Chapter 10
Establishing Multi-Partnerships Environmental Governance in Indonesia: Case of Desa Makmur Perduli Api (Prosperous and Fire Free Village) Program

Joni Jupesta, Anselmus Achmad Supriyanto, Goetz Martin, Junaidi Piliang, Susanto Yang, Agus Purnomo, Anita Neville, and Jean-Pierre Caliman

Introduction

In 2015, countries worldwide adopted 17 United Nations Sustainable Development Goals (SDGs) with 169 underlying targets that tackle major issues impacting the world. This ranged from ending poverty to protecting the planet and ensuring prosperity for all, as part of a new sustainable development agenda (UN 2015). To reach the goals in 2030, all stakeholders (government, business, and community) need to play their role. The role of government as policy maker is needed to set the target, tracking the progress and evaluating for the future improvement. The consensus among economists and policy makers has grown wider on the need for governments to put forward strong policies directed both at facilitating the growth of existing and emerging industries and addressing the unaccounted and unintended impact on society to growth (PWC 2017). In order to ensure that business takes part in implementing the sustainable development agenda, proactive action should be taken by policy makers.

Note: Exchange rate in 2017: 1 USD~ 13,380 IDR, 1 SGD ~ 10,000 IDR.

J. Jupesta (✉) · J.-P. Caliman
SMART Research Institute (SMARTRI), Pekanbaru, Indonesia
e-mail: jjupesta@yahoo.com

A. A. Supriyanto · G. Martin · J. Piliang · S. Yang
PT. Sinar Mas Agro Resource and Technology (SMART) Tbk, Jakarta, Indonesia

A. Purnomo
PT. Sinar Mas Agro Resource and Technology (SMART) Tbk, Jakarta, Indonesia

Golden Agri Resources (GAR) Ltd., Singapore, Singapore

A. Neville
Golden Agri Resources (GAR) Ltd., Singapore, Singapore

V. R. Squires, M. K. Gaur (eds.), *Food Security and Land Use Change under Conditions of Climatic Variability*, https://doi.org/10.1007/978-3-030-36762-6_10

In 2015, the Paris Agreement on Climate Change reflects a commitment to hold the rise in average global temperatures to well below 2° C above (the pre-industrial level) with an aspiration to a lower ceiling of 1.5° C. It too called on parties to "take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases" as referred to in Article 4, paragraph 1(d) of the UN Framework Convention on Climate Change (UNFCCC) (CoP 2016). The number of companies committing to addressing deforestation continues to increase, in particular the palm oil and timber industries which are directly linked to deforestation.

While SDGs deal more with social concerns such as poverty, healthcare, and employment as well as environmental issues, the Paris Agreement is focusing on environmental concerns. It is expected that private sector will be central to meeting the objectives of both the SDGs and the Paris Agreement. The business community could deliver greenhouse gas (GHG) emission reductions equivalent of 3.2–4.2 billion metric tons of CO_2 by 2030 equal to 7–9% of global emissions in 2010 of which 0.5–1.2 billion metric tons would be delivered by eliminating deforestation.

In terms of loss and damage, the Paris Agreement also recognizes the importance of averting, minimizing, and addressing loss and damage associated with the adverse effects of climate change, including extreme weather events and slow onset events, and the role of sustainable development in reducing the risk of loss and damage. The Paris Agreement builds on the continuation of the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts, following the review conducted in 2016 (UNFCCC 2016). Accordingly, areas of cooperation and facilitation to enhance understanding, action, and support may include:

(a) Early warning systems
(b) Emergency preparedness
(c) Slow onset events
(d) Events that may involve irreversible and permanent loss and damage
(e) Comprehensive risk assessment and management
(f) Risk insurance facilities, climate risk pooling, and other insurance solutions
(g) Non-economic losses
(h) Resilience of communities, livelihoods, and ecosystems

The forest fire in Indonesia was considered as a climate disaster due to its negative impacts in terms of GHG emissions, biodiversity loss, health, education, agriculture, water, etc. (Ekaputri 2016). The largest area burnt on the 2015 fire event is palm oil concessions followed by food crops and forestry concessions as shown in Table 10.1. Some of the burnt area was peatland, a global carbon pool (Page 2016). Out of 2.61 million hectares' land burnt, 618,574 hectares are peatland. This is caused by the emissions from Indonesia's peatland fires. In 2015 alone, it surpassed GHG from Japan and was more than double in Germany (Tacconi 2016). In total, the GHG emissions during the period July–December 2015 from the fire are 1.75 Gt CO_2, 87% of the total GHG emissions in 2012.

Not so long ago, sustainability was seen by most companies as little more than a peripheral "green issue" — useful for reducing energy and waste disposal cost or

Table 10.1 Area burnt by land use type during the 2015 fire event (Tacconi 2016)

Land use	Area (hectares)	Percentage (%)
Total area burnt	2,611,000	
a. Food crops	346,039	13.25
b. Estate crops	72,763	2.79
c. Palm oil concessions	505,887	19.38
d. Forestry concessions	233,414	8.94
e. Swamp forest	176,179	6.75
f. Natural forest	259,376	9.93
g. Other	807,369	30.92
h. Mining	24,183	0.93
i. Total accounted	2,425,210	92.88
j. Uncontrolled area	185,790	7.12
k. Fire-affected area not allocated to specific stakeholders (e + f + g + j)	1,428,714	54.72

The items a(-)h were obtained from World Bank Report in 2015 on forest fire

supporting some worthy community causes but hardly central to a company's core business (PWC 2015). The palm oil producers for one decade have been accused as one of the causes for the forest fire and deforestation in Indonesia (Purnomo and Dermawan 2017). Forest conservation and palm oil development should be reconciled with the landscape approach. Palm oil businesses have capacity to implementing sustainable development goals through working together in partnership mode with its stakeholders (community, government, other business entities, etc.).

The palm oil itself in terms of area was owned by plantation (private and government owned) 59% and smallholders' farmers 41%. Next to domestic consumption, the export value of palm oil in 2015 is 19 billion US$ representing 12.63% of the country's export. The palm oil industry sustains the lives for 16 million households directly and indirectly. The direct employment in the plantation is six million people (5% of total labor force) using a land area of 11.3 million ha (5.6% of total land area) in 2015 (Detik News 2017). A lot of the fire associated with palm oil is caused by land clearing through slash and burn done by the companies and by individual smallholders' farmers in the neighborhood.

The aim of this chapter is to elaborate the role of a non-state actor such as business partnership with different stakeholders (local community and local government) in reshaping the environmental governance. There are dual functions: (i) preventing forest fire in local scale and (ii) addressing the global issues (climate change, climate disaster, and SDGs) at the same time. We consider the forest and land fire in Indonesia at different levels of governance: global, regional, national, and corporate. We also discuss and analyze the Fire Free Village (*Desa Makmur Perduli Api*) program activities which comprise two initiatives: Fire Alert Village program and Pilot Project Integrated Ecological Farming program. The case study for Fire Alert Village program involves eight villages surrounding the palm oil plan-

tation company (PT AMNL)[1], and the case study for Integrated Ecological Farming program is one of those eight villages on Fire Alert Village program; Lembah Hijau 2 village.

Forest Fire in Indonesia

This chapter will elaborate the forest fire situation within a vertical hierarchy (international, regional ASEAN, national, and local) as shown in the Fig. 10.1. The United Nations task force recommended stronger cooperation between multilateral environmental institutions to facilitate synergies and promote policy coherence (Biermann et al. 2009). This issue has been connected to "institutional framework for sustainable development," i.e., the second theme of the 2012 United Nations Conference on Sustainable Development (UNCSD). A related study has been conducted on the climate change governance in Indonesia (Jupesta et al. 2012).

International Context

Prior to Paris Climate Agreement, the UN held a Climate Summit in 2014 at UN Headquarters, New York. This summit outcome is The New York Declaration of Forests which comprises of commitment to reduce felling of natural forest to half by 2020 and strive to end it by 2030. Attended by governments, companies, indigenous peoples, civil society organizations, and multilateral institutions, this non-binding declaration was the preliminary commitment prior to the Paris Climate Agreement 2015. Several collective actions were announced such as Zero Deforestation

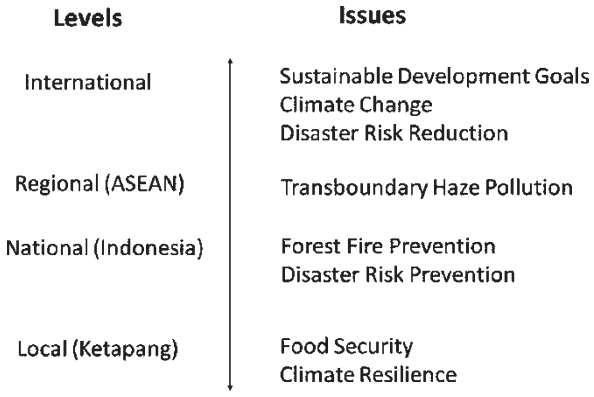

Fig. 10.1 Multi-level governance in forest fire in Indonesia

[1] PT. AMNL is the palm oil company subsidiary of PT. SMART Tbk. PT. SMART Tbk is a subsidiary of Golden Agro-Resources (GAR), the second largest palm oil producer worldwide.

Commitments from Commodity Producers and Traders. Some palm oil companies such as Wilmar International, Golden Agri-Resources, and Cargill pledge to adopt Zero Deforestation Policy from its palm oil production. Beyond that, Golden Agri-Resources (GAR) also makes a commitment that this policy will be applied to all third-party suppliers as well (UN 2014).

The Paris Agreement and the Sustainable Development Goals in 2015 have been set clearly by the governments as the global framework for environment and social sustainability. These two international agreements differ with the predecessor of the SDGs; the Millennium Development Goals (MDGs) are focusing on the developing countries, while the SDGs are applied to both developing and developed countries (CDP 2016). While the Paris Agreement on Climate Change commits the international community to hold the rise in average global temperatures to well below 2° C with an aspiration to a lower ceiling of 1.5° C, the SDGs focus more on both social and environment sustainability.

Out of 17 goals, the goal 13 of the SDGs (–): take urgent action to combat climate change and its impacts – is directly linked with the regional problems that are the subject of this chapter. The goal also acknowledges that the UNFCCC is the primary international intergovernmental forum for negotiating the global response to climate change (UN 2015). Floods, drought, heat waves, and other extreme weather events pose potential losses to persons and communities: losses in life and health, economic damages, displacement, and reduced access to basic needs and services, such as water, food, energy, and education. Disaster risk reduction (DRR) entails systematic efforts to reduce those factors in our societies that amplify the impacts of natural hazards. It includes such actions as building more resilient infrastructures, investing in disaster preparedness and in early warning systems, and developing new tools such as microinsurance and nature-based solutions, among many others.

Regional Context

Rapid land use change and El Niño-Southern Oscillation (ENSO) have resulted in recurring fires in Southeast Asia in recent decades. Frequently the fires then ignite underlying peat soils. The peat fires, in particular, release large amounts of CO_2, along with aerosols and toxic particulates that are known as "haze". This haze pollution has been a sporadic problem in Southeast Asia over the past 20 years (Lin et al. 2017). They impact most strongly in Indonesia where the forest fire occurred and in neighboring countries Singapore and Malaysia but also extend to Vietnam, Thailand, and the Philippines.

Indonesia's government has taken a step toward ratifying an ASEAN Agreement on 2014 to fight the haze that reached record highs in the region in that year. Indonesia is the only ASEAN member that has yet to ratify the ASEAN Agreement on Transboundary Haze Pollution, which all other nine country members of ASEAN already signed in 2002 (ASEAN 2015). The pact commits countries to prevent open burning, monitor efforts at prevention, share information, and help one another in

tackling the matter. During the haze period on July 2015–October 2015, Singapore faced the worst air pollution index at 341, compared to 50–100 as normal. Singapore Environment Council took action by suspending the use of the Green Label for environmental sustainability given to several haze-linked companies, leading to the removal of these companies' products from some supermarket shelves and increased public awareness of the links between consumer goods and haze (Wijedasa et al. 2015).

Further, in ASEAN Plan 2025, it stressed conservation and sustainable management of biodiversity and natural resources with ten strategic measures. One of these is by strengthening regional cooperation on sustainable forest management in the context of forest fire prevention and control, including through the implementation of the ASEAN Agreement on Transboundary Haze Pollution, to effectively address transboundary haze pollution.

National Context

One of the significant sustainability issues in Southeast Asia is the frequency of forest fire which occurred yearly during the dry season in Sumatra and Kalimantan island of Indonesia. Such fire rages every year during the summer season which brings the haze in most of the Southeast Asian countries: Indonesia, Brunei Darussalam, Singapore, Malaysia, The Philippines, Thailand, and Vietnam. In 2015, due to the El Niño weather pattern, the forest fire becomes especially severe. Unlike other emerging economies, such as China and India, most of Indonesia's GHG emissions are not from industrial activities but from peat fires and deforestation (Jupesta et al. 2011).

While at the global level 57% of the GHG emissions originates from fossil fuel, at the national scale, 53% of such emissions are caused by peat fires and changes in land use and forestry (LUCF) and peat fire (UNFCCC 2018). The total GHG emissions are estimated to grow from 1 Gt CO_2 in 2000 to 1.8 Gt CO_2 in 2014. GHG emissions from peat fire and LUCF have grown from 0.5 Gt CO_2 in 2000 to 0.98 Gt CO_2 in 2014. The GHG emission reduction targets in 2030 for LUCF and peat fire are 59.31% (scenario 1) and 60.15% (scenario 2), while the GHG emission reduction targets for agriculture are 1.1% (scenario 1) and 0.34% (scenario 2). Both scenarios were designed based on the 29% GHG emission reduction within the country effort (scenario1) and further 38% GHG emission reduction with international support (scenario 2).

Most forest fires were caused by the land clearing to convert it into other commodity products, e.g., palm oil plantation. Often this forest fire grows on peatlands, which store carbon from decayed organic matter; in tropical regions, these hold up to ten times as much carbon as surface soil. According to the World Bank, the forest fires in 2015 cost Indonesia 16 billion US$; this amount attributes to 2% of its GDP and is 84% of the export amount of palm oil value itself (World Bank 2016). In terms of SDGs, the Government of Indonesia just enacted Presidential Regulation No.59 in 2017 to promulgate the road map, national action plan, and local action plan to achieve Sustainable Development Goals 2017–2030 (Setkab 2017).

According to the government, 2.6 million hectares of Indonesian land burned between June and October 2015, a land area 4.5 times that of Bali (World Bank 2016). In the absence of the controlled burning measures or significant law enforcement, the fire grew out of control, fed by the drought and exacerbated by the effects of El Niño. This environmental crisis adds to the economic and social growth and costs 16.1 billion US$ (excluding the regional and local cost). Most of the frequent forest fires are in Sumatra and Kalimantan. Numerous studies have reported how Indonesia is lacking measures and efforts related to forest fires; thus multistakeholders' cooperation through multi-partner governance might be a solution to prevent and combat the forest fire.

Over the last decades, there has been rising trend in the occurrence of disasters worldwide and their related economic impact. This is particularly notable for climate-related disasters, – such as drought, floods, and storms (–) which are of signifying concern to agriculture and food security given the sector's dependence on climate. Despite the fact that the severe forest and wildfire during the long-term drought were caused by El Niño (FAO 2016), forest and wildfire has occurred every year during the summer season, mostly caused by land use change (land clearing) (Field et al. 2009). The Fire Alert Village program was developed as an effort to solve the problem of forest and land fire that occurred yearly regardless with or without El Niño.

Corporate Level

To overcome the forest, plantation, and land fire, Golden Agri-Resources (GAR) since 2016 took the initiative by working together with its stakeholders, local community, and local government to implement the "Fire Alert Village" program. This forest fire prevention program was also endorsed by the central government through the Coordinating Ministry of Economic Affairs. Those villages are highly vulnerable for forest fire according to Ministry of Environment and Forestry. Land located in the neighborhood of the company concession will be given priority to being supported by GAR in terms of social and physical infrastructure. There are 731 villages categorized as the most vulnerable villages in terms of forest and land fire according to Ministry of Environment and Forestry. At least three of the most vulnerable villages were located surrounding PT.Agro Lestari Mandiri (AMNL): Sungai Kelik Village, Lembah Hijau 1 Village, and Lembah Hijau 2 village. All of those three villages were in Nanga Tayap district at Ketapang Regency which is in West Kalimantan Province.

GAR decided to implement the Fire Alert Village program on the plantation in Nanga Tayap district due to its historical record. The location which has the highest risk and fire vulnerability level is given the priority for this program. This priority refers to chronology of fire or fire hotspot, land coverage with fire potential, land types (peat or non-peat), land condition and accessibility to the road, river, etc., conflict intensity and land claim, and socio-culture condition of local community which is still using slash and burn in land clearing for production of food crops that underpin food security.

Fire Free Village Program

To prevent the forest and wildfire occurrence, there should be robust and credible mechanisms for engaging multi-partnerships by involving community, market, and state. The study case in this study is the eight villages surrounding the palm oil plantation company (PT AMNL) for Fire Alert Village program and Lembah Hijau 2 village for Pilot Project Integrated Ecological Farming. PT. AMNL was located in Ketapang, West Kalimantan, and it belongs to PT. SMARTTbk., which is one of GAR' subsidiaries.

GAR plantations and most of their operations are in Indonesia consisting of more than 488,000 hectares of palm oil plantations (including smallholder farmers). In 2015, GAR updated its policy governing sustainability and launched the GAR Social and Environmental Policy (GSEP). It covers the key economic, social, and environmental issues facing the palm oil industry and serves as the company's main road map toward responsible palm oil production. In envisioning sustainable progress for people and the planet, it is aligned to the SDGs. As a signatory of the UN Global Compact through its subsidiary PT SMART Tbk., GAR is committed to working on and delivering the SDGs. GAR Sustainability Milestone is shown in Fig. 10.2.

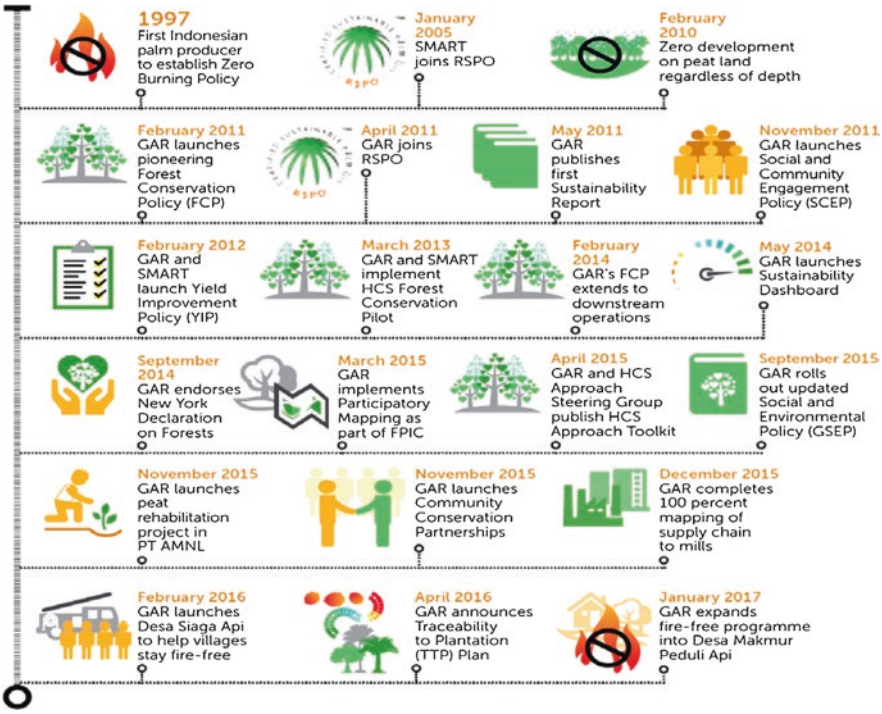

Fig. 10.2 GAR sustainability milestones

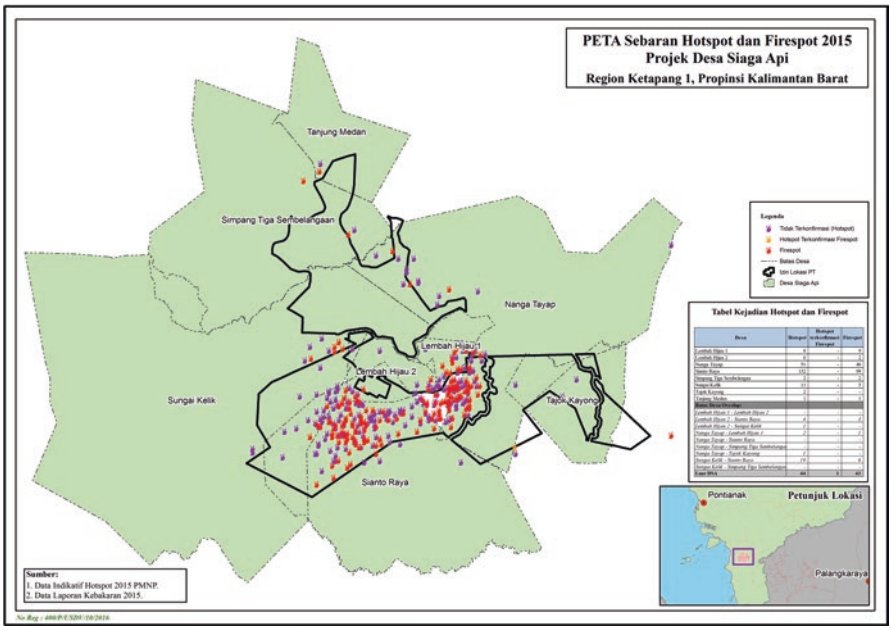

Fig. 10.3 Fires and hotspots on PT AMNL's concession in West Kalimantan in 2015

In 2015, the area burnt at PT. AMNL is 541 ha; which consist of nucleus plantation 450 ha and plasma plantation 91 ha. Figure 10.3 shows the fires and hotspots on PT. AMNL concession in West Kalimantan in 2015. Apart from that, the buffer zone also burnt, as did conservation area 590 ha and area outside of concession 85 ha. Most of the burnt area is peatland. There are eight villages located surrounding PT AMNL: Nanga Tayap, Tajok Kayong, Siantau Raya, Lembah Hijau 1, Lembah Hijau 2, Sungai Kelik, Tanjung Medan, and Simpang Tiga Sembelangaan. All the communities in those villages identify as "traditional agrarian" and still use slash and burn for land clearing.

There are two mechanisms for this "prevent and extinguish" fire program:

1. Build the forest fire prevention and forest fire extinguisher systems within the company PT. AMNL through activities of fire prevention management to prevent the forest fire on community.
2. Community Empowerment Program through implementation of Fire Free Village (Desa Makmur Perduli Api [DMPA]) program.

The first activity was implemented entirely within the company, and the second activity was implemented directly on the entire eight villages that are in the neighborhood of PT. AMNL. The second activity of the Fire Free Village Program consisted of two parts: Fire Alert Community program was implemented on eight villages, and Integrated Ecological Farming program was implemented only in one

of the eight villages surrounding company: Lembah Hijau 2 village. Both activities of Community Empowerment Program involved multistakeholders: company, local community, and local government.

Fire Management System

PT. AMNL (the company) has developed the forest and land fire prevention and suppression system as shown in the Fig. 10.4. There are four systems working simultaneously to ensure the forest and land fire prevention.

Community Empowerment Program Through Implementation of Fire Free Village/Desa Makmur Perduli Api (DMPA) *Program*

The Fire Free Village Program started as pilot project in February 2016 as the company's response to the "2015 forest fire." This program works through institutional strengthening (capacity building) at village level, so the villagers are able to organize and coordinate prevention measures and extinguish all fires on forest, plantation, and backyards. This program becomes highly important considering the impact of forest fire to human life in terms of health, environment, social, and economics.

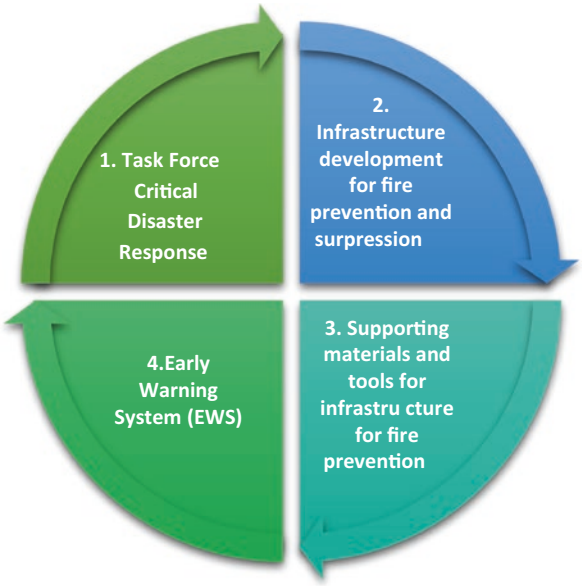

Fig. 10.4 Forest management system within PT. AMNL

Fire Alert Community Program

The Fire Alert Community program was developed on eight villages coordinated by PT. AMNL, with the program implementation stages as shown below:

1. Fire Alert Community inauguration
2. Socialization of Fire Alert Village program
3. Mapping of village border indicative
4. Formation and institutional strengthening of Fire Alert Community
5. Provision on infrastructure and equipment for Fire Alert Community (FAC)
6. Development of early warning system for forest and wildfire prevention
7. Socialization and campaign on forest and wildfire
8. Pilot Project of Zero Burning Land Clearing (ZBLC)
9. Monitoring, evaluation, and reward for Fire Alert Village

Integrated Ecological Farming Program

The aim of this is to enhance the community capacity to sustain its food without land burning. Land clearing by burning is ecologically unsound not only impacting the ecology and degrading the land's support systems over the long term but may also trigger forest and wildfire disaster. To meet the primary need for food, the Integrated Ecological Farming was developed as implementation of an agricultural system based on Zero Burning Land Clearing (ZBLC) method. Integrated Ecological Farming was promoted (mainly through Farmer Field Schools and Extension) as an alternative technology for the traditional farmers, many of whom practice the tradition of cut/slash/burn. The field school demonstrated how to self-sustain farming without using chemicals. It showed that there is an expenditure reduction when using improved farming practices to grow the self-sustaining vegetables on the backyard. These crops provide food security to the family through "own use," and any surplus can be sold to generate revenue and improve household incomes (Box 10.1).

The pilot project for Integrated Ecological Farming program was conducted on Lembah Hijau 2 village in Nanga Tayap district. Lembah Hijau 2 is the village created to accept new settlers under the transmigration program as part of "new Order era." The first phase was in 1992 when people came from Java (Javanese and Sundanese tribes). Most of the households have less than 0.5 ha of land to plant vegetables, raise goats, pigs, cow and tilapia fish. The villagers have one cooperative which is managed by four persons. In terms of education, this village has one kindergarten and one elementary school. There is no medical doctor, but there are two midwives and two traditional healers with two local clinics. There are 259 wells which are in good condition to supply fresh water for the locals.

Box 10.1 Several cases derived from the Integrated Ecological Farming program

Case 1: Mr. Yatimin (60 years old)
Mr. Yatimin is an active member of learning farm Sinar Harapan Besides actively maintaining a learning farm that is used for Farmer Field Schools, he also replicates the knowledge he gained on his backyard. Since January 2017, he started applying the knowledge he gained from field school by planting several vegetable crops (chili, spinach, morning glory, mustard greens, green bean, and corn) using the intercropping method. In a total of 12 months (1 year) in 2017, the 300 m^2garden from Mr. Yatimin produced 23.8 million IDR (~1779 US$). Pro rata in a month, it could bring value from generated additional income and save the household expenses with the amount around 1.98 million IDR (148 US$).

Case 1: Mr. Bambang (34 years old)
Mr. Bambang was a farmer previously. He is an active member of the learning farm Sinar Harapan. Since January 2017, he has planted the chili crop on his 300 m^2 backyard. With 6 plots, it produced 1 kilogram chili plot every week which starts from the third month to 12 months. The chili price is 80,000 IDR per kilogram. Within 1 year in 2017, Mr. Bambang could generate additional income 19.2 million IDR (~1435 US$) or 1.6 million IDR (~119.57 US$) per month.

Results of the GAR Fire Program

The Fire Alert Community program was highly successful as indicated by the decreasing number of hotspots/fire spots from 2015 to 2018 (Table 10.2).

Conclusions

Rapid land use change (including expansion of the area for oil palm production) and El Niño-Southern Oscillation (ENSO) have resulted in recurring fires in Southeast Asia in recent decades.

One of the significant sustainability issues in Southeast Asia is the frequency of forest fire which occur yearly during dry season in Sumatra and Kalimantan island of Indonesia. The forest fires in Indonesia are considered as climate disasters due to the negative impacts in terms of GHG emissions, biodiversity loss, health, education, agriculture, water, etc. Indonesia's government has taken a step toward ratifying an ASEAN Agreement on Transboundary Haze Pollution, which all 10 members

Table 10.2 Hotspots and fire spots in 2015–2018

		2015		2016		2017		2018	
No	Villages	Hotspot	Fire spot	Hotspot	Fire spot	Hotspot	Fire spot	Hotspot	Fire spot
1	Lembah Hijau 1	8	9	0	0	0	0	1	1
2	Lembah Hijau 2	6	2	0	0	0	0	1	1
3	Nanga Tayap	51	40	13	0	3	0	3	2
4	Siantau Raya	132	99	2	0	3	0	6	5
5	Simpang Tiga Sembelangaan	2	2	1	0	1	0	13	3
6	Sungai Kelik	11	5	2	0	3	0	13	4
7	Tajok Kayong	2	0	4	0	2	0	–	–
8	Tanjung Medan	1	1	1	0	0	0	–	–
	Total	213	158	23	0	12	0	37	16

already signed in 2002 (ASEAN 2015). The total GHG emissions are estimated to grow from 1Gt CO_2 in 2000 to 1.8 Gt CO_2 in 2014. GHG emissions from peat fire and LUCF grew from 0.5 Gt CO_2 in 2000 to 0.98 Gt CO_2 in 2014.

To overcome the forest, plantation, and wildfire, Golden Agri-Resources (GAR) since 2016 took the initiative by working together with its stakeholders: local community and local government implementing "Fire Alert Village" program. The study case reported here involves eight villages surrounding the palm oil plantation company PT. AMNL located in Ketapang, West Kalimantan, and it belongs to PT. SMART Tbk., a subsidiary of Golden Agri-Resources (GAR) company, one of the largest palm oil companies in the world. The Fire Free Village (*Desa Makmur Perduli Api)* program consists of three activities: Fire Management System, Fire Alert Community program, and Integrated Ecological Farming program. The Fire Management System was implemented within the company and fully organized by the company itself. The Fire Alert Community program was developed through community engagement to prevent the fire by formation of the Fire Alert Community.

The Integrated Ecological Farming program was socialization to the local community for noslash and burn by Zero Burning Land Clearing (ZBLC) by the development of the Field School. The success indicator of the Fire Alert Village is the reduction of the hotspots/fire spots, while the success indicator for the Integrated Ecological Farming is the replication on the backyard from the Field School participants.

The case study on the Fire Alert Community program shows that forest fire risk can be reduced, so that people could realize the healthy environment which is free from fire and haze. The hotspots were successfully reduced from 213 in 2015 to 37 in 2018, while the fire spots that were not detected by satellite were decreasing as well from 158 to 16 within the same period. The participation of local government as facilitator for the training and socialization, the funding from the company, and the active engagement from the local community in the fire prevention training and socialization could bring about prevention of fire and avoid a lot of loss and damage.

In Indonesia, the food production was highly impacted due to the climate change. The crops productivity has declined in 2015 due to long drought caused by El Nino. This is also exacerbated by burning the land as local tradition to clear the land before planting. The local community in Kalimantan believe that fire is the most effective tool in the existing practice of shifting cultivation that existed for hundreds of years. Shifting cultivation is local wisdom where the plot of land was cleared through fire and later cultivated to produce food crops for 1 and 2 years before moving to another plot. In this old technique, only man power alone could be used without machinery for cultivation, and no chemical fertilizer was applied. However, this shifting cultivation technique has a high risk in terms of generating uncontrolled fire that could be expanded by wind over a broader area within several hours, especially in the drought season. The productivity of this technique of food production is also relatively low compared with the modern agriculture techniques that rely on machinery and chemical fertilizer.

Hence, there is an urgent action to invest in healthy environment that produces food in sustainable way. One of the solutions is by engaging the community to Zero Burning Land Clearing. It would bring enormous impact to the environment so as enhance the food security. Food security and livelihood of the poor were vastly improved by adoption and replication of integrated ecological farming approaches into the community's backyard.

The two case studies for the successful replication on integrated ecological farming illustrate the merits of intercropping method over monocropping. Crop diversification is an important climate change adaptation and vulnerability reduction strategy that can, in the context of climate variability and extremes, help distribute risk, increase productivity, and stabilize incomes of the smallholder farmers, thus leading to food access improvement. This crop diversification that was implemented by Mr. Yatimin brought 25% more value added in terms of economic benefit compared with monocropping that was implemented by Mr. Bambang.

Before the pilot project Zero Burning Land Clearing, this area faced high prices of food since most of the food comes from outside the region. Since 2016, the food price was becoming more affordable since this program of backyard food production could fulfill (partly) the community food supply. This GAR program has been successfully accomplished with multiple benefits: (i) reduction of both forest fire and wildfires and (ii) strengthening resilience in terms of food security and poverty alleviation. It is envisaged that this program Fire Free Village (*Desa Makmur Perduli Api*) will be replicated and become a "lesson learned" on how the stakeholder cooperation could bring positive impact to realize climate resilience and mitigate climate change toward Sustainable Development Goals (SDGs).

Acknowledgments Many thanks for valuable inputs and comments from Linda Gurning, Naomi Distrina Ginting, Ian Sugawarnda, and Melissa Yeoh regarding the Fire Free Village (*Desa Makmur Perduli Api*) program on PT. AMNL, Ketapang Regency, West Kalimantan province.

References and Further Readings

ASEAN. (2015). ASEAN 2025: Forging ahead together. http://www.asean.org/storage/2015/12/ASEAN-2025-Forging-Ahead-Together-final.pdf.

Best Climate Practice. (2017). Best climate practice website. http://www.bestclimatepractices.org/contest/.

Biermann, F., Pattberg, P., van Asselt, H., & Zelli, F. (2009). The fragmentation of global governance architectures: A framework for analysis. *Global Environmental Politics, 9*(4), 14–40.

CDP. (2016). Revenue at Risk: Why addressing deforestation is critical to business success. https://www.cdp.net/en/research/global-reports/global-forests-report-2016.

Detik News. (2017). GenjotProduksiSawit, RI AndalkanLahanGambut. https://finance.detik.com/berita-ekonomi-bisnis/3467435/genjot-produksi-sawit-ri-andalkan-lahan-gambut.

Ekaputri, E. (2016). Forest and land fire: Study on impact in Katingan-Kahayan. In: *Lestari Landscape Journal*, *1*(1), USAID (in Bahasa Indonesia). http://www.lestari-indonesia.org/en/category/publications/lestari-jurnal/.

EU. (2017). Report on palm oil and deforestation of rainforests, Committee on the environment, Public Health and Food Safety. http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+REPORT+A8-2017-0066+0+DOC+XML+V0//EN.

FAO. (2016). Increasing climate resilience: Addressing the impact of extreme events on agriculture and the way forward. http://www.fao.org/3/a-i6408e.pdf.

Field, R. D., van der Werf, G. R., & Shen, S. S. P. (2009). Human amplification of drought-induced biomass burning in Indonesia since 1960. *Nature Geoscience, 2*, 185–188. https://doi.org/10.1038/NGEO443. https://www.nature.com/ngeo/journal/v2/n3/full/ngeo443.html.

HLPE. (2013). Investing in smallholder agriculture for food security. A report by the high-level panel of experts on food security and nutrition of the committee on world food security, Rome. http://www.fao.org/fileadmin/user_upload/hlpe/hlpe_documents/HLPE_Reports/HLPEReport-6_Investing_in_smallholder_agriculture.pdf.

Jupesta, J., Boer, R., Parayil, G., Harayama, Y., Yarime, M., Puppim, Jose, O., Subramanian, Suneetha M. (2011). Managing the Transition to Sustainability in an Emerging Economy: Evaluating Green Growth Policies in Indonesia. *Environmental Innovation and Societal Transitions, 1*(2), 187–191. https://doi.org/10.1016/..eist.2011.08.001

Jupesta, J., Bratasida, L., Maulidia, M., Kanie, N., Wakiyama, T., Suwa, A., Sunami, A., Parayil, G., & Harayama, Y. (2012). Strengthening the institutional framework for sustainable development: Climate change governance in Indonesia, Policy Brief, Earth System Governance Project. http://www.ieg.earthsystemgovernance.org/sites/default/files/files/publications/ESG_IEG_Jupesta_2012_IFSD-Indonesia.pdf.

Lemos, M. C., & Agrawal, A. (2006). Environmental governance. Annual Review of Environment and Resources, 31, 297–325. http://www.annualreviews.org/doi/abs/10.1146/annurev.energy.31.042605.135621.

Lin, Y., Wijedasa, L. S., & Chishol, R. A. (2017). Singapore's willingness to pay for mitigation of transboundary forest-fire haze from Indonesia. *Environmental Research Letters, 12*.

Ministry of Agriculture. (2016). Technical guideline on climate change impact and fire prevention. Plantation protection directorate director general of plantation, Ministry of Agriculture.

NASA. (2017). NASA Website http://earthdata.nasa.gov/earth-observation-data/near-real-time/firms/active-fire-data/.

Newig, J., & Fritsch, O. (n.d) Environmental governance: Participatory, multi-level and effective? *Environmental Policy and Governance, 19*, 197–214. http://Onlinelibrary.Wiley.Com/Doi/10.1002/Eet.509/Abstract.

Page, S. (2016). Forest and land fire: Study on impact in Katingan-Kahayan. In: *Lestari Landscape Journal, 1*(1), USAID (in Bahasa Indonesia). Http://Www.Lestari-Indonesia.Org/En/Category/Publications/Lestari-Jurnal/.

PS. (2017). Indonesia plantation data website. https://www.bps.go.id/Subjek/view/id/54#subjekViewTab4|accordion-daftar-subjek1.
Purnomo, H., & Dermawan, A. (2017). Palm oil and deforestation; facts to moving forward (in Bahasa), workshop on palm oil and deforestation in Indonesia, Thamrin School.
PWC. (2015). Make it your business: Engaging with the Sustainable Development Goals. https://www.pwc.com/gx/en/sustainability/SDG/SDG%20Research_FINAL.pdf.
PWC. (2017). Delivering the sustainable development goals: Seizing the opportunity in global manufacturing. https://www.pwc.com/m1/en/publications/delivering-sustainable-development-goals.html.
Setkab. (2017). Setkab Website http://sipuu.setkab.go.id/PUUdoc/175259/Perpres%20Nomor%2059%20Tahun%202017%20.pdf.
SIPONGI. (2017). SIPONGI Website. http://sipongi.menlhk.go.id/.
Tacconi, L. (2016). Preventing fire and haze in Southeast Asia. *Nature Climate Change, 6*, 640–643. https://www.nature.com/nclimate/journal/v6/n7/full/nclimate3008.html.
Tribun News. (2017). SMART beri reward 100 juta rupiah untukdesasiagaapi (in Bahasa). https://pontianak.tribunnews.com/2017/01/20/pt-smart-tbk-beri-reward-rp-100-juta-per-desa-untuk-desa-siaga-api-2016-di-ketapang?page=2.
UN. (2014). New York declaration on forests: Action statements and action plans. http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/07/New-York-Declaration-on-Forest-%E2%80%93-Action-Statement-and-Action-Plan.pdf.
UN. (2015). Transforming our world: The 2030 Agenda for sustainable development. https://sustainabledevelopment.un.org/post2015/transformingourworld/publication.
UNFCCC. (2016). The Paris outcome on loss and damage. https://unfccc.int/files/adaptation/groups_committees/loss_and_damage_executive_committee/application/pdf/ref_8_decision_xcp.21.pdf.
UNFCCC, 2ng ms office activation kindly save urz (2018). Third national communication of UNFCCC, Ministry of environment and forestry Republic of Indonesia.http://ditjenppi.menlhk.go.id/kerjasama/third-national-communication-to-the-united-nations-framework-convention-on-climate-change-tnc.html.
Wijedasa, L., Posa, M. R. C., & Clements, G. R. (2015). Peat fires: Consumers to help beat them out. *Nature, 527*, 305. http://www.nature.com/nature/journal/v527/n7578/full/527305b.html#t.
World Bank. (2016). The cost of fire: An economic analysis of Indonesia's 2015 fire crisis. i,regard.