Involvement and roles of stakeholders in Mahakam delta management to support mitigation and adaptation effort of climate change in East Kalimantan

T Wahyuni, Karmilasanti, S Y Indriyanti and Abdurachman

Centre for Dipterocarps Forest EcosystemsResearch and Development
Jalan A.W. Syahrani, Samarinda 75124, East Kalimantan. Phone.+62-0541-206364

*Corresponding author e-mail: yunitien@hotmail.com

Abstract. East Kalimantan provincial government supports Nationally Determined Contribution (NDC) commitment by developing Green Growth Compact (GGC) initiative. This initiative emphasizes participatory and collaborative efforts among stakeholders at different levels and roles in forest management. One of the prototype initiatives currently under development is the management of mangrove forest areas in Mahakam delta. This paper aims to provide information on the process of involving the parties by identifying more details about the role, importance and influence of stakeholders on the Mahakam delta area in order to support the initiative. Data collected through interviews, observation, documents study and using stakeholder analysis. The analysis showed that stakeholders concerned have a direct and influential role can be broadly divided into three main sub-groups: those who provide services needed for the sustainable use and management of these resources (mainly government, NGOs); KPHP (Production Forest Management Unit/FMU) Mahakam delta, Mangrove Lestari Foundation, and Planete Urgence/Bioma Foundation; those who are directly involved in production and trade of oil and gas: Pertamina Hulu Mahakam Company, Pertaminan Hulu Sanga-Sanga Company and Chevron Indonesia; those who are directly involved in production and trade of marine products: Conventional Shrimp Farmers Group and Sustainable Shrimp Farmers Group. Also, there are several parties or stakeholders are classified in the secondary and key stakeholders. This paper supports and provides information and inputs for such initiatives and better management efforts of FMU Mahakam delta.

Keywords: Prototype initiatives, stakeholders’ partnerships, forest area governance, production forest management unit (FMU) Mahakam delta.

1. Introduction

Indonesia has taken significant steps and actions to reduce emissions from the land-based sector. These steps and actions are by adopting a moratorium on primary forest logging and prohibiting the conversion of the remaining forests with reducing deforestation and forest degradation, restoration of ecosystem functions, as well as sustainable forest management including social forestry through the active participation of the private sector, small and medium enterprises, civil society organizations, local communities and the most vulnerable groups of people, especially indigenous peoples, and women - both in the planning and implementation stages[1,2].

The Indonesian government's Nationally Determined Contribution (NDC) commitment towards a future that is low in emissions and climate resilience requires real support and action by the local
government and all stakeholders at various levels, starting from the provincial level to the village[3]. The provincial government of East Kalimantan is the 4 (four) major national emitting region and supports the NDC’s commitment by developing a Green Growth Compact (GGC) strategy. As part of the Agreement, East Kalimantan also developed some prototype or model initiatives. These initiatives emphasize participatory and collaborative efforts among stakeholders at various levels and roles in forest management so that sustainable development activities can contribute to a wider scale. One of the prototype initiatives currently being developed is the management of mangrove forest areas in the Mahakam delta which is a strategic area in East Kalimantan due to its physical conditions and problems [4].

The mangrove forest area in Mahakam delta, in recent years has experienced various pressures, in addition to increasing population growth around mangrove forests and also because of the development that utilizes forest areas, resulting in changes in mangrove forests and even the possibility of loss of ecosystems [4]. The rapid use of mangrove forest area has shown a serious deterioration in environmental quality, with the high rate of conversion of mangrove land into land for other uses, especially shrimp ponds. The world economic crisis in 1997, led to an increase in the price of shrimp which encouraged people to continue to open mangrove forests for aquaculture activities. From the results of the latest research [5,6], the clearing of mangrove forest land cover for ponds has reached 54% to 70% of the land area of the Mahakam Delta or an area cover of about 60,000 to 63,000 hectares.

Mangrove forest area in the Mahakam delta is an area that is currently managed by the Production Forest Management Unit (PFMU) Mahakam delta[7]. The implementation of partnerships within the framework of FMU at the provincial or district level requires the identification of the parties concerned in more detail and becomes important in order to put the position and role of each party more fully in the framework of implementing the partnership. Through the identification of the parties will be reflected the interests of each party that has a positive or negative impact on the management of the area and map the parties based on their interests (interest), as well as outlining their positions and roles. This paper is expected to be a consideration for FMU Mahakam delta in managing forest areas and their natural resources so that the objectives to be achieved can be realized.

2. Study Sites and Methods

2.1. Study sites

This research was conducted in the Mahakam delta area in Kutai Kartanegara District, East Kalimantan Province. The delta area covers water and land areas with an area of approximately 150,000 ha, meanwhile the Forest Management Unit (FMU) Mahakam delta area covers approximately 110,153 ha. It is located between 117°14’38,2” – 117°39‘45,7” east longitude and 0°20’10,2” – 0°55’43,6” south latitude. Administratively, Mahakam delta area covers three sub-districts, namely Muara Jawa, Anggana and Muara Badak[7].

![Figure 1. The location of research area in Mahakam delta, East Kalimantan, Indonesia.](image-url)
2.2. Research Methods

Research data and information consists of primary and secondary data. Primary data collected based on perception of the respondents. Primary data collection techniques are carried out through: (1) Interviews are conducted in a semi-structured manner and are guided by a list of topics that have been prepared previously. The determination of the stakeholders as respondents was done through purposive and snowball sampling methods. Respondents selected with consideration that they have experience and knowledge in accordance with the research focus and (2) Field observation, intended to know and study in depth and at the same time verify or cross check about issues or problems that are the focus of the research.

The study of secondary documents are supporting data in the discussion of this paper is carried out through the collection of studies of documents and literature relating to the roles and interests of stakeholders and the governance of the FMU Mahakam delta.

2.3. Analysis

The analysis used is a qualitative stakeholder analysis that is applied to reveal the interests, roles and influence of stakeholders in the management of forest and land areas in Mahakam delta[8]. Stakeholder analysis is conducted by: (1) identifying stakeholders, (2) classifying and categorizing stakeholders, and (3) describing the relationships between stakeholders. Stakeholder analysis is carried out by interpreting the stakeholder interest and influence matrix. The preparation of the matrix is based on the respondent’s question description stated in the scoring and is based on the questions used in measuring the level of importance, role and influence of stakeholders. The result is a matrix consisting of four quadrants, as subjects, key players, crowd, and context setters. Subjects have high importance but their influence is low. Key players are active stakeholders because they have high interests and influence on the development of a project. Context setter has a high influence but little interest so that it can be a significant risk to be monitored. Crowd is a stakeholder who has little interest and influence on the desired results and this is a consideration to include it in decision making[9,10].

3. Results and Discussion

3.1 Mahakam delta overview

Historically, the function of the forest area in Mahakam delta was originally a production forest that could be converted based on some Indonesian regulations (Ministry of Agriculture and Ministry of Forestry). The mangrove forest area in Mahakam delta is important because of its vast expanse with various potentials, namely fisheries, oil and gas content, marine resources and tourism as well as non-timber forest products (NTFPs). The delta is a delta region consisting of small and large islands with a total of 92 islands that formed due to sediment at the mouth of the Mahakam river with the Makassar strait. Massive conversion of mangrove forests into pond areas has also triggered conflicts over the use of resources and land[8,11,12]. The land use conflict between aquaculture pond and the oil and gas industry has increased in line with the widespread conversion of mangroves[13]. Physical changes in the Mahakam delta region have threatened the balance of the mangrove forest area and the socio-economic sustainability of aquaculture. The exploitation of oil and natural gas as one of the business activities of national vital objects, should be accompanied by adequate arrangements in terms of utilization. This is necessary to provide certainty for business players in the category of national vital objects while ensuring the guarantee of sustainable environmental management with a balance of distribution of natural resource.

3.2. Identification of interests and stakeholder roles

The results of the study identified the stakeholders involved in the development of governance of the use of forest and land areas in FMU Mahakam delta divided into: (1) central government, (2) regional government, (3) private groups, (4) academic groups, (5) community groups and (6) other groups. Table 1 presents stakeholders in the six (6) groups in the management of FMU Mahakam delta.
Table 1. Stakeholders of governance in FMU Mahakam delta.

| Groups            | Institutions                                                   | Interest and roles                                                                                                                                 |
|-------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Central government| Ministry of Environment and Forestry (MoEF) with institutions  | 1. Conducting inauguration, appointment, boundary arrangement and mapping of forest areas                                                        |
|                   | as follows:                                                    | 2. Carry out conservation activities to support ecosystem conservation and biodiversity in the East Kalimantan                                    |
|                   | 1. Center of Forest Zone Stabilization Unit (BPKH) Region IV   | 3. Conduct mapping, stewardship and technical consideration of forest areas at the district level                                                   |
|                   | Samarinda;                                                     | 4. Facilitating the operation of the FMU                                                                                                           |
|                   | 2. Nature Conservation Agency (NCA) Kaltim;                    | 5. Manage and maintain its function and conduct research activities in the area of Education and Research Forest (HPP) Barat Muara Kaeli       |
|                   | 3. Regional Technical Implementation Unit Forest Planology East | 6. Manage all activities in the field of coastal engineering, such as infrastructure development, prevention of coastal erosion and others        |
|                   | Kalimantan Provincial Forestry Service                         | 7. Give suggestion to the Minister of Energy and Mineral Resources at his discretion in terms of preparing and offering working areas and carrying out |
|                   | 4. Forest Production Management Center (BPHP) Region XI        | the signing of a Cooperation Contract                                                                                                             |
|                   | Samarinda;                                                     | 8. Conducting inauguration, appointment, boundary arrangement and mapping of forest areas                                                        |
|                   | 5. Dipterocarp Research and Development Institute (B2P2EHD);   | 9. Carry out conservation activities to support ecosystem conservation and biodiversity in the East Kalimantan                                    |
|                   | Ministry of Public Work;                                       | 10. Conduct mapping, stewardship and technical consideration of forest areas at the district level                                                   |
|                   | 6. Center of River Region Kalimantan III;                      | 11. Facilitating the operation of the FMU                                                                                                           |
|                   | Ministry of Energy and Mineral Resources with institution as   | 12. Manage and maintain its function and conduct research activities in the area of Education and Research Forest (HPP) Barat Muara Kaeli       |
|                   | follow:                                                        | 13. Manage all activities in the field of coastal engineering, such as infrastructure development, prevention of coastal erosion and others        |
|                   | 7. Special Task Force for Upstream Oil and Gas Business        | 14. Give suggestion to the Minister of Energy and Mineral Resources at his discretion in terms of preparing and offering working areas and carrying out |
|                   | Activities (SKK Migas)                                         | the signing of a Cooperation Contract                                                                                                             |
| Groups          | Institutions                                                                 | Interest and roles                                                                 |
|-----------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Local government| 1. FMU Delta Mahakam;                                                        | 1. managing and encouraging the condition of the area and the living natural resources and its ecosystem |
|                 | 2. Government of Kutai Kartanegara Regency; Ministry of Home Affairs          | 2. Planning and developing the district area                                        |
|                 | 3. Government of Muara Jawa Anggana and Muara Badak sub-district; Government of Kutai; | 3. Carry out the administrative tasks of the sub-district area and administratively, get benefits from activities in the sub-district area |
|                 | 4. Village government in 3 sub-districts                                        | 4. Perform administrative tasks in the scope of the village                        |
|                 | 5. Marine Affair and Fisheries Agency of Kutai Kartanegara Regency             | 5. Providing programs that are directly beneficial to the community, especially for improving their welfare, both direct assistance of facilities and infrastructure for fishing and aquaculture and other facilities needed by the community |
|                 | 6. Counseling center of Agriculture, Fisheries and Forestry (BP3K) Kutai Kartanegara Regency; | 6. Implementing the preparation and implementation of regional policies in the field of agricultural, fishery and forestry extension at the sub-district level |
|                 | 7. Kutai Kartanegara District Forestry Service;                                | 7. Regulate forestry development at the provincial and district levels              |
|                 | 8. Provincial and District Mining service                                       | 8. Regulate mining activities at the provincial and district levels                 |
|                 | 9. Mangrove Information Center (PIM) by East Kalimantan Provincial Living Environment service | 9-10. Conduct monitoring activities and reporting environmental conditions at Mahakam Delta |
|                 | 10. Environmental Impact Management Agency Kutai Kartanegara Regency           |                                                                                                                                              |
| Private sector  | 1. PT. Syam Surya Mandiri (PT.SSM)                                            | 1. Get economic benefits from shrimp freezing for export purposes                  |
|                 | 2. PT. TOTAL E&P Indonesie (TEPI), since 2018 became (PT. Pertamina Hulu Mahakam); | 2/3/4/5 Get economic benefits from oil and mining activities natural gas           |
|                 | 3. PT. VICO, since 2018 became (PT. Pertamina Hulu Sanga-Sanga);              | 6. Get economic benefits from oil palm plantation activities.                      |
|                 | 4. PT. Chevron;                                                                | 7-9. Get economic benefits from coal mining activities                             |
|                 | 5. PT. PLN WKTKU                                                              |                                                                                                                                              |
|                 | 6. PT. Tritunggal Sentra Buana (PT.TSB)                                        |                                                                                                                                              |
|                 | 7. PT. Mitra Bangga Utam (PT.MBU);                                            |                                                                                                                                              |
|                 | 8. PT. Sinar Kumala Naga (SKN)                                                 |                                                                                                                                              |
|                 | 9. PT. Ar; PT. MBI; PT.RKBM; PT.SMS; PT.Tm                                    |                                                                                                                                              |
| Academicians    | Mulawarman University (UNMUL)                                                  | Conduct research activities and community services that support the management of the Mahakam Delta |
| Local people    | The community around FMU the Mahakam delta in 3 sub-districts of Muara Jawa, Muara Badak and Anggana | Have an interest in being involved in government and private projects |
|                 |                                                                               | Requires natural resources to benefit economically, maintain a friendly natural environment, spatial planning and ensure the sustainability of forest resources |
Table 1. Stakeholders of governance in FMU Mahakam delta (continued)

| Groups                | Institutions                                                                 | Interest and roles                                                                 |
|-----------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Other groups          | 1. Cultivation fishermen groups, Fishermen Catch and Processing Sea Products | 1. Obtain economic benefits from aquaculture, marine and marine products and ponds   |
|                       | 2. Anggana Farmers Association;                                              | 2/3. Provide guidance and coaching in shrimp farming and environmental balance.       |
|                       | 3. Contact Forum (Fishermen group, pond and Parakkang)                       | 4/5. Supports environmental projects oriented in recovery efforts and preservation of forest ecosystems |
|                       | 4. Mangrove Lestari Foundation-Delta Mahakam                                  | mangrove continuously and balanced                                                 |
|                       | 5. Planete Urgence from France partnering with Bioma Foundation               | 6. Help develop Green Development initiatives and develop prototype initiatives in the Mahakam Delta region |
|                       | 6. TNC (The Nature Conservancy)                                               | 7. Coordinate and monitor the commitment of the parties in the management of the Mahakam Delta |
|                       | 7. Regional Council on Climate Change East Kalimantan                          | 8. Helps to disseminate information related to Mahakam delta management activities   |
|                       | 8. Media                                                                      |                                                                                     |

The stakeholders in Mahakam delta who directly have a broad role and influence can be divided into three main sub-groups, namely those who provide services needed for the utilization and management of resources, namely (1) Government and NGOs; those who are directly involved in the production and trade of oil and gas, namely (2) oil and gas companies; those who are directly involved in the production, trade and processing of marine products, namely (3) groups of fishermen, fish farmers and processors who are members of the Conventional Shrimp Farmers Group and Sustainable Shrimp Farmers Group.

The position of the FMU which is the spearhead of forest management at the site level makes it possible to build intensive cooperation with various parties and the local community. The existence of FMU as a government representative at the site level is expected to minimize information mismatch, both resources and community behaviour, through geographical, social and cultural closeness. With its human resource potential, it will also be able to utilize its expertise in the process of building partnerships and partnerships with various parties and also in the community assistance efforts.

3.3. Mapping of stakeholders at FMU Mahakam delta

The stakeholders in the management of FMU Mahakam delta have diverse interests, roles and power, some are positive and are in line with the management objectives. Some are negative and are contrary to the objectives to be achieved[14]. The interests and power of stakeholders in the management of various FMU Mahakam delta’s need to be clearly mapped. Stakeholder mapping will help managers in engaging these stakeholders in achieving goals.

The dimensions of power and interests as significant and suggests the use of a 'Power-Interest Grid' to help balance the need to take broad definitions from stakeholders while still producing manageable figure[15]. The results of the involving a number of stakeholders are known based on power and interest, the stakeholders in managing FMU Mahakam delta can be categorized into four namely subjects, context setters, key players and crowds with details as follows [8]:

1. Stakeholders with a high level of interest but have a low power meaning as a subject. Stakeholders can make agreements by forming alliances with other stakeholders.
2. Stakeholders with a high level of interest and power are classified as Key Players. These stakeholders must be more actively involved, including in evaluating new strategies.
3. Stakeholders with low interest and power levels are classified as Crowd. A little consideration is needed to involve these stakeholders further because their interests and influence usually change over time. These stakeholders must be monitored and maintained in good communication.
4. Stakeholders with low interest but high power are classified as context setters. These stakeholders can pose risks so that its existence needs to be monitored and managed properly. Good relations with these stakeholders continue to be fostered. For this reason, all the information needed must still be provided so that they can continue to play an active role in achieving the goals. By knowing stakeholder mapping based on interest, its interests and roles will be able to explore the potential and ability of various parties to help overcome various problems and challenges in managing the area [16]. Map of stakeholders in managing FMU Mahakam delta is presented in Figure 2.

![Figure 2: Mapping of Stakeholders based on their power and interests (interest) in the management of FMU Mahakam delta.](image)

3.4. Building communication and consultation processes with stakeholders

In the stakeholder engagement process requires a process of communication, consultation, negotiation and learning processes that are sometimes very complex. It is important to explain that the partnership of the parties is not a workshop that occurs only once or in a harmonious meeting of principals on a fundamental basis, but as a structured process of agreements involving various activities and events, often carried out over a long-time frame.

The process of creating awareness of the management of the Mahakam delta region has begun. FMU has conducted a number of dialogues with other stakeholders, including from central and local government agencies, the private sector, academics, communities, NGOs and the media. Most stakeholders speak to support initiatives to engage in the development of environmentally friendly ponds by paying attention to the environment by conserving mangrove forests and natural resources of
DM coastal areas. Landscape-scale approaches and ecosystem-based management with the role of local governments are important in ensuring greater and sustainable benefits from these initiatives to support climate change mitigation and adaptation efforts. The collective design of land use schemes, land use regulations and land access regulations will be a 'Grand Design' that is mutually agreed upon.

4. Conclusion
The emergence of problems due to management of FMU Mahakam delta that has not been integrated. The concept of coastal area development is carried out individually by various interested parties so that conflicts of interest often occur. A comprehensive solution involving various parties related to decision making, legal, social, cultural and economic needs to be done. In response to these challenges, the parties can hold declarations and joint actions in formulating more detailed agreements on suitable and targeted partnership programs to support the achievement of sustainable FMU Mahakam delta management goals.

Acknowledgement
We thank FMU Mahakam delta, the Regional Council on Climate Change (DDPI) and The Nature Conservancy (TNC). We also thank the stakeholders who support the Green Development Agreement (GGC) in East Kalimantan.

References
[1] Murdiyarso D, Dewi S, Lawrence D and Seymour F 2011 Indonesia’s forest moratorium A stepping stone to better forest governance? (Bogor, Indonesia : Working Paper 76. CIFOR)
[2] Santamarta J C, Hernández-Gutiérrez L E, Ritter A, Neris J and Arraiza M P 2015 Sciences.191 264–269
[3] UNFCCC 2016 First Nationally Determined Contribution Republic Of Indonesia
[4] Sidik A 2010 The changes of mangrove ecosystem in Mahakam Delta, Indonesia: A complex social-environmental pattern of linkages in resources utilization Paper presented at The South China Sea Conference 2008. The South China Sea: Sustaining Ocean Productivities, Maritime Communities and the Climate. Kuantan, Malaysia, 25-29 November 2008. And re-presented at the Rescopar Scientific Meeting in Mulawarman University, Samarinda, Indonesia, 25-26 1–22
[5] Nisaa R M and Khakhim N 2017 Pemetaan Kerusakan Mangrove Menggunakan Citra Landsat Oli di Delta Mahakam, Kalimatan Timur Prosiding Seminar Nasional Geografi UMS Pengelolaan Sumberdaya Wilayah Berkelanjutan pp67–77
[6] Fawzi N I and Husna V N 2021 Aquaculture Development Monitoring on Mangrove Forest in Mahakam Delta, East Kalimantan IOP Conference Series: Earth and Environmental Science 750. 1–9
[7] Sekilas KPHP Delta Mahakam 2016 Dokumen Rencana Pengelolaan Kesatuan Pengelolaan Hutan Produksi (KPHP) Delta Mahakam Kabupaten Kutai Kartanegara Tahun 2016 - 2025. Laporan KPHP Delta Mahakam
[8] Persoon G A and Simarmata R 2014 J. of Marine and Island Cultures. 3 43–53
[9] Reed M S, Graves A, Dandy N, Posthumus H, Hubacek K, Morris J, Prell C, Quinn C H and Stringer L C 2009 J. Environmental. Management.90 1933–1949
[10] Thompson R 2011 Stakeholder Analysis Winning support for your projects Mind Tools
[11] Safitri M A 2012 Migration and Property in Mangrove Forest: The formation and adaptation of property arrangements of the Buginese in an open access delta in Mahakam, East Kalimantan, Indonesia Interview with former head of Provincial Fishery Services in Samarinda
[12] Simarmata R 2012 Indonesian Law and Reality in the Delta A Socio-Legal Inquiry into Laws, Local Bureaucrats and Natural Resources Management in the Mahakam Delta, East Kalimantan (Leiden University Press)
[13] Asihing K, Nugroho B, Kusmana C, Darusman D, Nurrochmat D, Krott M and Schusser C 2014
Int. J. of Marine Science. 4(16) 150–159
[14] Ackermann F and Eden C 2011 Strategic Management of Stakeholders: Theory and Practice Long Range Planning. 44 179–196
[15] Bahruzin B, Hidayat A and Kumala Putri E I 2014 J. of Agriculture, Resource, and, EnvironmentalEconomics. 1 1–11
[16] Wahyuni T, Noor’an R F, Wahyudi A, Rojikin A, Effendi H and Yuliana H 2020 Safeguards Sosial Dan Lingkungan Tambak Ramah Lingkungan Untuk Penurunan Emisi Di Delta Mahakam Kutai Kartanegara (Bogor : IPB Press)