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Fixing flammable Forest: The scalar politics of peatland governance and restoration in Indonesia

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Abstract: *Peatland fires and the impact of transboundary haze are often intertwined with socio-environmental externalities of neoliberal forest governance and overlapping systems of resource property rights in Indonesia. New peatland governance strategies are emerging to address fires and haze by reorganising peatland management using a more ecologically relevant scale that territorialises peatland according to its hydrological characteristics. Employing the concept of the eco-scalar fix, this paper interrogates rescaling peatland governance as a strategy to address the socio-ecological crisis associated with the conversion of peatland into mono-agricultural land. However, rescaling peatland governance entails the risk of merely displacing socio-environmental crises to areas considered less ecologically important rather than addressing them. Drawing on a case study of a peatland restoration in Riau, Indonesia, this paper shows how emerging hybrid forms of peatland governance can address the environmental externalities that have unintentionally been created. This hybrid form of peatland governance has pressured actors across multiple types of property to rework the ways that environmental commons are controlled and accessed.*

Keywords: *environmental commons, Indonesia, peatland fires, peatland hydrology, restoration, scale*

Introduction

Indonesia's peatlands are complex socio-ecological landscapes characterised by divergent interests, conflicting types of resource usage and overlapping land tenure claims (Thorburn and Kull, 2015; Mizuno *et al*., 2016). Indonesia's peatlands consist of decayed organic plant material that functions as a water reservoir and as carbon storage in its natural condition (Jaenicke *et al*., 2008; Wösten *et al*., 2008; Page *et al*., 2011). Despite their essential ecosystem functions, peatlands are often converted into mono-agricultural plantations and human settlements (Koh *et al*., 2009, 2011; Dohong *et al*., 2017). Land acquisition in forest industry and the cultivation of boom crops by large- and small-scale farmers has drastically transformed peatland landscapes in recent decades. Peatland conversion and drainage have become a major driver of the socio-ecological crises in Southeast Asia, particularly in Indonesia and Malaysia (Page *et al*., 2009; Miettinen and Liew, 2010). In 2015, Indonesia experienced a catastrophic forest fire, in which a third occurred on peatland and went on for weeks and caused economic losses of more than USD $16 billion (World Bank, 2016).

Peatlands are environmental common goods and competing interests and actors rely upon them (Sanders *et al*., 2019). Despite its material form as in situ environmental commons (Miller *et al*., 2019), peatland has unique ecological characteristics that have potential transboundary implications (Wijedasa *et al*., 2017). In turn, this shapes the manner in which peatland proponents interact and propose methods and scales of governance as suitable for optimum peatland utilisation and protection. In response to heightened international and domestic pressure to address forest fires and transboundary haze, the government of Indonesia (GoI) is trying to improve peatland governance and to restore 2.6 Mha of burned and degraded peatlands, two-thirds of which were within corporate concession areas (Setkab, 2016). Drastic measures have been introduced to manage and restore the peatland, including rescaling peatland governance to better match the ecological characteristics of peat. Consequently, restoring and

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managing Indonesia's peatland landscape means dealing with the interests and practices of a multitude of existing actors to align them with the ecological scale of the peatland.

Two research objectives shaped this study. First, it investigated the rescaling of peatland governance based on hydrological characteristics. This paper draws from the critical literature on scale, with particular reference to Cohen and Bakker's (2014) concept of the eco-scalar fix to determine the new spatio-ecological units that peatland proponents have constructed. Three interrelated peatland governance units – *peatland hydrological unit*, *peatland ecosystem function and peat dome peak* – are deployed to address environmental problems associated with peatland use and drainage. Accordingly, I trace the environmental rationalities behind the construction of the proposed peatland scalar fixes and their political economic consequences for peatland users, particularly for mono-agricultural plantations (Gray *et al*., 2014). The findings of the present research demonstrate that these fixes have repoliticised Indonesia's forest and land governance, leading to politically negotiated and contested access to peatland resources. Furthermore, the findings indicate that the rescaling of peatland governance based on its hydrological characteristics has been articulated as a process of spatial variegation, namely, as a process that seeks to spatially displace socio-ecological crises of peatland use (fire and haze risks) onto other, apparently less ecologically important areas (Cohen and Bakker, 2014). This functions through the internalisation and externalisation of environmental externalities that permit peatland rescaling to legitimise the exploitation of peatland in one place and promote its restoration in another place.

Second, this paper demonstrates how scaling out peatland governance across multiple forest property ownerships has positively addressed the unintended impacts of the ecological rescaling processes. As noted above, the ecological rescaling of peatland governance has introduced a repair rationality that proposes that 'unsustainable use "here" can be repaired by sustainable practice "there"' (Fairhead and Leach, 2003; Leach *et al*., 2012). The present research finds that this rationality produces modes of peatland governance that merely displace, instead of address, the fire and haze crises it was designed to resolve. I draw on a case study of a peatland restoration initiative situated in a buffer zone of the UNESCO protected biosphere in Riau Province, Giam Siak Kecil and Bukit Batu Landscape, to present a hybrid form of peatland governance that characterises a more just peatland governance initiative. This form of governance is typically transboundary in the sense that multiple logics, interests and rationalities of public and private institutions merge, coalesce, coexist and construct environmental governance (Rana and Chhatre, 2017; Miller *et al*., 2019).

This study is part of a larger research project investigating the governance of environmental commons in Southeast Asia. Primary qualitative data for this paper were gathered through fieldwork in Riau and Jakarta Provinces in Indonesia in 2018 and 2019. In total, 81 interviews were conducted, ranging between 15 min and 2 hours in duration. I interviewed 25 civil society actors, 14 government officials, 30 community members, 7 representatives of the private sector and 5 academics/scientists. The interviewees were recruited using a snowball method, where early subjects suggested others as potential informants. Pseudonyms are used in the article to protect interviewees' identities owing to the politically sensitive nature of this research topic. I also obtained several documents from the Peatland Restoration Agency (PRA), the local forestry agency and the grey literature published by local and national non-governmental organisations (NGOs) as well as various related regulations published by the Ministry of Environment and Forestry (MOEF) to understand peatland proponents' rationales and strategies for producing new ecological scales of peatland governance.

The remainder of the paper proceeds as follows. I discuss the conceptual frameworks in the next section, followed by a section on the peatland governance context. Subsequently, two sections present the findings; the first section describes the construction of the peatland eco-scalar fix and the second illustrates the ways that multi-actor peatland users have reworked access to peatland resources through the formation of hybrid forms of peatland governance. The final section draws conclusions and discusses the implications of

peatland ecological rescaling for broader environmental governance, forest fires and haze mitigation and the governance of transboundary environmental commons in Southeast Asia.

The eco-scalar fix and hybrid forms of environmental governance

Inherent to the design of environmental governance is the problem of scale (Newig and Moss, 2017). Critical analysts define scale as an analytical dimension, whether it is spatial, institutional or temporal, used to comprehend a governance system (Cash *et al*., 2006; Newig *et al*., 2016). Scholars who follow a constructivist approach describe scale not as pre-given but rather as a product of socio-political interactions and contestations (Andonova and Mitchell, 2010). Critical geographers define it as a socio-political tool that actors construct and use for a particular objective, such as rearranging access to and control over natural resources (Neumann, 2009; Rangan and Kull, 2009). Thus, scale is always fluid and dynamic and has multiple meanings. It is not a fixed entity with a certain definition. Understanding scale as a construction 'focuses analytical attention on who is constructing it, how they are doing so, to what ends, and with what implications' (Gray *et al*., 2014: 68).

Actors who engage in environmental governance 'articulate their agendas using scalar narratives regarding the appropriate scale at which to plan, implement, and govern' peatland (Gray *et al*., 2014: 66). Struggles over the scale at which peat 'governance is planned and implemented are simultaneously struggles over the right to control and benefit' from peatland resources (Gray *et al*., 2014: 66). Thus, how scale is framed is a mirror of actors' conduct as they include and exclude their particular rationalities and interests (Bulkeley, 2005). The literature of geography and the social sciences provides considerable critical discussion on the dilemma surrounding the management of natural resources based on political or administrative jurisdictions and ecological scale (Andonova and Mitchell, 2010; Kok and Veldkamp, 2011; Newig and Moss, 2017). Scholars describe scalar politics as a contest between actors over what they perceive as the right scale of governance and this difference leads each actor to interpret scale differently (Young, 2002).

Rescaling facilitates shifts in power over particular resources as a new unit of spatial management is being created, thereby allowing some actors to benefit while others are sidelined (Cohen and Bakker, 2014). The literature on scale describes how rescaling commonly transpires across one or more of the following axes: scaling up, down and out of government (Geddes, 2006; Cohen and Bakker, 2014). Scaling up means levelling up the governance of environmental commons from a lower to a higher jurisdiction (e.g. from local to national or from national to global); scaling down is the opposite. Meanwhile, scaling out is a mechanism for devolving governance and decision making out from a monolithic actor (commonly the state) to include multiple actors (McCarthy, 2005; Rana and Chhatre, 2017). Critical scholars have warned of the need for caution when exercising a rescaling preference and draw attention to 'how scales come to be defined and institutionalised' (Cohen and Bakker, 2014: 130).

Here, I build my analysis on the view that scales are 'fluid rather than fixed and constructed rather than pregiven' (Cohen and Bakker, 2014: 140). I draw on Cohen and Bakker's concept of the eco-scalar fix, namely, as 'a process of rescaling and reorganising governance as a strategy of either internalising or externalising socio-environmental externalities, or both, and thereby displacing conflicts and crises, often through the construction of (purportedly "natural") ecological scales, which simultaneously depoliticise and repoliticise governance' (Cohen and Bakker, 2014: 132). Cohen and Bakker (2014) developed the concept of the eco-scalar fix based on a critical understanding of Harvey's idea of a spatial fix and Bakker's notion of an ecological fix (Harvey, 2006; Bakker, 2009). Both Harvey's and Bakker's concepts emphasise the spatial dimensions of crises avoidance through processes of 'internalisation or externalisation of socio-economic conditions or both' (Cohen and Bakker, 2014: 132).

According to Cohen and Bakker (2014), the internalisation element of rescaling often occurs through the management of ecosystems in a singular spatial management unit, which mitigates the environmental impact of the use of one part

of the ecosystem by protecting another part (Cohen and Bakker, 2014). Meanwhile, externalisation is usually invoked through the process of decentralisation of environmental responsibilities (and its associated costs) to a newly created governance scale (Cohen and Bakker, 2014). Through the combined practices of internalisation and externalisation, rescaling environmental governance through an eco-scalar fix is advantageous to neoliberal stakeholders, as rescaling provides legitimacy for continuous exploitation of environmental commons (Bakker, 2009). Building on this perspective, I explore the rescaling of peatland governance in Indonesia and show that its ecological rescaling is a political process, which the state is using to legitimise the spatiotemporal displacement of peat-related environmental crises.

In addition to the literature on scale, I draw on a critical understanding of the hybrid governance of the transboundary environmental commons to examine a particular practice of decentralising environmental responsibilities, i.e. through the formation of multi-actor peatland restoration initiative at the newly constructed peatland ecological scale (i.e. the *peatland hydrological unit*). However, in the context where there is a strong presence of environmental activism, the hybrid peatland governance also emerges as a mechanism to prevent resource enclosure in a saturated peatland landscape often dominated by large-scale corporations (Rana and Chhatre, 2017; Miller *et al*., 2019). Hybrid governance is one of the particular characteristics of the governance of transboundary environmental commons, where decision making is scaled out by displacing a monolithic actor (usually the state), with diverse actors managing commons fairly and inclusively (Lambin *et al*., 2014; Ponte and Daugbjerg, 2015; Miller *et al*., 2019). Analysts argue that hybrid forms of governance have diverse characteristics that can be used to address the complex problems of forest governance (Armitage *et al*., 2012; Rana and Chhatre, 2017). The involvement of actors across sectors ensures the improved co-production of knowledge, which facilitates cross-learning between participants and improves transparency and effectiveness when negotiating and discussing development trade-offs (Armitage *et al*., 2012). Hybrid governance requires actors to become aware of new opportunities and spheres of intervention that they had previously ignored or avoided by combining their resources and opportunities (Rana and Chhatre, 2017).

The participation of non-state actors in hybrid forms of governance can increase pressure on state or powerful private sector actors to ensure good governance and accountability as well as to avoid rent seeking activities (Backstrand *et al*., 2010). Hybrid governance is conducted by contributing elements that can limit or enhance its success, for example, the interests and rationalities of the actors involved and whether there is a mechanism for preventing elite capture (Armitage *et al*., 2012; Rana and Chhatre, 2017). Despite its importance, few studies have been conducted on the performance of hybrid governance in particular socio-ecological systems. The present article addresses this gap by presenting a case study of hybrid peatland governance.

Indonesia's peatlands: The political economy and governance context

Indonesia's peatlands constitute rich carbon storage, containing around 28.1 gigatonnes of CO_2 equivalent or around 56% of the global tropical peat carbon (Yu *et al*., 2010; Warren *et al*., 2017). The myth that these lands are empty wastelands, under-utilised and non-productive land, legitimises peatland exploitation and conversion to large-scale agricultural plantation (Evers *et al*., 2017). The GoI was once believed to have succeeded in shifting these vast wastelands into lucrative agricultural opportunities (Dohong *et al*., 2017). Millions of hectares of peatlands were converted to agricultural plantations through the issuance of lucrative land management permits while the rights of Indigenous and local communities were ignored (Thorburn and Kull, 2015). Central and local government agencies used their own version of the forest map in issuing plantation and mining permits, which resulted in overlapping concessions and land tenure conflicts (Astuti and McGregor, 2017).

Extensive canal networks were constructed to drain peatland to make them more suitable for agricultural plantations (Jaenicke *et al*., 2010). Over-drainage reduces the groundwater level of

peatland and makes it more vulnerable to fire (Ritzema *et al*., 2014). Moreover, large-scale plantations and smallholder farmers occasionally use fire as the fastest and cheapest land-clearing method (Purnomo *et al*., 2017). This has contributed to peatland degradation as dry peat becomes easily combustible (Puspitaloka *et al*., 2019). Unsustainable large-scale agricultural activities have resulted in widespread peatland degradation, particularly in Sumatra and Kalimantan (Lee *et al*., 2014). The MOEF classifies 13% of Indonesia's peatland as heavily damaged, covering a total area of more than 769 339 ha (MOEF, 2017a). Approximately 86% of Indonesia's peatlands, equivalent to more than 20 Mha, have received damage at what is classified a moderate level, while only around 0.75% left or 181 000 ha are classified as non-degraded peatland (MOEF, 2017a). The Papua and West Papua provinces host more than 50% of the remaining non-degraded peats in Indonesia; Riau Province has the largest peatlands area, with a total of 4.9 Mha in which only around 24 262 ha are still in their natural condition (MOEF, 2017a).

Approximately 56% of the total peatland ecosystem in the Sumatra region is in Riau Province. Riau's peatland has the potential to store of ±14 605 million tonnes carbon (Wahyunto *et al*., 2003). Agricultural plantation ranks first as the largest peatland use in Riau, with oil palm plantation covering around 790 507 ha (PRA, 2017). Other crops that commonly cultivated on peatland are rubber, coconut and sago. According to PRA, in Riau Province, the total population working in the agricultural sector on peatlands in 2016 was around 937 840 people (PRA, 2017). This data represents 36.67% of the total population of Riau farmers (PRA, 2017). The data shows the extent of human activities and relationships with peatlands, making peatland one of the most saturated ecosystems in Indonesia.

The rapid growth of pulp and paper and oil palm industries in Indonesia is one of the main drivers behind peatland conversion to large-scale mono-agricultural plantations (Varkkey, 2013). Indonesia is the largest producer of palm oil in the world and the sixth largest producer of paper (DJP, 2019). The total export revenues of the two agricultural commodities achieved more than US$24 billion and provide more than 6 million jobs in the rural area (DJP, 2019). The two commodities contribute more than Rp 120 trillion in terms of tax revenue, making them the largest sources of revenue in the country (DJP, 2019). However, the agricultural sector, in particular, the rapid expansion of large-scale plantation, contributes to the creation of wealth inequality such that the richest 1% in Indonesia controls 68% of Indonesia's lands (katadata, 2018). This eye-opening statistic positions land inequality as an imperative problem faced by Indonesia in addition to environmental degradation.

During The United Nations Climate Change Conference of Parties 23 in Paris in 2015, President Joko Widodo announced the country's commitment to put a stop to peatland fires that had caused an annual haze crisis and stirred regional tensions (Akuantono, 2015). The PRA, a new government institution, was established in January 2016, following Indonesia's commitment to restore a minimum of 2 Mha of degraded peatlands by 2020 with priority for the provinces of Riau, Jambi, South Sumatra, West Kalimantan, Central Kalimantan, South Kalimantan and Papua (Setkab, 2016). PRA has the task of strengthening the coordination and facilitation of peatland restoration. However, despite having a mandate to coordinate peatland restoration, the PRA suffers from a lack of authority in designing peatland-related policies and governing the forest concessionaires. In an interview with one of the PRA officials, he raised a concern about his institution's inability in monitoring peatland restoration that are carried out by permit holders despite having a mandate to do so. The PRA official cited MOEF's reluctance in sharing data and access to forest concession areas as barriers in performing their tasks (Interview with official D, July 2018). The authority to design and issue peatland policies falls under the jurisdiction of the MOEF; accordingly, the rescaling of peatland governance is carried out by the MOEF with a minimum participation of the PRA.

The political economy context of forest and land governance explained above shape the manner in which peatland users propose and design governance strategy that fit with their interests. The next section elaborates on the construction and deployment of ecological

rescaling in peatland governance and interrogates its socio-environmental ramifications. The rescaling is imbricated in the messiness of Indonesia's forest governance and characterised by the asymmetry of power between interests representing political economic development and environmental protection.

The construction of Indonesia's peatland eco-scalar fix

Host to the largest tropical peatland in the world, Indonesia has been in the spotlight since the 2015 forest and peatland fires that burned more than 2.6 Mha of forests, of which more than 800 thousand hectares were situated on peatlands (World Bank, 2016). Changes in the peatland policies have sparked a heated debate in Indonesia, particularly between the private sector and related government agencies (MOEF and PRA) (GAPKI, 2017). The debates centred on the impact of the state-led rescaling of peatland governance, dividing Indonesia's peatland into conservation and cultivation functions (Hukumonline, 2017). However, as the paper argues below, these scalar changes have been employed to justify continuous peatland resource extraction despite having been constructed based on environmental protection rationalities.

Construction of peatland hydrological unit and peatland ecosystem function

Following Indonesia's 2015 forest and peatland fires, the latter became the focus of government attention, leading to the issuance of policies aimed at governing peatland use and protection (Dohong *et al*., 2017; Uda *et al*., 2018). One focus of these peatland policies was the production of a new spatial unit of governance based on peatland ecological characteristics (MOEF, 2017b). Initially, peatland was governed according to its depth, with peatland that was more than three metres deep prohibited for agricultural use.[1] After the 2015 fires, peatland governance was rescaled to reflect the hydrological characteristics of the peatland using the concept of the *peatland hydrological unit* to further emphasise fire prevention strategy. This rescaling is prescribed in the Government Regulation on Peat Management and Protection Number 57/2016 (MOEF, 2016).[2] In other words, the governance of peat is designed to follow its natural boundaries (*peatland hydrological unit*), which is not limited by administrative boundaries or sectoral silos. The peat policy defines a *peatland hydrological unit* as a singular peatland landscape bordered by two water bodies (MOEF, 2016).

In 2017, through Ministerial Decree No 129/2017, the MOEF issued a peatland map, which indicates the location of peatlands in Indonesia. The map divides 24 million hectares of Indonesia's peatlands into 865 *peatland hydrological units*, outlining the ecological boundaries of peat governance (Fig. 1) (MOEF, 2017c). The map was a key tool in the rescaling of peatland governance. The peat policy stipulates that a minimum of 30% of each *peatland hydrological unit* will be allocated a conservation function while the rest of the area will be classified as peat with cultivation function. The 30% minimum allocation for conservation function was constructed with reference to Indonesia's forest eco-politics, which originated from German scientific forestry (Siscawati, 2012). A forestry expert explained in an interview that this practice claims to be able to maximise and sustain peatland production capacity and is a common formulation in Indonesia's land and spatial governance (Interview with forestry expert Z, July 2018).

The MOEF described two different peatland functions for each *peatland hydrological unit*: cultivation and conservation through the issuance of the indicative *peatland ecosystem function* map (MOEF, 2017d). Peat regulation defines peat with a protection function as an area where peat domes are located and with a depth of more than three metres; this includes peatlands that are protected under the moratorium policy (MOEF, 2016). Peat domes are areas within a *peat hydrological unit* that are signified by a thicker layer of decayed organic mass and thus have a raised elevation (MOEF, 2016). As previously mentioned, peat domes serve important ecological functions as water reservoirs and carbon storage (Wösten *et al*., 2006; Posa *et al*., 2011); consequently, their destruction has significant environmental ramifications (Dohong *et al*., 2017). Therefore, Indonesia's policy makers intended to design a

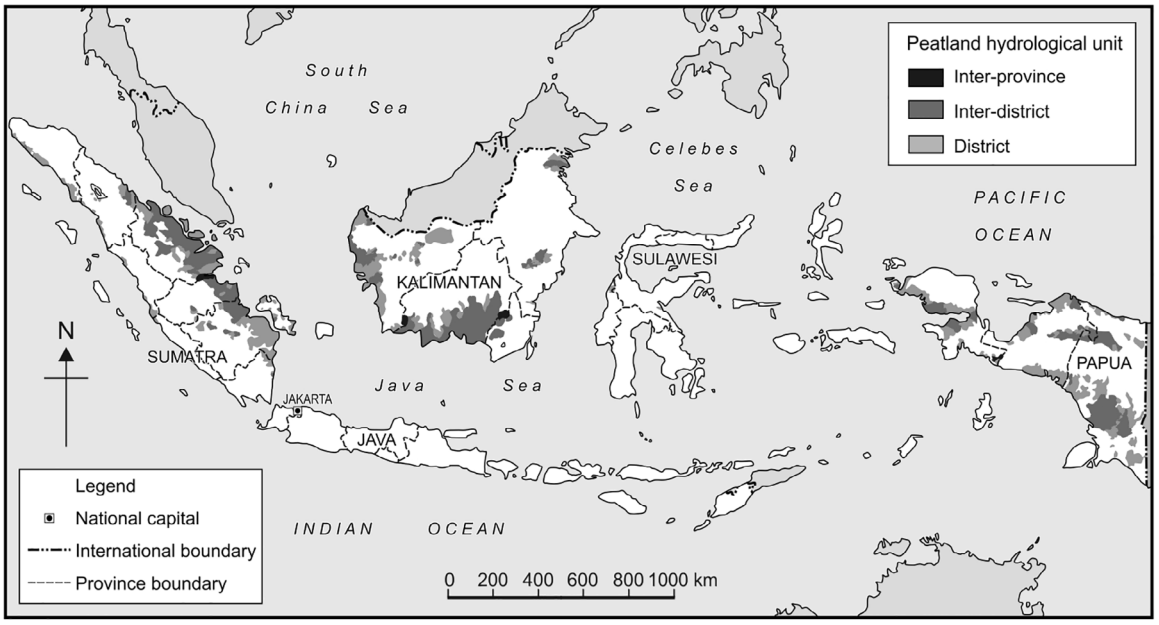

Figure 1. Peatland hydrological unit map Indonesia *Source*: Ministerial Decree Number 129/2017.

peatland policy that preserves and protects these ecologically fragile areas. A high-level official at the MOEF highlighted the importance of peat domes during his interview:

> More than 40% of peat domes in Sumatra and Kalimantan have been destroyed due to the over-drainage of peatland for agriculture and forest plantations. During the 2015 forest fires, the fires coming from peat domes were the most difficult to extinguish because of their deep layers of organic material. Even when the surface fires were gone, thick smoke was still billowing from the peat domes. This was because underground fires were eating peatland centimetre by centimetre until it was all gone and became ashes. When peat domes burned, only by the will of God through His mighty rain could save us all (Interview with official G, August 2018).

Governance Regulation Number 57/2016 defines peat with a cultivation function as an area outside peat domes that is less than three metres deep, whereby hydrological governance maintains peat moisture by keeping the groundwater table level at 0.4 m below the surface (MOEF, 2016). Policy makers have argued that the combination of water conservation in the protected peatland and water management in the cultivated area would keep each *peatland hydrological unit* fire-free. This environmental rationality of fires prevention characterises the construction of peatland eco-scalar fix. Table 1 summarises the rescaling of peatland governance and its associated policy regulation. The rescaling of peatland governance has socio-economic implications to peatland users, particularly large-scale concessionaires. The eco-scalar fix is mainly being implemented in large-scale concession through regulations concerning peat moratorium and water management that will be explored in the next section.

Rescaling ramifications: Internalisation and externalisation

Critical scholars have warned that rescaling to ecosystem boundaries will have deeply political consequences for the governance of scaled resources (Sievanen *et al.*, 2013). The rescaling has legitimised the MOEF to impose a permanent moratorium on the issuance of new plantation permits in the peatlands with a conservation function (MOEF, 2017e). Existing concessionaires are required to vacate operation areas that are situated in the conservation zone (MOEF, 2017e). The permit holders are also requested to restore the utilised peat by rewetting and replanting the peat with endemic plants. The

Table 1. Summary of peatland regulations that are related with rescaling processes

Regulations	Rescaling	Governance implications
Government Regulation Number 57/2016 on Management and Protection of Peatland Ecosystem	Peatland hydrological unit and peatland ecosystem function	• The regulation is translated into two Ministerial Decision (Number 129 and 130) and five Ministerial Regulations Number 14, 15, 16 and 17 Year 2017 and Ministerial Regulation Number 10/2019
Ministerial Decree Number 129/2017 on the Establishment of Peatland Hydrological Unit National Map	Peatland hydrological unit	• The map divides 24 667 804 ha of Indonesia's peatlands into 865 peatland hydrological unit. • The map is indicative and will be revised every six months. • The map has a scale of 1:250 000
Ministerial Decree Number 130/2017 on the Establishment of Peatland Ecosystem Function National Map	Peatland ecosystem function	• The map divides each of peatland hydrological unit into two functions: cultivation and protection • Total peatland with cultivation area is: 12 269 321 ha • Total peatland with protection area is: 12 398 482 ha. • The map is indicative and will be revised every six months. • The map has a scale of 1:250 000
Ministerial Regulation Number 14/2017 on Peatland Inventory and Establishment of Peatland Function	Peatland ecosystem function	• The regulation provides technical guidance on how to conduct inventory of peatland characteristics • The inventory will be the base for asserting function, either as cultivation or protection peatland
Ministerial Regulation Number 15/2017 on the Mechanism to Measure Peatland Groundwater Level	Compulsory peat water management as an implication of peatland scalar fix	• The regulation provides technical guidance for monitoring peatland water table management, particularly in the concession areas
Ministerial Regulation Number 16/2017 on the Technical Guidance of the Restoration of Peatland Ecosystem Function		• The regulation provides technical guidance on peatland restoration by dividing responsibility among peatland users
Ministerial Regulation Number 17/2017 on the Development of Forest Industrial Plantation		• The regulation provides guidance of forest industrial plantation's responsibility to revise its business working plan based on the new peatland ecosystem function map
Ministerial Regulation Number 19/2019	Peat dome peak	• The regulation provides scientific foundation for the construction of new scale based on water balance • The regulation significantly reduces peat protected area

rescaling of peatland governance occurs not only across spatial but also temporal scales (Neumann, 2009). For example, in peat protected areas that have been cultivated with oil palm, the MOEF permits plantations to operate until the end of their licence. Oil palm plantations require a permit from the National Land Agency and have a concession for 35 years. Furthermore, for pulpwood plantations, which fall under the authority of the MOEF, a concessionaire whose plantation is situated in the peat in the conservation zone is only allowed to harvest crops (around 5–6 years old) and is not allowed to reuse the area (MOEF, 2017e). Decisions

concerning what temporal scale to use greatly affect the distribution of responsibility as well as the ecological costs and benefits, for example, the carbon emissions from 35 years of peatland drainage versus 6 years (Rangan and Kull, 2009). Scientists have warned that peat degradation is irreversible (Wijedasa *et al*., 2017). Interviews indicated that decisions regarding the temporal scale of peat protection are a product of political and economic interests. Although peat protection might be an urgent agenda within the MOEF, it is not necessarily a prominent issue in other ministries overseeing agricultural and economic activities.

In the case of Indonesia's peatland governance, it can be argued that the classification of peatland into protection and cultivation functions was designed to permit the management of peatland as a single spatial unit (i.e. a *peatland hydrological unit*), which legitimised the internalisation of the socio-ecological externalities of peatland exploitation. The rescaling of peatland governance constitutes what Cohen and Bakker (2014) define as an eco-scalar fix. This fix was justified on the grounds that an improved environmental management of peatland would be based on maintaining the water balance in one *peatland hydrological unit*. Water is materially critical; its mismanagement is the primary cause of peatland fire and haze (Wösten *et al*., 2006) and this is the anthropogenic result of a particular economic and land development model (Koh *et al*., 2009). Scientist have argued that it is extremely useful to focus on peat hydrology as the most appropriate object of governance to protect peatland (Heil *et al*., 2007; Wösten *et al*., 2008).

The rescaling of peat governance based on natural boundaries and the principle of water balance was proposed by policy makers to prevent peatland fires. However, the present research found that the emphasis of the current peat policy entails concessions maintaining the peat ground water table at 0.4 m without ordering plantations to develop a water governance mechanism that monitors impacts on other peatland users in a *peat hydrological unit*. The policy has had the unintended impact of internalising the very socio-environmental crises that the rescaling was designed to address (Cohen and Bakker, 2014). Cohen and Bakker (2014: 131) argued that the eco-scalar fix is 'articulated within processes of spatial variegation – notably processes which seek to displace (whether spatially, temporally, or sectorally) the economic and environmental crisis'. This process is also known as the internalisation of socio-ecological impacts owing to the use of environmental commons and in the case of the rescaled peatland, governance has opened the path to the displacement of fire risk and the proposition of a controversial land swap policy.

In Bengkalis District, Riau Province, villages bordering with several acacia and oil palm concessions experienced intense water shortages during dry season because the concessions located at a higher elevation (upstream) blocked drainage canals to maintain the ground water table within their concessions. This situation has led villages to become fire prone during the dry season. The section further below presents a case study that describes how a coalition of environmental NGOs succeeded in forming a hybrid form of peatland governance. This serves as a platform for equal water sharing among peat users situated in one peatland landscape and to prevent resource enclosure. Peatland users' active involvement in managing peat hydrology in this particular peatland landscape has facilitated the decentralisation of environmental protection task from state to non-state actors and represents what Cohen and Bakker (2014) have termed the externalisation process. The construction of the *peat hydrological unit* as an ecological unit of management has provided a specific platform for users to collaborate and facilitated the state to offload responsibilities to the newly constructed ecological scale.

The land swap policy aims at providing new locations situated on mineral land to permit holders whose concessions are affected to the extent of 40% or more by the rescaling of peat governance (agroindonesia, 2017). The rationale behind this mode of governance is that peatland is ecologically more valuable than any other type of ecosystem. In proposing a land swap policy, it can be argued that the peat governance in Indonesia is based on the processes of spatial variegation that protect the peat environment by displacing the location of mono-agricultural plantations from peat to mineral land (Fairhead and Leach, 2003; Leach *et al*., 2012). In addition to the risk of intensifying deforestation, the land swap policy may lead to

more land conflicts with Indigenous and local communities who depend on the lands for their livelihood (Astuti and McGregor, 2017). According to the MOEF, the proposed land swap locations were sourced from inactive forest plantation concessions (Pasopati, 2018). However, without seeking proper consent from the potentially affected communities, the land swap policy risks overlooking land conflicts and claims made by Indigenous and local people. In an interview, an environmental activist explained the following:

> Inactive forest plantation concessions are usually the result of many factors; one is land tenure conflict with local or Indigenous communities, and another reason can be the concession holder's empty intentions to plant pulpwood in the first place. The permit is just a mask for them to log the forest and cash in on the natural wood, while leaving the forest deforested and prone to fires (Interview with environmental activist A, August 2018).

Environmental activists have demanded a thorough review of the land swap policy and its associated map of proposed swapping locations (Pasopati, 2018). Activists have further highlighted the possibility of corrupt officials profiting from a vague process of land swap allocation (Pasopati, 2018). The policy has been contested by both environmental NGOs and plantation industries. The industries cited the potential high costs involved in the closure of their current operational site to move the site to a new faraway location. In the section below, I further describe how contestations of the rescaling of peat governance by the private sector and farmers' associations have initiated changes that have forced the government to produce a new eco-scalar fix that prioritises economics over environmental interests.

Contestation and compromise: The construction of peat dome peak *as a new eco-scalar fix*

The rescaling of peatland governance has affected more than 2 Mha of plantations and triggered resistance, particularly from the private sector (Aziza, 2017; Priyanto, 2017). Smallholder oil palm association (Apkasindo) raised concerns over the rescaling implications wherein more than 12 Mha of peatlands are assigned as peatland with the conservation function (Hukumonline, 2017). In 2018, a North Sumatra based oil palm farmers' alliance submitted a request for a judicial review that asked the Attorney General Office to cancel the use of *peatland ecosystem function* as a terminology in Indonesia's land and forest governance (Saputra and Tanjung, 2017). The farmers argued that the new peat governance would potentially incriminate them because their plantations overlap with the peat with the conservation function (Saputra and Tanjung, 2017). Smallholder farmers raised concerns over the validity of the peat map because it is at odds with the land certificates the farmers received from the National Land Agency that certified the legality status for agricultural cultivation. Furthermore, the farmers argued that the overlapping situation would result in their inability to apply for international oil palm sustainability certification such as Roundtable for Sustainable Palm Oil (RSPO).[3] The Attorney General accepted the judicial review request on the grounds that the rescaling of peat governance has supplanted the spatial planning law that initially assigned function and status on Indonesia's land (Saputra and Tanjung, 2017).

A new scale of peat governance was constructed as a result of legal battles and political negotiations that placed peatland protection policies under scrutiny due to the resistance from private sector actors and the smallholder farmers' alliance. A new policy was issued to realign the peatland area that was off-limits for agricultural use (Ministerial Regulation Number 10/2019) (MOEF, 2019). The new policy rescaled the compulsory protected area to cover only what the MOEF defined as *peat dome peak*, whereas the previous policy had covered all peatland in the conservation zone. The peat dome peak was described as an area on the peat dome at its highest elevation. Thus, a significant proportion of the peatland landscape that was protected from economic development was reduced. The rescaling of peat governance came with new rules and a list of what is permitted or prohibited in the conservation zone. According to an environmental organisation, the new policy is expected to have a tremendous impact because the areas outside the *peat dome peak* can still be cultivated by existing plantation until permit expiry, despite its

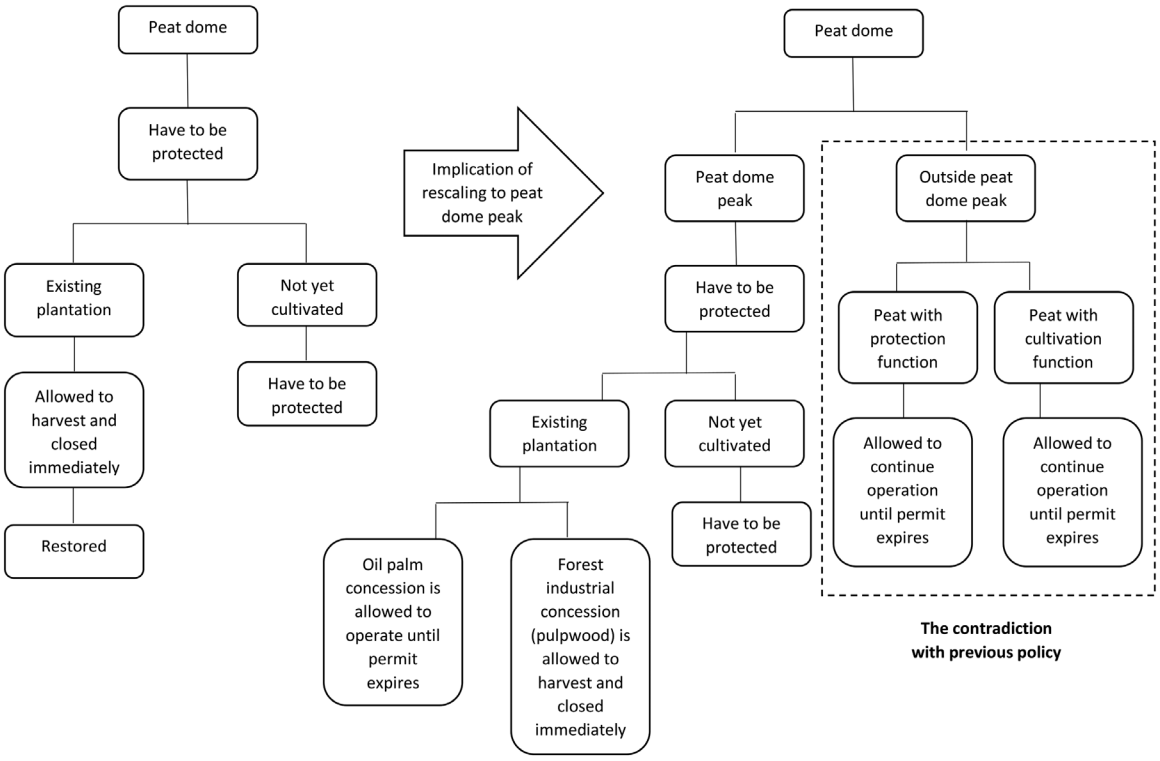

Figure 2. Implication of the rescaling processes to peat dome peak (Adapted from Hamzah *et al.*, 2019 with permission.)

function as the peat protection area (Fig. 2 for the differences and implication in the rescaling processes, figure adapted from Hamzah *et al.*, 2019). A news release statement from the MOEF discusses the issuance of a map outlining the location of the *peat dome peak* in 43 forest industrial concessions (Hutagalung, 2019). The *peat dome peak* map is not publicly available; consequently, it has raised concerns among environmental activists on the true rationality behind the latest rescaling of peatland governance (Arumingtyas, 2019). An interview with a forest industrial plantation manager revealed the drastic change that rescaling has brought to the private sector:

> The new regulation on the peat dome peak has saved our plantation. The previous regulation affected more than 80% of our plantation areas that we have had to restore or cannot use anymore due to their location on peat with a conservation function. The new policy has only marginal effects on our plantation areas, and we can still utilise almost all of our concession. If there had been no change in the regulation, I might have lost my job, and for sure, we would never have had this conversation (Interview with manager D, August 2019).

The new rescaling policy is also invoked with a new temporal scale approach in which existing plantations are allowed to cultivate peatland until their concessions expire despite being situated on peat with a conservation function. This approach means that both oil palm and acacia plantations are allowed to operate for another 35 years (or until the permits expire); previously, this was only allowed for oil palm concessions. Environmental scientists and activists have warned that the new rescaling policy will have tremendous socio-ecological ramifications (Hamzah *et al.*, 2019). The new rescaling policy was implemented merely a few weeks before the presidential election in April 2019. This was broadly perceived by environmental activists as a political deal between the plantation sector and the government (Arumingtyas, 2019). The new rescaling policy shows that scale is a product of political negotiation

(Bulkeley, 2005). The rescaling of peat governance has material and political consequences. It was formed as a response to environmental crises driven by Indonesia's neoliberal economic development. However, multiple actors' interests and rationalities have shaped the production and construction of peatland eco-scalar fix in ways that may simply displace socio-environmental externalities from peatland exploitation rather than alleviate them.

Hybrid governance of the peatland commons

This section provides an example of a hybrid governance arrangement of a peatland restoration initiative in the buffer zone area of the UNESCO protected biosphere reserve of Giam Siak Kecil and Bukit Batu Landscape in Bengkalis District, Riau Province (hereinafter GSKBB) (UNESCO, 2015) (Fig. 3). Miller *et al*. (2019) has cautioned scholars about classifying peatland and other terrestrial based environmental resources as a non-transboundary commons because of its usual containment in a single national administrative jurisdiction. However, according to the authors, the governmental structure of these environmental commons were in actuality 'both transboundary and hybrid in the sense that that they are created and maintained by coalitions comprising of state agencies, corporations, banks, international donors, local and international NGOs and community representatives' (Miller *et al*.,

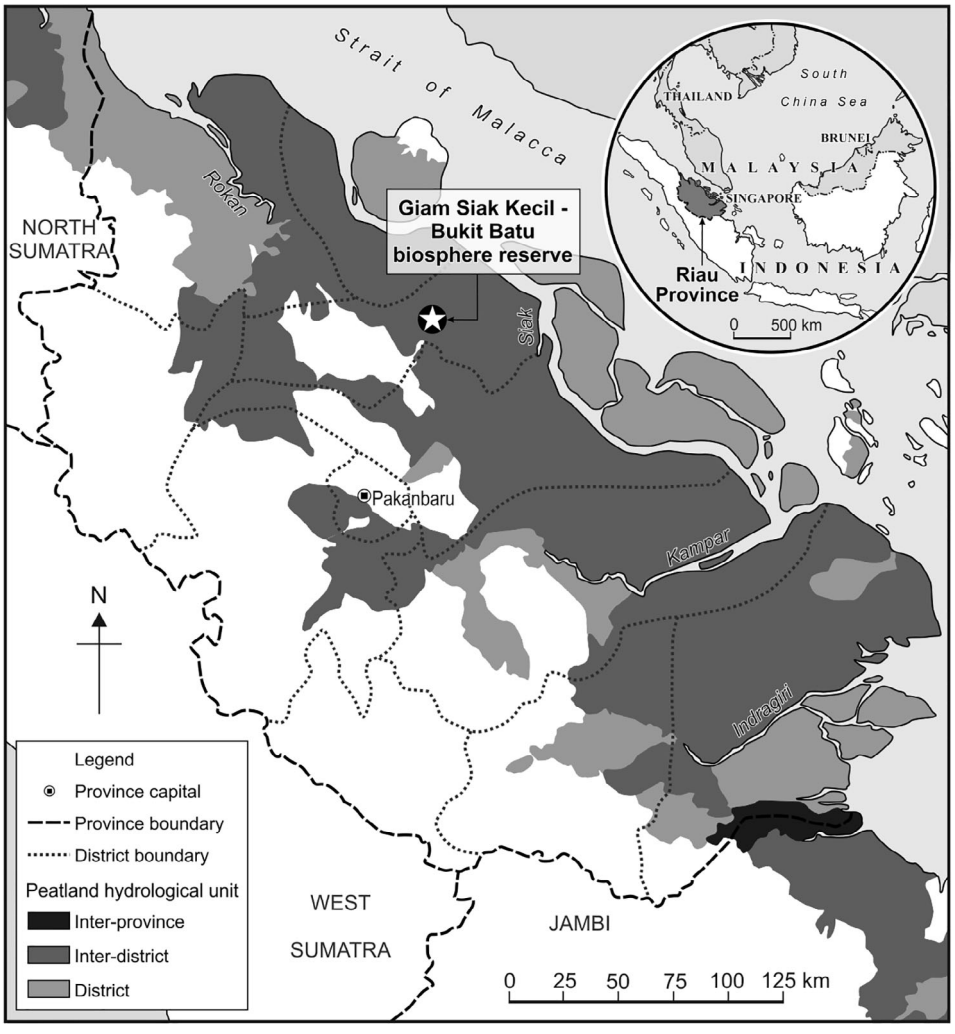

Figure 3. Case study area Giam Siak Kecil and Bukit Batu landscape

2019: 5). Following Miller *et al*. (2019), I see the peatland restoration partnership in GKSBB as a hybrid form of transboundary governance involving diverse actors, institutions and sectors across jurisdictional scales and authorities. This hybrid arrangement provides an opportunity to examine the challenges of governing environmental commons and peatland users' responses to the process of internalisation that results from the peatland eco-scalar fix.

GSKBB hosts a diverse range of endangered species, such as the Sumatra tiger (*Panthera tigris sumatrae*) and Sumatra elephant (*Elephas maximus*) (UNESCO, 2015). UNESCO has recorded more than 189 plant species in the biosphere spanning over 700 thousand hectares of terrestrial and marine areas (UNESCO, 2015). Within the buffer zone of the biosphere area, a coalition of civil society organisations has formed a partnership to implement and deliver a peatland restoration programme that targets 10 villages (WWF, 2018). The restoration initiative is a transboundary initiative led by a conservation organisation in partnership with four local NGOs in Riau, a local university and members of the Community Fire Brigade from the 10 targeted villages. The initiative receives financial support from a conservation organisation in Singapore. According to the conservation organisation, the restoration in GKSBB contributes around 101 573 ha (12%) of the PRA's restoration target in Riau province (WWF, 2018).

The restoration programme aims to rewet degraded peat by constructing canal blocks and improving the community's fire prevention system by installing 10 units of early warning systems for forest and peatland fires. These relay real time data to android-based system devices for 10 community fire patrols at the village level. The programme also aims to improve the community fire patrol's capacity by creating more knowledgeable, technologically savvy and disciplined subjectivities (Miller and Rose, 1990). In addition to this programme, a web-based peat management information centre has been launched to facilitate knowledge exchange and coordination (see www.riaubiru.com). Despite the technical rendering of the prescribed restoration activities (Li, 2007), civil society organisations have succeeded in supporting four villages to draft village regulations that potentially repoliticise natural resources management in peatland landscape communities. This section focuses on one of these four villages as a case study of a hybrid peatland governance.

One of the interesting points being discussed in village regulations is companies' responsibility to share water resources in rural areas. There are two active concessionaires in the GSKBB area with locations adjacent to the 10 villages involved in restoration activities. The two concessions are as follows: a forest industrial concession (Plantation A) and an oil palm concession (Plantation B). Both concessionaires' headquarters are located in Singapore. The two concessions are situated in the upstream area of the *peatland hydrological unit* in GSKBB, whereas the villages are located in the downstream area. To cultivate peatland, concessionaires often have to re-engineer peat hydrology to make it suitable for the crops to grow; in other words, they have to drain it. This means water will be drained to flow out of concession areas to the downstream areas (village settlements) during the rainy season, while water is blocked from flowing out of the concession during dry season to maintain a 0.4 peatland water table and prevent fires, as prescribed in the peatland eco-scalar fix. This water management has affected villages' settlements and community plantations, with excessive water causing flooding during the rainy season and the lack of water causing droughts and fire risk during the dry season. The rescaling of peatland governance at the *peat hydrological unit* has promoted the management of peatland in a singular spatial scale and produced unintended environmental externalities by displacing the fire risk from plantations to community areas (Cohen and Bakker, 2014).

The village-level regulation was suggested to address the aforementioned problem of environmental externalities by proposing a water sharing mechanism among peatland users in the GSKBB landscape. One article of the regulation highlights the role of corporations whose concessions are located within or bordering village territory to ensure they cooperate with the village community. Another article emphasises corporations' liabilities to share water with the village during the dry season to prevent fires. The village regulation also emphasises companies' responsibilities for sharing their drainage system maps with the village authority. The village regulation consists of mechanisms that hold corporations and village communities accountable when managing peat and its hydrology.

Water sharing emerges as a platform for collaborative land management across one *peatland hydrological unit*. The technical implementation of water sharing was discussed in a meeting in June 2019 attended by NGOs, community representatives and Plantation A, where participants agreed to form a taskforce to design a new drainage system that would enable the collaborative control of water flows from the concession (upstream) to the village areas (downstream). Despite a willingness from Plantation A to join the collaborative platform, Plantation B's approach to water sharing was less positive. They did not accept the NGO's invitation to discuss water sharing mechanisms. During an interview with a hydrological engineer, he explained that sharing water with village communities requires drainage engineering that is potentially expensive and is therefore an extra cost for the plantation. His explanation was as follows:

> A plantation's drainage infrastructure is considered more advanced than those located or owned by communities. Thus, when water sharing is agreed, technical intervention is required to renovate the communities' canals. This is essential to prevent water loss that can cause over-drainage during the dry season and to prevent flooding during the wet season. However, the re-engineering of the communities' canals will be expensive, and most companies will usually avoid this potentially costly collaboration (Interview with engineer F, August 2019).

Despite the slow progress aligning all peatland stakeholders on one governance platform, the regulation has introduced a sense of commonality among village leaders and members, including the community fire patrols. It is important to note, however, that concessionaire's involvement in the water sharing platform does not simply comprise being driven by the village regulation. In Indonesia's legal system, a village regulation does not have legal power over a private national entity, such as a forest plantation (Pramesti, 2018). The findings of the present research indicate that multiple rationalities motivated Plantation A's involvement, one being the company's interest to be associated with a well-known conservation NGO that led the water sharing initiative. Large-scale plantations have experienced scrutiny over their operations because of such plantations are associated as being one of the peatland fire causes (Pebrianto and Cahyani, 2019). An interview with Plantation A's manager reveals the significance of being seen as a collaborative peatland user in that it will provide a long-term benefit for the company such as the acceptance of their operations by communities and civil society.

Beyond fire prevention and water sharing, the regulation also introduces socio-environmental justice principles when managing a village's common resources, including land governance. The regulation includes articles on corporations' liabilities to follow government policy, with a minimum of 20% allocation of oil palm and pulpwood concessions to the community. The village regulation draws from President Joko Widodo's flagship programme on social forestry that aims to distribute access to 12.7 Mha of forest lands to local communities (KSP, 2019). Around 20% of the 12.7 Mha target for social forestry comes from the concessionaires' responsibilities to allocate the minimum 20% of their lands for partnership with local communities. However, as previously noted, a village-level regulation has no legal authority over a private entity. Thus, apart from setting a just principle of managing an environmental peatland commons among users at the village level, the regulation may not directly improve communities' access to land.

The GKSBB restoration initiative is still in its early implementation stage and not all forest management units within the peatland landscape have agreed to collaborate on the water sharing mechanism. However, findings show that a hybrid form of peatland governance involving multiple peat users has allowed a fair mechanism of accessing environmental commons to emerge. Further research is required to assess the long-term socio-environmental impacts of this hybrid form of peatland governance.

Conclusions

Drawing on the concept of the eco-scalar fix, the present paper has described the rescaling of peatland governance based on its hydrological characteristics. This rescaling draws on environmental rationalities of keeping water balance to

prevent fire and its associated transboundary haze. This has political and material implications in the sense that it produces ways of reorganising peatland users' conduct in accessing and managing peatland environmental commons. The rescaling produces new object of governance: the peatland groundwater table. Large-scale plantations have to conform to new rules justified on environmental grounds to minimise the socio-environmental externalities of peatland exploitation.

In this paper, I have shown that the spatial reorganisation of peatland has allowed new modes of governing to emerge. These modes of governing are justified by the processes of internalisation and/or externalisation of the socio-environmental externalities of peatland conversion to large-scale agricultural land. The government embraced neoliberal paradigms in governing peatland in the hope of using water management technologies to facilitate further peatland exploitation. I have also demonstrated that the ecological rescaling is a fraught process in which powerful actors' resistance and contestation have led to the construction of new scales of peatland governance (the *peat dome peak*) that fit with such actors' interests. Thus, I have shown how rescaling can have deeply political consequences in that it may empower particular actors while marginalising others and risks producing contradictory effects that will displace rather than address peatland fires and transboundary haze.

By examining a case study of a restoration initiative in Riau Province, I have demonstrated how the rescaling-out of peatland governance has provided an opportunity for the emergence of a hybrid form of peatland governance. This governance involves multiple actors across forest land ownerships, including concessionaires, communities, village authorities, universities, environmental activists and conservation organisations. The presence of multiple logics, interests and rationalities in governing peatland, including being associated with a well-known conservation organisation and gaining community acceptance, motivates powerful actors to collaborate to form mechanism for water sharing. As a result, a hybrid form of peatland governance can effectively prevent resource enclosures (in this case, water) and promote just ways of governing access to environmental commons. Thus, for peatland proponents, aligning the multiple interests of peatland users in a manner that acknowledges its hybrid and transboundary characteristics may prove to be essential in mitigating peatland fires and transboundary haze.

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Notes

1 Presidential Decree No 32/1990 on Management of the Protection Area stipulates the classification of peat that is more than three metres deep as a protected area and forbids its use for agricultural activities.
2 GR No 57/2016 is the revision of the previous GR no 71/2014 on Peat Management and Protection. The GR is the highest and most comprehensive regulation on peat in Indonesia as well as the legal base for the issuance of Ministerial Regulations (MR) on peat and other related policies.
3 RSPO is one of the major oil palm certification bodies that does not allow oil palm plantations on peatland regardless of depth.

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