

# Critical Fish Habitat Management to Secure Marine Fisheries Production in Indonesia

*Andhika Anjaresta and Firdaus Agung*

Marine Conservation Use

Ministry of Marine Affairs and Fisheries, Jakarta, Indonesia

email: anjaresta@yahoo.com

## Abstract

As one of major economic sectors in Indonesia, fisheries had been targeted to contribute approximately 7% to the national GDP in the next five years. This target relies on the capacity of marine habitats and its biodiversity to support fisheries production and food security. Maintaining habitats' functions and services while mitigating the negative impacts from land-based and marine-based pollution and climate change is very challenging. Rapid development and population growth in coastal areas have been considered as among the driving forces toward habitat degradation due to habitats loss, overfishing, and pollution. In order to sustain fisheries production, national programs have been focused on the conservation of fisheries habitats rather than on rehabilitation. Marine habitat conservation has been undertaken since 1990s and has covered about 15.7 million ha of MPAs as of 2015. Totally, approximately 22.7% of the country's coral reefs, 17.3% sea grass beds, and 22% of mangrove habitats have been protected. These three habitats are critical for fish recruitment. Nevertheless, complementing such conservation efforts are direct habitat rehabilitation activities such as mangrove rehabilitation, coral transplantation and installation of fish apartments. These efforts are intended to provide artificial habitats for fish, and in the long term, facilitate natural habitat regeneration. Although these activities have been implemented in many areas and over years, its effectiveness in improving fish stocks has not been investigated intensively. The challenges in the future are related with effective management of MPAs to support fisheries, engagement of multi-stakeholders participation in habitat management, and improving the effectiveness of rehabilitation efforts to include monitoring and evaluation.

## Introduction

Report of the Ministry of Marine Affairs and Fisheries (MMAF) of Indonesia indicated an increasing trend in the country's fisheries GDP from 4.20 in 2009 to 6.97 in 2014 (**Table 1**). Production from capture fisheries had also increase during the same period from 5.11 million metric tons (MT) in 2009 to 6.20 million MT in 2014. In spite of such increasing trend, Indonesia has been undertaking conservation measures (**Table 2**) to ensure the sustainability of its fishery resources. Under the country's Fish

Resources Conservation Law (Law 31/2004), conservation of fish resources is defined as the protection, preservation, and utilization of fish resources, including ecosystems (e.g. mangroves, sea grass, coral reef, estuary, coast, lake, river, swamp, reservoir), species (including endangered, threatened, charismatic), and genetic to ensure **the existence, availability, and continuity** while maintaining and improving the quality of the value and diversity of fish resources.

**Table 1.** Performance of Indonesia's capture fisheries sector (2009-2014)

	2009	2010	2011	2012	2013	2014
Fisheries GDP	4.20	6.00	7.00	6.50	6.90	6.97
Production from capture fisheries (million MT)	5.11	5.38	5.71	5.83	6.12	*6.20
Fish consumption (kg/capita/year)	29.08	30.48	32.25	33.89	*35.21	*37.89

Source: MMAF (2014)

\* preliminary data

**Table 2.** Conservation and management of critical fish habitats in Indonesia from 2010 to 2014

2010	2011	2012	2013	2014
• Management of 900,000 ha of critical habitats	• Management of 2.5 million ha, and additional 700,00 ha new conservation areas	• Management of 3.2 million ha, and additional 500,000 ha new conservation area	• Management of 3.6 million ha, and additional 500,000 ha of new conservation area	• Management of 4.5 million ha, and additional 300,000 ha of new conservation area

Moreover, in accordance with the country's Coastal and Small Islands Management Law (Law 27/2007), rehabilitation of marine and coastal habitats should be carried out through stock enhancement, habitat restoration, and conservation. From 2015 to 2019, Indonesia intends to establish new conservation areas (**Table 3**) considering that the number of

conservation areas that attained improvements in management effectiveness had increased. Although the proportion of marine conservation areas (MCA) to the fisheries management areas (FMA) could be minimal, the MCAs had protected most of the critical habitats in each FMA.

**Table 3.** Habitat conservation target (2015-2019)

	2015	2016	2017	2018	2019
New conservation areas to be established (ha)	500,000	600,000	800,000	900,000	1,000,000
Number of conservation areas that attained improvements in management effectiveness	15	28	30	33	35

Indonesia is presently intensifying its efforts in conserving and enhancing critical fisheries habitats, which comprise mangrove areas, coral reefs, and sea grass beds. In the next five years (2015-2019), Indonesia must have converted

some existing critical habitats into MCAs (**Table 4**). With the plan to adopt 30% conservation target, it is expected that more than 500,000 ha of these habitats would be conserved and enhanced.

**Table 4.** Planned conservation of existing critical habitats (2015-2019)

	Existing critical habitats	To be developed as MCAs	To be conserved(30% conservation target)
Mangroves	3.5 million ha	758,470 ha	227,540 ha
Coral reefs	3.3 million ha	747,190 ha	224,160 ha
Seagrass beds	1.8 million ha	304,870 ha	91,460 ha

## Habitats Conservation/Rehabilitation

### *Mangrove rehabilitation*

- Mostly conducted in northern coast of Java and eastern coast of Sumatra
- Targets not only for the purpose of restoring fish habitats but also for education, tourism, and coastal protection
- Using most abundant local species (mostly *Rhizophora* spp.)
- Engages the communities in planting and nursery
- Addresses issues related to land status, land use change, and long-term maintenance.



### *Installation of fish apartments*

- Supports fish aggregation and shelter
- Using environmental friendly materials, constructed near fishing communities
- Indicators of change: fish diversity, abundance, size composition, other associate biota
- Monitoring of effectiveness is still limited, increase pressure to fisheries



Results of the monitoring study conducted by Kriswan (2013) indicated that the composition of the catch (weight and length of individuals) surrounding fish apartments was better than those caught outside the apartments. Inside the fish apartments, catch was 1.4 times more than outside, while target species caught was about 80% higher inside the fish apartments than outside (59%).

### *Coral reefs rehabilitation*

- Focuses on reducing stress and damaging factors such as fishing, pollution, sedimentation, and coastal development
- Several direct rehabilitation activities include transplantation and artificial reefs
- Transplantation is carried out to provide new habitats, seed gardens (for ornamental corals), areas for diving activities, and coral adoption
- Indicators: fish biomass, coral health index (coral cover, fish target, and megabenthos)

### **Constraints**

Since the geographic coverage that is very large, various concerns had been raised, such as:

- Information on specific locations that are essential for fish recruitment (spawning, nursery, feeding) is still limited
- Monitoring on effectiveness of conservation and rehabilitation activities is still minimal

### **Recommendations**

- Secure land use and spatial planning (terrestrial and marine) for habitat conservation and rehabilitation sites
- Engage communities since the beginning of activities to support maintenance, monitoring, and nursery of rehabilitated habitats before these could be left to grow on their own.

### **Conclusion and Lessons Learnt**

- Most of marine fisheries habitats are already conserved but there is still a need for concrete management actions to maintain coverage and quality
- Rehabilitation of fish habitats in Indonesia is complementary actions to conservation efforts
- Its effectiveness to improve fish stocks depends on good understanding and proper selection of specific sites for spawning, nursery, and feeding areas



- Long-term impacts of conservation and rehabilitation of fish habitats are difficult to determine
- Involvement of multi-stakeholders is still challenging due to benefits and impacts on their own interests
- Apply multi-purpose objectives for conservation and rehabilitation of critical habitats to optimize stakeholders' inputs and maximize benefits
- Monitoring and evaluation on the results of conservation and habitat rehabilitation should be undertaken regularly and as a long-term activity