Stakeholders mapping of peatlands restoration in Jambi: A case of Tanjung Jabung Barat Regency

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Abstract. Peatland restoration needs collaboration among stakeholders. This research aims to study the role of stakeholders who concern on peatland restoration and to map their potential roles to succeed the restoration in Jambi Province. We used triangulation method to collect data and information i.e. in-depth interviews, field observation and Focus Group Discussion. The data were analysed by using descriptive analysis. It was found that in peatland restoration, stakeholders could be mapped into four quadrants “Key Players”, stakeholders with high influence and interest (Environment Office of Jambi Province and Tanjabar Regency, Forestry Office of Jambi Province, Estate Crop Office of Jambi Province, Tanjabar FMU, and NGOs); “Subject”, stakeholders with low influence but high interest (Watershed Management Unit of Batanghari River, Development Planning Agency of Jambi Province, Jambi University, Regional Secretary of Tanjabar Regency, BPHP, Agricultural Extension Institutions, NGOs (Warsi) and Makmur Jaya Joint Farmer Group); “Crowd”, stakeholders having both low influence and interest (The Food Crops Office both at Jambi Province and Tanjabar Regency, Conservation and Natural Reserve Unit, Development Planning Agency of Tanjabar Regency, Public Works and Public Housing Service of Jambi province Agricultural Crops and Horticulture district office and 2 farmer groups. To bridge the differences among stakeholders, strong coordination and cross-sector collaborative management should accommodate all interest and expectation of stakeholders.

1. Introduction

In Sumatra and Kalimantan, peatlands cover approximately 15 % and 11% of the total land area respectively, resulting in the total of 13.43 M ha of peat [1]. To date, 7% of pristine peat swamp forest remains in Sumatra and Kalimantan. Of the remaining peatlands in Sumatra and Kalimantan, about half is used for smallholder agriculture and industrial plantations [2]. Oil palm covers 64% of the industrial plantation area while the remainder is pulpwod plantations (Acacia) covering the rest of the area managed by industry [3]. During 2007 – 2015, the loss of peat forests and its ecosystem services in Sumatera and Kalimantan had reached a critical rate i.e. 2.6% per year [2]. Several activities causing of loss and damage of peat swamp forest were: 1) expansion of food crop agriculture, 2) expansion of oil palm plantations and 3) development of plantation forest for pulp and paper, especially with the species of *Acacia crassicaarpa*. This condition was exacerbated by fire and illegal logging from the remaining peat swamp forest [3–5]. To prevent from further damage, Indonesia has made a commitment through the implementation of a moratorium policy started in 2011 to prevent new concessions from converting peatlands, in particular, into plantations and logging areas [6]. In 2016 the moratorium was revised followed with the establishment of a total ban on peatlands clearing, even in existing concessions, and prohibiting the use of fire for land clearing. This policy has significantly prevent the development or
expansion of large-scale agricultural activities on peatlands, however the cultivation of oil palm and industrial plants for pulp and paper on peatlands cause a wide range of negative impacts [7].

Peat swamp forest is a unique and fragile ecosystem. Due to its typology and irreplaceable role and function, forest conservation, sustainable management and restoration of peatlands are indispensable for saving the remaining peat forests in Indonesia. This hard work requires synergistic and harmonious collaboration among related stakeholders. In addition, all peatland restoration and development projects need active participation of related stakeholders to ensure the success in its implementation [8].

Subsequently, Bennet [9] found that an integrated cross-sector approach with transparent dialogue between stakeholders to negotiate complex reciprocal exchanges from the environmental and economic imperatives should be the first priority for the success of its implementation. If it is not properly managed, it will cause damage to the ecosystem which is difficult to recover.

However, coordination and collaboration in managing peat forests are challenging. Harmonious coordination needs readiness of stakeholders involved to share roles and responsibilities and ensures that every activity and decision related to peat swamp forest ecosystems considers social, economic, and ecological rationality proportionally and guarantees the long-term sustainability of the ecosystem.

For a long time, peatlands management in Indonesia involves many concerning parties that may have different concept and mission for its implementation. This implies that its management always collides with the scope of authority of a sector. For example, the Ministry of Environment and Forestry will take care of peat ecosystems that are in forest areas. While the Ministry of Agriculture will focus on the management of peat ecosystems that are in Non-Forest Zone area (Area Penggunaan Lain/APL), as well as other ministries (sectors) will take care of peat ecosystems in their respective areas.

Due to its management activities including peatlands restoration and rehabilitation which are still sectoral, in many cases its implementation is conflicting or overlapping. Therefore, at this point, multi-sector regulation of peatlands restoration and rehabilitation is very much needed. Bureaucracy that tends to be sectoral needs to be clarified and reformulated, hence the protection and management of peatlands also becomes clear on its position on the development agenda. Regulations related to peatlands will provide legal certainty and strengthen the foundation for protection. Furthermore, all parties must recognize and respect the rights of all stakeholders. An understanding of the rights of each stakeholder is a fundamental part of the success of program activities [10].

Peatland restoration in Jambi Province were carried out by considering multiple aspects including condition of the burned peat ecosystem, hydrological conditions, rehabilitation techniques, species selection and social aspects of the community. Furthermore, it also considers the concept of "the right trees on the right place" and the impacts and benefits obtained by surrounding community from restoration activities and/or rehabilitation [11]. Peatland restoration and rehabilitation techniques have long been learned by Forest and Environment Research Development and Innovation Agency (FOERDIA). The role of all stakeholders related to peatland sustainability and at the same time providing alternative of economically beneficial activities to surrounding communities are very urgent.

To understand the role of each stakeholder regarding their power and interest in peatland restoration in Jambi Province, integrated research has been conducted to study the complexity and challenges in its implementation.

This research aims to study the role of stakeholders who concern with peatland restoration and to map their potential roles to succeed restoration with a case in Tanjung Jabung Barat Regency, Jambi Province.

2. Materials and methods

2.1. Data collection and analysis
This research used a qualitative method. Data and information were collected in various ways, namely, in-depth interviews involving 26 stakeholders selected by using snow-ball method, continued by Focus Group Discussion (FGD) to get a comprehensive picture of the role and responsibility of each
stakeholder. We use the concept of stakeholders from Hermans [12] and Maryono et al. [13] who defined stakeholders both as individuals and groups/institutions having interests and ability to manage a resource and make decisions and act in a coordinated manner, or in other words stakeholder is an "action-unit". Hence in this research, stakeholders mean all parties, including government agencies related to certain problems or plans that can influence and/or be influenced by the achievement of certain goals.

The data were analyzed by using descriptive analysis. Variables of influences and interests were used for mapping the position of stakeholders in restoration and rehabilitation efforts [14,15]. Variable of interest is determined by the following aspects: (1) the perception of the parties; (2) the motivations of the parties; (3) the needs of the parties; (4) forms of support from the parties; and (5) the benefits expected by the parties in utilizing peat. Variable of influences is assessed based on: (1) the level of involvement of the parties; (2) the role of the parties in decision making; (3) relations with other parties; (4) human resource support; and (5) financial support for peat restoration. By knowing the perceptions and positions of each stakeholder, it can be identified which stakeholders have the capacity and are willing to facilitate and to involve in the implementation of the peatland restoration program in Jambi province and which are not.

2.2. Research locations
The study was conducted in Tanjung Jabung Barat Regency (or abbreviated as Tanjabar) of Jambi Province. Jambi province covers an area of 0.6 million ha of peatlands, and about 160,225 ha of peatland is in Tanjung Jabung Barat Regency [16]. Tanjabar Regency is located on the east coast of Jambi Province, with an area of 5009.82 km². It is located between 0°53’- 01°41’ South latitude and 103°23’ - 104°21’ East Longitude. Total area of peatland in Tanjabar covers nine sub-districts namely Pengabuan, Senyerang, Bram Itam, Betara, Kuala Betara, Batang Asam, Tebing Tinggi, Seberang Kota, and Tungkal Ilir. Senyerang and Pengabuan are two sub-districts having the largest peatlands in Tanjabar [20]. The restoration of peatland in the study area focused on Bram Itam Peatland forest under Tanjung Jabung Barat Forest Management Unit/FMU (Figure 1).

Figure 1. Map of peatland forest in Tanjung Jabung Barat FMU, Jambi Province [17].
Peat Forest Reserve (Hutan Lindung Gambut, HLG) Bram Itam is surrounded by community settlements from three sub districts namely Bram Itam, Betara and Pengabuan and it is not a fire-prone area. Of the total area of Bram Itam peatland forest (15,050 ha), 30% of it has been encroached by surrounding communities for agricultural land and plantations covering of ± 5,000 ha. Consequently, trenches have been made as drainage canals to regulate water management as well as means of transportation for hauling agricultural and plantation products. Draining the peatlands is needed due to selection of non-native to peat species resulting the damage of peatlands [18,19].

3. Results and discussion

3.1. Biophysical conditions

The peat forest reserve of Bram Itam in Tanjabar Regency has peat depth ranges from 50 cm to <200 cm [21]. Land uses of the regency consisted of peat-swamp forest, agroforest of coffee (Coffea liberica) and betel nut (Areca catechu), agroforest of oil palm and jelutong (Dyera polyphylla), oil palm monoculture, betel nut monoculture, agriculture, and shrubs.

The peatlands soil is categorized as Histosol [22]. Peatland is generally a marginal land, owing to low pH and low soil fertility. The peatlands of the study area has a low pH (3.6-3.9). The soil nutrient contents of some land cover types was reported by Tata et al. [23], as follows: N content ranging between 0.63-1.08%, P-available was varied from low (28.1 ppm) to high (201.8 ppm), and relatively low macro-nutrient of Na, K, Ca and Mg.

3.2. Socio-economic characteristics of peatlands surrounding community

Population of Tanjabar in 2019 was 333,932 with a growth rate at 1.97%. The Gross Regional Domestic Bruto of the district in 2019 was 43,303 million rupiahs [20]. The main occupation of the community is farmer, covering about 76.7% of the population [24].

About 28.96% of total Bram Itam peat forest reserve area (e.g. 15,050 ha) has been occupied by migrant farmers since 2009 [19]. With long process, the forestry district officer has successfully approached the migrant farmers to raise awareness about the status of forest land, the function of forest reserve and the importance of fire prevention [19,25].

3.3. Peatlands restoration and involved stakeholders

To tackle forest and peatlands fires that occurred frequently in Indonesia including in Jambi Province, several efforts to restore degraded peat ecosystems by fires have been initiated by formulating several supporting policies. To corroborate the efforts, The Governor of Jambi Province has ratified a decree on the Regional Peat Restoration Team (Tim Restorasi Gambut Daerah or TGRD), which regulates government agencies or institutions to involve directly in the Jambi Province peatlands restoration. Duties of each agency is in accordance with Governor’s Decree No. 838/Kep. Gub / Bappeda 4.3/2017 dated 31 July 2017, concerning the Establishment of the Jambi Province Peatland Restoration Team (Tim Restorasi Gambut Daerah, TRGD).

Many institutions become the member of Jambi TRGD including the Regional Secretary of Jambi Province, Regional Planning of Development Agency (Bappeda), Forestry Office of Jambi Province (Dishut), Environmental Office of Jambi Province (Dinas LH), River Basin Management Agency of Batanghari (BPDAS Batanghari), Natural Resource Conservation Agency (BKSDA), (Sumatera River Region Agency (BWS Sumatra VI), Public Works and Public Housing Service of Jambi Province (Dinas PUPR), Estate Crops Office (Dinas Perkebunan), Indonesian Palm Oil Business Association (GAPKI), Indonesian Forest Entrepreneurs Association (APHI), the Jambi Branch Land and Water Conservation Society [11].
3.4. Mapping of related stakeholders in peatlands restoration
In order to get full description about power and interest of stakeholders involved in peatland restoration, stakeholder mapping was carried out by using Stakeholder Analysis which divides position of stakeholders into 4 (four) quadrants, namely key players, subject, context setter, crowd [14,15]. The position can describe the influences and interests of each relevant stakeholders in peatlands restoration as follows: Key players are those who support and agree with activities related with restoration of peatlands and it is depicted with high score of both influence and interest; Subjects are stakeholders who are interested in peatlands restoration but have limited influence to influence and organize the process. Subjects are indicated by high score of interest but low influence score; Context setters are those who have enough capacity to influence the process of peatland restoration but somewhat less interested to involve actively in the process, which is indicated by high influence score but low interest score; and Crowds are stakeholders who have low score for both influence and interest related with peatland restoration in Jambi Province.

3.4.1. Relevant stakeholders in Bram Itam peatland forest reserve of Tanjabar (HLG Tanjabar). To identify the strengths and interests of stakeholders related to the HLG Bram Itam restoration, both at regency and provincial levels, 26 stakeholders were interviewed based on their potential willingness to be involved in those activities. Those stakeholders were: Forestry Office of Jambi Province, Estate Crop Office of Jambi Province, Development Planning Agency at Province Level (BAPPEDA of Jambi Province), Development Planning Agency at District Level (BAPPEDA of Tanjabar Regency), Environment Office of Tanjabar, Environment Office of Jambi Province, Public Works and Public Housing Service of Jambi province (Dinas PUPR), Watershed Management Unit (BPDAS) of Batanghari River, Tanjabar FMU, Regional Secretariat of Tanjabar Regency, Jambi University, Conservation and Natural Reserve Office (BKSDA), Production Forest Management Office (BPHP), Agriculture and Food Security District Office, Agricultural Extension Institution of District Office, Agricultural Crops and Horticulture Provincial Office, NGOs (Warsi, WWF, Gita Buana, Kehijau Berbak, Mitra Aksi), Community Leader of Karya Lestari, Makmur Jaya Join Farmer Group, Farmer Group of Karya Pembangunan II, and Farmer Group of Pada Idi Sido Makmur.

3.4.2. Role of stakeholders in restoration efforts. The level of stakeholder’s interests was determined based on the respondents' assessment of the 5 variables, namely: perception, needs, motivation, forms of support and benefits expected by the parties in peat restoration. The level of influences was determined based on 5 other variables, namely: participation, role and contribution in making decisions, relationships with other parties, human resources and financial aspects in peat restoration. After knowing each score from each variable, then the mapping of the parties was done with the help of Excel software to describe the position of the parties. The middle values taken (vertical and horizontal) are determined based on the average value of each variable. A description of the position of the stakeholders in peat restoration is presented in Figure 2.
Figure 2. Influence and interests of stakeholder in HLG Bram Itam peatland restoration efforts.

A: Agricultural Crops and Horticulture Provincial Office; B: Agricultural Extension Institution of District Office; C: Jambi University; D: BAPPEDA of Tanjabar; E: Environment Office of Tanjabar; F: Tanjabar FMU; G: Regional Secretariat of Tanjabar Regency; H: BAPPEDA of Jambi Province; I: Environment Office of Jambi Province; J: Forestry Office of Jambi Province; K: Public Works and Public Housing Service of Jambi province; L: BPDAS; M: Farmer Group of Karya Pembangunan II; N: Farmer Group of Pada Idi Sido Makmur; O: Makmur Jaya Join Farmer Group; P: Community Leader of Karya Lestari; Q: Warsi; R: Mitra Aksi), S: Gita Buana; T: Kehijau Berbak; U: WWF, V: Estate Crops Provincial office; W: Agricultural Crops District office; X: Agricultural Crops and Horticulture district office; Y: BPHP; Z BKSDA.

The result of stakeholder analysis (Figure 2) showed that key players with high influence and interest in Jambi Province peat restoration program are: Environment Office of Jambi Province and Tanjabar Regency, Forestry Office of Jambi Province, Estate Crop Office of Jambi Province, Tanjabar FMU, and NGOs (WWF, Kehijau Berbak, Mitra Aksi and Gita Buana). Institutions having low influence but high interest in peat ecosystem restoration ("Subject"), consisted of BPDAS, Development Planning Agency at Province Level (BAPPEDA of Jambi Province), Jambi University, Regional Secretariat of Tanjabar Regency, BPHP, Agricultural Extension Institution, NGO (Warsi) and Makmur Jaya Joint Farmer Group. The parties with low level of interest and influence on the restoration of peat ecosystems ("Crowd") were the Food Crops Office both at Jambi Province and Tanjabar Regency, BKSDA, Development Planning Agency at District Level (BAPPEDA of Tanjabar Regency), Public Works and Public Housing Service of Jambi Province, Agricultural Crops and Horticulture of District Office, farmer groups (Karya Pembangunan and pada Idi Sido Makmur, and community leader.

3.4.3. Factors influencing stakeholder’s involvement in restoration efforts. The mapping result implied that low level of interest on peat ecosystem restoration (of farmer groups and farmers) might be due to a concern of losing opportunity to use the land for farming activities. This is due to common uncertainty and risk that make longer time to convince farmers to be willingly involved in certain activities [26,27],
including restoration. It will be easier to secure community involvement if the benefits of activities can be acquired more quickly. Therefore, the involvement decision likely depends on the potential benefits and risks for these stakeholders.

Meanwhile, the low level influence of policy makers (such as Development Planning Agency at District Level and Food Crop Office of Jambi Province) can be originated from misperception and low understanding of peat restoration. Ego-sector factors and overlapping regulations related to peat restoration may be another reason.

Furthermore, unclear socialization, unclear division of tasks and responsibilities in the field, might be also due to a shift in authority responding to the enactment of Law no.23 in 2014. Based on duties and responsibilities, Development Planning Agency at Province Level (BAPPEDA of Jambi Province) and Development Planning Agency at District Level (BAPPEDA of Tanjabar Regency), as well as BPDAS, should be the key players having high power and interest regarding the planning and implementation of peat ecosystem restoration in Jambi Province, especially in Tanjung Jabung Barat Regency. However, the analysis showed contradictory results.

Other factors possibly causing confounding position of stakeholders with their institutional functions are: the change of status of Bram Itam peatland forest. Previously, Bram Itam peatland forest was under the authority of BPDAS. However, since the establishment of Tanjabar FMU as Production FMU (the majority of forest functions in the Tanjabar and Tanjabtim areas are production forests), BPDAS seems to play less role in managing Bram Itam peatlands forest.

Shifting authority in peatland management which was previously by BPDAS and switched to Tanjabar FMU has significantly altered the capacity of BPDAS in peatland restoration. Although in fact, in terms of funding support, fund allocation that was managed by Tanjabar FMU is much smaller than that of BPDAS. Shifting of authority among stakeholders should be better and stronger coordinated, hence each stakeholder could involve in peatlands restoration based on their capacity (power, funding, human resources, and others), otherwise it will influence the accomplishment of restoration program in the reserve area.

Next, the Head of the Jambi Regional Peatland Restoration Team (TRGD) is the Provincial Secretary. It seems that the budget for managing the centre (BRG) is under the Regional Secretary coordination, without the intervention of BAPPEDA. This may cause BAPPEDA does not participate much in planning activities and appear to be lack of power in peat restoration.

Peat ecosystems are not only environmental assets, but also economic resources. Therefore, those two aspects should be managed appropriately to meet the economic functions and environmental protection. Challenges of peatland management are not only related to technical aspects, but also on how to improve community welfare, land productivity, certainty of forest and land area, resources management, and other interests of sustainable and genuine development.

Based on previous restoration in HLG Bram Itam, the challenges faced were not only related to the severity of the terrain including its biophysical conditions, but also relates to less effective coordination among stakeholders resulting in the diversity of perception and implementation.

Apart from the need of harmonious collaboration among related stakeholders, active involvement of local communities as the forefront in the restoration activities is also substantial for the success of implementation. Local communities who have strong dependency upon peatlands should be involved during the restoration from the beginning of the process (selection of tree crop combination species). The interests and expectations of community groups should be considered, and their rights must be respected. In addition, clear understanding about future benefits for the communities need to be socialized widely. No development can involve stakeholders without motivation and clear benefits from the restoration program for them.

In addition, capacity building for farmers and local communities can play an important role in assisting stakeholders (most importantly marginalized groups and small-scale producers) who depend on peatland resources to adapt and adopt sustainable practices for the management and use of natural resources. Peatland management strategies must be locally adaptive, to support the transition of
smallholders to alternative production practices and provide equitable incentives for sustainable resource conservation [28].

Subsequently, Bennet [9] avowed that peatland restoration faces economic-environmental trade-offs. This, in many cases, has resulted in intense disagreement between stakeholders who have different interests (company concessions, communities, local government, etc.). The success of peatland restoration will depend not only on how those various priorities can be merged and resolved, but also on improving both governance and technical capacity.

For the successful adoption and implementation of peatlands management including restoration efforts, involved stakeholders (e.g. government administrations, research institutes, the private sector, NGOs, local communities) need to understand the various issues, respect each other’s views and work together [29,30]. To promote this, education, training, and information dissemination are required, particularly focusing on the objectives and actions of the strategy. The dissemination program is important to increase the knowledge, skills and understanding of all stakeholders and to promote the consensus needed to bring about the desired results and to prevent miscommunication among them.

4. Conclusion
Mapping relevant stakeholders of peatlands restoration in Bram Itam peatland forest reserve of Tanjabar reveals that not all relevant stakeholders were willing to involve in the restoration. Apart from the differences of influences and interests among stakeholders, there were external factors influencing their willingness to involve in peatlands restoration efforts. Stakeholders having high influence and interest in Jambi Province peat restoration program were: Environment Office of Jambi Province and Tanjabar Regency, Forestry Office of Jambi Province, Estate Crop Office of Jambi Province, Tanjabar FMU, and NGOs (WWF, Kehijau Berbak, Mitra Aksi and Gita Buana). Institutions having low influence but high interest in peat ecosystem restoration ("Subject"), consist of BPDAS, Development Planning Agency at Province Level (BAPPEDA of Jambi Province), BPHP, Jambi University, Regional Secretariat of Tanjabar Regency, Agricultural Extension Institution, NGO (Warsi) and Makmur Jaya Joint Farmer Group. Stakeholders with low level of influence and interest in the restoration of peat ecosystems ("Crowd") are the Food Crops Office both at Jambi Province and Tanjabar Regency, BKSDA, Development Planning Agency at District Level (BAPPEDA of Tanjabar Regency), Public Works and Public Housing Service of Jambi Province, Agricultural Crops and Horticulture district office, farmer groups and community leader.

Active involvement of related stakeholders is a prerequisite for any intervention program. A negotiation-based approach that unites various visions and interests must be used. All must realize that stakeholder rights exist and that these rights are a fundamental part of an activity. The principles of a rights-based approach must be adhered to promote integrated action in development restoration and intervention efforts.

Collaboration among stakeholders is necessary to bring about sustainable peatland management. Establishing collaboration network among Ministries, agencies, and institutions, both central and regional level could be a crucial step for the action. The principles of collaborative management should be cross-sectoral.

Finally, local communities as the forefront in the restoration activities and who has strong dependencies upon peatlands should be involved in the action. In its implementation, community involvement should be from the beginning, to build sense of belonging on the success of restoration. Clear information about future benefits for communities is crucial for the success of restoration. Local people should be motivated and undoubtedly understand the benefit of restoration.

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