The Support of MPA (Marine Protected Area) in Coral Triangle Area: Evidence from Kei Islands, Indonesia

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Abstract. Kei Islands located inside the coral triangle. Therefore, the biodiversity level on the sea in this area is considered high. United nation has proposed for water that included in the coral triangle has to apply marine protected area (MPA) to preserve the area. The main problem is most of the community especially in Kei Islands have depended on the sea as their sources of the economy even fisheries commodity like fish play a large part on the inflation rate and other prosperity indicators likes school and housing. Also, Kei Islands practice on form local wisdom for owning areal of the sea which calls "petuanan laut" by certain of villages or group of villages in one area. This study aimed to map the cluster of catching fisheries area based on the quantity of fish supply on a local market in Kei Islands and measure each cluster on their support and perspective on Marine Protected Area (MPA). We conducted a focus group discussion and collecting additional data by questionnaires with descriptive and quantitative analysis with logistic regression. The implication of this study can provide a clear view of coastal communities view on MPA program also to identify an area that has marine resources, human resources, and equipment to provide government an empirical view on catching fisheries in Kei Islands to issued better policy to develop fishing industry in Kei Islands.

1. Introduction

Coral triangle is sea area with world richest and highest marine biodiversity located at Asia Pacific's region consist of six countries namely Indonesia, Malaysia, Philippine, Timor Leste, Papua New Guinea, and Solomon Islands also known as CT6 (Coral Triangle 6). The areas are a home of over 120 million people who depend on their live fisheries and marine activities from fishing, fish culture and mariculture and marine ecotourism [1, 10]. The coral triangle area contains over 70% of coral species and more than 35% reef fishes of world supply [9]. Therefore it is important to conserve the area since it also relates to future food security. In 2008 inter-governments initiative between countries on coral triangle area to preserve the marine resources with agreement and policy known as CTI (Coral Triangle Initiative). The initiative proposed by President Yudhoyono of Indonesia, where it covers an area of 5.7 million km^2, biogeographically delineated by high coral diversity, one of the goals of CTI was to establish MPA (Marine Protected Area).

Furthermore, the purposed of Marine Protected Area (MPA) is to conserve and maintain the sustainability of marine resources [2]. Only 2.1% part of the sea in the world to conduct MPA program, in another side United Nation has targeted by 2020 at least 10% or sea around the world will apply for MPA Program. The resistance of many countries and coastal community on the application of MPA arise cause of the signification of sea to each local community on their welfare [4]. Thus, the

most efficient way to manage well-received MPA is involving the coastal community regarding their interests in crafting this program.

In a rural region in particular developing country like Indonesia, barriers to face in the matter of conservation on land and sea is socio-economy factors. Where it starts from the social gap, education, job opportunity and welfare comparison between rural and urban area, also in recent years is climate change and political stability [7-8]. There are only a few successful cases for the application of MPA in the coastal area. Aside from economic factor, in Fiji, the local coastal community willing to accept MPA with the environmental approach, where local community approved MPA program to preserve their area from climate change which has taken great influence on their region [5].

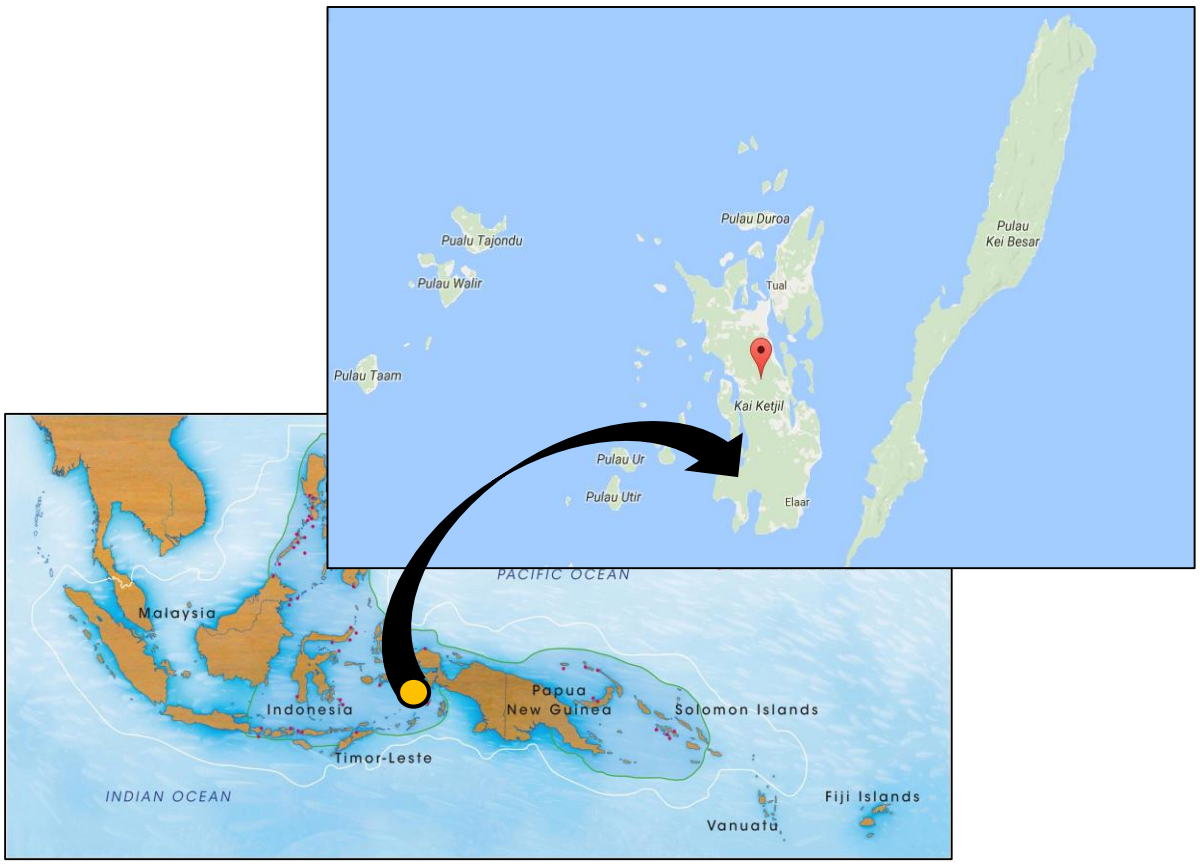

Figure 1. Kei Islands in Coral Triangle Area

Kei Islands located in the coral triangle area, which means this area has abundant of biodiversity resources. Therefore it is necessary to preserve it by applied MPA program. As an archipelagic region, Kei Islands needs to maintain their marine resources in the long run since it is the only sources of revenue for this area. The potential of catching fisheries of this region is high, although based on the study conducted by [6], if the trend of fishermen behavior, fleet, fishing technology includes illegal fishing on the same course then in 8-10 years from now the number of marine resources in this region, in general, will drop significantly. This current condition makes the application of Marine Protected Area (MPA) is greatly needed because it is not only will have a significant impact on future of world marine biodiversity but also the future welfare of Kei Islands community. The aimed of this study was to measure the acceptance of MPA by catching fisheries community in Kei Islands.

2. Methodology

To get sufficient data to obtain a better result on this study, we divided step into data collecting into two approaches. First, we conducted a preliminary survey to determine active fishermen in the region

along with the fishing ground based on supply-side information from active fishermen. With the information that we have gathered, we divided fishermen villages into clusters as baseline source for the second step of our data collecting. Where we conducted Focus Group Discussion (FGD) on fishermen on each cluster on their on the MPA related to their knowledge, their view and their input on the application of MPA in the region. Also with a total of 255 respondents which were fishermen that didn't include on FGD to measure their social-economy condition and their support on the concept of MPA applied in Kei Islands Sea. This study conducted from May to August 2017 on Kei Islands, Indonesia. For data analysis, we used descriptive analysis and logistic regression.

Table 1. Clusters Fishermen and Fishing Ground in Kei Islands

No	Clusters	Villages	Fishing Ground
1	Dullah Laut	• Dullah Laut • Duroa • Tamedan • Labetawi	Water of Dullah Laut Islands, Mas island and Rumadan islands
2	Ohoirdetutu	• Ohoidertutu • Ohoiren • Ohoira • Wab	Water of west bank Kei Kecil Island and Tanimbar Kei island
3	Selayar	• Selayar • Sitniohoi • Dunhawan	Water of dua island, sepuluh island and Ngidiun cape
4	Sathean	• Sathean • Ibra	Nerong strait
5	Kei Besar	• Ngafan • Sungai	Kei Besar island water

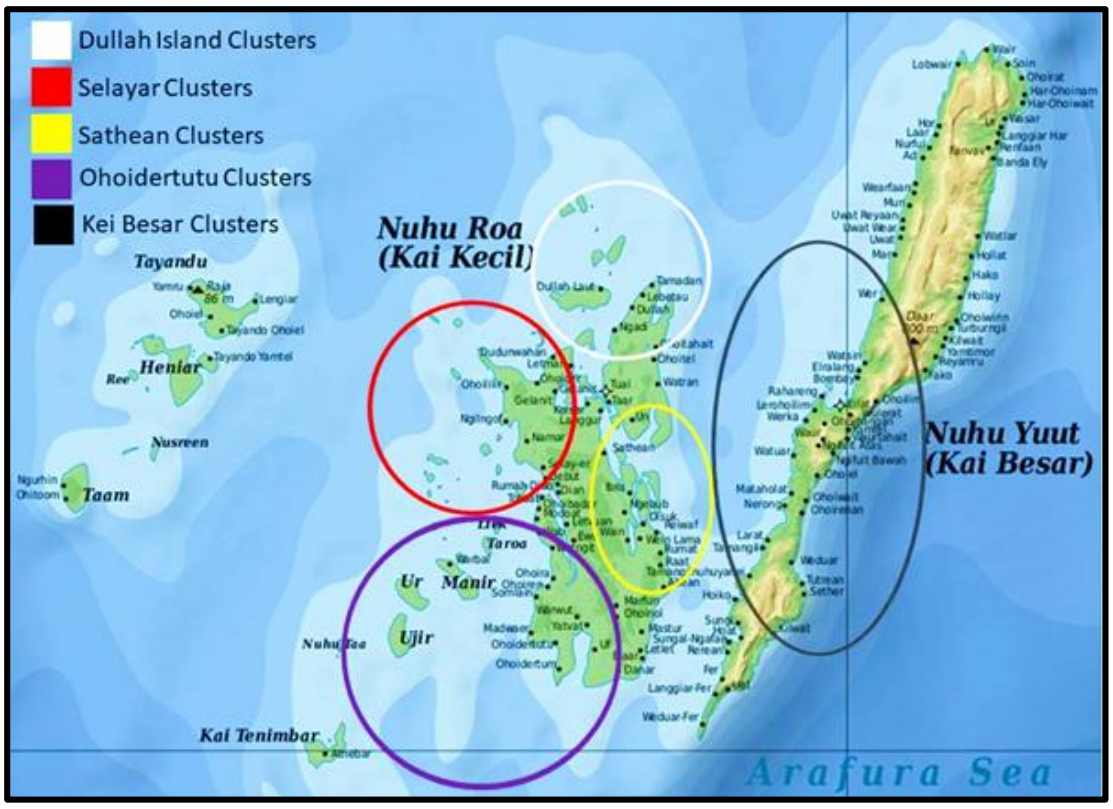

Figure 2. Village Clusters based fishing activity in Kei Island

On table 1 as we can see, we have five groups with total 15 villages in Kei Islands. On each cluster consist of fishermen who used fishing as their source of revenue to support their family, also fishermen that conducted fishing activity as their primary job. These five clusters also consist of high productivity of fishermen in the region. Therefore these were the locations to collect the data on measuring the support on the application of MPA in Kei Islands.

3. Results and discussion

The variables in this study consisted of 1 dependent variable namely support of MPA and seven independent variables, ie role variables in capture fisheries, fishing gear, fishing catching location, length of time to go to sea, income, the combination of local wisdom and reason to support MPA. The result showed that of the seven there were 24 indicators, with only 12 independent indicators of 6 variables that statistically significant to the support of MPA this can be seen in table 2.

Table 2. Significant Variables Result

	B	Sig.	Exp(B)
Role of fishing activities			
Fisherman (Own all of their fishing equipment)	-1.252	.072*	.286
Lift nets owner	-2.046	.035**	.129
Fish seller	-3.010	.044**	.049
Fishing gear			
Fishing net and *bubu*	2.340	.049**	10.382
Fishing area			
On sea own by their village	1.511	.035**	4.533
On sea own by other village but has "*pela*" relation	-2.387	.097*	.092
Duration			
Duration 4 – 6 hours	1.088	.072*	2.968
Combine with local wisdom			
Sasi	5.346	.000**	209.865
Sustainability reason			
Economic	3.075	.010**	21.653
Environment	6.294	.001**	541.258
Social	2.633	.084*	13.913

N = 255, Significant at **5% and *10%

3.1. Role of Fishing Activities and Fishing Gear

On table 2, based on the role in fishing activities for fishermen who own their fishing gear and equipment was statistically significant to affect their perception on support MPA, where they have tendencies not to support MPA. It happens because compared to the fisherman who doesn't own their fishing gear and equipment, those who have their gear are having a broad range of fishing activity and liberty to conducted fishing activity anytime. Within said they feel the application of MPA this region will limit their range and therefore will eventually affect their revenue. Same goes to lift net owner, where they also tend to support MPA, since lift net has a limited range of operation, with MPA it will impact their productivity. A fish seller in the local market also tends not to support MPA, because they said it is related to the supply of fish which also will impact the price of fish they buy from fishermen which can decrease their margin profit.

For fishing net user tend to support MPA. Fishermen who use the fishing net on their take on MPA is tended to be positive since it will help maintain the carrying capacity and resources of the shallow marine environment. The fishing net user often operates in shallow water which makes the application of MPA tend to not significantly affect their productivity in a way that decreases their catching result.

3.2. Fishing Area and Duration

On fishing area variables, fishermen who are conducting their fishing activity in the sea that own by their village tend to support MPA but those who usually did their fishing activity on sea own by their neighbor but have *pela* relation, where *pela* is local wisdom form of bonding between villages, tend to not to support MPA. For fishermen that used to conducted fishing activity in believing that if MPA applied in their water will mean good for future. Therefore they tend to support MPA but on other side, fishermen who used to conduct fishing activity in water own by other village did it out of the reason that, water own by their village is not high on marine resources as water own by other villages especially when they have *pela* relation because they will have a permit to conduct fishing activity.

Based on the duration of fishing activity, fishermen who used to spend 4-6 hours each day to conducting fishing activity tend to support MPA. The positive tendencies occur because most of the fishermen in Kei Islands did fishing activity in their water, thus for a short period it only cover shallow water makes the application of MPA not affect their fishing activity.

3.3. Combine with local wisdom and Sustainability reasons

Most fishermen in Kei Islands based on our filed study sounded skeptic on their take of the application of MPA mainly because it will limit their fishing activity since more than half of coastal community in Kei Islands depend their life on marine resources. The idea of MPA tend to have a negative perception of fishermen, but on the notion of combining with a form of local wisdom called *sasi* then MPA get more positive responses. *Sasi* is the spatial and temporal closure of fields, forests, reefs and fishing grounds, tidal zone (*meti*) or village-controlled sea (*petuanan laut*), is a conspicuous feature of Maluku region [11], with *sasi* will make sure that nobody takes what does not belong to them.

Based on sustainability reasons, measured by indicator namely environment, social and economy, fishers tend to have a positive perception on supporting MPA. This result indicated that fishermen on Kai Islands are understood the importance of preserving the sea for better future, but based on our field survey, they hesitated to showed directly support MPA because of they afraid it may negatively affect their lives. Since there are no other natural resources in this region, aside of agriculture and newly emerged marine ecotourism, marine resources are the only source of their revenue. Therefore in order to make MPA program work in the region, the local and central government have to make sure that another sector is also alive to support their daily need, in addition to that combining with a form of local wisdom also can help the application of MPA in this region.

4. Conclusion

Most fishermen tend to support MPA model in a way where there are strict rule and law by the government to prevent to conduct fishing activity in a certain sea in Kei Islands, but if it combines with a form of local wisdom called *sasi*, then MPA can work in this region. Fishermen in the region have understood the important maintain the marine resources for the future, but they tend to be practical in short-term because the sea is where they go to support their family. The idea of MPA may work in Kei Islands if central and local government find another sector aside of agriculture as new sources of revenue while at the same time modified the form MPA with local wisdom to make it works.

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