

# Environmental Justice and Impact of Palm Oil Plantation Expansion on Inland Fisheries: Case study on the Wetlands of the Middle Mahakam Area in Indonesia

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## ABSTRACT

The recent development of social inclusion issues has enabled the dissemination of environmental justice to improve the livelihood of rural communities. In contrast, as a major stakeholder in wetland areas, the palm oil industry accelerates the distribution of inequality issues in inland fisheries. To balance the interest of multilevel stakeholders through successful environmental justice and natural resource management in the wetland area, this case study identified the aspects of environmental justice associated with the issues of localities and land conversion to palm oil plantations in the Middle Mahakam Area, East Kalimantan, Indonesia. Several in-depth interviews were conducted in this study using a semi-structured questionnaire and participant observations. The expansion of palm oil plantations evidently contributed to the environmental impact, primarily deteriorating the water quality of the area. This phenomenon was found to have a negative influence on the income of fishers, which potentially caused conflicts among the stakeholders. Fishers themselves also contributed to destructive fishing because of the misperception of common natural resources and economic reasons. Moreover, the local government considers the palm oil industry as an income generator rather than an actor in environmental degradation. Additionally, environmental justice has generally relied on the grievances and complaints of the fishers for the management of the local environment and fisheries. Therefore, distribution, procedure, and recognition of justice significantly contributed to these interrelated issues in the Middle Mahakam Area.

**Key words :** *Environmental justice, Environmental impact, Palm oil expansion, Wetland, Inland capture fisheries, Middle Mahakam area*

## Introduction

Land grabs are related to transnational large-scale land acquisitions (Li, 2018; Theesfeld, 2018). The term “grab” is used to indicate something that is taken away, such as customary land rights, diverse farming systems, and ecological balance (Li, 2018).

Through a pattern similar to monoculture plantations in the colonial era, land grabs are largely occurring in the global South (Vicol, 2015; Li, 2018). This increase in land grab is triggered by the global policies of food security and bioenergy (Dell’Angelo, D’Odorico, and Rulli, 2017). A debate on land grabbing provides a global understanding that land

grabbing not only fundamentally changes traditional access to natural resources, land access, and ownership that impacts well-being and livelihood, but also increases economic inequality through the dynamics of proletarianism and smallholding. Furthermore, it has a significant impact on environmental and natural resource degradation, which also leads to disproportionate environmental risk distribution (Dell'Angelo *et al.*, 2017; Andrews, 2018; Bowen, 2002).

Indonesia has experienced excessive land grabbing. The implementation of decentralized government and the mandated amount of palm blending in diesel has increased the rapid expansion of large-scale palm oil plantations by providing land concessions and environmental deregulation (Susanti and Maryudi, 2016; Pye, 2019; Larsen *et al.*, 2014). Consequently, the livelihood of many rural communities has been negatively affected by the lack of state protection (Li, 2018). Inland fisheries are no exception to this impact (Obidzinski *et al.*, 2012; de Jong Edwin and Nootboom, 2010). In recent years, grievances have been raised over resource-based competition between palm oil plantations and fishing communities in affected areas (de Jong Edwin and Nootboom, 2010). In particular, there has been land and water jurisdiction disputes between inland small-scale fisheries and large-scale palm oil plantations (Sheaves *et al.*, 2018; Larsen *et al.* 2014). The manner in which an environmental impact is framed within a system could influence stakeholder perception of whether the environmental impact of palm oil plantations is just or unjust, which in turn could influence how relevant stakeholders respond to the impact.

Although there has been substantial research on the impact of palm oil on the environment (de Jong Edwin and Nootboom 2010; Obidzinski *et al.*, 2012; Sheaves *et al.*, 2018; Saswatecha *et al.*, 2015; Amalia *et al.*, 2019), the impact of palm oil on fisheries in wetland areas has not been adequately explored in the literature. Therefore, there is a need to address the current knowledge gap on environmental justice issues associated with the decline in fish catches owing to large-scale palm oil expansion. This paper contributes to the discussion on the impact of palm oil plantations on small-scale fisheries by exploring relevant stakeholder perceptions. In this study, the environmental impact of palm oil plantations on inland fisheries in the Middle Mahakam Area (MMA) were examined in terms of distribution, procedure,

and recognition of justice. An environmental justice approach was applied to understand the disproportionate distribution of environmental and economic burdens faced by fishing communities. This research utilized justice as an analytical tool to understand the degree of marginalization in communities affected by large-scale palm oil plantations, governed by the three pillars of environmental justice claim-making: evidence, process, and justice itself (Walker 2010).

### Concept of Environmental Justice

The administration of justice is based on three inter-related elements, though not necessarily sequential: justice (how things should be/normative), evidence (how things are/descriptive), and mechanism (why things are/how they are/explanatory). Justice is an ethical or moral justification that underlies a normative judgment. Evidence explains what can be considered unequal (evidence of injustice and environmental inequality), how is this inequality organized across various social classes, the source of such evidence, and entities involved. Meanwhile, the process of environmental inequality cannot be simply explained, but is formed of multiple interlinked processes. Instead of solely investigating the present scenario, there is a necessity to understand the history and development of these processes; local processes leading to environmental inequalities are interrelated and part of larger processes operating at regional and global scales.

Environmental justice consists of three concepts: distributive, procedural, and recognition justice. Distributive justice is linked to the following underlying issues: who is an environmental justice recipient? What does distribution imply in this context? What is the allocation or equality of the rights principle? The concepts of distribution are based on utilitarian, democratic equitable rights, and causal obligation or merit, which are applicable to the three dimensions of environmental justice (Walker, 2010). In addition, distributive justice generally comprises three "rules": the equity rule, which states that greater rewards or outputs should be earned by an individual who contributes higher; the need rule, according to which higher rewards or outputs should be received by a person with a greater need; and the equality rule, which states that everyone should receive equal rewards or outputs regardless of their needs or contributions (Patrick *et al.*, 2014). Procedural justice is related to the accessibility of environ-

mental information, which is an important condition for effective participation and informed consent, inclusion in the process of decision-making and environmental policy making, access to legal mechanisms to challenge decision-making and protect environmental rights, inclusion in community-based participatory research, and consultation. Furthermore, the pillars of both distributive and procedural justice are recognized. The recognition of justice requires that people are equally represented, free from physical threats, and provided absolute and equal democratic rights (Movik, 2014). In terms of environmental justice, recognition also implies that the attitudes and participation rights of all related stakeholders are respected and valued (Clough, 2018). Lack of recognition is the basis for unequal distribution of environmental justice (Bustos *et al.*, 2017).

## Materials and Methods

### Study Area

The MMA is under the jurisdiction of the two municipalities: Kutai Barat and Kutai Kartanegara. One of the three largest lakes located in Kutai Barat and two of them located in Kutai Kartanegara. The MMA is a wetland dominated area with some peat land, swampy, and dry areas. We identified counties in which people traditionally depend on inland fisheries. We then determined the locations of overlapping dense palm oil plantations and coal mining activities in these counties using expert judgment. We selected Muara Kaman, Kenohan, and Kota Bangun sub-districts as our study sites because of a variety of considerations in the MMA i.e all those three sub-districts surrounded by palm oil plantation and coal

mining, community livelihood is fishing, and they are part of wetland. Muara Kaman had 16 palm oil companies across 121,116.32 hectares and 16 coal mining companies across 41,145.76 hectares. Kota Bangun was surrounded by six palm oil companies in an area of 62,800 hectares, and six coal mining operations in 5,000 hectares. Kenohan has two palm oil companies across 34,824 hectares and two coal mining companies across 4,997 hectares.

### Data Collection and Data Analysis

Our study primarily utilized qualitative methods – in-depth interview using a semi-structured questionnaire, participant observation, and content analysis to explore environmental justice issues. Fieldwork was conducted from September 2020 to January 2021. Community leaders, such as the village head, mediated the first contact with communities. We selected forty fishers as “key informants”, as these people had in-depth knowledge on fishery resources. The sampling design of these fishers followed a purposive technique wherein informants were intentionally chosen. The participants (N=70) in the study were 40 fishers, eight academicians, 15 governments, and seven non-governmental organizations (NGOs: Walhi, Bioma, Bumi, Jatam, Pokja 30). The 40 fishers were interviewed considering four from each of the 10 villages, respectively: Muara Kaman Ulu, Muara Siran, Sabintulung, Puan Cepak, Sedulang, Liang Buaya, Kehala Ulu, Semayang, Sebelimbangan, and Pela.

All data was recorded and manually transcribed into MS Word and saved per file per informant. Each transcribed document was examined in detail, and the primary themes on the process, evidence, and perception of justice were identified and coded

**Table 1.** The interview guideline example

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- What are the main drivers of fisheries adversely affecting the environment?
  - What are main pressure of change in inland fish production?
  - What are the main drivers of non-fisheries activities adversely affecting the environment?
  - To what extent is environmental justice been considered in the decision making process of development project?
  - Which group of people were most affected by coal mining and palm oil?
  - Which sector were most affected by coal mining and palm oil?
  - To what extent is the decision making process of a) spatial planning, b) land concession, c) EIA permit of palm oil and coal mining consider and address to:
  - Equity in benefit and impact distribution?
  - Are all relevant actors and potential affected communities include inside the process?
  - Is there justice for inland capture fisheries sector?
  - What, if any, are environmental justice implication of palm oil and coal mining' presence in fisheries zone, particularly for artisanal fisher?
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using NVivo 12 (Ltd 2012) through the following steps.

- Open coding by creating categories based on information contained in the data. The process provides code based on the meaning contained in words, phrases or paragraphs that exist in the interview transcript.
- Thematic coding by placing open results based on the central theme of the study.
- Analytic coding that further analyzes the results of open coding that is not following the study's central, can be a sub-category of the central theme or as a new theme.
- Validity test using probing and retesting the coding and model (Bandura, 2019).

Our in-depth interviews with operators of palm oil companies and coal mining companies were canceled because of the lack of response. As a result, we conducted a content analysis of environmental impact assessment (EIA) documents and reports from several companies in the research location.

**Table 2.** The name of companies and locations

Company	Village
PT. KPM	Kupang Baru (the village located in the upper and next to Muara Siran)
PT. KAM	Puan Cepak and Sedulang
PT. AEK	Sedulang
PT. ATK	Liang Buaya
PT. SKL	Sabintulung and Muara Kaman Ulu

**Findings**

Process: Palm Oil Plantation Expansion and its Pressure on Fish Capture in the Wetland of Middle Mahakam Area (MMA)

In central Mahakam, there are four fishing areas: wetlands, swamps, rivers, and peat or wetland forests. Fishers attempt to catch fish in swamps, reservoirs, and lakes during the rainy season, whereas in the dry season, they fish in the rivers only. The main fishing areas in each region are different, as there are predominantly rivers, lakes, or swamps in some places. Swamps are the primary catching areas for Muara Kaman, Muara Siran, Sabintulung, Liang Buaya, Puan Cepak, and Sedulang.

Currently, several swamps and tributaries are closed due to the construction of roads with the introduction of palm oil plantations. Lakes and swamps are not common fish-breeding locations, as many swamps and riparians have turned into palm

oil plantations since their inception. The most inevitable consequence of land conversion into wetland palm oil plantations is the loss of spawning areas (Prianto *et al.*, 2013). The fish are tiny in size, and the dried peat can no longer absorb water during the rainy season; therefore, a canal was constructed to solve this. As demonstrated by the decreased surface runoff and groundwater, the palm oil concession area affected the amount of water in rivers and swamps. In addition to the effects of conversion of wetlands into palm oil plantations, rivers often produce a decreased catchment area.

Draining peatlands destroys fish breeding areas and fishing grounds, and fishing areas were significantly reduced because of a lack of specific boundary markers on the land owned by fishers in addition to its hydrological regime. Fishers only identified them using fishing gear placed on their land in the traditional tenure system. However, when the palm oil company visited the village to confirm the location of their licenses, most of the land owned by the fishers was included under the company's permit. The fishers were unable to justify their ownership, as they had no legal evidence. However, as the rivers, swamps, and lakes are legally designated by the state as typical fishing locations for common use, it was not possible for the fishers to sue the company because those areas were not state territory.

In Kutai Kartanegara, the reduction of traditional fishing areas is observed from the use of rights, mining, and plantation permits granted to the company. In 2015, overlay maps of cultivation rights and coal mining licenses with water bodies in the sub-district of Muara Kaman showed that the extent of water bodies, wetland agriculture, lake, and river borders decreased to 19,513.34 ha (Land Agency, 2017. PT. KPM (PT. Khaleda Prima Mandiri) demonstrated that of the total permit area of 20,868 hectares, 80% or 16,201 hectares was productive land for plantations, while the total the unsuitable area was 4,565,456 hectares (PT. KPM EIA document. 2012). This is due to the burden of using woodlands, peatlands, rivers, and lake borders. Furthermore *et al.* (2017) also observed that the establishment of the palm oil plantations in the Middle Mahakam Area occurred in two types of ecosystem landscapes: peat and non-peat areas, most of which are in the peatlands. For the areas outside the peatlands, the water level is maintained by the company using canalization, even when the plantation experiences drought (Dharmawan *et al.*, 2017)

Palm oil companies were expected to have a positive impact through employment, corporate social responsibility (CSR), and partnerships with the permission granted, all three of which were expected to improve welfare. However, land concessions have a potential detrimental effect on both the environment and human society (Pye *et al.*, 2017). On the social front, large land areas can compete with community land, so that their acquisition will cause social conflict. Environmentally, all the EIA documents for palm oil plantations analyzed in this study revealed that land clearing activities, nursery preparation, preparation of palm oil plantations, construction of road networks, application of fertilizers, herbicides and pesticides, fruit fresh bunch workshop operations, and transportation of used oil waste would significantly affect the environment. Most wetland plantations require canals to control the water level. Such plantations often attach canal construction to activities that are expected to have detrimental impacts, including the disruption of natural surfaces, pollution, runoff, flooding, sedimentation, and depletion of water quality, which eventually affects fish quality (Sumarni *et al.*, 2016).

Activities requiring high volumes of water include fresh fruit bunch processing and waste treatment activities. In addition, the volume of surface water around the plant site and the surrounding water body is often affected by water requirements. The presence of palm oil also has an impact on the deterioration of river water, as the natural flow changes into an open-closed channel system. This channel was utilized by the water management system to maintain surface water levels, regulate the moisture at palm oil roots and air humidity, and neutralize water acidity (Obidzinski *et al.*, 2012). However, the canal system endangers fish because, even though it is connected to the river, pesticides and chemicals frequently applied to plantations could possibly flow into these canals during the rainy season. In contrast, wastewater from wastewater treatment plant (WWTP) reservoirs, has the potential to overflow runoff, which pollutes river water, exhibiting variations in total suspended solids (TSS), water pH, and oil or fat content (Badrun *et al.*, 2019).

### Evidence

NGOs, academia, fishers, and government organizations emphasize that the volume of surface water has been changing. The water level in the area of

Mahakam Kaskade Lake varied considerably compared to the previous decade, hindering prediction of flooding, intermittent, and receding cycles (Suyatna *et al.*, 2017). Furthermore, the Mahakam River has undergone a water logging crisis in the past. This has led to sedimentation, which affects the quality of the water. Some other factors also contribute to the decline in water quality, such as palm oil cultivation, coal mining, human settlements, and seasonal influences. The impact of lower water quality can be observed on the first or second day after the first rainfall to within a week after the rain. It was also found to be dependent on the combination of polluted water and seasonal variables.

Several palm oil companies tend to degrade the environmental quality owing to their activities. According to the EIA semester reports, water quality analysis was conducted by PT. KAM (PT. Khaleda Agropripta Malindo) semester 1 report of 2019 showed that among the parameters dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), pH, TSS, oil and fat, total nitrogen, cadmium, copper, lead, and zinc, only DO, BOD, and COD exceeded the allowable limit on water quality parameters. These were measured in palm oil mill effluent (POME) ponds, land applications, and water sampling locations. Water quality monitoring were conducted by PT. ABK (PT. Agrieast Borneo Kencana) on April 26, 2019, in the upper reaches of the Menamang River, downstream of the Sedulang River, and at the wastewater monitoring site. The results showed that the solid waste produced from the processing of fruit fresh bunch was 15,157 tons of blanks, 8,459 tons of fiber, and 3,348 tons of shells. These were all used as fertilizer and boiler fuel, and like solid waste, all forms of liquid waste were fully treated and utilized in a land application system, such as land fertilizer application. Although no liquid waste was discharged into the river, water quality monitoring in the Sedulang and Menamang rivers showed that the parameters of BOD<sub>5</sub>, COD, free chlorine, and phenol compounds do not comply with the requirements of the quality level. This trend has also increased from 2007 to 2019. PT. ABK demonstrated that eutrophication along river basins with peat swamp ecosystems is affected by an increase in some of these parameters.

The results of testing wastewater quality in the PT. AEK aerobic waste pools were similar. PT. AEK observed in semester 1 of 2009 that the parameters,

namely turbidity, iron content, color, and total coliform, exceeded the quality standard. Water quality was lower than that in the previous semester (semester 1) of 2019. The same issue was also demonstrated by PT. ATK (PT. Agrojaya Tirta Kencana), which a palm oil company based in Liang Buaya and Tunjungan villages. The environmental monitoring conducted by them in semester 1 of 2019 showed the existence of a trend for increased levels of BOD and COD in the Liang Buaya and Tunjungan rivers from 2017 to 2019. PT. SKL (PT. Sawit Kaltim Lestari) also highlighted that some parameters exceeded the threshold values of 0.1 mg/l Cu, 0.1 mg/l Zn, 0.3 mg/l Pb, and 0.02 mg/l Cd. Meanwhile, water quality testing in monitoring wells suggested that turbidity, total coliform, BOD<sub>5</sub>, color, pH, and Fe exceeded the quality requirements.

Consequently, combined and cumulative effects of manmade and natural causes, changes in water quality, and destructive fishing have resulted in mass mortality in fish (Purnomo *et al.*, 2004). However, the temporary mass mortality of fish has been considered as an initial indicator of environmental management failure. Thousands of fish died in many Mahakam tributaries in 2019, including the Sabintulung, Segah, Perak, and Bengal Rivers (Korankaltim, 2019). The incident occurred not only in the upstream or upper tributaries of the Mahakam River, including the Kedang Pahu River, Belayan, Kedang Rantau, Kedang Kepala, but also in the middle segment, such as Muara Wis, Muara Kaman, and Tenggara. A significantly large number of fish died, fainted, and emerged on the surface at a time.

After the prolonged floods in the previous year (2017), the volume of water started declining during the dry season, and several heavy metals settled in the riverbeds at a certain point. Later, as the water started to recede, the river's white fish became intoxicated, as heavy metals were combined with settlement toxins. Academia, NGO groups, and some fishers stated that there is no disclosure or documentation of this phenomenon, and the origin of the poison has not yet been studied. The causes of deaths are not yet understood, and the surrounding plantation activities cannot be cited as a cause without adequate verification. An academician respondent argued that contributing factor emphasized that it must be proven that the companies' waste is dumped or overflows into the river. However, most

fishers believed that due to the poor performance of the waste collection pond, the mass death of fish was caused by palm oil waste. They also believed that the runoff transports chemical wastes from mining operations upstream of the Belayan River.

Another phenomenon observed in the MMA is the decline in fish catches. Currently, fishing is not selective, and all types and sizes of fish are caught. However, as the number is small and continues to decrease, their price is high. With the variations in drought, the swamps dry out, and the supply of fish decreases. Therefore, fishers find it difficult to find fish, and use an increasing number of fishing gear. In the past, during the rainy season, catches ranged from two to 37 times higher than those in the dry season. Presently, during the rainy season, catches decreased to approximately two to 20 times of those in the dry season. The catches in the dry season have decreased fourfold compared to the past in the long-term annual fluctuations. Furthermore, the present catch is 22 times that of the past rainy season. Thus, in all communities, a continuous downward trend was observed in fish catches.

Shrimp (*Macrobrachium malayanum*) and other fishes, such as bentilap, lais (*Lais hexanema*), salap (*Barbodes schwanenfeldii*), biawan (*Helostoma temminckii*), papuyu (*Anabas testudineus*), sepat (*Trichogaster pectoralis*), pentet (*Clarias batrachus*), and lepok (*Kriptopterus limpok*), have become scarce. According to the PT KAM report (2008), several types of fish, such as catfish (*Clarias batrachus*), cork (*Ophiocephalus striatus*), seluang (*Puntius spp.*), sepat (*Trichogaster pectoralis*), papuyu (*Anabas testudineus*), Patin (*Pangasius polyuranodon*), jelawat (*Leptobarbus hoevenii*), lais (*Lais hexanema*), and eel (*Monoorus albus*) are becoming increasingly scarce. Furthermore, two fish species have become extinct at the same location in 2015, namely Patin (*Pangasius polyuranodon*) and shrimp (*Macrobrachium malayanum*). Lancing, baung, and jelawat (*Leptobarbus hoevenii*) have also been rare since 2012 (Prokal.co, 2017), as well as kelik (*Clarias leiachanthus*) (Suyatna *et al.*, 2017).

These abovementioned phenomena caused economic instability, uncertainty, and vulnerability among inland fishers (de Jong Edwin and Nooteboom 2010). The economic potential of fisheries was significantly reduced, and the structure of livelihoods shifted from fisheries towards plantations (Yulian *et al.*, 2017; Dayang Norwana *et al.* 2011). Fishers expected that benefits from the plan-

tation company would be shared equitably because of its involvement in the plasma partnership scheme. This scheme is a government obligation to compensate for the land use of plantations; however, they stated that benefit sharing was not proportionate to the lost fishing ground, creating dissatisfaction with profit sharing (economic security). This led to irresponsible fishing practices that conflicted with traditional fishers and detrimental actors (community security). The communities have diversified livelihoods, but before becoming independent, they require government guidance and support to adjust to palm oil plantations (Obidzinski *et al.*, 2012; Yulian *et al.*, 2017).

### Environmental Justice

Based on the grievances and complaints of the fishers, it was observed that their dissatisfaction was focused on two aspects, namely environmental and fisheries management. Planning, implementation, and monitoring processes were related to grievances and complaints regarding environmental management. Furthermore, planning for environmental management was found to be based on non-participatory management strategies, and not on carrying capacity, ecosystem suitability, or community needs. This plan was included in numerous decisions taken at many levels by different agencies, including those related to developmental and urban planning, land use permits, and environmental management. The failure of the government and companies to regulate pollution, its effects, impact recovery, compensation, CSR, and community engagement in pollution monitoring was a source of concern in the implementation of environmental management. Therefore, fishers are often directly affected in terms of health, economy, livelihoods, inequality in benefit-sharing, and economic vulnerabilities due to the presence and activities of plantations.

### Distributive Justice

Injustice is expressed in grievances and protests (Sulaiman *et al.*, 2014). Complaints by fishermen represent the deprivation of the rights or ownership of fishermen, namely the rights to land, water resources, and livelihoods in fisheries. Due to contamination, which significantly reduces water quality, the right to freshwater resources is violated, thereby infringing upon the right of fishers to make a decent living through fishing (Morrice and Colagiuri, 2013).

According to the concept of polluters pay in Indonesia Law No. 32 of 2009 article no. 87, the companies should provide compensation for the pollution caused by them "every person in charge of a business and or activity that violates the law in the form of pollution and or damage to the environment which causes harm to other people or the environment is obliged to pay compensation and or take certain actions". To date, however, pollution or mass fish mortality has not been reported to have been committed by a single company. It is difficult to determine the sources of pollution due to its complexity of incidence, and cross-sectoral and combined effects over a prolonged period. Furthermore, because the plantations are adjacent to each other, the numbers are very high (Morrice and Colagiuri 2013). Mass fish deaths also occur outside the concessions of companies; therefore, villagers do not make claims against them. Due to the lack of scientific knowledge on the issue, the community entitled to obtain compensation does not fight for their rights. Furthermore, there was no objective evidence to demonstrate the occurrence of contamination; the villagers use layman terms, such as "smelly white water". All the EIA reports studied in this research showed that many parameters of water quality had exceeded the threshold. However, the local organizations were unable to substantiate their claims of pollution caused by the plantation company. Therefore, the use of scientific terminology in the EIA report justified the scientific validity of the company's activities. Uncompensated fish mortality reveals how the allocation of environmental gains and losses is unfair, and highlights power asymmetries among political and industrial interests and fishing community inhabitants (Pojman *et al.*, 2015).

The protection of wetland fisheries, as part of the forest environment, depends on the functioning of forest ecosystems. The combination of their ecological and hydrological roles contributed to the pool resources in semi-common fisheries. Therefore, changes in wetland management and their use for palm oil plantations not only affect altered lands, but also untransformed ones. Changes in the land use alter the microclimate, which is characterized by changes in flood and drought patterns or water levels that also alter the productivity of fisheries. Land tenure and ownership are often influenced by socio-economic shifts in land use. Furthermore, wetlands that were previously semi-common pool assets owned by the state or the city have been granted to

corporations with large-scale concessions and rights of use. Therefore, fishing grounds have significantly decreased, and the land and natural resource access rights of fishers have also been revoked.

As an alternative measure, the government is trying to reduce the disparity in land tenure and use by mandating that businesses build partnerships with plasma-called communities (Obidzinski *et al.*, 2012). However, the concept of partnership, cannot be reasonably applied to wetland plantations, as the management of water at the planting site and the location of plasma partnership plantations inevitably affects the amount, level, and quality of water outside the site. Therefore, palm oil productivity is very low and economically unprofitable. The aim of this study was not to oppose the expansion of palm oil plantations, but to provide an overview of the effects of the expansion of these plantations in wetlands. In reality, the plasma partnership has caused dissatisfaction instead of reducing social instability due to a shift in fishing grounds. The dissatisfaction of fishers had a rebounding impact that manifests when the plasma quotient varies from the expected value. The plasma-owned fishers are working to restore their livelihoods to fisheries, but owing to the environmental changes, the fisheries have deteriorated. Therefore, the highly affected fishers engage in destructive fishing to sustain their livelihoods, which consequently, further deteriorates the fishing scenario. Traditional fishers are most disadvantaged in these circumstances.

Fishers use counter arguments to justify destructive fishing activities, stating that they do not have comparable extensive impacts because (a) destructive fishing was practiced long before palm oil cultivation and the quantity of catches remained unaffected, (b) it is localized and affects a limited area, (c) fish are temporarily dead and live again after electrofishing, and (d) the pollutants generated are different. However, the government claimed that the use of fish poison as part of a destructive fishing practice is illegal, as it causes migration of fish, making them not return to the place where the poison was applied. Destructive fishing practices also lead to the depletion of fishing grounds and a rise in pollution. Therefore, according to the government, fishers have no right to claim compensation for the incidence of fish mass mortality, decrease in fish catches, and reduction in fishing grounds.

### Procedural Justice

The previously mentioned rights related to the involvement of communities in decision-making are necessary for development planning, spatial planning, land use permits, and EIA. NGOs, fishers, and some academics have related the deprivation of fishers' rights to the degree of government responsibility in the environmental management and the planning process adopted during the implementation and monitoring phases of environmental management. Furthermore, the MMA fishing group continued to suffer procedural injustice because they did not have evidence of the negative impacts on water quality determined through scientific analysis and could not thoroughly justify their allegations.

All agencies involved in regulation development planning must integrate bottom-up and top-down planning. However, due to the lack of community capacity to develop a local-based initiative and the lack of community participation in the district development planning forum, there is an unusual acceptance of a village-level development planning proposal. Furthermore, there is an objection to the implementation of public consultations in spatial planning and land concession because of low levels of participation and low information transparency (Ramadhan and Darmansyah, 2018). Spatial planning preparation is driven by firms that have very close relationships with politics. As it is conducted simultaneously during public consultation, the validity procedure for granting land permits by the community frequently confused with environmental approval, land concession, and plasma scheme. Therefore, for their environmental impact concerns, royalty payments, and land compensation, fishers do not receive adequate considerations because stakeholders believe that they contributed to the degradation by allowing corporations to enter their territories (Obidzinski *et al.*, 2012).

### Justice of Recognition

Expansion of palm oil plantations on wetlands does not consider the habitat, living/animal spaces, environmental impact, and environmental carrying capacity. Government and investors assess economic benefits while neglecting human security (Joni 2015). A lack of consideration of the livelihoods of the local community, fishing rights, and associated cultural aspects indicates a lack of justice (Paloniemi *et al.*, 2015). Furthermore, identity politics in devel-



opment was indirectly related to the low recognition of the importance of fishers and inland fisheries. The government and companies chose to provide agricultural assistance because of its higher cost effectiveness compared to assistance for fishing.

## Discussion

Environmental justice involves external and anthropogenic claims (Pojman *et al.*, 2015). It is known that external investment generates both benefits and impacts. Some people receive the benefits, while others experience the impacts differently. While destructive fishing causes social and environmental injustice, in some areas, this problem has been reduced to a minor cause compared to the environmental problems caused by palm oil plantations. This is a major issue because environmental degradation has affected all fishers, both traditional and destructive fishing, which results in declining aquatic ecosystems.

In consideration of the local community, the distribution of benefits and impacts from palm oil plantations must be proportionate, as the largest recipient of the impact should receive the highest compensation and protection. In practice, the implementation of the concept of proportionality in the social, ecological, and economic domains is associated with the division of environmental management zones into three categories: research, ecological, and social boundaries. For an entity to be subject to liability in the social zone, it is only necessary to ensure compensation for the impact in the ecological zone. In fact, although the same impact experienced because of the accumulation and distribution of pollution beyond the localities, the people outside the boundary and zone do not receive the same compensation and CSR as the people within.

All NGO group respondent relates the issue of environmental injustice to the concept of the community. It emphasizes that fishers who rely on local natural resources and understand the characteristics of the local environment are the group most entitled to have their livelihoods prioritized, by protecting their fishing activities and the fishing grounds. For decision-making to significantly impact the lives of these communities, the involvement of fishers in such processes is essential. Meanwhile, government and academic groups reflect the opinion that natural resources must be managed based on the ethical concept of profit maximization for all groups. The

expansion of palm oil in swamps is not considered as a change of use but an investment in natural resources, to maximize the benefits of the swamp for all community groups. If the fishers' group is negatively affected, the government plans to generate alternative livelihoods.

Thus, this study illustrated the relationship between palm oil plantations and fisheries, and how fisheries are interrelated to development. A prevalent phenomenon reported by the NGOs is the inverse relationship between increasing global demand for coal and palm oil and decreasing catch at the local level. Rural communities that depend on natural resources face uncertainty and instability due to variations in the demand for their natural resources and seasonal increases (Malin and DeMaster 2016). Multinational companies are expanding their property to developing countries in pursuit of more profitable shared ownership that allows products from the wetlands to be sold in the central market (Meyfroidt *et al.*, 2018). Hence, establishing international economic relations with poor countries causes negative externalities that are incurred by the developing nations; however, the government fails to apply the precautionary principle to prevent externalities and is less strict in implementing environmental regulations (Pojman *et al.*, 2015).

As palm oil plantations are an important part of the global supply chain for palm oil, an important consideration is that whether the question of deforestation in palm oil plantations should be raised at the international level. Palm oil is an industrial product that contributes to deforestation and climate change. Therefore, redistributing the advantages and disadvantages of this industry through CSR and Indonesian Sustainable Palm Oil (ISPO) certification is not effective. The government stated that fisheries were not sacrificed for palm oil plantations because the government has been exploring solutions for community groups affected by such expansions. They have also conducted meetings with companies in an effort to redistribute their income. The government considers that palm oil has greater benefits for the larger community. However, they have been currently overlooking the habitat destruction originating from palm plantations in wetlands. They state that if wetlands in non-forest areas can increase productivity, palm oil should be planted in those areas. Furthermore, local communities' rights to local governance conflicted with the government's efficiency and maximization prin-

principles. According to Pojman *et al.*, (2015), when the efficiency principle is not achieved due to imperfect market mechanisms, it is necessary to recognize the importance of individual and ecological integrity and ensure coordination and institutionalization of principles and ideals mentioned in the global regulations, and national and international laws. According to Davidson (2012), the government should apply negative incentives. These incentives should be provided to businesses that comply with environmental standards, and those should be enforced before they are penalized (Davidson, 2012). According to Davidson (2012), penalties must be redistributed, and not governed by victim-paying principles. However, companies polluting the environment must compensate for the loss of service. The corporation cannot expect the victim to pay a fee to protect its resources from being exploited. As the palm oil plantations are primarily owned by multinational companies, Indonesia must negotiate positive and negative incentives in the interests of environmental justice at the local level through continuous and entirely egalitarian redistribution of satisfaction and wealth to buffer the impact on specific groups (Pojman *et al.*, 2015).

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