The role of panglima laot towards fisheries management based on ecosystem approach in Banda Aceh City

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Abstract. Panglima Laot was indigenous institutions of Aceh that hand to realize sustainable fisheries management particularly with an ecosystem approach. The objective of this study is to evaluated status of Panglima Laot on fisheries management based on ecosystem approach. This research was conducted in 2017 in Banda Aceh City. Data analysis used Composite index with multy criteria analysis and then visualized by flag modelling. The result of this study showed Panglima Laot status was ‘good’ category. Composite value of Lhok Pasie Tibang Panglima Laot is 66.6, Lhok Kuala Aceh Panglima Laot 62.5 and Lhok Kuala Cangkoi Panglima Laot 72.6.

1. Introduction
The current modernization era, unsustainable of fish resources is a big threat to many people. One of the factors causes the limitation of government system to support fisheries sustainability because of both legitimacy and ineffective function [1]. Fisheries management is one of efforts to ensure the sustainability of fish resources by using ecosystem approach. The aim of fisheries management with an ecosystem approach is how to balance of the socio-economic objectives of society with utilize knowledge, information and dynamics of biotic and abiotic components, so it can be managed in comprehensive and sustainable [2]. In line with the principles of EAFM, the implementation of fisheries management cannot be carried out by one party only, but also involves many parties. The application of EAFM in Indonesia to date has been implemented through several projects and programs supported by assistance from academics, institutions or external organizations [3].

The region of aceh sea is known to have good cultural value, especially the city of Banda Aceh. The culture is Sea Custom Law, which has been used since the 16th century. Sea custom law is a rules espoused by the indigenous society in operation cach that led by Panglima Laot. Sea custom law uses guidelines at sea such as fishing ground regulations, fishing gears, and the resolution of conflicts between fisherman. It has also become the cultural identity of fisherman’s society [4]. Panglima laot role in principle has the goal of achieving harmony between societies by utilizing traditional customs, so that the economic and social communities can be good fully. It is consistent with the concept of fisheries management by an ecosystem approach to ensuring balanced fisheries sustainability. So far, spatial research on ecosystem-based fisheries management related to biological, social, economic and governance aspects has been carried out a lot [5 - 10]. Based on that background, researcher interested to study Panglima Laot role on fisheries management in Banda Aceh with ecosystem approach indicators.
2. Material and Methods

2.1. Site and Place
The study was conducted on January to March 2017. The research facility is done in three places, that is Pasie Tibang Panglima Laot in Alue Naga, Kuala Aceh Panglima Laot in Lampulo and Kuala Cangkoi Panglima Laot in Ulee Lheue.

2.2. Data Collection Methods
Methods of data collections are getting in depth interview and dissemination of questionnaires with direct surveys and literature studies. The sample used for an expert respondents was determined to use an purposive sampling technique. A sample is determined by taking into account the presence and availability of being a respondent, experience, rank, credibility, reputation, and knowledge are linked with needed information [11]. The chosen responders were Panglima Laot, Marine and Fisheries Services of Aceh, The supervisor of Marine resources and fisheries of Aceh, and Marine police.

2.3. Analysis Data

2.3.1. Indicators identification
Indicators identification was determined based on the answer result of interview, questionnaires distribution and literature study in each study location. Measured indicators can be seen at Table 1.

| No | Indicator                                                                 | Criteria                                                                 |
|----|---------------------------------------------------------------------------|--------------------------------------------------------------------------|
| 1  | Pursuance to responsibility in formal or non-formal fisheries management plan | Formal:  
1= more than 5 times fisheries management violation  
2= 2-4 times fisheries management violation  
3= less than 2 times fisheries management violation  
Non-formal:  
1= more than 5 violation information  
2= 2-4 times violation information  
3= less than 2 times violation information  |
| 2  | Completeness of roles on fisheries management                               | Rule completeness  
1= no rule assembling  
2= there are rule included 3-5 domain  
3= there are rule included 6 domain  
The availability of tools, person, warning and punishment  
1= no rule assembling, tools, person, warning and punishment  
2= rule assembling not effectively, tools and person available but no action, warning dan punishment available  
3= rule assembling effectively, tools, person, action, warning dan punishment available  |
| 3  | Decision rule mechanism                                                   | 1= no decision rule mechanism  
2= mechanism available but not effectively  
3= mechanism available and effective  |
| 4  | Fisheries management plan                                                 | 1= no fisheries management plan  
2= fisheries management plan available but not fully apply  
3= fisheries management plan available and fully apply  |
| 5  | Fisheries management policy and institutional synergetic level             | 1= conflict between institutional and contradiction policy  
2= inter-institutional communication not effective and not support policy  
3= well inter-institutional synergy and support policy  |
2.3.2. Indicators assessment

An indicators assessment is done using a multi criteria analysis (MCA) with composite index development using a likers scale score (based 1,2, and 3). There are indicator assessment step: (1) determine criteria; (2) score by criteria; (3) determine value; (4) index develop for each indicator.

2.3.3. Status classification

The previously acquired composite value is visualized with the flag model, can be seen at table 2. It could describe the status the status or conditions of fisheries management undertaken by Panglima Laot in ‘bad’, ‘not good’, moderate’, ‘good’ and ‘excellent’ category.

| Composite value | Flag model | Description |
|-----------------|------------|-------------|
| 1-20            |            | Bad         |
| 21-40           |            | Not Good    |
| 41-60           |            | Moderate    |
| 61-80           |            | Good        |
| 81-100          |            | Excellent   |

3. Results and Discussion

3.1. Result

The result of composite analysis showed Pasie Tibang Panglima Laot included in good category with composite value 66.6. Each score of all indicators is 2 (moderate). Kuala Aceh Panglima Laot is classified good category with the composite value 62.5. All of indicators have score 2 (moderate) other than adherence level to principles of responsible fisheries with score 1 (poor) because increased infraction in last five years. In other hand, composite value of Kuala Cangkoi Panglima Laot is 72,6 and included good category. The score obtained by each indicator is 2 (moderate) while the stakeholders capacity indicator has 3 (good) score. It is due to increased stakeholders capacity and properly incorporated.

Table 3. The results of assessment on Panglima Laot role

| Indicators* | Result | Score | Value | Total |
|-------------|--------|-------|-------|-------|
| **a. Pasie Tibang Panglima Laot** | | | | |
| 1 | 3 violation | 2 | 25 | 5.000 |
| 2 | There are rule but not effectively | 2 | 26 | 5.200 |
| 3 | Decision rules mechanism available but not fully apply | 2 | 18 | 3.600 |
| 4 | Fisheries management plan available but not fully apply | 2 | 15 | 3.000 |
| 5 | inter-institutional communication not effective | 2 | 11 | 2.200 |
| 6 | Increasing but not functional | 2 | 5 | 1.000 |
| | Composite value | | | 66.6 |
| **b. Kuala Aceh Panglima Laot** | | | | |
| 1 | 13 violation | 1.5 | 25 | 3.750 |
| 2 | There are rule but not effectively | 2 | 26 | 5.200 |
| 3 | Decision rules mechanism available but not fully apply | 2 | 18 | 3.600 |
| 4 | Fisheries management plan available but not fully apply | 2 | 15 | 3.000 |
| Indicators* | Result                                      | Score | Value | Total  |
|------------|---------------------------------------------|-------|-------|--------|
| 5          | inter-institutional communication not effective | 2     | 11    | 2.200  |
| 6          | Increasing but not functional                | 2     | 5     | 1.000  |
|            | **Composite value**                          |       |       | **62.5**|

**c. Kuala Cangkoi Panglima Laot**

|   |                                                   | Score | Value | Total  |
|---|---------------------------------------------------|-------|-------|--------|
| 1 | 6 violation                                       | 2     | 25    | 5.000  |
| 2 | There are rule but not effectively                | 2,5   | 26    | 6.500  |
| 3 | Decision rules mechanism available but not fully apply | 2     | 18    | 3.600  |
| 4 | Fisheries management plan available but not fully apply | 2     | 15    | 3.000  |
| 5 | inter-institutional communication not effective   | 2     | 11    | 2.200  |
| 6 | available and functional                          | 3     | 5     | 1.500  |
|   | **Composite value**                               |       |       | **72.6**|

1 Pursuance to responsibility in formal or non-formal fisheries management plan
2 Completeness of the rules on fisheries management
3 Decision rule mechanism
4 Fishery management plan
5 Fisheries management policy and institutional synergetic level
6 Stakeholders capacity

3.2. Discussion

Panglima Laot’s job is to supervise and maintain the traditional laws of the sea, to organize the ordinances of fishing, to resolve disputes in connection with marine fishing, and to hold sea customs ceremonies handling accidents at sea, to cooperate with the other social issues [12]. Based on data, the level of adherence to the principle of responsible fisheries is measured by the number of formal and non-formal violation in Pasie Tibang is 3 act, in Kuala Aceh 13 act and Kuala Cangkoi 6 act over the past 5 years. The violations were illegal fishing, trade permits, and customary violation. So far the central government and Panglima Laot have established polices on aspects of fisheries management, but implementation in the fields has not been effective, since the regulation is still public and is not fully implemented. It is also due to a lack of awareness to managed together, which leads to an activity in infraction on that police.

In the other hand, Panglima laut has a different custom rules. Every panglima laot made a policy based on deliberate decisions with fishermen and customary advisers. The decision-making mechanism in Pasie Tibang Panglima Laot still implicated local fishermen. This is because the majority of fisherman are small scale, so it rarely involves local government in police-making. In different conditions, the decision-making mechanisms of Kuala Aceh Panglima Laot invariably involve associated authorities such as Marine and Fishing Service, Hambormaster, and Marine Resources and Fisheries Control Stations. In Kuala Aceh Panglima Laot territory have an Ocean Fishing Port. It is based in principle under local government supervisor, so decision-making mechanism need collaboration of many institutions. Kuala Cangkoi Panglima Laot, decision-making mechanism also involve local government and fishermen. Interagency and inter-policy involvement serves to prevent conflict of interest and policy impact. Decision making should involve multiple parties to make the parties feel responsible for the decision.

The Panglima Laot territory has several FMPs which has been established by the government such as FMP of WPP 572 at Ministrial Decree No.76/2016 and FMP of TCT at Ministrial Regulation No.107/2015. Based on interview, FMP still not fully executed because many fishermen still did not understand. The understanding can be changed through good synergy between stakeholders. The higher synergy will be raising interest capacity also becomes an important point in supporting implementation of management. Thus far, stakeholders increase their capacity through training, workshops, and other support activities.

Research shows Panglima Laot’ role in Banda Aceh city in a good category. Similar research also suggests that Panglima Laot in Simeulue played a good role [13]. These conditions provide a good
opportunity to ensure sustainable fisheries resources so that a prosperous civil-society economy can also prevail. While that is a good category, to keep those fisheries managed, a well-aimed strategy would be needed. The action of fisheries management must be taken precautionary approach to be sustainable [14].

The suggested strategy is law enforcement in its full justice so that transgressions can be minimized. Stakeholders’ compliance can be increased through law enforcement, providing awards and penalties for doers who obey the rules and who violate. Other options that governments can do in their law enforcement efforts for monitoring and evaluation, communication and coordination, rewards staff, control systems, duties and authority, and planning direction [15]. The second strategy is to provide an understanding of the rules that governments has established to the people of traditional laws so that the rules can be fully implemented for their purpose. The third strategy is to increase capacity of institution and synergy between institutions and polices. In the absences of increased institutional capacity, society could not sustain its collective and economic performance. The increase also needs to be used to create people’s support, ability and social, economic and political self reliance [16]. Increasing synergy is necessary in order to prevent the overlap of stakeholder’s police. Both coordination and combination between the central and local government is also important because it can help to make sustainable management [3, 17]. Based on that strategy, it is hoped to improve Panglima Laot’s role in fisheries management particularly in Banda Aceh city

4. Conclusion
The role of Panglima Laot in Banda Aceh Aceh for managing fisheries based on ecosystem approach in good categories. The strategy that needs to be done is establishment of law enforcement, the effort to bring policy understanding into all stakeholders and increase synergy between institutions and policies.

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