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Understanding and Tackling Haze Pollution: Perspectives from Sustainability Science and Bioethics



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INDIGENOUS PEOPLE IN THE DYNAMICS OF LAND USE CHANGES, FOREST FIRES AND HAZE IN RIAU PROVINCE, INDONESIA

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Forest fire in Tesso Nilo National Park, Riau Province (2017)
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Forest fire in Tesso Nilo National Park, Riau Province (2017)
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related to the interface between nature and society, it is an interdisciplinary arena to satisfy the social demands within the limit of nature's carrying capacity (Bennet, 2013). Sustainability science is "an attempt to bridge the natural and social sciences for seeking creative solutions to the complex problems" (Jerneck, Olsson, Ness, Anderberg, Baier, Clark, Hickler, Hornborg, Kronsell, Lovbrand, and Person, 2011: 69).

The research is important for the following reasons. First of all, indigenous people are victims of the haze problem as their settlement are affected by the haze. In addition, their livelihood depends on the cultivation of the forest land. Finally, they themselves are parts of the dynamics of stakeholders relating to land use changes and forest fires.

The research is associated with the principle of social responsibility stipulated in Article 14 of Universal Declaration on Bioethics and Human Rights. Three out of five elements of the concerns about social responsibility are relevant, including: (1) improvement of living condition and the environment; (2) elimination of marginalization and exclusion of persons on the basis of whatever grounds; and (3) reduction of poverty and illiteracy (IBC, 2010: 9). Although these elements are not directly related to provision of healthcare, they are equally important as stated in the conclusion of the report: "... it is important to acknowledge that the achievement of these goals requires not only a serious effort to improve health and health care delivery but also acceptance of responsibility to minimize or eradicate avoidable risk of threats to health and well-being" (IBC, 2010: 45).

The IBC Report (2010) also recognized the many stakeholders involved in the social responsibility aspect such as communities, commercial companies, political organizations, educational institutions, and law enforcement agencies. This indicates

that synergy and collaboration among stakeholders are significant and are critical aspects of sustainability science.

The objective of this research is to develop understandings of the environmental, social and ethical aspects of the haze problem based on which an initial framework can be formulated to contribute to solving the problem. Specifically, the research (i) identify the stakeholders and socio-economic-cultural-policy drivers of haze, (ii) investigate the linkages between forest and haze problem to the indigenous people, and (iii) develop a sustainability framework for collaborative support to indigenous people and to overcome the forest fire haze problem.

BENEFICIARIES AND IMPACT

The main beneficiaries of this research are the communities in the affected area of Riau Province (Indonesia), district/provincial government agencies responsible and working with these communities, as well as other affected regions outside Riau Province.

METHODS

The research adopts a mixture of methods including literature review, focus group discussion (FGD), and field observation.

Firstly, a meeting with the stakeholders was held to explain the substance, approach and methodology of the study. Two FGDs were also made at this step.

Secondly, a literature review of related documents was done to identify the information available relating to the haze and other environmental problems at the studied site.

Based on the literature review, FGD and field visits, the mapping and analysis of stakeholders were carried out.

The next step entailed field visit/observation, and in-depth interviews of key informants (stakeholders), including the community at the selected research sites.

Results were then synthesized, sent out for feedback, and revised as the final report.

RESULTS

Research site

The research was conducted in Riau Province (Indonesia), which borders with Malaysia and Singapore. Riau Province has experienced significant forest lost due to land conversion for palm oil plantation, industrial forest plantation, and other agricultural purposes. The province's total population is more than 6.5 million covering an area of around 108,000 km² with peatland as the dominant type. There are seven ethnic groups, of which Melayu, Batak, Minangkabau, and Javanese are the majority.

Pelalawan District was selected as the research site, as this is where Tesso Nilo National Park (TNNP) is located. TNNP in particular and Pelalawan District in general are both parts of the affected area. Established in 2004, TNNP covers an area of 10,793 ha. It has a strategic role, serving as (1) a transitory ecosystem from highland to lowland and habitat for endemic animal species of Sumatra Island such as elephants and tigers; (2) a buffer zone; and (3) a place that preserves biodiversity and its sustainable use. TNNP has a rich biodiversity; however, ecosystem conditions have deteriorated recently due to humans activities. About 53% of the TNNP area has been cleared and has

the status as open land without vegetation (Office of TNNP, 2017).

Two villages of the District (Segati and Lubuk Kembang Bunga) were visited during the fieldwork. Both of them are partially located inside TNNP.

Located in Langgam sub-district, Segati village covers an area of approximately 59,476 ha, more than half of which overlaps the TNNP territory. The majority of villagers live on agricultural activities, including both food crops (such as corn, cassava, and sweet potato) and plantation crops (such as palm oil, rubber, and coconut). The village population, which is the largest in Langgam, has increased by 27.5% in the last five years from 6,477 to 8,261 persons (BPS, 2011/2015/2016), of which two-third was migrants. They have come to get involved in land clearance activities for palm oil plantations.

Lubuk Kembang Bunga (LKB) village is located in Ukui sub-district. LKB Village has topography of lowland area and surrounded by both forest and protected forest area. The village has 3,682 inhabitants, whose ethnic groups are Melayu Riau, Javanese, Batak of North Sumatra, and Melayu of North Sumatra. Part of them are migrants from transmigration and individual initiatives. Total area of the village is 24,293 ha, more than half of which is forest and idle land. The rest are used for settlement (6,187 ha) and community plantation (5,000 ha). Main income sources of LKB villagers are from agricultural activities, in particular plantation of rubber and palm oil (mostly), coconut, cassava, banana, vegetables and other fruits. LKB villagers also harvest honey from kepong sialang forest as non-timber forest products (NTFP).

Haze occurrence and health impact

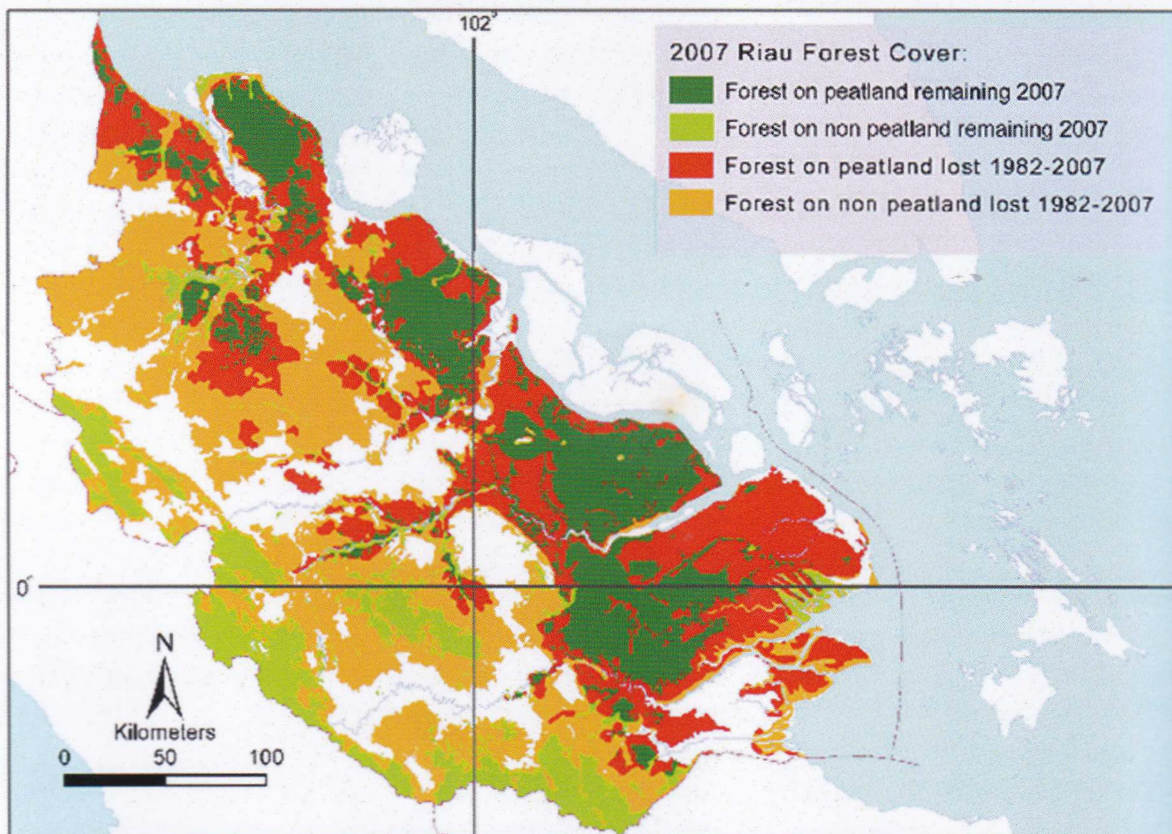
Forest and land fires, which happens almost every year in Riau Province, have disturbed public life and resulted in economic as well as ecological losses. Development of plantation business, especially palm oil, is *an crucial factor that causes fire and haze*. According to World Wide Fund for Nature (WWF), Riau has lost more than four million hectares of forest over the past 25 years. Meanwhile, CIFOR (2003) reported that peat forest fires were the largest contributor to haze. The report also referred to Riau as one of the provinces in Sumatra contributing to the haze problem that spread to Singapore, mainland Malaysia, and other parts of Sumatra.

In 2007, the remaining natural forest area in Riau Province was 2,478,734 ha, 65% of which was peat swamp forests. Frequent land conversion and degradation have reduced forest area from year to year. Figure 1 illustrates the change of forest cover in 2007 and forest lost in prior period.

The changes of land cover spread out since the expansion of palm oil, pulp and paper industries. Although these industries have led to impressive economic growth in Riau Province, they do not go hand in hand with the awareness of sustainable development in general and environmental issues in particular.

It can be seen from Figure 1 that the change of land cover in Riau province consists of forest on peatland and forest on non-peatland.

Figure 1: Map of Riau Province and indication of forest cover in 2007 and forest lost in prior period (Source: WWF Indonesia, 2010)



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The remaining peat forest in 2007 spread only over the eastern part of Riau Province, and non-peatland forest also experienced considerable loss. Non-peat forests are scattered in the western and southern parts of Riau Province. As mentioned earlier, this forest cover reduction was caused by land clearance for palm oil and industrial crop plantation.

Observation showed that fire spots in Riau Province tended to increase between 2010 and 2014 (from over 4,000 to over 21,000), then dropped in 2015 (over 7,000) (Greenpeace, 2015). The figures indicate that forest and land clearance activities continued to occur without proper handling by various parties and caused enormous impact to people's life. Between 2016 and July 2017, fire spots were still detected in various areas. However, the number of forest and land fires in 2017 reduced, according to the Ministry of Environment.

Major challenges with regard to health management during the occurrence of fires and haze are the collaboration and concerted actions (such as fundraising and staff mobilization) among relevant agencies to provide health care services to the affected communities and mitigate health-related impacts. At the moment, they are still seen as the sole responsibility of Riau Province Health Agency. Therefore, there is still room for improvement in this matter.

Community preparedness to deal with forest fires and haze

After the heavy forest and land fires causing haze disaster in 2015, the Masyarakat Peduli Api (MPA/Fire Care Community) has been set up at Segati village as part of the efforts to deal with forest fires. The Health Agency has also established the emergency response unit. MPA has an operation center (POSKO)

with supporting equipment. It organizes patrol activities two or three times a week depending on the weather. According to MPA, forest and land fires happen for two major reasons: (1) the carelessness of the community when using fire (such as disposing burned cigarette waste at fire-prone locations, and leaving small-scale fires intended to repel insect from biting the hamlet); and (2) land clearance activities by relatively small scale investor using slash and burn method to reduce costs. With the organized activities aforementioned, MPA of Segati village has successfully controlled the occurrence of fires and were awarded with Rp. 100 million by palm oil enterprise in the area.

What is interesting from the experience of Segati village was the possibility to build the capacity of MPA to be able to provide small-scale land clearance services to the community and small scale (legal) investor to prepare land for agricultural purposes. Members of MPA can be trained to improve their technical skills and provided with supporting equipment. The MPA can be given the right to cultivate land which functions as a showcase of how to properly conduct land clearance. The earning from the cultivated land can also support MPA operational costs and the livelihood of the active members in the long term. This initiative can therefore be part of the future strategies to deal with the threats of forest fires and haze.

Social indigenous system

The indigenous people called Petalangan have existed in Pelalawan before Hinduism came to the region. Petalangan people lived under the influence of several kingdoms prior to the Indonesian independence (Marzali, 2014). For this reason, they have developed their own socio-economic

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some of whom are active in land clearance activities;

- 8) A number of indigenous people interact positively with forest land inside TNNP through harvesting NTFP such as honey from *sialang* trees, rattan, etc,
- 9) The existence of local wisdom in the form of dividing forest land into cultivated land, reserved forest, and traditionally protected forest for honey production (*kepungan sialang* forest); and
- 10) Local institutions for forest land management in the form of community forestry (HKM) is promoted by the government, and have successfully helped indigenous people avoid forest land destruction activities in some cases.

DISCUSSION

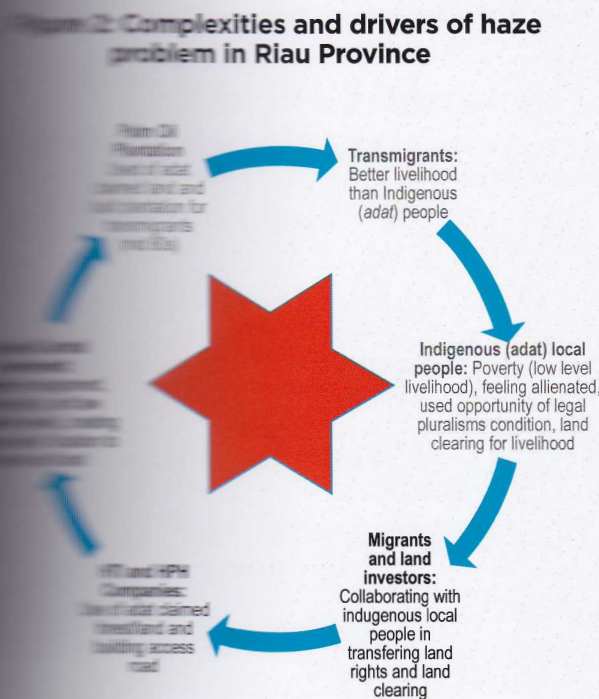
Complexities and drivers of haze

Key points from the result section about the complexities and drivers of the haze problem can be summarized as follows:

- 1) Haze problem is a consequence of land clearance for plantation (mainly palm oil and rubber). This situation is then worsened by illegal logging. Dry season with less rainfall and reduced soil water table also make forest and peatland more prone to be burned, and fire spread to a larger area. Two factors which make land clearance attractive include: (1) an increase in land price after clearance; and (2) the existence of palm oil factories which do not require plantation; instead, they obtain raw materials from non-corporate plantation which is mainly located on the area either under overlapped property right regimes or disputed tenure status (between the state, adat communal rights, and corporate concession).
- 2) The forest concession given by the government to palm oil companies, industrial forest (HTI), and logging concession (HPH) have overlapped the *adat* communal land claimed by indigenous people. This has created conflicts between the companies and the indigenous people. In addition, the development of palm oil plantation in earlier periods which was intended for and distributed to trans-migrants from outside Riau Province has left indigenous people with the feelings of being alienated and unequally treated.
- 3) Road construction in HTI locations to transport timbers has made it easier to access the forest and thus attracted even more land clearance.
- 4) The difficult economic condition of indigenous people (around 75% are classified as poor households) and their low educational level have limited their income sources to logging (in the *adat* communal forest land claimed by indigenous people), involvement in land clearance activities, and transfer of land rights to migrants from outside Riau Province as well as investors.
- 5) Migrants, whose population have prevailed quickly, hope to improve their livelihood through land-based economic activities in Riau Province. Indigenous people, feeling alienated by the government, consider migrants and land investors as partners to improve their livelihood through land clearance (by fire) and land right transfer.
- 6) The government, both central and local, did not have a firm standpoint and policies to tackle various aspects of the problem. Related regulations were considered insufficiently

enforced. The migrants residing within the TNNP area have integrated into the nearby village, leading to an expansion of village area coverage, further land conversion, and an "open access" situation.

These factors are visualized in the following



Ethical framework for collaborative supports to build adaptive capacity for indigenous people and overcome haze problem

Framework components

This ethical framework consists of four components: (1) property right regimes; (2) ethical issues; (3) elements for actions and transition towards sustainability; and (4) addressed sustainability issues.

Property right regimes

Forest fires and haze problem tend to be rooted in the legal plurality relating to the rights to access and control over forest and land (property right regimes). There are four property right regimes attached to forest and land resources: state, private, communal, and open access. Property right regimes regulate relations among the people (actors) on access, rights to benefit, and control over the property objects. Each property right holder has his own ethical issues associated with his position in the governance and management of land and forest for sustainability.

Ethical issues

The state-related ethical issue is the responsibility to protect the interests of indigenous people and help them have a decent life. Ethical issue of the private sector (corporations) is the responsibility for the benefits obtained from the resources controlled by the state but used mainly to improve the welfare of the people. Ethical issue of the community is the responsibility to behave environmentally friendly in using and managing land and forest.

Elements for actions and transition towards sustainability

Elements of the framework are identified based on the ethical issues and the root cause of the haze problem aforementioned. In this case, they include the cultural, socio-economic, and environmental interest and concerns. The framework aims at and focuses on re-establishing the rights of indigenous people to have decent life and adaptive capacity for sustainable use of land and forest; however, it also has to take into account of the benefits of other involved stakeholders. This is why the term

	Ethical issues	Elements for actions and transition toward sustainability	Addressed sustainability issues
	<ul style="list-style-type: none"> - State responsibility to protect the interests of indigenous people and improve their welfare; - Corporate social responsibility 	<ul style="list-style-type: none"> • Development of local economy and conservation of forest (i.e improvement of <i>kepungan sialang</i> forest as eco-tourism destination). • (Wherever possible and agreed upon): Establishment of a collaborative model for developing palm oil and industrial forest plantation, which is between the corporations and indigenous people/other legal inhabitants, and facilitated by the government; • Development of state-owned permanent food crop land, which is cultivated by local people and managed by local authorities with yield sharing arrangements; • Social and cultural empowerment of indigenous people to sustainably manage land and forest, and improve livelihoods (i.e establishment and empowerment of MPA). 	<ul style="list-style-type: none"> • Local economic development (NTFP); • Economic growth and employment; • Food security; • Conservation of land, forest, water, and biodiversity.

In general, the actions proposed in the ethical framework above offer win-win situations for all stakeholders in the transition toward sustainability. Re-establishing the rights of indigenous people is expected to create a more decent life for them, and help them be able to get actively engaged during the process, even though the outcomes that it generates may be slightly different from those of previous institutional and legal arrangements.

As noted earlier, it is the changes of the property right regimes (tenurial relations) that have created disputes in the area, which are some of the causes of forest fires and haze. To be more precise, at the beginning there were only two types of land: state land and communal land. Later, land and forest was given to corporations. The complexities of relations under these three types of legal ownership, together with other intervening factors, tend to have led to endless problems with regard to sustainability. Therefore, stakeholders should consider a new set of property right arrangements as a condition to enable the transition towards sustainability. Considering the components of the ethical framework, the new arrangements are proposed as follows:

- *State land and forest* can be developed into: (i) nucleus estate small holder (NESP) area where appropriate; (ii) permanent food crop area; and (iii) forest conservation area.
- *Land and forest under expired concession*:
 - The land inside TNNP can be developed as protected area where indigenous people have the rights to harvest NTFP under community forestry (HKm) arrangements. Rehabilitation inside TNNP area can focus on *kepungan sialang* forest;
 - The land outside TNNP can be developed/converted into NESP area through collaboration among indigenous people, enterprises (both public and private), and other legal local inhabitants; and
 - Areas which are suitable for food crops can be developed as permanent food crop land, managed by local authorities, and cultivated by indigenous people as well as other legal local inhabitants with yield sharing arrangements.
- *Communal land and forest*: assistance programs should be provided to empower local institutions and

local people for sustainable use and management of land and forest. *them so that they can actively get engaged*

All the proposals above are expected to help overcome the root cause of forest land fires and haze problem.

CONCLUSION AND RECOMMENDATION

Given that forest fires and haze substantially influence the socio-economic and environment aspects as well as international relations, innovative solutions to the problems are urgently required. A major root cause of forest fires and haze is the take-over of land and forest under the communal control by the state, which is then under concession of (mostly palm oil) corporations. On the one hand, this has left indigenous people with the feelings of being unequally treated, unable to get benefits from the land, and alienated in their own homeland. On the other hand, the development of palm oil plantation and industrial forest has contributed significantly to economic growth. Apart from that, environmental concerns cannot be left behind because it affects the benefit streams from natural resources in the long term. This is concerned with ethical dimensions, particularly the governance of resources and the relations among stakeholders. All of those complexities are also connected with the principle of social and public responsibilities enshrined in Article 14 of Universal Declaration on Bioethics and Human Rights, namely: (1) improvement of living condition and the environment; (2) elimination of marginalization and exclusion of persons on the basis of whatever grounds; and (3) reduction of poverty and illiteracy (IBC, 2010: 9).

Taking all of the above factors into consideration, key solutions to the problem should be based on re-establishing the rights of indigenous people and empowering

in relevant processes. This research offers an ethical framework (which still needs further development) as the basis for the stakeholders to take actions in the transition towards sustainability and avoid the haze problem.

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APPENDIX