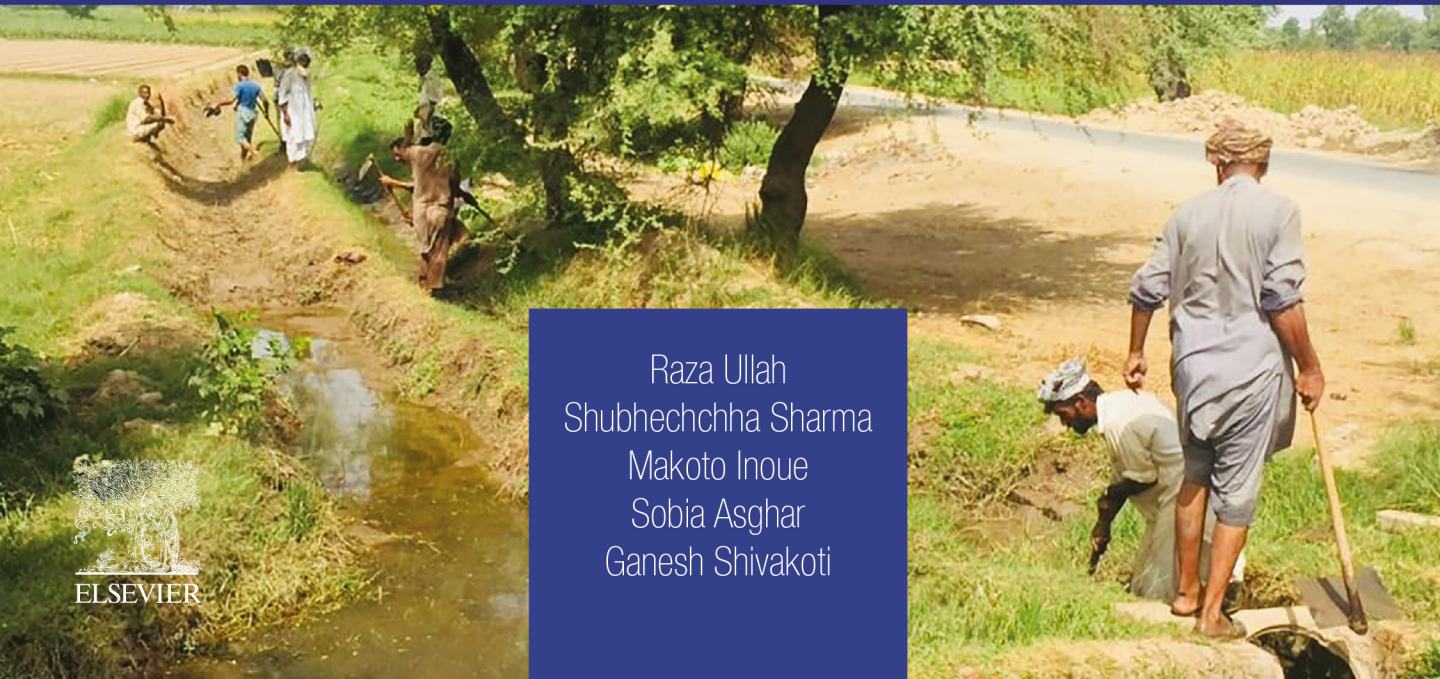




Natural Resource Governance in Asia

From Collective Action to Resilience Thinking



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Indigenous people in the dynamics of land use changes, forest fires, and haze in Riau Province, Indonesia

18

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1 Background and research objectives

The problem of haze caused by forest fire has occurred annually in Southeast Asia, specifically affecting Indonesia, Malaysia, and Singapore. It has not only caused environmental degradation at the site but also affected the health of the people and the economy at a wider scale, crossing the provincial and country borders.

Efforts to deal with the haze problem in the past mostly concentrated on the physical or ecosystem aspects. However, haze is also a product of human behavior, which belongs to the domain of social system and, thus, includes ethical aspects. Haze annually occurs in the areas where forest is converted for agricultural purposes through land clearance practices such as slash and burn, which may increase the susceptibility to forest fire beyond the intended area.

Human behaviors toward the ecosystem are influenced to a large extent by ethical values, which can be used as the basis for actions. However, an important condition is that the understandings of the social, ethical, and environmental aspects have to be integrated. In regards to the haze problem, little has been done to explore these ethical aspects and their applications in practice. Therefore it is worthwhile to study this topic more in-depth and develop a framework for action from sustainability perspective. The goal of sustainability science is to formulate science-based innovative solutions to the problems relating to sustainability. Because those problems are complex and essentially 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 (Bennett, 2013). Sustainability science is “an attempt to bridge the natural and social sciences for seeking creative solutions to the complex problems” (Jerneck et al., 2011, p. 69).

The research is important for the following reasons. First of all, indigenous people are victims of the haze problem because their settlements 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 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 (UNESCO IBC, 2010, p. 9). Although these elements are not directly related to provision of health care, 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" (UNESCO IBC, 2010, p. 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 will: (1) identify the stakeholders and socioeconomic-cultural policy drivers of haze; (2) investigate the linkages between forest fire and haze problem to the indigenous people; and (3) develop a sustainability framework for collaborative support to indigenous people and to overcome the forest fire and haze problem.

2 Beneficiaries and impact

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

3 Methods

The research adopts a mixture of methods, including literature review, focus group discussion (FGD), and field observation. The FGD method is deemed appropriate in this case because the objective of the research required cross-stakeholders in-depth understanding on dynamics of interactions and the complex problems resulted from, which could not be obtained from a conventional survey method.

First, FGDs meeting with the stakeholders were held to explain the substance, approach, and methodology of the study. It was, then, followed by in-depth discussions on the complex problems of interactions and their dimensions.

Second, a literature review of relevant documents was done to identify the key information available relating to the haze and other environmental problems on 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.

4 Results

4.1 Research site

The research was conducted in Riau Province (Indonesia), which borders with Malaysia and Singapore. Riau Province has experienced significant forest lost because of 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 because 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 81,793 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 uses. TNNP has a rich biodiversity; however, the 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.

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 subdistrict, 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 past 5 years from 6477 to 8261 persons (BPS, 2011/2015/2016), of which two-thirds were migrants. They have come to get involved in land clearance activities for palm oil plantations.

Lubuk Kembang Bunga (LKB) village is located in Ukui subdistrict. LKB village has topography of lowland area and surrounded by both forest and protected forest areas. The village has 3682 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 (6187 ha) and community plantation (5000 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 *kepungan sialang* forest as nontimber forest products (NTFPs).

4.2 Haze occurrence and health impact

Forest and land fires, which happen 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 a crucial factor that causes fire and haze. According to World Wide Fund for Nature (WWF) Indonesia Technical Report 2008 (Uryu, 2008, p. 3), Riau has lost more than 4 million hectares of forest over the past 25 years. Meanwhile, CIFOR (2006) 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. Fig. 18.1 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 Fig. 18.1 that the change of land cover in Riau province consists of forest on peatland and forest on nonpeatland. The remaining peat forest in 2007 spread only over the eastern part of Riau Province and nonpeatland forest also experienced considerable loss. Nonpeat forests are

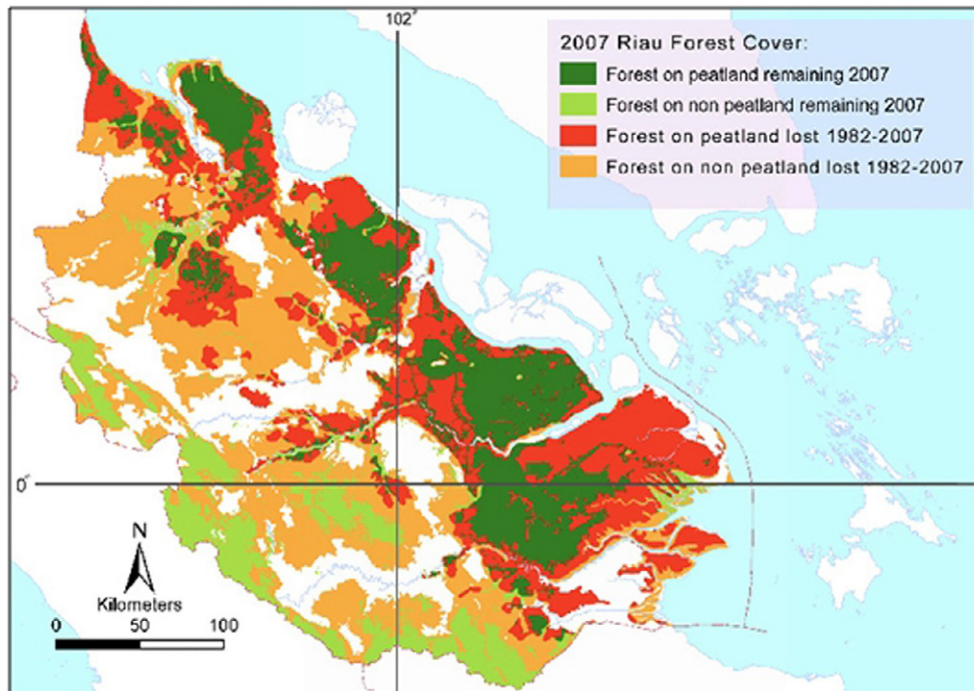


FIG. 18.1

Map of Riau Province and indication of forest cover in 2007 and forest lost in prior period, WWF Indonesia Technical Report.

Source: Uryu, 2008.

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 4000 to over 21,000) and then dropped in 2015 (over 7000) (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.

4.3 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 at 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 enterprises in the area.

What is interesting from the experience at 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) investors 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 that 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.

4.4 Social indigenous system

The indigenous people called Petalangan have existed in Pelalawan before Hinduism came to the region. Petalangan people had lived under the influence of several kingdoms prior to the Indonesian independence (Marzali, 2014). For this reason, they have developed their own socioeconomic and cultural system, including access, control, and management of land and forest.

The social indigenous system in Pelalawan is called *Pebatinan* (Batin system). There are 29 *Pebatinan* in Pelalawan, each of which is led by a Batin. This system is based on communal ownership

and control over land and forest, which is called *hutan tanah ulayat*. Land and forest are divided into three categories:

- *Rimba perladangan*: seasonal forest land to grow food crops using slash and burn method.
- *Rimba cadangan*: reserved forest to harvest timber and nontimber forest products as income sources.
- *Rimba kepungan sialang*: forest allocated specifically as habitat for bees to produce honey, which is seasonally harvested by indigenous people.

As the livelihood of the indigenous people are land- and forest-based, the norms and ethics related to forest and land use rights and management have developed and evolved over time, adapting to the socioeconomic and political changes. The main reasons for changes are related to governance (in particular local authorities) and economic development (Marzali, 2014). Another reason is related to population whereby a significant number of migrants moved into Pelalawan and got involved in the conversion of forest into cultivated land for agriculture and settlements.

There are two traditional ways of managing land and forest: *Nyanyi Panjang* and *Menumbai*. Both are important elements for sustainable land use. As the local community's forest is reduced by the provision of concession to private companies and other parties, these practices have faded and now rarely performed.

- *Nyanyi Panjang*: It is a type of cultural event in the form of singing poems containing norms and ethics in the social life of the community. Through the event, the community is reminded from time to time about the principles of interactions among different aspects of their land- and forest-based life.
- *Menumbai*: It is the practice of harvesting honey from *sialang* trees. *Sialang* is a term used to represent a group of tree types that are suitable as hotbed for bees (*Apis dorsata* type) to produce honey. The diameter of these trees is usually around 1 m with the height between 25 and 35 m. This practice is conducted two or three times a year during the night with a torch made of coconut fruit fiber as the only source of light. First, the group of the harvester prepares a bamboo ladder to climb the tree. Next, the harvester moves closer to the tree while singing the poems with the torch at hand to make the bees fly away and also to repel the wild animals that may be living on that tree. After climbing on the tree and reaching an appropriate point, the harvester collects the beehive that contains honey. It takes about 4 h to harvest the honey from one tree. The honey will be then shared among the team of harvesters, clan leaders, and the other clan members following *adat* regulations.

4.5 Stakeholders

Purnomo, Shantiko, Sitorus, and Achdiawan (2015) identified 17 stakeholders involved in the complex problem of haze and forest fires, including land claimants; farmers' group (two); marketing team of cleared land; government agencies of different levels (five); land speculators; land buyers (two); palm oil and industrial plantation businesspersons and corporations (three); nongovernment organizations; and universities and research institutes. These stakeholders can be classified into four main categories:

- (1) indigenous people;
- (2) migrants and land investors;

- (3) palm oil and industrial forest plantation corporations; and
- (4) government agencies.

4.6 Socioeconomic, cultural, and political drivers of haze

Based on review conducted, the following are drivers of the haze problem, which are concerned with demographical, socioeconomic, cultural, political, and communication factors:

- (1) Significant number of migrants involved in land clearance activities.
- (2) Use of fire in land clearance to reduce the costs.
- (3) Opening of idle bush land for cultivation in dry seasons by using fire, which increases the possibility of fire spreading beyond the intended area.
- (4) Small-scale land clearance stakeholders do not have access to appropriate technologies to clear the “tough” bush in the area (*pakis*) and, thus, use fire as the only choice.
- (5) Weak law enforcement.
- (6) Information about the risks and danger of forest fire and the way to deal with them was not adequately delivered to the local community.
- (7) The roles of local institutions, especially those relating to forest land, are weakened.
- (8) Overlapped claims over forest land (tenurial conflict) among the property rights holders are not resolved.
- (9) Lack of communication between the government and the community.

Further, the following are factors relevant to the haze problem, which are concerned with agricultural aspects, survival strategies, local wisdom, and local institutions for forest and land use.

- (1) A significant proportion of local inhabitants’ income (about 59%) come from harvesting timber from the forest and can be obtained in relatively short time compared with other agriculture activities.
- (2) Food sources come from shifting agriculture using slash and burn method.
- (3) Traditional income source from honey harvested from *kepungan sialang* forest has declined because the number of *sialang* trees has decreased because of forest clearance for cultivation and logging.
- (4) Migrants from outside can clear the land inside the TNNP without being punished by law, which sets a negative example for village locals in the area.
- (5) Inconsistency between TNNP’s initial establishment mandates and the ways relevant actors/stakeholders manage the forest. As a result, a majority of TNNP area has now been under cultivation.
- (6) Insufficient efforts have been made to empower indigenous people in sustainable management of forest land (PMDH) and improvement of their livelihoods.
- (7) Indigenous people live on multiple layers of income source, including agricultural food crops, labor activities, plantation, and development of relationship with traders/investors, some of whom are active in land clearance activities.
- (8) A number of indigenous people interact positively with forest land inside TNNP through harvesting NTFPs such as honey from *sialang* trees, and rattan.

- (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).
- (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.

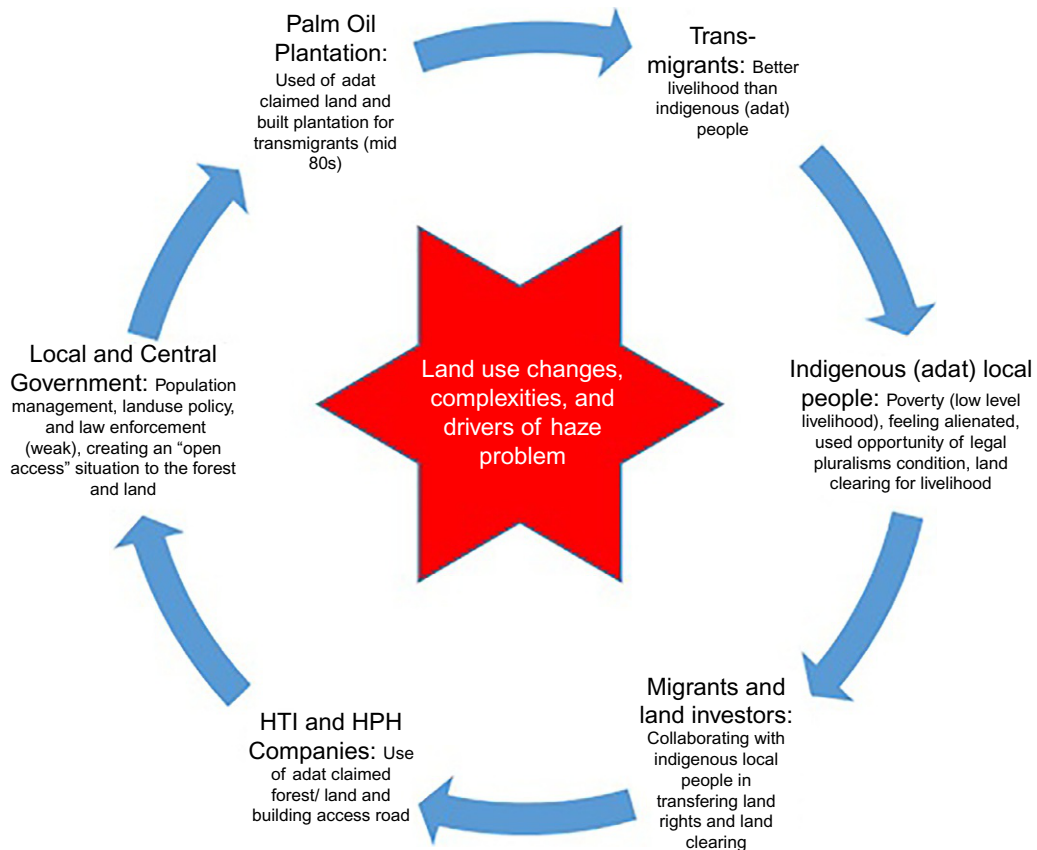
5 Discussion

5.1 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 that 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 noncorporate plantation that 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 has 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.

Those factors are visualized in the following figure (Fig. 18.2).

**FIG. 18.2**

Complexities and drivers of haze problem in Riau Province.

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

5.2.1 Framework components

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

5.2.1.1 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.

5.2.1.2 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.

5.2.1.3 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, socioeconomic, and environmental interest and concerns. The framework aims at and focuses on reestablishing 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 “collaborative supports” is added in the name of the framework.

5.2.1.4 Addressed sustainability issues

It was mentioned earlier that the sociocultural aspects of local institutions of land and forest include but not limited to:

- Classifying forest into three categories (cultivated forest, reserved forest, and protected forest—*kepungan sialang*).
- Inheriting the norms, ethics, and regulations about land- and forest-based life through *Nyanyi Panjang*.
- Regulating the harvest of NTFPs with social and equitable sharing in the community.

As such, the framework must keep in mind the following matters: (1) the social and cultural structures of indigenous people are land- and forest-based and (2) indigenous people have already developed local wisdom for sustainable management of land and forest.

5.2.2 Framework elaboration

From the components identified earlier, the framework is elaborated as in [Table 18.1](#).

In general, the actions proposed in the ethical framework above offer win-win situations to all stakeholders in the transition toward sustainability. Reestablishing 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 is one 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 were also given to corporations. The complexities of relations under these three types of legal pluralism, together with other intervening factors, tend to have led to endless problems with regard to

Table 18.1 Initial ethical framework to facilitate actions and transition toward sustainable use of land and forest and avoidance of haze.

Property right regimes	Ethical issues	Elements for actions and transition toward sustainability	Addressed sustainability issues
State land and forest (presently not assigned any usufruct right but also claimed as communal forest land)	State responsibility to protect the interests of indigenous people as well as other legal inhabitants and improve their welfare	<ul style="list-style-type: none"> • Development of <i>kepungan sialang</i> forest under community forestry status (HKm) where appropriate • 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, managed by local authorities, and with arrangements of yield sharing • Social and cultural empowerment of indigenous people to sustainably manage land and forest and to improve their livelihoods (i.e., establishment and empowerment of MPA) 	<ul style="list-style-type: none"> • Conservation of land, forest, water, and biodiversity • Local economic development (NTFPs) • Economic growth and employment • Food security
Land and forest under concession to corporation (both palm oil plantation and HTI—still valid and on-going)	Corporate social responsibility	<ul style="list-style-type: none"> • Supporting local economic development and forest conservation (i.e., development of <i>kepungan sialang</i> forest as for ecotourism purposes) 	<ul style="list-style-type: none"> • Local economic development (NTFPs, eco-tourism) • Conservation of land, forest, water, and biodiversity • Food security

Continued

Table 18.1 Initial ethical framework to facilitate actions and transition toward sustainable use of land and forest and avoidance of haze—cont'd

Property right regimes	Ethical issues	Elements for actions and transition toward sustainability	Addressed sustainability issues
Land and forest under expired concession	Reestablishment of rights of indigenous people for a decent life	<ul style="list-style-type: none"> • Development of state-owned permanent food crop land, which is cultivated by local people and managed by local authorities with yield sharing arrangements • Empowerment of MPA • (Inside TNNP): Development of <i>keputusan sialang</i> forest with the rights of indigenous people to harvest NTFPs • (Outside TNNP): 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 arrangement • Social and cultural empowerment of indigenous people to sustainably manage land and forest, and to improve their livelihoods (i.e., establishment and empowerment of MPA) 	<ul style="list-style-type: none"> • Social development & empowerment • Local economic development (NTFPs, eco-tourism) • Food security

Table 18.1 Initial ethical framework to facilitate actions and transition toward sustainable use of land and forest and avoidance of haze—cont'd

Property right regimes	Ethical issues	Elements for actions and transition toward sustainability	Addressed sustainability issues
Communal land and forest	<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>keputusan 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 (NTFPs) • Economic growth and employment • Food security • Conservation of land, forest, water, and biodiversity

sustainability. Therefore stakeholders should consider a new set of property right arrangements as a condition to enable the transition toward 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 NTFPs 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.
 - Areas that 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.

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

6 Conclusion and recommendation

Given that forest fires and haze substantially influence the socioeconomic 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 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 (UNESCO IBC, 2010: 9).

Taking all of the above factors into consideration, key solutions to the problem should be based on reestablishing the rights of indigenous people and empowering them so that they can actively get engaged 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 toward sustainability and avoid the haze problem.

Appendix 1



Appendix 2



Appendix 3



Appendix 4



Appendix 5



Appendix 6



Appendix 7



References

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Natural Resource Governance in Asia

From Collective Action to Resilience Thinking

Raza Ullah, Shubhechhha Sharma, Makoto Inoue, Sobia Asghar, Ganesh Shivakoti

Natural Resource Governance in Asia: From Collective Action to Resilience Thinking identifies key leverage points where interventions can be made to promote resilience to deal with both current and future impacts of ongoing environmental and sociopolitical challenges. It utilizes case studies from Asia, a key demographic for natural resource management, which can be applied globally in understanding solutions and the current state of knowledge in natural resource dynamics.

Offering a holistic and practical view of resilience and environmental management in the face of climate change, this book is organized into three parts: community forestry and socioecological systems; community irrigation, competing water demand, and robustness challenges; and climate change and natural resource dynamics and challenges. It examines a diversity of problems throughout Asia through an interdisciplinary lens, making it invaluable to researchers and policymakers alike.

Key Features:

- Combines collective action and resilience thinking to understand complex issues and challenges in natural resource management
- Presents methods and case studies to validate theory in practice
- Includes up-to-date research applied to current issues to address both the current and future risks and uncertainties

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