Conservation impact from Lamteungoh fishing village: lesson learned from Aceh coastal area

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Abstract. Indonesia is an archipelago nation with most of its big cities lays on or adjacent to the coastal area. Thus, driving huge demand for marine and fisheries resources in the concerning region. However, with a long coastline, the rural areas or coastal villages are distributed along the coast surrounding the archipelago, therefore it is reasonable to consider the impact being given by the coastal village on its effort toward conservation. In this study, we applied the Rapid Appraisal of Fisheries Management System (RAFMS), which is a recently developed technique to quickly assess the fisheries management system, which is time-efficient, was cost-effective and was gathered from coastal community and stakeholders. In this study, the study area is located at Lamteungoh village in the coastal area of Peukan Bada subdistrict, Aceh Province. This village is known for its pristine coastal and marine ecological condition compare to the other region. The result shows that the traditional fishermen institution called the Panglima Laot has a significant role in the region's conservation actions. Some policies of implementing area- and time-based restrictions in engagement to the marine resource by the fishermen, as well as restrictions to catch particular marine species have impacted positively towards conservation activities in the region. Thus, it is possible to replicate this traditional management system at the other coastal areas beside Aceh province in Indonesia.

1. Introduction
Sustainable marine resource management is usually being implemented by the long practices of a traditional customary fisherman and or fisheries institution [1]. Such as in Indonesia, several coastal areas have this traditional management system, i.e. the Panglima Laot [2,3] in Aceh Province, the Sasi Laut in Maluku [4], the Awig-awig in northern Lombok [5], the Maawu Dabau in Riau Province, the Punggawa-sawi in South Sulawesi Province [1]. The existence of these customary marine and fisheries institutions plays a major role in protecting the interested region and or implementing regional rule with manifest in the conservation, especially when the increasing pressure being given to the marine environment by the developments of the city.
Indonesia is known as an archipelago nation with more than 17,000 islands and ~50,000 km of coastline [6]. Most of its big cities and significant developments are located adjacent and or close to the coastal area. It gives an enormous amount of demand for marine and fisheries resources to support those cities in the concerning region. A lot of immediate impact to the marine environment is observable clearly [7] and its long-term is derived from the records of the coral reefs, sediment, and oceanic parameters were evident of these impacts as well [8]. However, with a long coastline, compared to the big cities located in the concerned region, the rural areas dominate, which implies that the customary fishermen and fisheries institution should have a tangible impact on conservation.

The Lamteungoh fishing village is one of the best locations to observed the performance of the customary action performed by Panglima Laot. Because its located adjacent to the capital of Aceh Province, which had a significant change especially in the coastal area caused by the tsunami disaster on 26 December 2004 and a rapid process of rehabilitation and reconstruction post-disaster. As of now, the coastal area is somewhat in a higher state of development compared prior to the tsunami event [9]. Not only that, Lamteungoh fishing village is located close to the Tuan Island (the closest island to the capital), and Aceh Islands, which is known as the host of pristine coral reef locations, nursery ground as well as the fishing ground hotspot [10,11], as it is shown in Figure 1.

![Figure 1](image_url)

**Figure 1.** Aceh Province is located at the northwest edge of the Indonesian archipelago as shown by the purple rectangle on the foreground map. On the background map, the study site, i.e., Lam Teungoh village indicated by the bright green color with text. The blue and green colored shapes indicate the locations of fishing ground during the northeast and southwest monsoon, respectively. The brown shape indicates the location where the sharks and rays usually being caught by the fishermen. The x magenta symbols indicate the coral reefs locations. The solid thick red line indicates the Marine Protected Area (MPA).

This study aims to identify which policy, practices, and other implications toward conservation are applied by the Panglima Laot at Lamteungoh fishing village. The contribution of finding in this study could be applied elsewhere in coastal areas around the world.
2. Rapid Appraisals of Fisheries Management System (RAFMS)

2.1 Data collection and respondent participation

In this study, we follow the procedure to conduct the RAFMS by [12,13]. The RAFMS is a powerful tool to generate data quickly, cost-effectively, attract participation from the concerned stakeholders, and consider validation from the concerned community to the result analysis performed from the data that was gathered [14]. The RAFMS are successful to assess the fisheries management system in the Philippines [13,15] and Indonesia [14,16]. In the course of data collection, a total of 13 respondents participated, involves Panglima Laot, coastal residents, fishermen, fisheries traders, and local sellers. The respondents are chosen purposively to cover the entire community aspects at the study sites.

A list of questions or a questioner being set up to estimate the conservation performed by the Panglima Laot. The interviewers also bring the necessary equipment, which aimed to gather complete information from the respondent. For example, the interviewer asks the respondent “Do you ever caught a shark? Where did you usually get them?”. The respondent answered with, for example, “yes I do, I usually caught them north to Tuan Island”. To get complete information, the interviewer will identify which shark that respondent caught by the list of shark figures, then ask the respondent to indicate its location on the map.

2.2 Validation

During the validation step, a number of 13 respondents have participated with the same composition as indicated in data collection. This number of participants during the validation exclude the indirect participation from the passing by coastal residents. The initial analysis that was performed from the data that was gathered was presented to the respondent during the validation, then allowed the respondent to address all the issues that may rises upon the result that was discussed. All the changes that resulted in the validation process were updated into the final result.

3. Selected Result of RAFMS and Discussion

The RAFMS method applied in this study is successful to identify the fisheries management system. The resulting finding shows that the location of the fishing ground was different in each monsoon period, confirming the finding done by [14]. During the northeast monsoon, the fishermen went to the northwest and or southwest direction indicated by the blue-colored region in Figure 1. It is opposite throughout the southwest monsoon, where the fishermen went fishing on north and northeast indicated by the green-colored region in Figure 1.

The conservation practices being performed by Panglima Laot were time- and area-based restrictions in engagement to the marine resource by the fishermen, as well as restrictions to catch particular marine species [1–3]. The practices for time-based restriction are the same for surrounding Aceh’s coastal area, such as; 1) No fishing activities each Friday, 2) No fishing activities during Islamic religious day, and 3) No fishing activities commemorate the tsunami every 26 December. These time-based restrictions are practiced at the entire coastal region in Aceh Province, thus with a long coastline, the no-fishing activities for all time-based restrictions made a huge conservation practice and its contribution for the region.

The area-based restrictions were established through several levels of fishing practices. Those levels such as restriction to not fishing at all cost in an area, banned or restriction on types of fishing gear, and a modest adjustable restriction in fishing and gear at a particular area [1,3]. Such a region is shown by the red line in Figure 1, indicates the establishment of a marine protected area (MPA) in this region. As seen in Figure 1, some fraction of the MPAs area intersects with the fishing location. The Panglima Laot explains that in some cases the fishermen observed the school of fish, then they deploy their fishing gear at those regions. The validation step indicates that the intersect region areas are small and they only catch at those places sometimes as they are lucky to find a school of fish.
To help the fishermen only concentrate at some particular areas in the MPA region, the Panglima Laot with the help from the Wildlife Conservation Society (WCS) designs small or mini sizes rumpons (fish houses) with the location indicates by the orange-colored shape in Figure 1. Its location is spread inside the MPA areas and close or adjacent to it. The fishermen indicate that the availability of rumpons at those locations helps them to easily catch fish with no boundaries between monsoon, which means that, as soon as the fish are schooling in the rumpon sites, it will remain there throughout the year. In this effort, the rumpon will limit the fishermen's fishing area at the MPAs while only concentrated their fishing on the rumpon sites.

As of the restrictions to catch particular marine species, the WCS, Universitas Syiah Kuala (USK) and the government (Marine and Fisheries Department) together advocates the Panglima Laot about the endangered, vulnerable, and threatened marine species. Such restrictions such as a ban on fishing particular shark and ray species, i.e., *Pristis microdon* or the largetooth sawfish, *Rhincodon typus* or whale shark, *Mobula alfredi*, and *Mobula birostris* both are manta rays are already being practices [17]. To help them improve their livelihood, the Panglima Laot also encourage the family member such as fishermen wives to find suitable alternative livelihoods such as planting vegetables in the house yard and or some other alternative livelihood which had a minimum or less effort, however, could give a benefit.

4. Conclusion

It is concluded that the Panglima Laot at Lam Teungoh village has successfully applied a tangible policy to improve the conservations in the region. The area- and time-based restriction as well as the ban on fishing some particular marine species are implemented by the Panglima Laot, and was found effective. Such as, the construction of mini rumpons as well as encourage an alternative livelihood for the fishermen's family is among the key success being performed by the Panglima Laot at this village. Thus, similar practices could be applied elsewhere along the Indonesia coastline and or around the world.

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5. Reference

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