal	974	4,541	131	Rural	Coastal
13. Tapuac	690	2,704	96	Rural	Landlocked
Total	5970	47719	4535		

Source: NSO 2015 Census of Population, NSCB

Existing fisheries management measure in the area of the site

The management measures at the Local Government Units (LGU) particularly at the fisheries refugia management sites are created based on the national laws or Republic Acts. Some of the National Laws, Proclamation, Fisheries Administrative Orders, are the Philippine Fisheries Code of 1998 or Republic Act 8550 An Act Providing for the Development, Management, and Conservation of the Fisheries and Aquatic Resources, Integrating all Laws Pertinent Thereto, and for other Purposes, RA 10654 An Act to Prevent, Deter and Eliminate illegal, Unreported and Unregulated Fishing, Amending Republic Act no. 8550, Otherwise Known as "The Philippine Fisheries Code of 1998," and for Other Purposes, The Local Government Code of 1991 or RA. 7160 An Act Providing For A Local Government Code of 1991, The Department of Interior and Local Government (DILG) Memorandum Circular No. 2018-59 – Policies and Guidelines on the Regulations and Monitoring of the Fishery Activities in Municipal waters among others. The implementation of the national law is implemented at the LGU by adopting provisions applicable to the local situation. However, for some of the provisions of the national laws which requires further interpretation, the LGU can enact specific ordinance or policies applicable to the local situation. The Municipality of Masinloc has enacted several Municipal Ordinances, Resolutions to manage their coastal and marine waters (Table 16).

Table 6. List of Municipal Ordinances, Resolution, Presidential Proclamation

Municipal Ordinance, Executive Order, Resolution	Date Issued	Description
Municipal Ordinance No. 30	July 1989	Declaring the San Salvador Marine Sanctuary (SSMS), a 127 Hectares Fish Breeding (No Take) Sanctuary
Municipal Ordinance No. 51-95	October 25, 1995	An Ordinance Regulating Fishing and/or Fishery Privileges in the Municipality of Masinloc, Province of Zambales and for other Purposes
Municipal Ordinance 51-95	1995	Ordinance Amending Section 4A and 8 of Municipal Ordinance 51-95 Re: An Ordinance Regulating Fishing and/or Fishery Privileges in the Municipality of Masinloc, Province of Zambales and for other Purposes
Municipal Ordinance 66-00	January 5, 2000	Ordinance on Proper Garbage Disposal within the Municipality of Masinloc
Municipal Ordinance 80-05	June 20, 2005	An Ordinance Regulating the Production of Seaweeds in the Municipality of Masinloc, Province of Zambales and for Other Purposes
Municipal Ordinance 83-05	December 19, 2005	An Ordinance on Solid Waste Management
San Lorenzo Barangay Ordinance No. 02-06	2006	Declaring the Panglit Marine Protected Area Having a Total Area of 20 Hectares in Sitio Panglit
Municipal Resolution 14-07	February 12, 2007	Resolution Approving Barangay Ordinance No. 05 S. of 2006 of the Barangay Council of Bani, this Municipality Re: Ordinance Declaring the Bani, Masinloc, Zambales Marine Protected Area Having a Total of 50 Hectares (24 Hectares Core Zone and 26 Hectares Buffer Zone) in Coastal Line of Purok Duhok, Bani
Municipal Resolution 40-07	April 3, 2007	Resolution Approving Resolution No. 02-2007 of the Barangay Council of San Salvador, This Municipality Re: Declaring the San Salvador and Taclobo Marine Protected Areas Having a Total Area of 127 Hectares in Sitio Libaba and 2 Hectares Taclobo Farm
Municipal Ordinance No. 92-08	June 4, 2008	An Ordinance enacting the Coastal Resources Management Code of the Municipality of Masinloc
Presidential Proclamation 231 PCRA 2009		Masinloc Bay Marine Reserve - (Masinloc and Palauig Waters)
Municipal Resolution No. 120-10	August 20, 2010	Resolution Adopting the Integrated Coastal Resources Management (ICRM) Plan of the Municipality of Masinloc, Zambales and Endorsing to the Department of Environment and Natural Resources and the Asian Development Bank (ADB) for Funding and Implementation of the Identified Priority

		Sub-Projects
San Lorenzo Barangay Ordinance No. 02-Series of 2011	June 6, 2011	An Ordinance Approving the Expansion of the Marine Protected Area in Sitio Panglit, San Lorenzo, Masinloc , Zambales
San Lorenzo Barangay Resolution No. 015Series 2011	June 6, 2011	Resolution Approving the Marine Protected Area Management Plan of Panglit, San Lorenzo, Masinloc, Zambales
DENR Protected Area Management Board (PAMB) Resolution No. 5, Series of 2011	July 14, 2011	Resolution Adopting the Masinloc Oyon Bay Marine Reserve (MOBMR) Protected Area (PA) Management Plan
Municipal Ordinance No. 127-18	March 6, 2018	The Comprehensive Fisheries and Coastal Resources Management Ordinance of the Municipality of Masinloc, Zambales
Municipal Ordinance No. 137-18	November 13, 2018	Amending Sections 105 (b) and 108, Article X (Regulated Fishing Gears and Prohibited Activities) of Municipal Ordinance No. 127-18: The Comprehensive Fisheries and Coastal Resources Management Ordinance of the Municipality of Masinloc, Zambales

Usage of *refugia* by threatened and endangered marine species threatened and endangered species found in the *refugia* sites

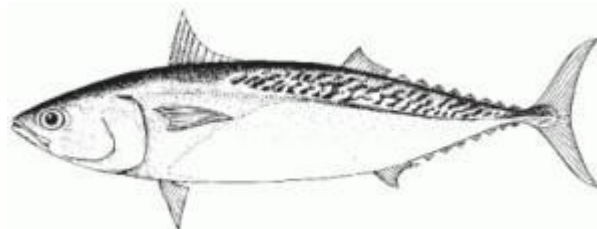
Marine mammals and turtles have been seen passing through the coastal waters of Masinloc. There are known marine turtles nesting in Zambales particularly in the municipality of San Narciso, as well as in the province of Bataan, south of Zambales. The Olive Ridley sea turtle (*Lepidochelys olivacea*) is known to use the shoreline of San Narciso as nesting area during the months of October to March. Other known nesting sites along the West Philippine Sea area from the north to the south of Luzon Island are the provinces of La Union (north of Zambales and adjacent province of Pangasinan) Bataan and Batangas provinces south of Zambales.

1. Priority species information

Name: Frigate Tana

Scientific name: *Auxis thazard*

Local name: Tulingan



Frigate: *Auxis thazard* (Lacepede, 1800)



Morphology

Auxis thazard has a robust body, elongated and rounded; the teeth are small and conical in a single series; the total gill rakers on the first gill arch is 36-42; dorsal fins 2, D1X-XII, separated from the second dorsal fin by a large interspace; second dorsal fin followed by 8 finlets; anal fin followed by 7 finlets; pectoral fins are short; strong pectoral; a large single-pointed flap between pelvic fins; a strong ventral keel on each side of the caudal-fin base between smaller keels. The color of the back is bluish or black on the head; a pattern of 15 or more narrow oblique dark wavy lines in scaleless are above the lateral line; the belly is white; pectoral and pelvic fins are purple and the inner sides are black.

Distribution

In the Philippines, the fish is distributed all over the marine waters of the country both coastal and offshore waters and within the waters between the island provinces. The fish is abundant the whole year round in some fishing grounds of the country.

Life cycle and mating behavior

The spawning season of frigate tuna varies with areas, in relation to temperature and other environmental conditions. However, in some fishing grounds in the Philippines the fish are caught the whole year round having an observed the same mode per month. This may suggest that frigate tuna may have a regular spawning time throughout the year.

1.1 Length at first maturity/size/weight/age

The length at maturity is reported in several publications such as 27.5, 29.7, 30 and 30.5 cm male/unsexed while the common length observed was 60.0 cm. TL male unsexed. The maximum published weight was 1.7kg and the maximum reported age was 5 years (FISHBASE).

1.2 Gonadosomatic index and size frequency

No data/information.

1.3 Area of habitat in each stage/migration pattern

In the Philippines, the observed larger fish are caught in offshore waters while fish less than 25 cm are caught within the deeper municipal waters. Importance of the site to the life cycle of the species as nursery/spawning/feeding, etc.

1.4 CPUE/stock size/MSY

No available data/information.

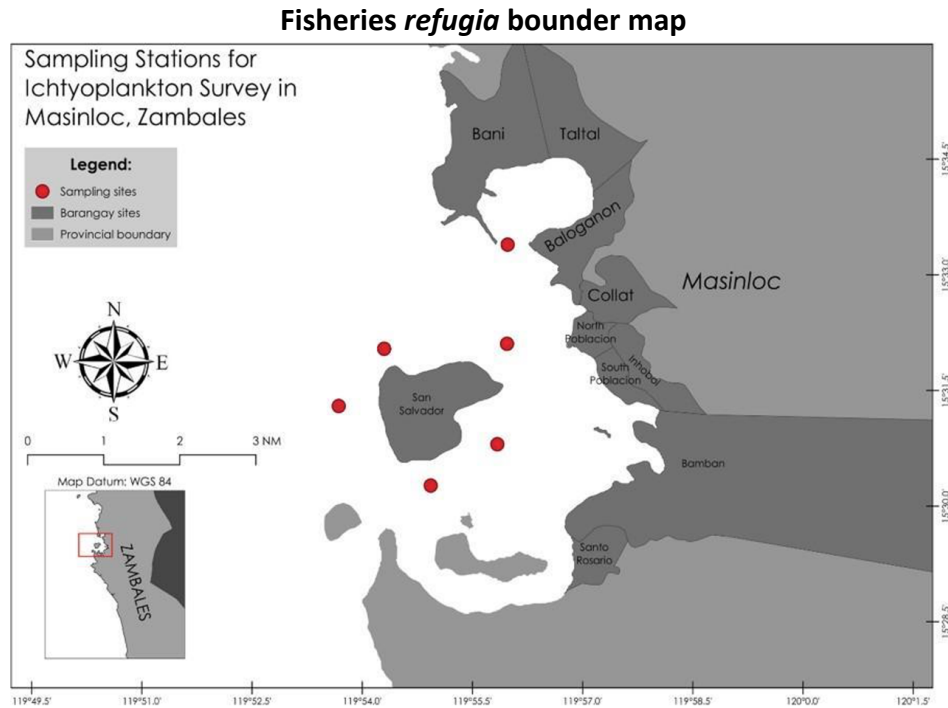


Figure 3. Map of Masinloc Refugia Site

Fishing area by each fishing gear

Figure 4 shows the different distance of the municipal waters from the land. Fishing within the municipal waters is fishing boats less than 3 gross tonnage GT). Fishing is only for the registered fisherfolk residing in the municipality.

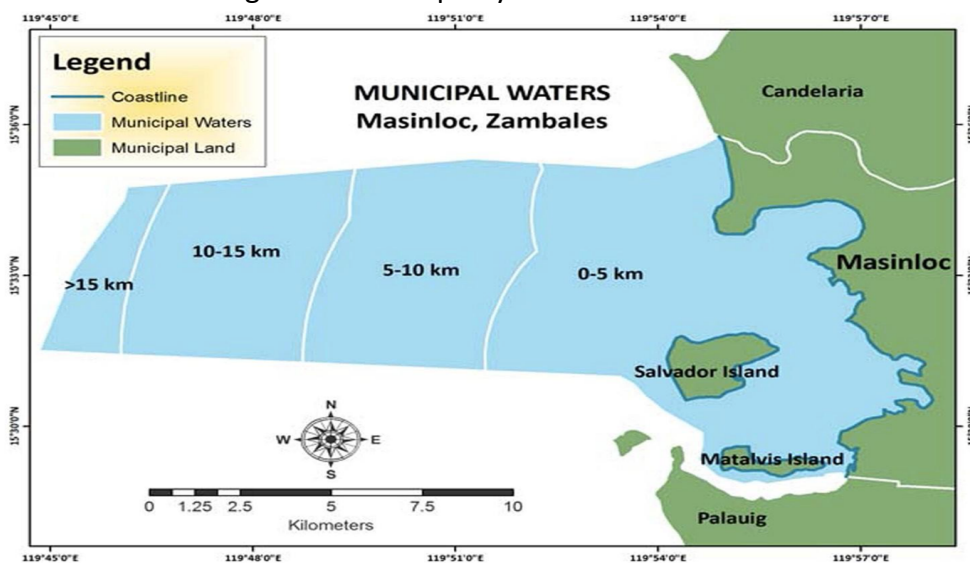


Figure 4. Map of the municipal waters of Masinloc showing the different distances from the municipal land. *Source:*

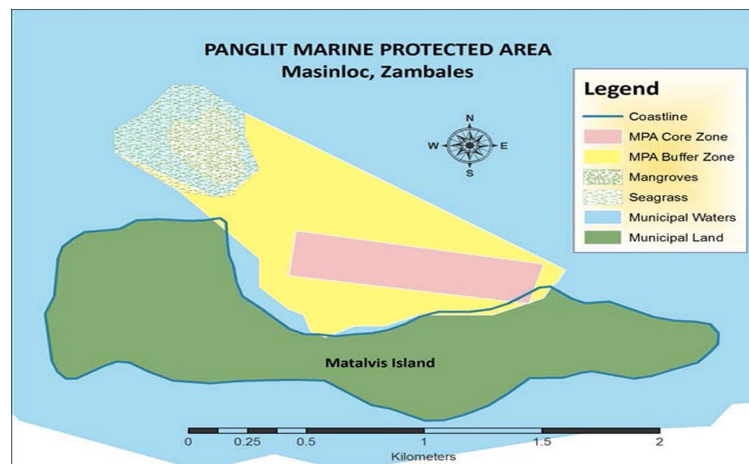
(*Source: Masinloc ICRMP 2010-2012 accessed from ICRMP Website: ICRMP.dnr.gov.ph*)

Important coastal habitats by site

The coastal habitats at the Masinloc *refugia* site are composed of mangroves, coral, reefs and seagrass. Coral, reefs are mostly found at the coastal waters of San Salvador Island.



Source: 2010-2012 ICRMP of Masinloc, Zambales
 Figure 5. Location of the MPAs at the coastal waters of Masinloc



Source: BMB and ICRMP report Part 2 (EHM) 2014
 Figure 6. Map of Panglit Marine Protected Area showing the location of the different types of habitats

The site is very rich in marine resources that make it a good refugia site.

Table 11. The different marine resources in Mangrove Areas Species

Species	Number of species
Crustaceans	8
Bivalves	14
Gastropod species	35
Fish species	16
Bird species	44
Migratory bird species	57

Socio-economic Profile

The users and beneficiaries of the fisheries refugia are the following:

1. Marginal Fishermen
 2. Seaweeds Farmer
 3. Gleaners
 4. Researchers
 5. Tourist/Visitors
 6. Fish Vendor
 7. Fish Buyer
 8. Fish Processor
 9. Ice Plant
 9. Food Establishment
 10. Academic Institution
 11. Tourism Establishment
 12. Boat Owners/operators and crew
-
- i. Resource Value Estimates
 - ii. Issues and Concerns

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 Masinloc are the issues and problems which are particularly present in each of the areas.

The management issues and problems identified are the following:

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 of 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, fisheries and communities in coastal areas
 2. Low level of participation of the communities in the coastal and fishery management

Management Interventions

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

Evaluation in 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.

The following are the reports to be generated including the data, tools and methodologies to be used, institutional and scheduling arrangements as well as the 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 Person	Monthly	
4. Conditions of Coral Reefs, Seagrass and Mangroves	Form	Research/surveys	LGU, MSI and BFAR	Every 2 years	
5. Fish Catch Reports	Form	Daily Catch Recording	Technical Focal Person	Annually	
6. Economic report					
7. Marginal Fishermen Income Report	Form	One on one interview or survey	FISHERIES REFUGIA Coordinator/ Manager	Annually	
8. Socio-Economic Condition Report	Form	One on one interview or survey	FISHERIES REFUGIA Coordinator/ Manager	Annually	
9. Performance Management Evaluation Report	Form	Group Discussion/ Evaluation	FISHERIES REFUGIA Committee TWG	Annually	