

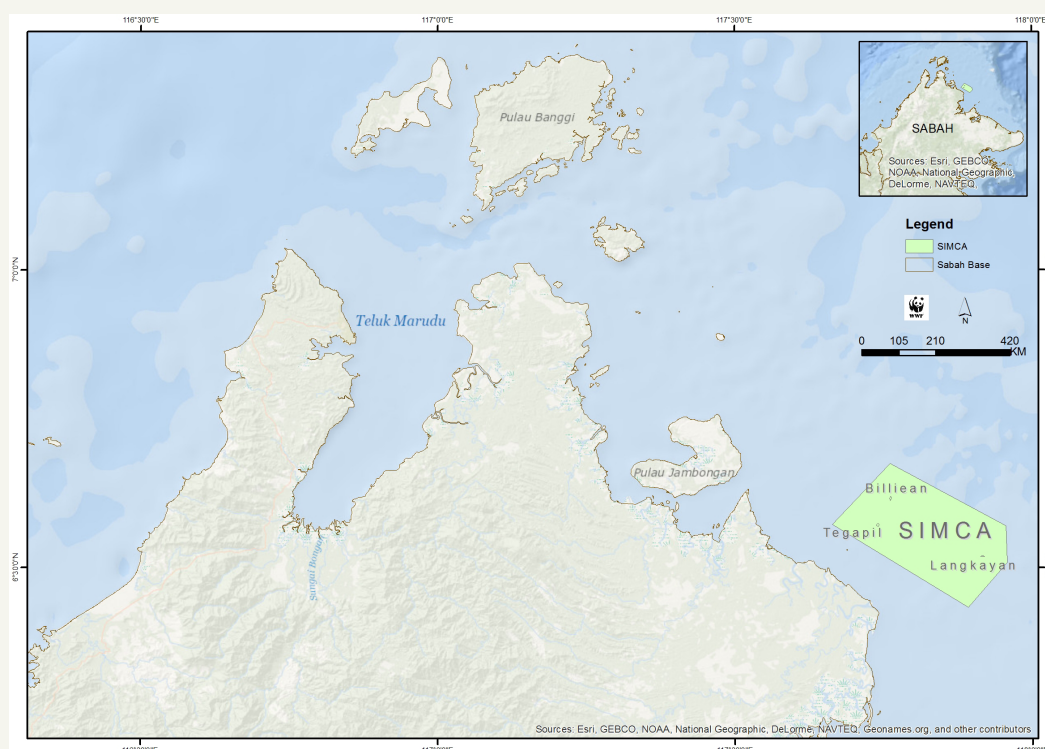
The Benefits of a Marine Protected Area

A case study of the Sugud Island Marine Conservation Area (SIMCA)

Background

Marine Protected Area (MPA) is well known to provide protection for biodiversity. Many MPAs are established with the objectives of biodiversity conservation. /For example, the Turtle Islands Park, off the shore of Sandakan, Sabah, was established for the protection of sea turtles while the Tunku Abdul Rahman Park off the shore of Kota Kinabalu, Sabah, was established for the protection of coral reefs./ As environmental management approach move toward ecosystem based management approach, MPA is seen to be a management tool that will also benefit the fisheries and the fishing community as well as conserve biodiversity. A case study was conducted to assess the impact of the Sugud Island Marine Conservation Area (SIMCA) that was established in 2001 under the Sabah Wildlife Enactment.

SIMCA comprises
an area of
46,317
HECTARE



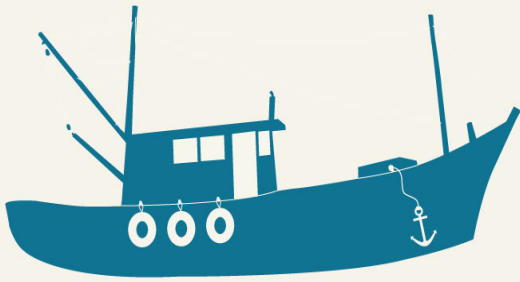
No-take marine reserves are defined as areas where fishing is not allowed, and have been used as management tools for marine conservation, fisheries, and recreational activities around the world (Halpern, 2003).

SIMCA is a no-take marine reserve that was established in Sabah, Malaysia, in 2001, as a Category II conservation area under the IUCN Protected Area Management Category. The management of the conservation of SIMCA has been taken over by Reef Guardian, a non-profit organisation since 2004. A year later a strong enforcement team was established to control the intrusion of fishing vessels within SIMCA, with on-going patrol activities at least twice a week, assisted by a land-based radar tracking system that enables the Reef Guardian team to monitor fishing intruders day and night.

Objectives of the survey conducted in 2011 and 2012:

1. Determine the fishery and socio-economic effects of SIMCA on local fishing communities.
2. Evaluate the effects of reserve protection on reef fish biomass and abundance (density).

Fishery and socio-economic effects of SIMCA on local fishing communities



Background

Prior to the establishment of SIMCA, the reefs surrounding the three islands were fishing grounds for small and large-scale commercial fishermen. Nearly 40 – 50% of fishing boats checked from 2006 to 2009 were fish or shrimp trawlers (SIMCA, 2009), with drift net fishing following as the second most commonly used fishing practice. Additionally, compressor fishing, spear-fishing, sodium cyanide fishing and dynamite fishing have been recorded around SIMCA.

1. Targeted fishing communities situated along the Sugud mainland - the villages closest to SIMCA

Awareness of SIMCA

Nearly 66% of fishermen were not aware of the existence of SIMCA. From the 34% who were aware, they reported that they heard about it from passing fishermen or through awareness field trips conducted by Reef Guardian in 2008-2009.

89%

agreed that the establishment of MPAs will help conserve the marine environment for future generations and more MPAs similar to SIMCA should be created in Sabah.

Affects of SIMCA

Only 8% stated that the creation of SIMCA had affected their fishing activity positively. They claimed that fish are more abundant in areas nearer to SIMCA. The other fishermen did not experience any effects because their fishing grounds are not near or within SIMCA.

Perceptions about MPAs

About 97% of fishermen supported the establishment of MPAs. They felt that their livelihoods would be protected with an increase in MPAs, since protected areas would safeguard fish stock and prevent over fishing by visiting trawlers and other destructive fishing methods adopted by fishermen from outside their villages. Only one fisherman did not support the establishment of MPAs because he was unsure about the effects that it might have on him.

There appears to be a distinction in the spatial behaviour of the fishermen interviewed at sea. Although there appeared to be a lack of economic or fishery related incentives for fishermen to fish within, or close to, SIMCA, fishing boats still continued to encroach into SIMCA. To find out why these fishermen were attracted to fish in SIMCA, only responses from fishermen who were found fishing within SIMCA were considered..



2. Targeted fishermen found fishing around SIMCA - who do not live within the immediate vicinity of the marine reserve

60%

of the respondents indicated that they fished in SIMCA because there was more fish there.

Affects of SIMCA

A compressor fisherman indicated that he could get twice as much catch in SIMCA as compared to his other fishing grounds in Karakit, Manawali, Jambongan, and Tigabu. In addition, 20% said that the fish in SIMCA were bigger, while another said that he was able to catch more expensive fish in SIMCA.

77%

expressed their support for the establishment of MPAs.

Perceptions about MPAs

62% of respondents indicated that MPAs benefitted fishermen. The most common benefit mentioned was that marine protected areas served as nursery grounds for fish, while other reasons included that MPAs ensured safety and income, were important for future generations, and allowed fish to grow larger in size.

Conclusion

1. The creation of SIMCA appears to have had minimal impact on the fishing activities of Sugud fishing communities.
2. The SIMCA area is currently used primarily by commercial trawlers and compressor fishing operations that target shrimp and live reef food fish species.
3. Most fishermen who fish in the vicinity of SIMCA do not perceive differences in fish size or fish catch compared to other fishing grounds that are not close to SIMCA. However, the continual presence of fishing vessels within SIMCA implies that fishing is better inside SIMCA.
4. The large proportion of non-Malaysian crew working on commercial boats implies that any benefits from the creation of SIMCA may not be fully captured by Sabah society.

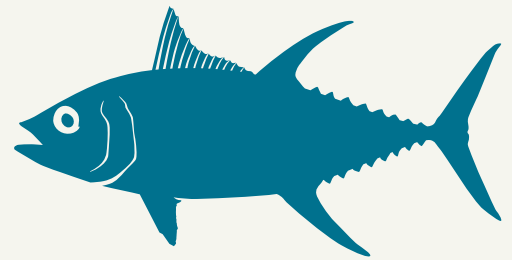
In the future by assessing the spatial use patterns of fishermen and engaging their opinions on where to locate no fishing zones before establishing MPA boundaries may help to achieve full support and avoid raising concerns.

Evaluation of the effects of reserve protection on reef fish biomass and abundance

Background

A total of 12 patch reefs surrounding Lankayan Island were chosen for the underwater survey, based on protection level and distance from the island.

Total fish biomass was highest at level 1 (100% protection), with an average of **54,963g** (55kg) per 250 m²



There was no significant difference in total fish biomass between sites of the same protection level. However, there was a significant difference in total fish biomass between the different levels of protection.

Three levels of protection were defined:

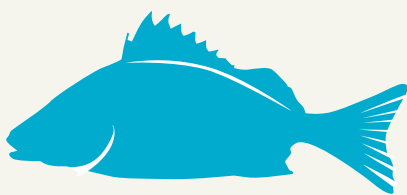
Level 1: 100% protection, whereby the reefs are located less than 2 nautical miles from Lankayan Island, and are constantly protected by the presence of enforcement;

Level 2: 50% protection, whereby the reefs are located between 2 to 4 nautical miles from Lankayan Island, and are occasionally poached by fishermen; and

Level 3: 0% protection, whereby the reefs are located more than 4 nautical miles away from Lankayan Island, or are situated outside of SIMCA, and there is no presence of enforcement and no management of fishing activities.

Mean, standard deviation (SD), maximum (Max), and minimum (Min) total biomass (g/250m²) of all fish families across three levels of protection.

Protection Level	Mean	SD	Max	Min	Count
1	54,964	55,011	240,627	3,194	24
2	20,649	19,862	63,617	1,254	24
3	10,201	11,100	47,595	1,010	24



An increase in spawning stock within a reserve can lead to an increase in the production and dispersal of larvae, and potentially result in increases of 'larval export' to other areas. (Ormond & Gore, 2003).

Total fish biomass and species richness was higher at reefs that are well protected compared to unprotected reefs outside SIMCA. The number of commercially important species such as groupers and snappers are more abundant at level 1 protection reefs compared to reefs at levels 2 and 3. At least 6 grouper species that are highly valuable for the live reef food fish trade, such as *Cromileptes altivelis* (Barramudi cod) and *Plectropomus leopardus* (Leopard coral grouper), were found in reefs with level 1 protection. The protection of reefs appears to allow some fish species to recover. Some fishes are able to grow larger, which is important for sustaining spawning-populations in the reserve.

It is theorized that a build-up of biomass within a no-take reserve will result in a biomass overflow, leading to emigration of adult or sub-adult fish out of the reserve. Besides groupers, reserve protection also seemed to have an effect on snappers. Snapper abundance count was significantly higher in reefs with full protection.



Conclusion

Reefs where fishing has been virtually eliminated have higher fish biomass and diversity than semi or non-protected reefs.

Lessons learned on SIMCA

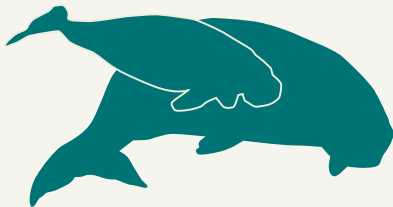


Although SIMCA was created for biodiversity protection and recreation purposes, the project has shown the result that the creation of SIMCA may have produced ecological benefits by increasing the total biomass of commercially important fish species within the reserve.

Reef fishes that allowed to growth larger are potentially serves as spawning-stock that provided a source of recruitment to replenish areas outside of reserve. However, the socio-economic impacts of SIMCA are less conclusive. On the one hand, most fishermen who fish in the vicinity of SIMCA do not perceive differences in fish catch or earnings compared to other fishing grounds. Yet, the continual presence of fishing vessels within or just outside SIMCA suggests that fishing is better in the vicinity of SIMCA, at least for commercial operations.

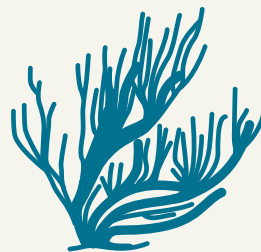
SIMCA was not created for socio-economic objectives; nevertheless, the study shows that the socio-economic impacts of a no-take zone cannot be ignored, as it influences fishermen's fishing behaviour and ultimately, the integrity of an MPA.

Overall lessons learned on MPAs



Fishermen are aware that MPAs can serve as fish nursery grounds, thus it is likely that fishermen perceive indirect benefits of protected areas. It is important to assess the spatial use patterns of fishermen and engage their opinions on where to locate no fishing zones prior to the establishment of MPA boundaries.

The management implications of the study are just as applicable to multi-use marine protected areas, which are increasingly being used as tools for fulfilling multiple biodiversity, sustainable fisheries, and poverty alleviation goals, particularly in the Coral Triangle.



More information can be found in the study report:

Determination of Fishery and Socio-economic Effects of SIMCA on Local Fishing Communities and Evaluation of the Effects of Reserve Protection on Reef Fish Size and Abundance. By Chung Fung Chen, Lydia Teh, Louise Teh, Felicity Kuek, Gan Sze Hoon and Leony Sikim. 61 pages.



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