Mapping Marine Resources Utilization Based on Seascapes Area: A Study on Gender Comparison

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Abstract. Each section of coastal area from village area to deep sea has particular fisheries and marine activities. Therefore requirements for knowledge, skill, and risk are distinct between each scape. Based on this notion we divided seascapes based on three different area, first is village area to mangrove and coconut trees before coast area, second is area from beach to shallow water and the third is deep sea. We conducted our data collection in Kei Islands, Indonesia, with purposive sampling to target fishermen and aquaculture farmers in the coastal area. Purposes of this research are to analyze the role and the contribution of male and female on each area to formulate the best way to improve and maintain the sustainability of microenterprises and coastal community welfare; we used logistic regression to analyze the data. The result demonstrated each fisheries activity in each seascape with based on gender on each area and activity. Recommendation of this study especially for the government as empirical guidance to improve the economic welfare of the coastal community in Kei Islands and small islands area in general.

1. Introduction

The tropical coastal seascape is one of the locations that contain high of marine biodiversity which also place of many natural resources and ecosystem services that are significant for coastal community and people in general’s daily need. Researchers used many different terms of seascapes, [1, 2] proposed seascapes as areal where combination between mangrove forests, seagrass beds, and coral reef ecosystems exist. Each section of seascapes requires distinct knowledge, and skill even risk to utilize, because it’s a delicate situation to handle since every part of seascapes depends and supports each other. Therefore, in Caribbean coastal ecosystems there’re trying to distinguish the importance of seagrass and mangrove habitats to populations of coral reef fishes [4]. Countries in the world especially developed countries face whole new challenge compare to undeveloped countries or country with high gap on infrastructure between big cities and rural area. In country such as Australia [3], the main challenge is to preserve the seascapes, but for countries like in Africas, the main challenges are to optimum utilize since most of the coastal community still live under poverty.

With each section of seascapes has its distinct features, then, the role of gender in the utilization on seascapes become clearly different especially related to the productivity and risk. Male and female use coastal area differently and will produce differential economic and environmental impacts. Many types of research had been conducted to view role of gender on utilization of coastal area, [5] Showed the different on knowledge poses based on gender, [6] Studied on the contribution of female on coastal area
utilization, [7] Stated to gender should be integrated to maximize the productivity of economic resources and maintain environmental existence of coastal area.

Indonesia is an archipelagic nation that covers 5.8 million km² of marine area and has approximately 17,504 islands, a coast line of 95,181 km [8] and 8,090 coastal villages [9]. Millions of Indonesia’s poor belong to small-scale coastal fishing households in the eastern region of Indonesia and are heavily reliant on fish for daily food and to generate income to meet daily living costs as well as other basic needs such as education. Kei Islands are located in Eastern Indonesia, to be precise is in Maluku Province. Thus many of coastal community in Maluku in general and Maluku, in particular, rely their daily life on fisheries sector, either from fishing, mariculture, food processing and marine ecotourism. Despite high potential on marine and fisheries resources, [10] stated that in Maluku if the trend stands still then in 8-10 years number of fish in Maluku sea, in general, includes Kei Islands will drop gradually and significantly. Therefore, the ability to utilize other section of sea is important for the sustainability of fisheries productivity, especially on mariculture and food processing based fisheries resources.

For fishing activities, male as dominant gender, but for another sub sector of fisheries, its supposed to be balanced on the number between male and female, where female in particular play huge role on selling fish and other fisheries product compare to male [11]. As a coastal area, the ability on the utilization of fisheries resources in Kei Islands is important to increase community well-being and welfare, therefore, purposes of this research were to analyze the role and contribution of gender on each seascapes section in coastal area. On this study we used three seascapes area. First, village and mangrove area, the second is beach and shallow water and the third one is deep sea and coral reefs as it shows in figure 1.

![Seascapes Section of This Study](image)

**Figure 1.** Seascapes Section of This Study

2. Methodology
The study was conducted from May to July 2017, a preliminary survey conducted during two weeks period to determine the best research location that meets the criteria. Primary data collected by purposive sampling using questionnaire and focus group discussion (FGD). The sample size of 122 men and women 122 people who work mariculture farmers, fishermen and micro enterprises of food processing and marine ecotourism in 10 (ten) villages (Ohoi in local language) in Kei Islands which consists of two administrative government namely Southeast Maluku Regency and Tual City. Name of villages on this research as follows Ohoi nglingof, Ohoi evu, Ohoi letvuan, Ohoi loon, Ohoi kelanit, Duluh laut village, Ohoi sathean, Ohoi ngafan, Dulah darat and lupus hamlet (as seen of figure 2). The methodology of analysis using Descriptive and logistic regression analysis.

We conducted our study by adopting the previous study conducted by [12] but we also did some adjustment on the research, for instance, we focus only fisheries sector, and also we choose villages with
same particular trait as seascapes that we have divided. Based on our preliminary survey there are more than 15 villages that meet the criteria and we choose 10 villages where they have active villages for processing, they also have mangrove that contains many fisheries resources and have beach and fishing activity on deep sea and coral reefs. Aside from FGD we also collected the data by questionnaire to have comprehensive result on the comparison on the contribution of gender in fisheries resources utilization in Kei Islands.

The seascape section divided based on data and information obtained by discussion during the preliminary study. In section 1 usually, has mangrove ecosystem still affected by splashing sea water or tidal, plantation, get sun exposure and village area with the risk that is considered low. In section 2 where coastal and shallow seas have characteristics of tidal, waves, coral reef and seagrass ecosystems, species of biotic and abiotic resources, especially fisheries, aquaculture, resource utilization properties, some private and some common properties, have physical and moderate risks. The deep sea region has high salinity characteristics, has variations in surface temperature with depth, species of biotic and abiotic resources, considered high risks and physical.

On table 1 can be seen that number of fishermen in this study is the highest on fishing activities category 43.9% followed respectively by mariculture farmers 32.4%, marine ecotourism 11.1%, a combination of several activities 9.4% and fisheries processing 3.3%. Based on seascapes area more than half of respondent of study operate on section 2 of seascapes 59.4% followed by section 3 14.8% and section 1 7% also result showed that respondents also operate on the combination section 18.9%. Most of the respondent generate their income between IDR 500.000 to IDR 2.000.000,- also more than half of respondent work around 1 to 6 hours a day.
Table 1. Social economy characteristic of respondents

| Fisheries Activities              | Frequency | Percent |
|----------------------------------|-----------|---------|
| Catching fisheries               | 107       | 43.9    |
| Fisheries processing             | 8         | 3.3     |
| Mariculture                      | 79        | 32.4    |
| Marine Ecotourism                | 27        | 11.1    |
| Combination                      | 23        | 9.4     |

| Seascapes Activity               | Frequency | Percent |
|----------------------------------|-----------|---------|
| Section 1                        | 17        | 7.0     |
| Section 2                        | 145       | 59.4    |
| Section 3                        | 36        | 14.8    |
| Combination                      | 46        | 18.9    |

| Income                           | Frequency | Percent |
|----------------------------------|-----------|---------|
| < Rp.500,000                     | 35        | 14.3    |
| Rp.500,000-Rp.999,999            | 89        | 36.5    |
| Rp.1,000,000                     | 93        | 38.1    |
| Rp.1,999,999                     |           |         |
| Rp.2,000,000-Rp.2,999,999        | 18        | 7.4     |
| > Rp.3,000,000                   | 9         | 3.7     |

| Hours of work                    | Frequency | Percent |
|----------------------------------|-----------|---------|
| < 2 hours                        | 44        | 18.0    |
| 2-3 hours                        | 56        | 23.0    |
| 4-5 hours                        | 87        | 35.7    |
| > 6 hours                        | 57        | 23.4    |
| < 2 hours                        | 44        | 18.0    |

Female and Male: 122; N: 244

3. Result and Discussion

3.1. Income generated by gender based on seascapes section

In section 1 female's income was greater than male's because in this area the dominant activities are fishing processing and ecotourism, but the income is not too significantly large because the processing product price has not been maximized also due to the influence of bad weather when we conducted the research. The number of visitors to the tourist sites for ecotourism activities decreased due in our research period, but this is an empirical condition on Kei islands where income from fisheries and marine resources utilization often fluctuate during the time. In section 2, female's income is greater than male's because, in this area, the highest activity are mariculture, ecotourism, and fishing where female conducted more mariculture and ecotourism with an addition of low on productivity on fishing activities in the shallow area makes female has more advantage in section 2. In section 3, male's incomes are larger than women because the third area of dominant activity is fishing and ecotourism with high risk and physical requirements make male because of dominant forces on this section (Table 2).
Table 2. Income generated by gender based on seascapes section

| Section          | Male         | Female       | Total       |
|------------------|--------------|--------------|-------------|
| Combination Location | 35.150.000  | 8.820.000   | 43.970.000 |
| Section 3         | 32.800.000  | 12.950.000  | 45.750.000 |
| Section 2         | 50.600.000  | 85.850.000  | 136.450.000|
| Section 1         | 8.000.000   | 8.900.000   | 16.900.000 |

3.2. Income generated by gender based on seascapes activity

In section 1 and section 2 was dominant performed by female the highest income fisheries activity for the female is on marine ecotourism activities, fishing processing, mariculture, where it’s the total income from the utilization of all section combine for female. Especially the fisheries processing where male did not contribute to income generated. The highest income fisheries activity for the male is in catching fisheries activities because most of the fishermen either in section 2 and section 3 are male, so it's also understandable for the male to have more income generated in fishing activity than female. For combination on the section of seascapes to operate, male generate more income than female. This also understandable since male has the main job to provide economic support for each household where female is actually has double job on house job and also to support their family in fisheries activity, therefore male has more time to conducted more fisheries activity in various of seascapes sections, this aside from physical advantage of male from female (Table 3).

Table 3. Income generated by gender based on seascapes activity

| Section               | Male          | Female        | Total       |
|-----------------------|---------------|---------------|-------------|
| Mariculture           | 27.500.000    | 40.200.000    | 67.700.000  |
| Combination           | 23.100.000    | 8.000.000     | 31.100.000  |
| Fisheries processing  | 3.720.000     | 3.720.000     | 3.720.000   |
| Catching fisheries    | 73.950.000    | 34.000.000    | 107.950.000 |
| Marine Ecotourism     | 2.000.000     | 30.600.000    | 32.600.000  |

3.3. Logistic regression result

Table 4. Significant results of logistic regression

| Logistic Results                  | Sig.   | Exp(B) |
|-----------------------------------|--------|--------|
| Marine Ecotourism                 | .008** | .070   |
| Villages, Mangrove and Coconut areal | .072*  | .264   |
| Beach and Shallow water           | .014** | .269   |
| Work < 2 Hours                    | .046** | .258   |

*Significant in 10%; **significant in 5%

Based on the result showed on table 4, out of 8 variables with total 17 indicators only 4 indicators that have significant effect on gender contribution. Where it can be seen on result of logistic regression, showed that the male tends to prefer conducted marine ecotourism activity, in section 1 and section 2 also the result showed that male also not to prefer operating in this section. These results support the other result on this study where female generated more income in section 1 and section 2, where based on our discussion with coastal community showed that male seems to have thought about high potential
on economic in sea especially on fishing activity in deep water that's why they prefer to go fishing. This argument also supports the result of logistic regression where male did not prefer to work less than 2 hours since they mostly go fishing in deep water which took more than half a day.

4. Conclusion

Male generated IDR 126,550,000.00 where, female create IDR 116,520,000.00 each per month, although, Female has a great potential for generated more income if provided with sufficient knowledge and skill related. In general, both gender still underperformed compared to marine and fisheries resources availability in the region, therefore the role of higher education institutions and research organization in significant to increase coastal community skill and capability on utilizing and maximize the marine resources in Kei Islands.

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