

Does Capture Fisheries in The Vicinity of tin Mining Area

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Does Capture Fisheries In The Vicinity of Tin Mining Area Sustainable? : A case study in Bangka Island, Indonesia

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Abstract. The purpose of this research was to determine capture fisheries status in a sustainability perspective based on ecology, economy, social, technology and ethic dimensions. A data analysis method which used was Multidimensional Scaling with RAPFISH technique. All dimensions in this study were based on FAO's attribute and was modified based on fisheries condition in research location. Score multidimensional analysis is 45,69. These results indicate that the multidimensional sustainability status of capture fisheries on Bangka Island is in a less sustainable status. The result showed that ecology was the dimension which has the lowest score in order to support captured fisheries sustainability in Bangka Island. The result also formulated sensitive attribute in every condition and gave management recommendations for the sustainability of captured fisheries based on that attribute. This study showed the importance of dimension integration and stakeholder's teamwork multisectoral in order to manage the sustainability of captured fisheries.

1. Introduction

Both fisheries and minning are basis sectors Bangka Belitung Island. So, those sectors has significant influence on regional economy [1]. Tin minning activity is local economic activity since hundreds years ago and gave positive contribution for their household economic. On the other hand, tin minning activity that done continuously make tin deposits in water flow. That decreasing water quality as fish living habitat and also decrease marine biotal diversity [2]. There was a problem, when tin minner got profit by their economic activity, fisheries sector have got lost. That was decreasing of fisheries captured and also uncertainty of fisheries amount. It would make horizontal conflict or social / stakeholder problem.

Based on economic potenton of tin minning, Bangka Belitung government expanded IUP. So more than a half from its area. The Regional Government of Bangka Belitung expands Mining Business Permit (IUP), so that three-quarters of the Bangka Belitung archipelago operates a mining business. The rest of the land is used by the forestry industry and a small portion is used as a living space for the community, including fishermen. If tin mining exploitation continues, mining on land destroys forests and mining in the sea damages coastal ecosystems and fisheries resources. The impact will be felt by 45,000 traditional fishermen who rely on life from the sea and the coast.

The basic concept of sustainability is not only ecological, but also related to socio-economic, community and institutional [3]. Tin minning in Bangka island is potential of economic activity. But, in some case there was occurred tin minning of exploitation in capture fisheries area. Based on these problems, this study aims to analyze the sustainability status of capture fisheries around tin mining on Bangka Island.



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2. Methods

2.1 Sources of Information

This research was held in Bangka Island, Bangka Belitung Province. Focus location at capture fisheries point : Mentok, Sungai Liat, Koba dan Tobo Ali. That location also of **ore tin** minning area (Fig 1). This research was held on March until June 2019. Colleted data was **primary and secondary data**. **Primary data** was **obtained from** key informant (14 person Fishery experts from the region and the authors' personal experience). Secondary data was obtained from published papers, fishery statistics reports, government agency literature. Some data and information for ecological attributes were collected from FishBase [4], and some socio-economic information was obtained from the CIA World Factbook [4].

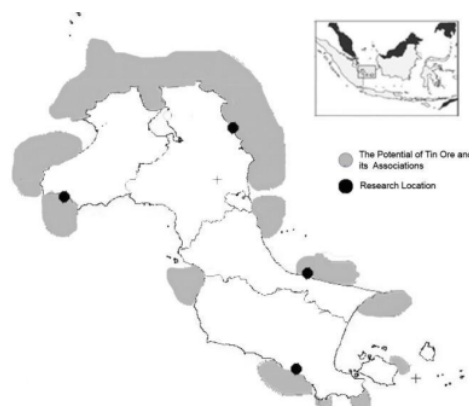


Fig. 1. Potency Mapping of Mining in Bangka Islands

2.2. Rapfish Analysis

Data analysis using the RAPFISH technique [5]. Aspects of the study consist of Ecological, Economic, Social, Technological and Ethical [6]. The list of attributes used in RAPFISH analysis (51 attributes) refers to FAO Fisheries Circular No. 947 (1999) [7]. Rapfish includes a “good” capture fishery (defined as 100% sustainability score), consisting of the best possible scores for all the attributes in the respective evaluation fields, and a “bad” or “worst” fishery (defined as 0% sustainability score), which has the worst scores [6]. A more detailed account is given in Tesfamichael and [6], [7], [8], [9].

In order to determine which attributes have proportionally larger influence on the results, each attribute was sequentially dropped from the MDS analysis for each evaluation field, providing a value for the percentage influence of each attribute on the overall ordination (“leverage”)[6]. Further analysis was carried out by combining the capture fishery scores to enable overall comparisons among aspects using a kite diagram [6].

3. Result and Discussion

Sustainability status prediction of capture fisheries in tin minning are was described by 51 atributs that consist of 11 ecological atributs, 10 economic atributs , 9 social attributes, 12 technological attributes, and 9 social attributes. Rapfish analysis can determine sustainability status in every dimention. That status has important role in monitoring, analysing, ecosystem condition description, social activity affect and policy efectifity in order to fulfilled management goals (Rice dan Rochet, 2005)[10]. Rapfish analysis result is showed in Picture 2.

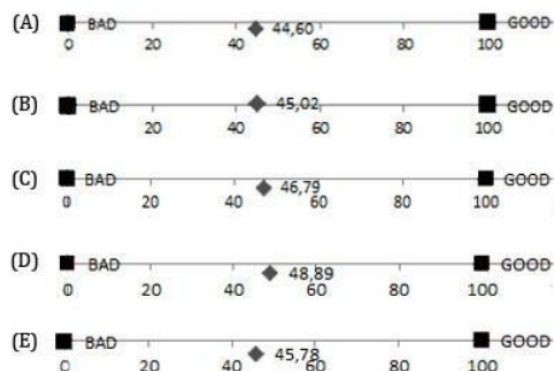


Fig. 2. RAPFISH sustainability scores (X-axis) for ecological (A), economic (B), social (C), technological (D) and ethic (E) evaluation fields

Fig. 2 shows plots for the status results from the MDS ordinations. The capture fisheries are distributed on the X-axis according to their sustainability in the specified evaluation field. Sustainability status in all aspect less than 50 that 's mean less sustainable. Ecological aspect score was 44,60; aspek ekonomi 45,02; social aspect was 46,79; technological aspects 48,89; and ethic aspect was 45,78. Ecological aspect has the lowest score. Most of fisheries analysis before, this aspect was less than the others aspects(e.g., [7]; [11]; [6]).

Sustainability status in every dimention cant describe the whole off sustainability status. Nilai indeks setiap dimensi perlu digabungkan untuk menentukan nilai status keberlanjutan multidimensi. Indeks score of every dimention need to combined to determine multidimension sustainability status score. That is done by multiplying indeks score of existing condition with weight of every dimention. Overall, score of sustainability indeks was 45,69 (Tabel 1) that indicated sustainability status of capture fisheries in Bangka Island was less sustainable.

Table 1. Sustainability index status

Aspects	Weighting	Sustainability Scores	Amount
Ecological	0,429	44,60	19,121
Economic	0,230	45,02	10,340
Social	0,071	46,79	3,301
Technological	0,168	48,89	8,201
Ethic	0,103	45,78	4,729
Total	1,000		45,692

That the attribute 'number of migration ranges' has an influence (S.E. around 3.31%) in ecological aspects. That is greater than the others in the position of ordination of fisheries on the axis of sustainability. The next biggest attribute is 'trophic level change' with S.E. around 2.99%. Number of migration ranges and trophic level change also affected by tin mining activities in Coast Bangka.

Key factor in economic aspect based on Rapfish analysis was marketableright and sector employment. That marketing fish problems in bangka are distribution and marketing chains, but it's tin mining still become interesting working fields. Employment sector crisis in Bangka need employment creation and enterprise development. Most of household income and income generating was fisheries sector. On the other hand, business development that sustainable is supporting system of job creators [12].

Conflict status and environmental knowledge was the biggest resiten factor in social aspect. Conflict of interest in coastal area between fishermen and tin minner was main issu. There was a problem between minning activity and capture fisheries. Environmental knowledge of coastal

community was low. That is signed by a lot of land damage in coastal area because of social economic activity.

Technologically, these Bangka Island fisheries use relatively more selective and passive gears, while the industrial fisheries use active, non-selective gears, which are more destructive to the ecosystem. Pre sale processing of fisheries commodity in Bangka was not optimal. Generally, fishermen sold fisheries commodity without added value process. They only processing their commodity into simple product such as salted fish, fish chips, fish ball and simple others.

Just management and adjacency and reliance was sensitive factor in ethic aspect. Management by multisectoral policy is needed to solve this coastal area problem. [13] said that policy formulation and resources management goals that participative approach produced adaptive strategic in independence, capacity and knowledge utilization of resources user so can increase sustainability of social resources utilization.

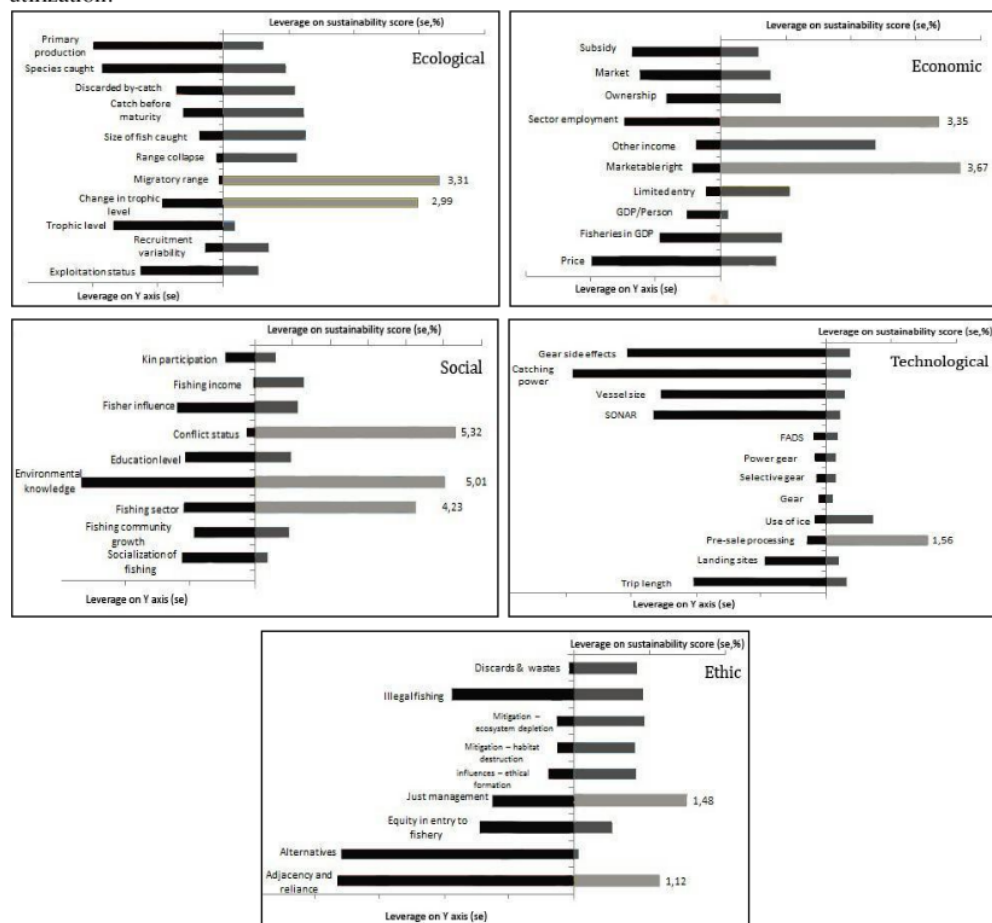


Figure 3. Attribute leverage analysis of RAPFISH ordination for capture fisheries.

4. Conclusion

Score multidimensional analysis is 45,69. These results indicate that the multidimensional sustainability status of capture fisheries on Bangka Island is in a less sustainable status. To improve the sustainability status comprehensively, structuring various influential attributes is needed. This status need monitoring, assessing and understanding ecosystem conditions, the impact of human activities, and the effectiveness of policies to achieve management goals. Strategy based on integrated

approach to all dominant factors (key factors) that influence capture fisheries in Bangka Island is making improvements and programs in key factors. This study showed the importance of dimension integration and stakeholder's teamwork multisectoral in order to manage the sustainability of captured fisheries.

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