TECHNICAL REPORT

ITTO PP–A/56–340–1
Capacity Building on Forest and Land Fire Management in Indonesia






Prepared for the project by:
Irfan Malik Setiabudi (Project Coordinator)

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ITTO FIRE PROJECT PROFILE

· Project number	:	ITTO PP-A/56-340-1
· Host Government	:	Indonesia
· Starting date of the project	:	January 28th, 2021
· Duration of the project	:	18 months, include 6 months extension
· Technical & scientific personnel for reporting	:	
Project Coordinator	:	Irfan Malik Setiabudi, S.Hut., M.Sc.
Advisor	:	Dr. Hiras Sidabutar
Key-resources person	:	Dr. Israr Albar
		Eny Haryati, S.Hut., M.Sc.
Project Secretary	:	Nuri Nursjahbani, S.Hut., M.Si.
· Implementing institutions	:	
Executing Agency	:	Directorate of Forest and Land Fire Management, Directorate General of Climate Change, Ministry of Environment and Forestry (MoEF)
Address	:	Manggala Wanabakti Building, Block VII, 13th Floor, Jl. Gatot Subroto, Jakarta 10270
Phone number	:	+62 21 5704618
Fax number	:	+62 21 5704618
Email	:	tukarhutla13@gmail.com
Website	:	sipongi.menlhk.go.id

Jakarta, July 2022

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BBSDLP	:	*Balai Besar Penelitian dan Pengembangan Sumber Daya Lahan Pertanian* (Indonesian Center for Agricultural Land Resources Research and Development)
BIG	:	*Badan Informasi Geospasial* (Geospatial Information Agency)
BMKG	:	*Badan Meteorologi, Klimatologi, dan Geofisika* (Meteorological, Climatological and Geophysical Agency)
BNPB	:	*Badan Nasional Penanggulangan Bencana* (National Agency for Disaster Countermeasure
BPPT	:	*Badan Pengkajian dan Penerapan Teknologi* (Agency for the Assessment and Application of Technology)
BRGM	:	*Badan Restorasi Gambut dan Mangrove* (Mangrove dan Peat Restoration Agency)
BRIN	:	*Badan Riset dan Inovasi Nasional* (National Research and Innovation Agency)
CATIE	:	Center for Research and Training in Tropical AgricultureDirectorate
FLFM	:	Directorate of Forest and Land Fire Management
FCP	:	Program of Community Development on Fires Control in Peat Land Area
FDRS	:	Fire Danger Rating System
FFPMP	:	Forest Fire Prevention and Management Project
FGD	:	Focus Group Discussion
GIS	:	Geographic Information System
IIRR	:	International Institute for Rural Reconstruction
ITTO	:	International Tropical Timber Organization
JICA	:	Japan International Cooperation Agency
LAPAN	:	The National Institute of Aeronautics and Spaces
MA	:	*Manggala Agni* (Forest and Land Fire Brigade of MoEF)
MPA	:	*Masyarakat Peduli Api* (Fire Care Community)
MODIS	:	Moderate Resolution Imaging Spectroradiometer
MoEF	:	Ministry of Environment and Forestry
NOAA	:	National Oceanic and Atmospheric Administration
NGO	:	Non-Government Organization
PLTB	:	*Pembukaan Lahan Tanpa Bakar* (Land preparation without burning)
PM	:	Atmospheric Particulate Matter
PSC	:	Project Steering Committee
Renstra	:	*Rencana Strategis* (Strategic Plan)
Renja	:	*Rencana Kerja* (Work Plan)
RPJMN	:	*Rencana Pembangunan Jangka Menengah Nasional* (National Mid-term Development Plan)
RFMRC-SEA:		Regional Fire Management Resource Center-South East Asia
SMART	:	System Monitoring and Reporting Technology
UNFCCC	:	United Nation Framework Convention on Climate Change

SUMMARY

Fires in Indonesia occur almost every year, especially during dry season. Many researchers stated that forest and land fires in Indonesia are almost 99% caused by human activities. According to various studies and experiences, forest and land fires in Indonesia have negative impacts on health, ecosystems, the economy, transportation, politics, etc.; caused loss of forest cover and natural wildlife habitats and damage to forest and land including peatland ecosystems. The key problems identified by the stakeholders were: i) negative impacts on health, ecosystems, economy, transportation, politics, etc.; ii) loss of forest cover and natural wildlife habitats; iii) damage to forest and land including peatland ecosystems; and iv) insufficient comprehensive policies and operational regulations on forest and land fire prevention.

The project was formulated to address the key problem that had been identified and defined the specific objective that should be achieved. The development objective was to support the capacity building for the implementation of an integrated forest fire prevention program and reduce the effects of fires on forest cover, natural wildlife habitats, and livelihood; while the specific objective was to improve prevention of forest and land fire through strengthening management and technical capacity of stakeholders at three targeted provinces and national level.

Regarding the implementation strategy, defined specific objective will be achieved through delivery of three outputs, namely:

1) Best agricultural practices applied by Fire Care Community (*Masyarakat Peduli Api*)/Local communities
2) Management capacity to address forest and land fires problems strengthened
3) Cooperation among local institution, private sector and communities for forest and land fire prevention strengthened

During the 18-months period, the project had completed all planned activities and even carried out several unplanned activities. Completed planned activities contributed to achieving the targeted outputs. The project introduced and improved the program on alternative integrated land preparation without burning for the communities/*Masyarakat Peduli Api* as one of the answers to national policy on burning prohibition, i.e. through land preparation without burning for agricultural purpose and economic empowerment for improve the economic aspect. The land preparation without burning practice was conducted by utilizing biomass wastes from land preparation. The project also improved capacity of *Manggala Agni* through different training programs which most of the substances were novel knowledge for *Manggala Agni*.

To ensure sustainability of the project benefits, planned follow up actions are: 1) strengthening synergy and collaboration of stakeholders; 2) continuing implementation of activities by Directorate of Forest and Land Fire Management, Fire Regional Agency, and *Manggala Agni*; and 3) encouraging more active community participation in fire prevention.

Learned from the project were; i) the huge-complex works of fire management require synergy and collaboration from all stakeholders including Government, *Manggala Agni*, private sector,

communities/*Masyarakat Peduli Api*, universities, NGOs, and even international agencies; ii) communities and farmers urgently require alternative technologies, approaches, and practices to meet that prohibition policy and accomplish their farming tasks; iii) The *Manggala Agni* should be trained periodically to maintain and improve their capacity in fire management, and their fire equipment revitalized over time to meet needed of quality and quantity.

1 INTRODUCTION

1.1.Origin and the problem

1.1.1. Origin

In recent years, forest fires have risen in global attention as an environmental and economic issue. Fires are considered a threat to sustainable development because of their direct effects on ecosystems, contribution to carbon emissions and impact on biodiversity. Fires in peat areas generate smoke haze that causes negative impact on health, daily activities, transportation, education and regional cooperation. According to the research study published in the Atmospheric Chemistry and Physics journal, researchers conducted field measurements during 2015 El Niño in Central Kalimantan, showing that the smoke haze from peat fires contained 90 gases that are harmful for health and contribute to greenhouse gas emissions since the smoke haze contains carbon dioxide, carbon monoxide and methane (Stockwell, 2016). Another study that has been conducted in Central Kalimantan and published in Springer shows that the average increase in the annual mean PM 2.5 concentration due to peatland fires in Central Kalimantan was 26 µg/m3, which is more than twice the recommended value of the World Health Organization Air Quality Guidelines. The increase of PM 2.5 leads to increased occurrence of a range of air pollution related diseases and premature mortality. The number of premature mortality cases can be estimated at 648 cases per year (26 mortality cases per 100,000 population) among others due to chronic respiratory, cardiovascular and lung cancer (Hein, 2019).

Sahardjo (2003) stated that in shifting cultivation, fire has been used since thousands of years ago because it is easy, quick, and cheap, and farmers think that the soil can get nutrients from the ashes. According to Sadjati (2012), farmers using fire in farmland preparation assumed that the soil would become more fertile after being burnt, but disregard the hazard that occurred from uncontrolled burning. While few of the burning activities are ecologically sound and useful, many of them were harmful and damaging to the environment. People often have the opinion that by burning the land, it can fertilize the soil. However, researchers suggest that excessive and uncontrolled land fires actually result in infertile soil (poor nutrient) and can cause loss of soil organisms that may have important roles in soil fertility.

Massive forest and land fires occurred in Indonesia in 1982/1983, 1997/1998, 2006, 2009, 2014, 2015 and 2019 with varying scales and intensities. Fires during 1997/1998 especially in Sumatera and Kalimantan burnt an area of 11.7 million ha, while in the fire season in 2015 burnt area was estimated at 2.1-2.6 million ha (Albar, 2016). Last fire season in 2019, estimated burnt area was about 1.6 million ha.

Figure 1. *Manggala Agni* and stakeholders took a break while combating fires

In 1993, ITTO supported a project "Establishment of a Demonstration Plot for Rehabilitation of Forest Affected by Fire in East Kalimantan". In addition, JICA had consistently supported the Ministry of Forestry (MoEF) on forest fire prevention, among others, Forest Fire Prevention and Management Project (FFPMP) in 1996-2006 and "Program of Community Development of Fires Control in Peat Land Area (FCP)" in 2013.

For more than two decades, actions to combat the fires focused on suppression activities. However, the 2015's fire, transboundary haze pollution occurrences and Indonesia's commitment to climate changes issues on COP-21 UNFCCC that was held in Paris on 2015 encouraged Indonesia to change approaches into focusing on prevention activities. The President of Republic of Indonesia issued Presidential Directives since 2016 until 2019 (each year) to prove Indonesia's strong commitment in addressing forest and land fire problems. In general, Presidential Directives consists of mechanisms to strengthen prevention, field operation, law compliance and enforcement. Prevention activities that have been conducted are as follows: integrated prevention patrol, routine patrol, early detection and early warning system, peatland management, campaign and socialization, establishment of *Masyarakat Peduli Api*, biomass utilization "Zero Burning Policy" *(Pembukaan Lahan Tanpa Bakar)*, and community assistance program. The prevention activities are focused on increasing awareness and participation of communities at village level and integrated prevention patrol to prevent forest and land fires. Currently, mainstreaming forest and land fire prevention in Indonesia is a key agenda to tackle the forest and land fire problem. Prevention activities could contribute to reducing hotspots and forest and land fires occurrences, increasing public awareness in preventing forest and land fires and improving community welfare.

In order to strengthen prevention activities, the MoEF established the Forest and Land Fire Brigades called *Manggala Agni* since 2002 in 12 fire prone provinces in 34 Local Fire Station *(Daops Manggala Agni)* which consists of 1,875 personnel. The insufficient number of *Manggala Agni* encourages MoEF and other Institutions to establish Fire Care Community *(Masyarakat Peduli Api/MPA)* on a voluntary basis. Currently, there are 704 groups of MPA with 10,569 members in 28 provinces. *Manggala Agni* has trained the members of MPA with basic knowledge of forest and land fire control. The members of MPA are expected to be the "agent of change" in their community regarding forest and land fire prevention.

In terms of prevention, the MoEF launched integrated prevention patrols since 2016, although they still need improvement to achieve the effectiveness and efficiency of integrated patrol programs. This program targets 8 fire prone provinces, namely: North Sumatera, Riau, Jambi, South Sumatera, West Kalimantan, Central Kalimantan, East Kalimantan, and South Kalimantan. A team of integrated prevention patrol consists of *Manggala Agni*, *Masyarakat Peduli Api*, Police, Army, Forest Rangers and representatives of local governments. Besides the new program called integrated prevention patrol, MoEF also conducts routine patrols outside the integrated prevention patrol areas. Both patrols aim to prevent, monitor, and conduct early suppression of forest and land fires.

According to the burnt area calculation using Landsat 8 imagery, the data showed that the largest burnt area in 2019 was located in South Sumatera Province (328,457 ha), followed by Central Kalimantan with a total burnt area of 303,881 ha while burnt area in South Kalimantan Province was recorded at around 136,428 ha. These three provinces also have large areas of peatland that are very prone to fire in the dry season. The area of peatlands in three provinces from the widest to the smallest in sequence is Central Kalimantan with around 2,659,000 ha, South Sumatera with around 1,262,000 ha and South Kalimantan with around 106,000 ha. These data indicate that it is important to increase prevention activities in these areas.

This project has supported the Government of Indonesia to conduct fire prevention activities. The project had involved *Manggala Agni* and *Masyarakat Peduli Api* as the main key actors in forest and land fire control and prevention at site level (village level) through training and integrated prevention patrol in 3 fire prone provinces in Indonesia. The project has also supported government officials to strengthen their capability to conduct effective and efficient forest and land fire management to address forest and land fire problems. The project was the joint initiative of the Governments of Indonesia and Japan in their efforts to reduce incidents of forest and land fires in Indonesia.

Figure 2. *Manggala Agni* and stakeholders carried out fire suppression

1.1.2. The problem addressed

In Indonesia, forest fires occur almost every year especially in dry season. Many researchers stated that almost 99% of forest and land fires in Indonesia are caused by human activities. Local communities in Indonesia are familiar with the use of fires in traditional livelihood activities, such as land and post-harvest vegetation clearing, agriculture preparation, hunting, camping, etc. Use of fires in farmland preparation has long been practiced in almost every part of the world, not only in Indonesia but also in other countries which practices traditional agriculture since the use of fires in farm or agricultural preparation is quick, easy and cheap. Historically, local communities with their local wisdom have played a significant role in the management of fires for many years. However, changes in land use patterns, social conflicts, and economic growth often change these fire use patterns and practices.

Fire prevention is a key program identified in the MoEF Strategic Planning Document (*Renstra* and *Renja* 2020-2024) and it is in line with President Directives No. 3 year 2020. Insufficient budget allocation for carrying out the program has prevented achievement of fire prevention targets. In light of the importance of tackling the issues, the project will introduce improved technology/system and develop techniques and guidelines such as SMART (System Monitoring and Reporting Technology), an application tool that can be utilized for managing an integrated real time report by *Manggala Agni* in the field, and enhance preventive measures for protecting the forests from fires and haze in target location.

Based on Indonesia regulations, the coordination mechanism in forest fire prevention shall be conducted at various levels, namely: central, provincial, district/city, as well as at the site level. At central level, several ministries and national agencies have established coordination mechanisms which include, among others, the MoEF; Ministry of Agrarian Affairs; Spatial Planning/National Land Agency; Ministry of Health; National Institute of Aeronautics and Spaces (LAPAN); Meteorological, Climatological and Geophysical Agency (BMKG); and Geospatial Information Agency (BIG). At the operational level (provincial and below), there is room for improvement, including coordination among actors i.e. these are all important efforts towards a common goal. However, at the operational level, despite increased cooperation among local governments, law enforcement units, communities and the private sector, more needs to be done.

Several studies and experiences reveal that forest and land fires in Indonesia have resulted in negative impacts to health, ecosystems, economy, transportations, politics, etc.; loss of forest cover and natural wildlife habitats and damages to forest and land including peatland ecosystems. The key problem that causes repeated-occurrences of forest and land fires identified by the stakeholders meeting were:

i) Negative impact to health, ecosystems, economy, transportations, politic, etc.
ii) Loss of forest cover and natural wildlife habitats
iii) Damage to forest and land including peatland ecosystems
iv) Insufficient comprehensive policies and operative regulations on forest and land fire prevention

Based on the stakeholder consultations, three main causes of the key problems identified, were: 1) Poor agricultural practices conducted by communities; 2) Limited management capacity of institutions to address forest and land fires problems; 3) Lack of cooperation/actions among stakeholders in forest and land fire prevention

1.2. Project design

Design of the project was based on in depth problem analysis involving stakeholders at the problem tree and solution tree, consisted of the following elements:

- **Development objective**

  To support the capacity building for the implementation of integrated forest and land fire prevention program and reduce the effects of the fires on the forest cover, natural wildlife habitats and livelihood

- **Specific objective**

  To improve prevention of forest and land fire through strengthening management and technical capacity of stakeholders at three targeted provinces of South Sumatra, Central Kalimantan and South Kalimantan, and national level. Note that the specific objective was the direct response to the key problem addressed by the project.

- **Outputs**

  Defined project specific objective was planned to be achieved through delivery of three outputs, namely:

  i. Best agricultural practices applied by Fire Care Community (*Masyarakat Peduli Api*)/Local communities
  ii. Management capacity to address forest and land fires problems strengthened
  iii. Cooperation among local institution, private sector and communities for forest and land fire prevention strengthened

  Note that defined outputs were in conformity to the main causes of the key problem.

- **Activities**

  Those three outputs would be delivered through implementation of 12 pertinent activities as listed below:

  <u>Output 1</u>

  Activity 1.1. To improve training materials on sustainable agricultural and silvicultural management techniques/ guidelines as well as development of zero burning practices

  Activity 1.2. To implement training for local community especially Fire Care Community *Masyarakat Peduli Api)* members

  Activity 1.3. To establish demonstration plots of zero burning practices in 8 locations.

Figure 3. *Manggala Agni* carried out fire suppression

Output 2

Activity 2.1. To provide training for forest and land fire control for Forest and Land Fire Brigade (*Manggala Agni*) at province and district level

Activity 2.2 To support officials on forest fire damage estimation using GIS and remote sensing application

Activity 2.3. To develop technology/system of SMART integrated patrol-reporting application for early detection and warning of forest fires in the fields.

Activity 2.4 To improve Standard Operational Procedure on Forest and Land Fire Control

Activity 2.5 To support building capacity of Forest and Fire Brigade (*Manggala Agni*) to control land and forest fire by providing safety equipment.

Output 3

Activity 3.1 To improve and strengthen the institutional coordination of the Task Force for Control on Forest and Land Fire Management at the national and provincial/district level.

Activity 3.2 To hold dialogues on forest and land fire Management/action with private sector and other local institutions

Activity 3.3. To organize a sub-regional workshop for prevention and management of forest and land fires in Southeast Asia with an emphasis on Indonesia

Activity 3.4. To develop dissemination of the outcomes of the project and asses of its replication in other area

Note that planned project activities were consistent with the indirect causes of the key problem.

A logical framework was developed as a tool for measuring achievement of the project as shown in Table 1.

Table 1. Logical framework

Intervention strategy	Measurable indicators	Means of verification	Assumption
Development Objective Support the capacity building for the implementation of integrated forest fire prevention program and reduce the effects of fires on forest cover, natural wildlife habitats and livelihood	• forest burnt area reduce 10% from 2019 • hotspot in target area reduce 10 % from 2019 • number of *Manggala Agni* or community having accident with forest fire decreases up to 90 %	• National report of forest and land fire in Indonesia/ statistics book • Annual Hotspot Information	• Stakeholders supported on addressing forest and land fire in Indonesia • Forest and Land Fire Prevention is National priority programme
Specific Objective To improve prevention of forest and land fire through strengthening management and technical capacity of stakeholders at three targeted provinces and national level	• Community in 8 villages in 3 provinces apply best practice agriculture (land preparation without burning). • Capacity of Forest and Land Fire Brigade *(Manggala Agni)* & officials in 3 provinces improved. • Proven technology on reporting and detection of forest fires and forest burnt area to support Monitoring System available • Personal protective clothing properties and safety equipment of *Manggala Agni* in target location available • Main stakeholder awareness in three provinces on forest fire prevention improved	• Regional Report of Forest and Land Fire • Data and statistics book • Progress report • Training report • Report of stakeholder coordination • Documentation • Monitoring and Evaluation Report	• All stakeholders committed to handle Forest and Land fire
Output 1 Best agricultural practices applied by Fire Care Community (MPA)/Local communities	• One package of Development/improvement on sustainable agricultural and silvicultural management techniques as well as development of zero burning practices area available • Eight training programmes for local communities especially Fire Care Community *(Masyarakat Peduli Api/ MPA)* members in 3 provinces namely South Sumatera, Central Kalimantan and South Kalimantan conducted. • Demonstration plots of zero burning practices in 8 locations established	• Training reports • Training Material	• Community is committed to forest and land fire prevention programme • Fire Care Community members could be an agent of change to their neighborhood and promote zero burning activities.

Intervention strategy	Measurable indicators	Means of verification	Assumption
Output 2 Management capacity to address forest and land fires problems strengthened	• Four training programmes on forest and land fire control conducted for Forest and Land Fire Brigade (*Manggala Agni*) in 3 provinces namely South Sumatera, Central Kalimantan and South Kalimantan • Series of training for officials on GIS modeling carried out and proven remote sensing technology developed • One set technology/system of SMART integrated patrol reporting application developed and installed in 3 target provinces • One Standard Operational Procedure on Forest and Land Fire Control developed • Personal protective clothing properties and safety equipment of *Manggala Agni* in target location available	• Training reports • Short course report • Activity Report • Guideline/SOP • Procurement report	• Knowledge of *Manggala Agni* in forest and land fire response in the field will increase and it will help to reduce the incidence of forest and land fires. • Capability of government officials in forest and land fire management will increase and contribute to effective and efficient forest and land fire management performances. • Performance on forest and land fire control will increase through proper activities based on SOP/guidelines.
Output 3 Forest and land fire prevention action increased	• MOU among stakeholders (task force) to exchange information, conduct policy dialogues, strengthen cooperation implemented • Two dialogue series to support Land Preparation without Burning *(Pembukaan Lahan Tanpa Bakar/PLTB)* with private sector and local institutions implemented • A sub-regional workshop for prevention and management of forest and land fires in Southeast Asia with an emphasis to Indonesia conducted • Dissemination of the outcomes of the project developed in various forms such as leaflets, film and report/social media	• Activity report • Dialogues report • Workshop report • Documentation	• local institutions and other stakeholders are interested to join the integrated prevention patrol activities. • All stakeholders have awareness to prevent forest and land fire

Figure 4. Woman *Manggala Agni* carries out fire suppression

1.3. Assumptions and risks

The assumptions made by the proponents to ensure the successful project implementation and achieve the specific objective include:

1) The stakeholders support the whole project's activities,
2) The central government maintain forest fire prevention as its national priority programme,
3) All stakeholders firmly commit to actively participate in actions to handle forest and land fire in the country.

Moreover, some potential risks that could obstruct achievement of project outputs and the specific objectives had also been identified including:

1) Stakeholders do not fully support addressing forest and land fire problems in Indonesia.
2) Forest and land fire prevention are not maintained as a national priority program.
3) All stakeholders do not commit to handle forest and land fire problems.

In order to mitigate or reduce these above risks, the project carried out activities in intensive coordination and cooperation with all stakeholders referred to the Minister of Environment and Forestry Regulation No P.32/2016 on Forest and Land Fires Control which aims to increase stakeholders' participation in forest and land fire control including prevention, suppression, and post-fire activities. Furthermore, the related stakeholders at local, district, provincial, national, or even regional levels were invited and involved in the meetings, training, or events that could increase their awareness and participation in addressing forest and land fire issues. The regional office and project personnel delivered continuous and direct contact and coordination with the local communities and representatives of related stakeholders to build networking and conduct intensive communication as well as participation in project events.

1.4.Organization of the report

Chapter 1 briefly presents the formulation process of the project, covering problem identification by identifying origin, development of project design and logical framework as well as assumptions and identification of risks;

Chapter 2 describes applied methodologies on project preparation and implementation;

Chapter 3 provides information on project intervention, achievement, and lessons learned as regards best agricultural practice applied by the Fire Care Community (*Masyarakat Peduli Api*);

Chapter 4 provides information on project intervention, achievement, and lessons learned as regards strengthening of management capacity for forest and land fire brigade (*Manggala Agni*) as well as Regional/District personnel to address forest and land fires problems;

Chapter 5 provides information on project intervention, achievement, and lessons learned as regards strengthening of synergy and cooperation among local institutions, private sector, and communities for forest and land fire prevention;

Chapter 6 presents a general discussion regarding achievement of specific objective and development objective, as well as the lessons learned; and

Chapter 7 presents a conclusion and recommendations from the project implementation

2 APPLIED METHODOLOGIES

2.1. Project implementation strategy

The project proponent hypothesized that the specific objective of the project will be achieved through delivery of three outputs, namely:

1) Best agricultural practices applied by Fire Care Community (*Masyarakat Peduli Api*)/Local communities
2) Management capacity to address forest and land fires problems strengthened
3) Cooperation among local institution, private sector and communities for forest and land fire prevention strengthened

Under the outputs, 12 main activities had been identified and implemented to achieve those outputs by developing guidelines, delivering trainings/courses, improving technology, organizing workshops/Focus Group Discussions/Meeting, as well as providing fire safety equipment.

Output 1

The activities under Output 1 developed guidelines for alternative agricultural practices related to land preparation without burning by communities. In addition, the project carried out capacity building on grass root level by implementing training programs for local communities especially member of *Masyarakat Peduli Api* in 8 locations in the three targeted provinces, followed by developing demonstration plots for zero burning practices in the same locations.

Output 2

Under Output 2, the activities developed guidelines on forest and land fire control for fire brigades. The project carried out training programs on forest and land fire control for Forest and Land Fire Brigade (*Manggala Agni*), organized training/workshops on fire-spatial approaches, and conducted socialization and training on utilizing SMART Patrol Information System in three targeted provinces. The SMART Patrol Information System is an application technology for managing an integrated real-time reporting and monitoring of fire prevention patrols by *Manggala Agni*. Moreover, through collaboration between *Manggala Agni* and *Masyarakat Peduli Api*, SMART patrols were conducted as a preventive measure against forest fires and haze in the targeted locations. The project also provided fire equipment to support the operation of forest and land fire control.


Figure 5. Participatory technical meeting

Output 3

This output was delivered by developing of synergy and collaboration among stakeholders which is important to enhance information sharing and take rapid-fire suppression actions. Dialogues on synergy and collaboration were also effectively carried out to support actions on land preparation without burning (*Pembukaan Lahan Tanpa Bakar*/PLTB) involving communities, private sector, regional government, and village government. The project organized sub-regional webinar series for the prevention and management of forest and land fires in Southeast Asia which involved international experts and practitioners on forest fires. The project also disseminated the outcomes of the project in various forms such as leaflets, videos, and reports using different available platforms including social media.

2.2. Adjustment and improvement of the strategy

2.2.1. General process and its improvement

In general, in the process of organizing implementation of planned activities, the project applied a stakeholder participatory approach. Involved stakeholders were Directorate Forest and Land Fire Management, Secretariat of Directorate General of Climate Change, Agency of Climate Change and Forest and Land Fire Management in Regional Sumatra and Kalimantan, Local Fire Stations (*Daops Manggala Agni*), Coordinator *Daops Manggala Agni* province (South Sumatra, Central Kalimantan, and South Kalimantan), fire brigades (*Manggala Agni*), as well as experts/researchers and IPB university.

The stakeholder participatory approach was started by conducting technical meetings with the relevant stakeholders. The technical meeting elaborated on several aspects comprising: training substance that also considered communities' specific needs, targeted participants, locations, appropriate facilitators/instructors, and time schedule.

To finalize an activity implementation plan, the project collaborated with the Directorate of Forest and Land Fire Management and made field coordination in South Sumatra and Central Kalimantan. The field coordination arranged meetings and consultations with the Agency of Climate Change and Forest and Land Fire Management in Regional Sumatra and Kalimantan, Local Fire Stations (*Daops Manggala Agni*), and Coordinator *Daops Manggala Agni* provinces (South Sumatra, Central Kalimantan, and South Kalimantan). That meeting aimed to discuss and reconfirm the activities implementation plan.

Figure 6. Field coordination

2.2.2. Particular adjustment and improvement

For modules development under Activities 1.1 and 2.4, the project engaged expert team with the prior approval of the ITTO Secretariat. The module development started by carrying out brainstorming with the relevant stakeholders, identifying the problem, developing a draft, exposing and reviewing the draft with the stakeholders, and finalizing the module. Data and information were collected by carrying out meetings and workshops, reviewing the literature, and interviewing relevant resource persons. The expert team also conducted intensive communication with the Directorate of Forest and Land Fire Management regarding their official tasks, responsibilities and experience in implementing the fire prevention programs without burning as well as encouraging local communities on fire prevention in land preparation.

Regarding Activity 2.3, development of the SMART Patrol Information System was conducted in several phases comprising collecting data of fire prevention patrols, developing standard measurement of parameters, providing technology infrastructure, developing a mobile application and web-based information system, conducting system testing and evaluation, finalizing the system and improving the capacity of targeted users.

Under Activity 2.5, considering the targeted safety equipment as stated in the Project Document, further identification and determination of fire equipment in terms of type, unit, and also specification had been accomplished by consulting with the fire stakeholders and *Manggala Agni* at the site. The procurement process referred to Project Agreement ITTO PP A/56-340-1 and ITTO Guidelines for the selection and employment of consultants, procurements and payments of goods and services, as well as guidance and recommendations of PSC Meeting, Executing Agency, and ITTO Secretariat. Procurement of the equipment was carried out and assisted by the Procurement Committee in accordance with existing government's rules and procedures and with the prior written approval of the ITTO Secretariat.

2.2.3. Considering fire occurrence

Since involved stakeholders and targeted participants have their own tasks and responsibilities in the forest and land fire management, implementation of planned activities also considered fire occurrence. When fire occurred in the targeted area and required all stakeholders to carry out fire control, the planned activities were relocated to other targeted areas with no fires, or even postponed.

2.2.4. Adaptation to pandemic Covid-19 condition

The project commenced and implemented during the Covid19 pandemic that implementation of the activities should be organized under strict health control protocol. This condition strongly influenced the project implementation due to restriction of movement and gathering of participants, whilst the nature of the project activities as technical training/course required to gather participants in the same location. A training activity is not optimally fruitful if conducted under a virtual fashion. Furthermore, when the Covid-19 pandemic got worsen and resulted in an increasing trend to emergency phase, the government would enforce stricter health protocols that prohibited any face-to-face activities. In this period, the project had delayed almost all planned training/courses.

In the implementation of training activities, the committee always coordinated and communicated with the local task force on Covid-19 that controlled issuance of a permit for delivering the activities. The training venue was also sprayed with disinfectants prior to the implementation of the training. Furthermore, all the committees, facilitators, and participants took the Covid-19 swab test and applied 5M protocols for Covid-19 prevention, namely wearing masks, washing hands, keeping their distance, avoiding the crowd, and reducing mobility. The training and participants were also provided with hygiene kits of the Covid-19 prevention, such as masks and hand sanitizers. In effect, the Covid-19 pandemic had made implementation of activities problematic.

3 BEST AGRICULTURAL PRACTICES APPLIED BY FIRE CARE COMMUNITY (MPA)/LOCAL COMMUNITIES

3.1. Introduction

This chapter discusses on the alternative technology for local communities and farmers to use as a substitute for fire in livelihood – related activities in light of government policy on burning prohibition and encouraging community participation in prevention of forest and land fires.

Many researchers stated that almost 99% of forest and land fires in Indonesia are caused by human activities. Local communities in Indonesia are familiar with the use of fires in traditional livelihood activities, such as land and post-harvest vegetation clearing, agriculture preparation, hunting, camping, etc. The use of fires in farmland preparation has long been practiced in many parts of the world including Indonesia since the use of fires is quick, easy, and cheap. Historically, local communities with their local wisdom have played a significant role in a healthy management of fires for many years. However, changes in land use patterns, social conflicts, and economic growth have often changed the healthy fire use patterns and practices.

As to date, many local communities continue applying fires, especially in the initial preparation of farming lands. This continued use of fires also reveal that local communities are not well informed nor well trained with the alternative land use practices i.e. a zero burning technology.

3.2. The project interventions

To address the problem on using fires by local communities in livelihood – related activities, the project had formulated and implemented several approaches as presented below.

Activity 1.1 Development/improvement of training materials on sustainable agricultural and silvicultural management techniques as well as development of zero burning practices

The activity aimed to develop one package of sustainable agricultural and silvicultural management technique as well as a zero burning technology for local communities to use in local livelihood development. To implement the intervention, the project engaged an expert team of the Research, Development and Innovation Agency of MoEF, comprising Dr. Saptadi Darmawan, Kushartati

Budiningsih, and Irfan Malik Setiabudi with the main task to develop a training module on zero burning practice. The assignment of the expert team was made with the prior approval of the Executing Agency and the ITTO Secretariat.

The process on module development by the expert team consisted of the following steps: carrying out brainstorming with the relevant stakeholders, identifying the problem and alternate practices, defining outline, developing draft, exposing and reviewing the draft with stakeholders, and lastly finalizing the module. Needed data and information were collected through meetings and workshops, reviews of literature, and interviews of relevant resource persons including academies, bureaucrats, practitioners, and local communitie. In developing the module, the expert team conducted intensive communication with the Directorate of Forest and Land Fire Management regarding their official tasks and responsibilities as well as experiences in implementing fire prevention programs without burning and in encouraging local communities to take part in fire prevention.

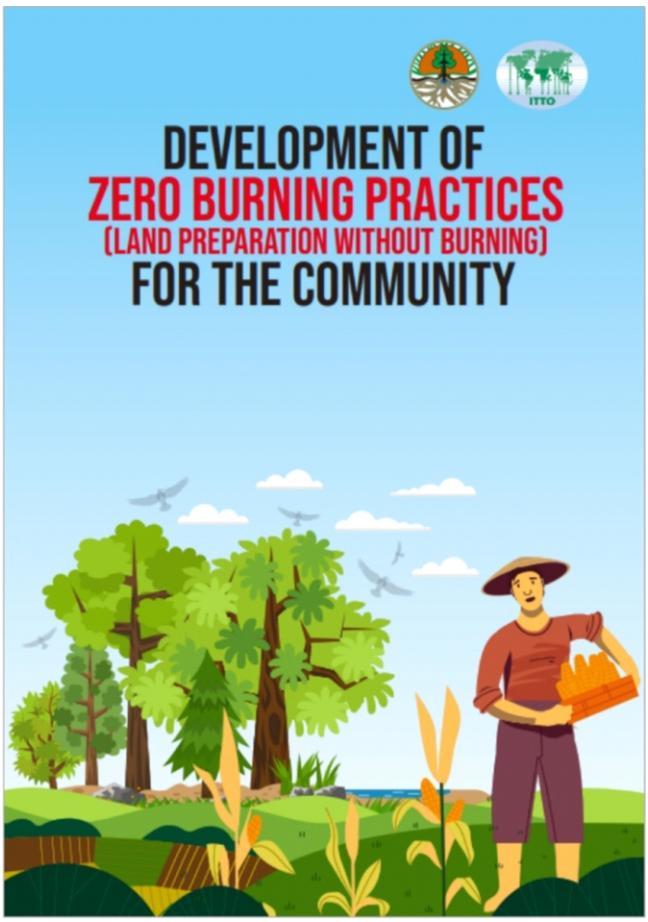

Figure 7. Module of zero burning practices

The activity produced the module entitled "Development of Zero Burning Practices (Land Preparation without Burning) for the Community". The module consists of 16 chapters as follows:

Chapter 1 : Forest and Land Fires
Chapter 2 : Introduction of Peatland
Chapter 3 : Regulation and Policy Related to Forest and Land Fire
Chapter 4 : Community Participation on Forest and Land Fire Prevention
Chapter 5 : Land Preparation without Burning
Chapter 6 : Utilization of Land Preparation Waste
Chapter 7 : Manufacturing of Liquid Smoke
Chapter 8 : Manufacturing of Charcoal
Chapter 9 : Manufacturing of Compost Charcoal
Chapter 10 : Manufacturing of Charcoal Briquette
Chapter 11 : Manufacturing of Biomass Stoves
Chapter 12 : Manufacturing of Block Composts
Chapter 13 : Demonstration Plot Design
Chapter 14 : Lesson Learned from Integrated Charcoal Technology Implementation
Chapter 15 : Development of Integrated Charcoal Technology Enterpreneurship
Chapter 16 : Closing Remarks

Activity 1.2 **Implement of training for local community especially Fire Care Community (*Masyarakat Peduli Api*) members**

The activity was designed to address the lack of capacity in practicing land preparation without burning, by local communities. The targeted communities were the *Masyarakat Peduli Api* since the *Masyarakat Peduli Api* is a voluntary group that supports implementation of fire management in the village while all its members are local residents, mostly working as farmers.

The stakeholders had collectively defined 8 (eight) locations of technical training including *Masyarakat Peduli Api*. The parties also agreed to include additional participants from the *Manggala Agni*, Village government, and others (agricultural extension, Army, Police). *Manggala Agni* was involved to improve their skills in carrying out promotion of fire prevention to the communities. The village government as the lowest administrative unit was included considering its tasks in providing services for the local community and for preventing fire incidents in the village.

Involvement of additional participants was aimed to enhance their skills for land preparation without burning as one alternative technology on burning prohibition which is important for supporting their task for conducting fire prevention campaign to local communities and other parties. The involvement is also useful to sustain the program on encouraging the community in applying technique for land preparation without burning to support fire prevention program.

Figure 8. Technical training of zero burning practices

Besides the participants, the project also invited other relevant stakeholders, initially as observers but later on as participants in the FGD on supporting the communities on development of zero burning practices. The invited stakeholders consisted of Agencies in Regional/District government (Forestry/Forest Management Unit, Agriculture, Industry, Small-medium business), Regional Disaster Management Agency (BPBD), Army, Police, Village Government as well as Private firms.

The technical training on zero burning practices was carried out in 8 villages in 3 targeted provinces; specifically, 2 trainings in each Central Kalimantan and South Kalimantan, and 4 trainings in South Sumatera. The total participants of the trainings reached 240 people, or averaging 30 persons per training. The training participants were dominated by *Masyarakat Peduli Api* as the primary target.

Table 2. Participants of zero burning practices training by affiliation

NO	LOCATION		DATE	PARTICIPANT					REMARKS
	District	Village		Fire Care Community	Fire Brigade	Village Govt	Others	Total	
	South Kalimantan								
1	Tapin	Sungai Rutas Hulu	4-5 Oct 21	16	9	5	-	30	
2	Banjar	Landasan Ulin Timur	6-7 Oct 21	20	8	2	-	30	
	Central Kalimantan								
3	Pulang Pisau	Pilang	18-19 Oct 21	16	10	2	2	30	Army, Police
4	Barito Selatan	Parapak	21-22 Oct 21	15	10	3	2	30	Army, Police
	South Sumatra								
5	Banyuasin	Lubuk Lancang	13-14 Dec 21	15	10	2	3	30	Agriculture extension, Army, Police
6	Musi Banyuasin	Wonorejo	16-17 Dec 21	15	10	2	3	30	Agriculture extension, Army, Police
7	OKI	Jejawi	10-11 Jan 22	15	10	3	2	30	Army, Police
8	Muara Enim	Gelumbang	12-13 Jan 22	15	10	5	-	30	
TOTAL				**127**	**77**	**24**	**12**	**240**	

Table 3. Participants of zero burning practices training by gender

NO	LOCATION		GENDER		
	District	Village	Female	Male	Total
	South Kalimantan				
1	Tapin	Sungai Rutas Hulu	4	26	30
2	Banjar	Landasan Ulin Timur	-	30	30
	Central Kalimantan				
3	Pulang Pisau	Pilang	-	30	30
4	Barito Selatan	Parapak	1	29	30
	South Sumatra				
5	Banyuasin	Lubuk Lancang	-	30	30
6	Musi Banyuasin	Wonorejo	3	27	30
7	OKI	Jejawi	1	29	30
8	Muara Enim	Gelumbang	-	30	30
TOTAL			**9**	**231**	**240**

The technical training on zero burning practices was facilitated by instructors from the Research, Development and Innovation Agency – MoEF who delivered materials on Integrated Charcoal Technology including techniques for making charcoal, compost, and liquid smoke. Participants were trained to utilize woody-biomass wastes from land preparation for conversion to liquid smoke and charcoal; finer-biomass wastes were processed into compost. The 2-days technical training delivered theoretical and practical materials. The participants also directly taught on how to produce liquid smoke, charcoal as well as compost. They also practiced on how to use those products directly in the field. The charcoal and compost were used for planting media, increasing pH value of peatland, fertilizer, and also improving soil structures; while liquid smoke was applied for fertilizer and pest repellent. Detailed information is available in the module on "Development of Zero Burning Practices *(Land Preparation without Burning) for the Community)*" produced by the project.


Figure 9. Manufacturing of liquid smoke and charcoal

Figure 10. Manufacturing of planting media

Figure 11. Manufacturing of biomass compost

In fact, this alternative method did not change the process of agricultural practices that were usually applied by farmers. Sequence of the process is still the same as the previous one started with clearing the land, then preparing the land or developing land bed, planting the commodities, cultivating the commodities, and finished with harvesting the commodities. Those processes are conducted continuously as a cyclical mechanism. This alternative approach emphasized on utilization of biomass waste resulting from land clearing as previously explained.

Under the zero burning practices training, the participants, especially the *Masyarakat Peduli Api* also received a set of agricultural tools, pumps, bio-decomposers, and liquid smoke-charcoal manufacturing machines.

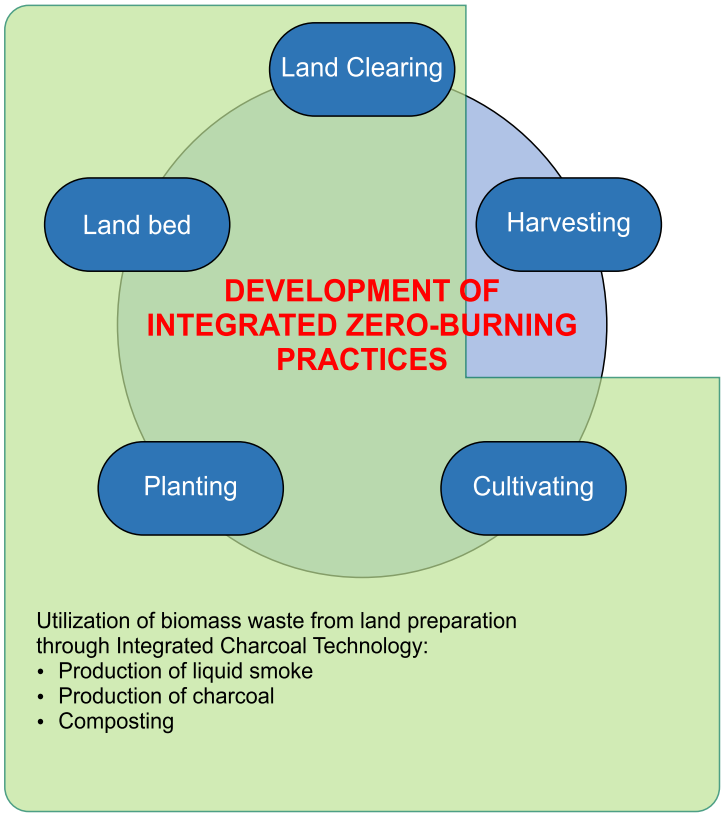

Figure 12. Development of integrated zero-burning practices

Unplanned activities

The technical training of zero burning practices emphasized more on agricultural aspect, but the community also requires skills for economic empowerment. For that concern, the project organized 3 additional technical trainings on community economic empowerment focusing on fish farming (aquaculture) which was carried out in South Sumatra (2 trainings) and in Central Kalimantan (1 training). The participants reached 81 persons in total, dominated by *Masyarakat Peduli Api* as the primary target.

Figure 13. Training of economic empowerment

The training on community economic empowerment was facilitated by instructors from the Fisheries Service that delivered substances regarding fish farming and fish feed production. The participants, especially the *Masyarakat Peduli Api* also received constructed ponds, fish seeds, fish feeds, fish feed manufacturing machines. Both trainings on agricultural and economic aspects were subsequently identified as "integrated land preparation without burning practices".

Table 4. Participants of economic empowerment training by affiliation

NO	LOCATION		DATE	PARTICIPANT					REMARKS
	District	Village		Fire Care Communit	Fire Brigade	Village Govt	Others	Total	
	Central Kalimantan								
1	Pulang Pisau	Pilang	22 Mar 21	15	8	-	3	26	Forest Management Unit, Army, Police
	South Sumatra								
2	Banyuasin	Lubuk Lancang	19 Apr 22	15	10	2	3	30	Fisheries extension, Army, Police
3	OKI	Jejawi	24 May 22	15	6	1	3	25	Army, Police
TOTAL				**45**	**24**	**3**	**9**	**81**	

Table 5. Participants of economic empowerment training by gender

NO	LOCATION		GENDER		
	District	Village	Female	Male	Total
	Central Kalimantan				
1	Pulang Pisau	Pilang	-	26	26
	South Sumatra				
2	Banyuasin	Lubuk Lancang	1	29	30
3	OKI	Jejawi	1	24	25
TOTAL			**2**	**79**	**81**

Activity 1.3 Establish demonstration plots of zero burning practices

The activity was devoted to tackling limited capacity of stakeholders in land preparation without burning. This activity was executed in parallel with Activity 1.2. Since the communities and other participants had been trained on techniques for land preparation without burning, under this activity the participants were given the opportunity to directly apply the knowledge and skills taught under Activity 1.2 under the assistance of competent experts. The stakeholders had collectively identified 8 (eight) sites as demonstration plots which were the same locations as the technical training.

All eight demonstration plots for zero burning practices were established simultaneously in parallel with the training on zero burning practices involving 8 villages in 3 provinces, i.e. 2 demonstration plots each in Central Kalimantan and South Kalimantan, and 4 plots in South Sumatera. The demonstration plots were developed in collaboration with *Masyarakat Peduli Api* and *Manggala Agni* with the support by the village governments, and other such parties as agricultural extension,

Army and Police. The development of demonstration plots was also assisted by the Research, Development and Innovation Agency of MoEF.

The development process of demonstration plots, was supported and facilitated by the project for 3 to 4 months to cover one of harvesting cycle of seasonal crops. The stages of zero burning development involved: (1) land clearing; (2) land bed preparation; (3) planting; (4) maintenance; and (5) harvesting. The post management of the demonstration plots are to be handled by the *Masyarakat Peduli Api* with the assistance of *Manggala Agni* and the Village Government by using the revenues obtained from the first harvest cycle for buying needed inputs.

Table 6. Development of demonstration plots for zero-burning practices

NO	LOCATION		AREA (m^2)	COMMODITY
	District	Village		
	South Kalimantan			
1	Tapin	Sungai Rutas Hulu	1,000	Chilli, orange, Weeping paperbark
2	Banjar	Landasan Ulin Timur	1,000	Chilli, eggplant, long beans, durian, mango, edamame beans
	Central Kalimantan			
3	Pulang Pisau	Pilang	1,100	Chilli, eggplant, long beans, onion, cucumber, corn, durian
4	Barito Selatan	Parapak	1,000	Chilli, eggplant, long beans, corn, durian
	South Sumatra			
5	Banyuasin	Lubuk Lancang	1,600	Chilli, durian, avocado
6	Musi Banyuasin	Wonorejo	2,100	Chilli, durian, avocado, betel nut
7	OKI	Jejawi	2,600	Chilli, eggplant, cucumber, peanut, durian
8	Muara Enim	Gelumbang	2,600	Chilli, tomato, durian, mango
TOTAL			**13,000**	

As previously mentioned, development of demonstration plots for zero burning practices did not change the established process of agricultural practices that were usually applied by local farmers. The sequence of the process is still the same as that one presented above. Those steps are conducted continuously as a cyclical mechanism. This newly introduced approach only emphasized on utilization the biomass waste resulting from land clearing.

For development of demonstration plots, the *Masyarakat Peduli Api* and *Manggala Agni* used a set of agricultural tools, i.e. pumps, bio-decomposers, fish feeds, fish feed manufacturing machines, and liquid smoke-charcoal manufacturing machines, they received from the project during the technical training. The participants also directly exercised to produce liquid smoke, charcoal as well as compost and practiced on how to use the tools in the field. Products of the exercise were used in the cultivation process; the charcoal and compost were used as planting media, as material for increasing pH value of peatland, fertilizer, and for improving soil structure. The liquid smoke was applied for fertilizer and pest repellent. The planting media (charcoal and compost mix) was used once in the initial land preparation before planting, while compost was also applied for fertilizer during the cultivation stage. The spraying of liquid smoke was conducted periodically, at least once a week, that depends on the condition. If there were attacks by pests and disease, spraying of liquid smoke was applied more frequent, e.g. every two days, with a higher concentrate of liquid smoke.

Unplanned activities

Development of the demonstration plots for zero burning practices emphasized more on the agricultural aspect. However, the project also assisted construction of fish ponds farming to improve augment communities' income: 2 units in South Sumatra and one unit in Central Kalimantan. Both demonstration plots for agricultural and economic purposes are further identified as integrated land preparation without burning practices. Note that establishment of the fish pond farming was unplanned activity that was adored by local communities.

Figure 14. Development of land preparation without burning practices

Table 7. The fish ponds farming

NO	LOCATION		SEED AMOUNT	FISH SPECIES
	District	Village		
	Central Kalimantan			
1	Pulang Pisau	Pilang	1,500	Catfish, Snakehead fish
	South Sumatera			
2	Banyuasin	Lubuk Lancang	1,500	Nile tilapia
3	OKI	Jejawi	4,500	Catfish
TOTAL			**7,500**	


Figure 15. Fish pond farming (aquaculture)

3.3. Discussion on the interventions

Most fires in Indonesia are caused by human activities; land preparation by burning by local communities is among the significant activities. For this reason, the project had introduced three interventions as highlighted below:

1) The project had developed a module entitled "Development of Zero Burning Practices (Land Preparation without Burning) for the Community". The module contains general information regarding forest and land fires, including peatland; policy on fire prevention, community participation, practices of biomass wastes utilization from land preparation related to zero burning, design of the demonstration plots and lessons learned. The module serves as a reference for alternative approach to zero burning practices that can be applied by local communities amid the national policy on burning prohibition.

2) To address the lack of capacity in the practice of land preparation without burning, the project organized technical training on the development of zero burning practices. These zero burning practices approach emphasized conversion of biomass waste resulting from land preparation to liquid smoke, charcoal, and compost which was further used in their agriculture cultivation process. This alternative method was also claimed as not to change the established agricultural practices that have been applied by local communities; it solely introduced the products made of wastes into the agriculture cultivation processes. This training focused more on the agricultural aspect and targeted the local communities, primarily the *Masyarakat Peduli Api*, followed by the *Manggala Agni*, village government, and other stakeholders as the secondary participants.

   Since the technical training of zero burning practices emphasized more on agricultural aspect, the project also carried out training on community economic empowerment. Both training subjects, together is identified as integrated land preparation without burning practices.

3) In terms of applying the knowledge and skills that had been received from the zero burning training, the communities also practiced their improved capacity directly in the field through development of

demonstration plots. Supported by the project for about 3 to 4 months to cover one cycle of harvesting seasonal crops harvesting, the communities directly produced liquid smoke, charcoal as well as compost to use directly in cultivation process.

In the beginning, it was very difficult to prepare the land without burning. However it would be always difficult if we only saw it, so we worked on it, and the yields from the implemented PLTB could be used for our daily needs

Oscar pradana
(MPA, Pulang Pisau – Central Kalimantan)

Figure 16. Testimony of *Masyarakat Peduli Api*

3.4. Achievement of the intervention assessed

The three planned activities that had been fully implemented were:

- Activity 1.1 To improve training materials on sustainable agricultural and silvicultural management techniques/ guidelines as well as development of zero burning practices;
- Activity 1.2 To implement training for local communities especially *Masyarakat Peduli Api*;
- Activity 1.3 To establish demonstration plots of zero burning practices.

The project interventions introduced under Output 1 were supposed to fully deliver that output. To assess the extent to which the output had been delivered, there is a need to match the indicators of achievement defined in the project document with the outcomes of the three activities; the matching process is shown in Table 8.

Table 8. Assessment of intervention achievement

Output/Activities	Indicators of achievement	Achievement of interventions
Output 1		
Best agricultural practices applied by Fire Care Community (*Masyarakat Peduli Api*)/Local communities	(1) One package of development/ improvement on sustainable agricultural and silvicultural management techniques as well as development of zero burning practices area available	(1) Module: Development of Zero Burning Practices (Land Preparation Without Burning) for the Community
	(2) Eight training programmes for local communities especially Fire Care Community *(Masyarakat Peduli Api/MPA)* members in 3 provinces namely South Sumatera, Central Kalimantan and South Kalimantan conducted	(2) Organized trainings: 8 zero burning practices and 3 additional community economic empowerment for local communities especially Fire Care Community *(Masyarakat Peduli Api/MPA)*
	(3) Demonstration plots of zero burning practices in 8 locations established	(3) Developing demonstration plots: 8 demplots and 3 additional fish ponds farming

The matching of indicators of Output 1 with outcomes of the activities under that output shown in Table 8 clearly indicated that Output 1 "Best agricultural practices applied by Fire Care Community (*Masyarakat Peduli Api*)/local communities" had been fully achieved and delivered.

3.5. Lessons learned

From the implementation of three activities under Output 1: "Best Agricultural Practices Applied by Fire Care Community (*Masyarakat Peduli Api*)/Local Communities", the important lessons learned were:

- Considering national policy on burning prohibition, local communities and farmers really require a feasible alternative technology or approach that can be used effectively for preparing lands for farming.
- Community participation in fire prevention should be encouraged, assisted, and accompanied continuously by the Government and other stakeholders.
- Community economic empowerment is required to augment income of the poor local communities.
- The huge-complex works of fire management require synergy and collaboration from all stakeholders including Government, *Manggala Agni*, private sectors, communities/*Masyarakat Peduli Api*, universities, NGOs, and even international agencies.

4 MANAGEMENT CAPACITY TO ADDRESS FOREST AND LAND FIRES PROBLEMS STRENGTHENED

4.1. Introduction

This chapter examines the process on strengthening of management capacity of the forest and land fire brigade (*Manggala Agni*) as well as Regional/District personnel to address forest and land fires problems.

The *Manggala Agni* is a vanguard in the implementation of forest and land fires control and fire suppression. Undeniably, management operation of forest and land fire is a very high-risk activity, especially the activities that must be directly carried out in the field. Considering that condition and in order to prevent and reduce working accidents, *Manggala Agni* should be equipped with knowledge and skills for controlling an effective management of fire control and provision of personal safety outfits and fire equipment.

4.2. The project interventions

To strengthen management capacity of *Manggala Agni* and Regional/District Agency for controlling and preventing forest and land fires, the interventions that had been identified and implemented under the project are highlighted below.

Activity 2.4 **To Improve Standard Operational Procedure on Forest and Land Fire Control**

The activity aimed to develop one package of enhanced procedures on forest and land fire control to serve as a guide for field operation by *Manggala Agni* and other fire personnel. For this purpose, the project engaged an expert team of the Research, Development and Innovation Agency of MoEF, comprising Kushartati Budiningsih and Irfan Malik Setiabudi. Engagement of the expert team was made with the prior approval of the Executing Agency and the ITTO Secretariat.

In developing the module, the expert team carried out brainstorming with the relevant stakeholders, identified the problem and alternate solution, defined the outline, developed the draft, exposed and reviewed the draft with the stakeholders, and lastly finalized the module. Needed data and information were collected by carrying out meetings and workshops, reviewing the literatures, and interviewing relevant resource persons including academies, bureaucrats,

practitioners and local communities. In developing the guidance, the expert team also conducted intensive communication with the Directorate of Forest and Land Fire Management, the Agency of Climate Change Forest and Land Fire Management in Region Sumatra and Kalimantan including their Local Fire Stations regarding their official tasks, responsibilities, and experiences in the implementation of forest and land fire control.

The activity completed the guiding module entitled "Procedures for Forest and Land Fire Brigade". The module or handbook consists of 11 chapters; it presents the tasks and responsibilities of fire brigades on forest and land fire control encompassing prevention, suppression, as well as post-fire actions. Chapters of the handbook consist of:

Figure 17. Procedure for Fire Brigade

Chapter 1 : Introduction
Chapter 2 : The Occupational Health and Safety (K3) in Forest and Land Fire Control
Chapter 3 : Forest and Land Fire Control Planning and Preparedness of Forest and Land Fire Hazards
Chapter 4 : Increasing Stakeholder's Awareness in Forest and Land Fire Control
Chapter 5 : Increasing Personnel Capacity of Forest and Land Fire Control
Chapter 6 : Utilization of Land Preparation Waste
Chapter 7 : Management of Equipment and Tools of Forest and Land Fire Control
Chapter 8 : Prevention of Forest and Land Fire Through Fire Risk Reduction
Chapter 9 : Forest and Land Fire Patrol
Chapter 10 : Forest and Land Fire Suppression
Chapter 11 : Monitoring and Evaluation of Burnt Area

Activity 2.1 To provide training for forest and land fire control for Forest and Land Fire Brigade (*Manggala Agni*) at province and district level

The activity was designed to provide training for forest and land fire control for *Manggala Agni* at the province and district levels. The training consisted of four sessions, for implementation in three provinces, namely: South Sumatra, Central Kalimantan, and South Kalimantan. The main participants were members of *Manggala Agni* who worked in Local Fire Stations (*Daerah Operasi/Daops*) in three provinces.

Based on the formulated training plan, in the technical meeting and field coordination, the stakeholders had identified and agreed regarding locations and its targeted *Manggala Agni*, the length of technical training, kind of delivered subjects, and targeted facilitators/instructors. The technical training was organized on 3 consecutive days through a hybrid mechanism (online and offline), in which each training day was delivered one training subject both theoretical material as well as practical exercises. The practical exercises were allocated more than the theoretical by percentage comparison of more or less 80% and 20% respectively.

The 3-day training subject on forest and fire management consisted of: i) Occupational, Health, and Safety (*Keselamatan dan Kesehatan Kerja*/K3); ii) Animal evacuation; and iii) Forest fire practices. The subjects are closely related to each other and strongly support *Manggala Agni* in accomplishing their tasks and responsibilities. The subjects and competent facilitators are described in Table 9.

Table 9. The subjects of fire management and facilitators

No	Subject	Scope	Facilitator/Instructors
1	Occupational Health and Safety	OHS basic, initial rescue to the victim (blackout, injury, bleeding, fractur) including its evacuation	Army (Health division)/Indonesian Red Cross/Manpower Service/ Center for Community Health
2	Forest fire control practices	Government regulation of fire, socialization of fire prevention to the community, fire patrol, fire suppression, introduction and utilization of fire equipment	Trained *Manggala Agni*
3	Animal evacuation	Regulation of animal protection, introduction of species, treatment and rescue of fire impacted animal	Natural Resources Conservation Unit

The project realized implementation of four technical trainings for the Forest and Land Brigade (*Manggala Agni*) in Central Kalimantan (Palangkaraya, Kapuas) and South Kalimantan (Banjar, Tanah Laut) with total participants of 178 *Manggala Agni* members.

Figure 18. Technical training of fire management

Unplanned activities

Since *Manggala Agni* is the vanguard of fires control operations, it should be trained periodically to improve and maintain their capacity. It was noted that there was an absence of fire management training for several years due to the lack of national budget; hence, the project had delivered more technical training for *Manggala Agni*.

(I) Since the technical training on the implementation of forest and land fire management is very important to all fire brigades (*Manggala Agni*), the main stakeholders agreed to expand implementation of such training to cover all 11 (eleven) Local Fire Stations in 3 provinces. In other words, the project had organized 7 (seven) additional trainings for that particular subject. Considering the time bound, the training was conducted simultaneously for two adjacent districts, and some opening ceremonies were performed in virtual fashion.

The project carried out seven additional technical trainings for *Manggala Agni* in South Sumatra (OKI, Lahat, Banyuasin, Musi Banyuasin); Central Kalimantan (Kotawaringin Barat, Barito Utara); and South Kalimantan (Tanah Bumbu), with total participants of 234 *Manggala Agni* members.

Through eleven technical trainings, 412 members of *Manggala Agni* in South Sumatra, Central Kalimantan, and South Kalimantan were trained and eleven local fire stations were involved in.

Table 10. Participants of fire management training for *Manggala Agni*

NO	LOCATION (District)	LOCAL FIRE STATION	DATE	PARTICIPANTS		
				Female	Male	Total
	ORIGINAL TARGET			**6**	**172**	**178**
	Central Kalimantan					
1	Palangkaraya	*Daops* Kal I/Palangkaraya	25-27 May 21	2	62	64
2	Kapuas	*Daops* Kal II/Kapuas	25-27 May 21	3	37	40
	South Kalimantan					
3	Banjar	*Daops* Kal V/Banjar	15-17 June 21	1	33	34
4	Tanah Laut	*Daops* Kal VI/Tanah Laut	15-17 June 21	-	40	40
	BEYOND TARGET			**13**	**221**	**234**
	South Sumatera					
5	OKI	*Daops* Sum XVI/Lahat	6-8 July 21	3	27	30
6	Muara Enim	*Daops* Sum XVII/OKI	6-8 July 21	2	28	30
7	Banyuasin	*Daops* Sum XIV/Banyuasin	16-18 Mar 22	-	30	30
8	Musi Banyuasin	*Daops* Sum XV/Musi Banyuasin	16-18 Mar 22	2	28	30
	Central Kalimantan					
9	Kotawaringin Barat	*Daops* Kal III/Pangkalan Bun	15-17 Feb 22	1	29	30
10	Barito Utara	*Daops* Kal IV/Muara Teweh	15-17 Feb 22	-	30	30
	South Kalimantan					
11	Tanah Bumbu	*Daops* Kal VII/Tanah Bumbu	31 May-2 June 22	5	49	54
	TOTAL			**19**	**393**	**412**

Note: Funding employed cost-sharing mechanism with national budget (Fire Regional Agency budget)

(ii) In early 2022, the Agency of CCFLFM Region Sumatra and Kalimantan recruited new fire brigades (*Manggala Agni*) to complete established standard personnel of the fire squad. Since the new *Manggala Agni* must be equipped with technical skills for basic forest and land fire management, the project facilitated the required training. The subject of basic fire management is prerequisite to preparing a new *Manggala Agni* with respect to tasks and responsibilities in fire management.

Three basic trainings on fire management were centrally organized in South Sumatra (Banyuasin), Central Kalimantan (Palangkaraya), and South Kalimantan (Banjar) with total participants of 112 new *Manggala Agni* as detailed in Table 11.

Table 11. Participants of basic fire management training for new *Manggala Agni*

NO	LOCATION (District, Province)	COVERAGE Province/Local Fire Station	DATE	PARTICIPANTS		
				Female	Male	Total
	BEYOND TARGET					
1	Banyuasin, South Sumatera	South Sumatra, Jambi, North Sumatra, Riau	12-15 Jan 22	17	40	57
2	Palangkaraya, Central Kalimantan	Central Kalimantan, West Kalimantan	10-12 Jan 22	2	18	20
3	Banjar, South Kalimantan	South Kalimantan, East Kalimantan	10-12 Jan 22	13	22	35
	TOTAL			**32**	**80**	**112**

Note: Funding employed cost-sharing mechanism with national budget (Fire Regional Agency budget)


Figure 19. Training of basic fire management for new *Manggala Agni*

(iii) Considering the critical approach to putting fire resources (personnel and fire equipment) in place and the need for a quick response to fire incidents, Directorate of FLFM had defined approach to establish and activate sub-Local Fire Stations physically closer to fire-prone areas. That approach should be supported with sufficient fire equipment that should be ready for use in critical condition. To support availability and readiness of fire equipment the project had carried out three technical training on fire mechanics in three provinces. The trainings were participated by 28 *Manggala Agni* in total. In addition, the sub-Local Fire Stations was also assisted with 20 mechanic toolsets as shown in Table 12.

Table 12. Participants of fire mechanics training

NO	LOCATION (District, Province)	COVERAGE Local Fire Station	DATE	PARTICIPANTS	MECHANIC TOOLSETS
	BEYOND TARGET				
1	OKI, South Sumatera	Local Fire Stations, Sub-Local Fire Stations	10 June 22	8	8
2	Palangkaraya, Central Kalimantan	Local Fire Stations	9 June 22	12	6
3	Banjar, South Kalimantan	Local Fire Stations	9 June 22	8	6
TOTAL				28	20

Note: Funding employed cost-sharing mechanism with national budget (Fire Regional Agency budget)

Figure 20. Training of fire mechanics

Activity 2.2 To Support Officials on Forest Fire Damage Estimation using GIS and Remote Sensing Application

The activity aimed to help improve capacity of *Manggala Agni* and Regional/District personnel in the estimation of burnt-area and development of fire-prone map. The two subjects employ GIS and Remote Sensing application for producing data and information to support forest and land fire management. Design and implementation of the training are highlighted below.

(I) Socialization and technical training on burnt-area estimation

The project organized 2 technical trainings on burnt-area estimation in Palangkaraya and Palembang involving *Manggala Agni*, Regional/District officials, Army, Police, and Provincial Technical Implementing Unit under MoEF as the participants. The training was organized under a hybrid fashion led by proficient facilitators from National Institute of Aeronautics and Space of Indonesia (LAPAN-BRIN) and MoEF. The subjects, facilitators, participants of the training as well as the institutions involved are presented in Tables 13, 14 and 15 respectively.

Table 13. The subjects of training on burnt-area estimation and facilitators

No	Subject	Scope	Facilitator
1	Identification and burnt-area estimation	Burnt-area estimation: regulation, institutional arrangement, data sources, data processing, verification-validation	Directorate Forest and Land Fire Management, MoEF
2	Calculation of size of burnt-area	Regulation, monitoring burnt scar area, development of methods, (future) improvement of method	Directorate of Inventory and Monitoring of Forest Resources, MoEF
3	Utilization of Remote Sensing for monitoring forest and land fire	Monitoring fires, development fire danger rating system, monitoring hotspots and haze, burnt-area detection	National Institute of Aeronautics and Space of Indonesia (LAPAN-BRIN)
4	Inventory of Green House Gas from forest fires	Inventory guideline, Forestry GHG inventory, Methods, GHG emission profile on forest fires	Directorate of Green House Gas Inventory and Monitoring Report and Verification, MoEF

Table 14. Participants of training on burnt-area estimation

NO	LOCATION (District, Province)	DATE	PARTICIPANTS			REMARKS
			Female	Male	Total	
1	Palangkaraya, Central Kalimantan	17 Nov 21	4	35	39	• Participated by *Manggala Agni* from South Kalimantan, East Kalimantan, and West Kalimantan by offline and online
2	Palembang, South Sumatera	24 Nov 21	4	31	35	• Participated by *Manggala Agni* from Riau, Riau Islands, North Sumatra, and Jambi by offline and online
TOTAL			**8**	**66**	**74**	

Table 15. Involved institutions in training on burnt-area estimation

NO	INSTITUTIONS	REMARKS
1	Directorate Forest and Land Fire Management, MoEF	Central level
2	Meteorological, Climatological and Geophysical Agency	Provincial level
3	Army	Provincial and District levels
4	Police	Provincial and District levels
5	Regional Disaster Management Agency	Provincial and District levels
6	Unit Service of Province Government	Forestry Service, Forest Management Unit
7	Unit Service of District Government	Environment Service
8	Provincial Implementing Unit of MoEF	Natural Conservation Agency, Production Forest Management Agency
9	CCFLFM Regional Agency	Provincial level
10	Provincial Coordinator *Manggala Agni*	Provincial level (Central Kalimantan, South Kalimantan, West Kalimantan, East Kalimantan, South Sumatra Jambi, North Sumatra, Riau, Riau Islands)
11	Local Fire Stations (LFS)	District level (17 LFS in Sumatra and 13 LFS in Kalimantan)

Figure 21. Training of burnt-area estimation

(ii) Socialization and technical training on fire-prone map production

Under Activity 2.2, two technical trainings on fire-prone area mapping were carried out in Palangkaraya and Palembang involving *Manggala Agni*, Regional/District officials, and Provincial Technical Implementing Unit under MoEF as the participants. The trainings were organized under a hybrid fashion, i.e. applying both offline and online Zooming, with the assistant of proficient facilitators from Geospatial Information Agency (BIG) and MoEF. The subjects, facilitators, participants and the institutions involved in the training on fire-prone area mapping are presented in Tables 16, 17 and 18, respectively.


Figure 22. Training of fire-prone area mapping

IPB University, Directorate of Forest and Land Fire Management, Regional Agencies of Climate Change in Sumatera and Kalimantan; and with the funding support of ITTO and Education Fund Management Institution (LPDP) of Ministry of Finance Indonesia, the SMART Patrol Information System, i.e. a system monitoring and reporting technology for fire prevention patrol, had been successfully developed and piloted.

Development of the system was carried out by an expert team led by Prof. Imas Sukaesih Sitanggang and involved the following steps:

(1) Collecting forest and land fires prevention patrol data: biophysical, peatland, weather, and socio-economic
(2) Developing standard measurement of biophysical, peatland, weather, and socio-economic data
(3) Providing and installing information technology infrastructure: hardware, software and internet to support the development and implementation of system
(4) Developing a mobile application: user requirement analysis, database, process and interface design, system implementation and system testing
(5) Developing a web-based information system: user requirement analysis, database, process and interface design, system implementation and system testing
(6) Spatial analysis of patrol data: tracking location of patrol activities and patrol activities coverage
(7) Usability testing and evaluation of mobile application and a web-based information system
(8) Non-functional testing of the system: load testing, volume testing and testing scalability for mobile and web-based applications
(9) Capacity building of users: forest and land fires prevention patrol team, administrators, and managerial levels
(10) System documentation in form of e-document and multimedia products: a) system manuals and user guides, b) server and system management

The activity has developed the SMART Patrol Information System which consists of (android) a mobile application, web-based application, and database. The system had been developed and applied initially in Sumatra and Kalimantan regions, and subsequently in the entire Indonesia. The output achievement was also completed with Manual of Parameter Measurement and user manual video.

Table 16. The subjects of training on fire-prone area mapping and facilitators

No	Subject	Scope	Facilitator
1	Arrangement of fire-prone mapping	Regulation, development of fire-prone mapping, criteria and standard, data sources, methodology, data processing, ground validation, follow-up	Directorate Forest and Land Fire Management, MoEF
2	Thematic Geospatial Information (TGI) of Fires	Regulation, one map policy, institutional arrangement, development of TGI, Integration Standardization, TGI elements of Fires	Geospatial Information Agency (BIG)

Table 17. Participants of training on fire-prone area mapping

NO	LOCATION (District, Province)	DATE	PARTICIPANTS			REMARKS
			Female	Male	Total	
1	Palangkaraya, Central Kalimantan	18-19 Nov 21	4	24	28	• Participated by *Manggala Agni* from South Kalimantan, East Kalimantan, and West Kalimantan by offline and online
2	Palembang, South Sumatera	25-26 Nov 21	2	23	25	• Participated by *Manggala Agni* from Riau, Riau Islands, North Sumatra, and Jambi by offline and online
TOTAL			**6**	**47**	**53**	

Table 18. Involved institutions in training on fire-prone area mapping

NO	INSTITUTIONS	REMARKS
1	Directorate Forest and Land Fire Management, MoEF	Central level
2	Regional Disaster Management Agency	Provincial and District levels
3	Unit Service of Province Government	Forestry Service, Forest Management Unit
4	Unit Service of District Government	Environment Service
5	Provincial Implementing Unit of MoEF	Natural Conservation Agency, Production Forest Management Agency, National Park Agency
6	CCFLFM Regional Agency	Provincial level
7	Provincial Coordinator *Manggala Agni*	Provincial level (Central Kalimantan, South Kalimantan, West Kalimantan, East Kalimantan, South Sumatra Jambi, North Sumatra, Riau, Riau Islands)
8	Local Fire Stations (LFS)	District level (17 LFS in Sumatra and 13 LFS in Kalimantan)

Activity 2.3 To Develop Technology/System of SMART Integrated Patrol-Reporting Application

The activity aimed to develop and introduce the use of SMART Patrol Information System. A fire prevention patrolling is meant as an early detection of fire occurrence. The patrol needs to apply a system to support an efficient data management and reporting mechanisms. In collaboration with

Table 19. Piloting use of SMART Patrol Information System and its participants

NO	LOCATION	LOCAL FIRE STATION	DATE	PARTICIPANTS		
				Female	Male	Total
	ORIGINAL TARGET			**8**	**57**	**65**
1	Central Kalimantan	*Daops* Kal I/Palangkaraya	15 Nov 21	2	27	29
2	Central Kalimantan	*Daops* Kal II/Kapuas	16 Nov 21	1	11	12
3	South Kalimantan	*Daops* Kal V/Banjar	17 Nov 21	5	19	24
	BEYOND TARGET			**8**	**87**	**95**
4	South Sulawesi	*Daops* Sul I/Gowa	31 May 22	7	53	60
5	North Sumatra	*Daops* Sum I/Sibolangit	20 Jun 22	1	34	35
TOTAL				**16**	**144**	**160**

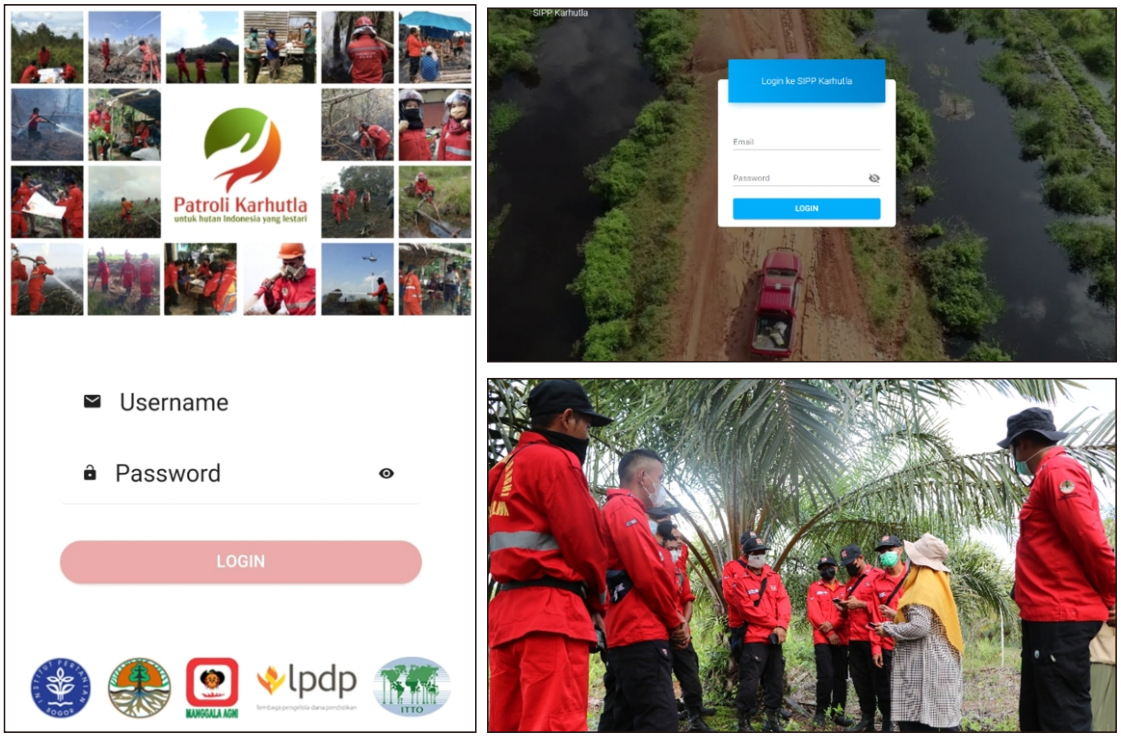

Figure 23. Development of SMART Patrol Information System

Before we had the app, we used to send reports manually and it took a lot of time and efforts. Today, we are fortunate to have the app that helps make our work more effective and efficient.

Ferdian Krisnanto
(Head of CCFLFM Sumatra Region Agency)

Figure 24. Statement of Head of CCFLFM Sumatra Region Agency

Unplanned activities

After the SMART Patrol Information System was completed, the activity also organized the Launching of the SMART Patrol Information System and a National Seminar on Fire Prevention: Policy, Social Approach, and Technological Innovations simultaneously on 29-30 June 2022. The SMART Patrol Information System was officially launched on 29 June 2022 by President of IPB University, Prof. Arif Satria; and Director General of Climate Change, Ms. Laksmi Dhewanthi; witnessed by the relevant partners including Director of Forest and Land Fire Management, MoEF, Mr. Basar Manullang; ITTO representative, Dr. Hwan-ok MA; Indonesian Endowment Fund for Education, Mr. Triyoga Adi Perdana; Dean of Faculty of Mathematics and Natural Sciences, IPB University, Mr. Berry Juliandi; and leader of the expert team, Prof. Imas Sukaesih Sitanggang.

The National Seminar on Fire Prevention: Policy, Social Approach, and Technological Innovations under a hybrid formal (in-person and online Zoom) was attended by 281 participants in the first day, while 248 participants were present in second day, both through offline and online zoom. Agenda of the national workshop appears as Annex 1.

Figure 25. National seminar on fire prevention

Activity 2.5 To Support Building Capacity of Forest and Land Fire Brigade (*Manggala Agni*) to Control Forest and Land Fire by Providing Safety Equipment

The activity was designed to provide safety equipment to support capacity building of *Manggala Agni*. In view of preventing and reducing work accidents, *Manggala Agni* should be equipped with personal safety outfits and fire equipment. The kinds and number of fire equipment that should be procured had been predefined in the project document. In the procurement process, the project communicated with Directorate of Forest and Land Fire Management, Agency of CCFLM Regions of Sumatra and Kalimantan, Local Fire Stations, and *Manggala Agni* to confirm on specifications of needed fire equipment.

The project proposed to amend procurement of remote sensing and satellite phone and had been approved by Executing Agency and ITTO Secretariat; while these equipment are important to support fire management, their procurement can be postponed. *Manggala Agni* convinced the project that it was then more important and urgent to provide additional portable fire water pumps and handy talkies. In addition to providing portable oxygen with double functions to serve as a

breathing first-aid when *Manggala Agni* conducted fire suppression operation and to help Covid-19 patients surviving.

The procurement process was adhered to ITTO Guidelines for the selection and employment of consultants, procurements and payments of goods and services, as well as guidance and recommendations of PSC Meeting, Executing Agency, and ITTO Secretariat. The procurements were carried out and assisted by the Procurement Committee whose members represented the Executing Agency/Directorate of Forest and Land Fire Management, procurement official, and capital item management official. After receiving the evaluation result of quotations from the Procurement Committee, the procurement was carried out accordingly. Procurement of safety equipment and its distribution are presented in Table 20 while specifications of procured equipment are shown in Table 21.

Table 20. Procurement of safety equipment and its distribution

NO	ITEM	UNITS		DISTRIBUTION		
		Planned	Realized	South Sumatera	Central Kalimantan	South Kalimantan
1	Firefighter coat	480	1.110	460	350	300
2	Safety shoes	480	580	260	200	120
3	Portable fire water pumps	4	16	6	7	3
4	Motorcycle	3	8	1	4	3
5	GPS	6	7	3	2	2
6	Handy talkie	-	58	24	20	14
7	Portable oxygen	-	90	34	32	24

Table 21. Specifications of purchased safety equipment

NO	ITEMS	SPECIFICATION
1	Firefighter coat	NOMEX firefighter coat • Consists of jacket (3-layer) and pants 3-layer). Outer layer: NOMEX® IIIA material are composed by 93% NOMEX® Aramid, 5% KEVLAR®, 2% anti static carbon fiber, with a standars 6.0 oz/yd²; Middle layer: breathable fleece (Dacron); Inner layer: soft cotton. • Flame retardant and water repellant, meet the heat resistance testing standard according to NFPA 2112 & NFPA 2113 • Color: Red (standard), SNI 0989-20 • Customs: logo on the left pocket and writing on the behind, include standard short sleeve cotton t-shirts
2	Safety shoes	Harvik Fireman Boots • Flame retardant upper, steel toe cap and steel midsole protection, heat and oil resistant anti-slip sole • Heel energy absorbing sole construction, spone cushion insole, heat and cold insulating outsole, extra padding for ankle, heel tendon and shin protection • Electric shock resistant outsole up to 18kV • EN ISO 20345:2004, CSA Z195-02/ASTM F 2413-05 • High contrast colors for good visibility, pull-up strap for easy don and doff

NO	ITEMS	SPECIFICATION
		AGJ fire safety shoes • Polythene rubber upper; front rubber guard • Flame retardant inner; steel midsole protection; puncture-resistant and fire-resistant sole • provided with two handles of each side for easy booting and ≤60mm wide; • Comfortable, easy booting, anti-abrasion, anti-stab, flame retardant, heat-insulating, high voltage resistant, oil-resistant, anti-slip, anti-acid and alkali; • ≥280 mm height; ≤3 kg/pair weight; 10% oil resistant; ≥5000V Withstand voltage; ≤22℃ heat insulation; ≥15° slip resistant; • Passed the Indonesian Fire Service Testing Laboratory; • Customs: logo on the left and right shoes
3	Portable fire water pumps	Waterax Mini-striker (MSTR) water pump • Machine: Honda GXH50 series 4 -stroke, horizontal shaft, single cylinder, OHV, Net power output 2,1 HP(1.6KW) @7000RPM, Fuel type Gasoline, Fuel tank: Integral 0.81 quarts (0.77 lit re), Bore & stroke 1.65 x 1.,42 inches (41.8 x 36 mm), Ignition Transistorized Magneto, Oil capacity 0.26 quarts (0.25 litre) • Pump: Single Stage Centrifuge, direct drive, pressure 200 PSI (13.8 bar), Maximum pressure 85 PSI (5.9 bar), Ma ximum Flow 80 GPM (303 lpm), Intake 1-1 / 2" Male NPSH Thread • Complement package and logo custom
4	Motorcycle	Yamaha WR 155 R • Engine: 155 cc, Liquid Cooled 4 stroke, SOHC, 4 Valves, VVA, single cylinder, Transmission: Manual, Stroke Wet type multi -plate, Fuel injection, Electric starter, Max torque 14.3 Nm, Max power 12.3 kW, Front brake: Wave disc, Rear brake: Wave disc, Frame: Semi double cra dle, Front suspension: telescopic, Rear suspension: monoshock, logo custom Yamaha LEXI • Engine: 124.7 cc Liquid Cooled 4 stroke, SOHC, single cylinder, Transmission: V-belt automatic, Stroke Dry, centrifugal automatic, Fuel injection , Electric starter, Max torque 11.3 Nm, Max power 8.75 kW, Volume silinder, Front brake: Disc, Rear brake: Drum, Frame: underbo ne, Front suspension: telescopic fork, Rear suspension: unit swing, logo custom
5	GPS	GPS Garmin 66s • 3" Sunlight Readable Display • Multiple Navigation Satellite Systems • BirdsEye Satellite Imagery Auto updated • Waypoints 10.000 points • Track log 20.000 points • Waterproof rating IPX7 • Memory 16 GB • Additional memory card 8 GB

NO	ITEMS	SPECIFICATION
6	Handy talkie	Motorola MOTOTRBO SL1M • Unit: VHF, Channel Capacity 256, Low Power Output 1 W With Range Max Technology, HighPower Output Analog and Digital 2 W, 3W With Range Max Technology, Frequency 136 -174 MHz, Dimensions (HxWxL) 4.95 x 2.17 x 0.87 in (125.7 x 55.0 x 22.0 mm), Weight with Battery 5.76 oz/163.4g, Battery Life 2300 Mah battery • Complementary packages, custom logo
7	Portable oxygen	PURE AIR oxygen tube • Contains 1 m^3 of oxygen; capacity 7.1 Liter; Height 64 cm; weight 13 kg • Complementary packages: trolley, regulator, and hose • Custom logo

Figure 26. Procurement of safety equipment

4.3. Discussion on the interventions

Since management of forest and land fire is a very high-risk activity, forest and land fire brigade (*Manggala Agni*) as well as the Regional/District officials, should be equipped with knowledge and skills for an effective implementation of fire management and provided with personal safety outfits and fire control equipment. For that reason, the project had demonstrated five interventions as specified below:

1) The project had completed the handbook entitled "Procedure for Forest and Land Fire Brigade". The guidance discusses the tasks and responsibilities of fire brigades in the implementation of forest and land fire control, including prevention actions, suppression, as well as post-fire activities. The handbook provides a working guide for fire brigades (*Manggala Agni*) and other fire brigades/officials in the implementation of forest and land fire control in the right and safe ways/procedures.

2) To improve the capacity of the *Manggala Agni*, the project organized several technical trainings, consisting of 11 fire management training to cover all Local Fire Stations in 3 provinces, 3 basic fire management for the new *Manggala Agni*, and 3 fire mechanics for *Manggala Agni*. The training subjects are not always in the form of technical fire suppression, but also the relevant subjects that support fire prevention and post-fire actions, such as occupational health and safety, animal evacuation, early warning, fire-prone map production, burnt-area estimation, socialization and campaign, etc. Those kinds of technical trainings should be carried out periodically to maintain and improve their capacities in accomplishing their tasks in fire control.

3) To improve capacity of the Regional/District officials and *Manggala Agni*, the project organized socialization and technical training on burnt-area estimation and fire-prone mapping. The training aims to provide knowledge and skills to support implementation of fire management. The subjects delivered by the training must refer to existing Government or official criteria and standards. Those trainings are also important to provide data and information to support early warning approaches and fire prevention programs as well as for monitoring and evaluating post-fire actions.

4) To support the implementation of fire prevention patrol, the project with the relevant stakeholders had developed a System Monitoring and Reporting Technology for Fire Prevention Patrol (SMART Patrol Information System), equipped with the Manual of parameter measurement and user manual video. The system assists and eases *Manggala Agni* in conducting fire prevention patrols, especially in standardized recording data – information as well as reporting. Generated and analyzed data and information are a significant contribution to policymakers in decision making process. The system has been utilized in Sumatra and Kalimantan regions and will soon be implemented throughout Indonesia.

5) To effectively accomplish their tasks and responsibilities in fire control, *Manggala* Agni were also provided with safety equipment, namely firefighter coats, safety shoes, motorcycles, portable fire water pumps, GPS, handy talkies, and portable oxygen. Specifications of the equipment and tools were defined in collaboration with *Manggala Agni*, expert and the relevant stakeholders.

After comprehending the animal evacuation, now we know better and know how to evacuate the animal. Related to the K3 (Occupational Health and Safety), Manggala Agni ever experienced injury. And after learning the subject, we now know how to manage such injuries

Andi Riandi
(*Manggala Agni*, *Daops* Banyuasin – South Sumatra)

Figure 27. Testimony of *Manggala Agni*

4.4. Achievement of the intervention assessed

Five interventions that had been fully implemented under Output 2 were:

- Activity 2.1 To provide training for forest and land fire control for Forest and Land Brigade (*Manggala Agni*) at province and district level;
- Activity 2.2 To support officials on forest fire damage estimation using GIS and remote sensing application;
- Activity 2.3 To develop technology/system of SMART integrated patrol-reporting application;
- Activity 2.4 To improve Standard Operational Procedure on Forest and Land Fire Control;
- Activity 2.5 To support building capacity of Forest and Land Fire Brigade (*Manggala Agni*) to control land and forest fire by providing safety equipment.

The full implementation of the interventions identified under Output 2 implied that the output had been fully achieved and delivered, i.e. management capacity to address forest and land fires problems strengthened. To assess whether Output 2 had been achieved or not, there is a need to match indicators of achievement of the output with realized outcomes or results of the interventions. The matching process is presented in Table 22.

Table 22. Assessment of intervention achievement

Output/Activities	Indicators of achievement	Achievement of interventions
Output 2		
Management capacity to address forest and land fires problems strengthened	(1) Four training programmes on forest and land fire control conducted for Forest and Land Fire Brigade (*Manggala Agni*) in 3 provinces namely South Sumatera, Central Kalimantan and South Kalimantan	(1) Organized training: 4 forest and land fire management for *Manggala Agni* in 4 Local Fire Stations • 7 additional fire management for *Manggala Agni* in 7 Local Fire Stations • 3 additional basic fire management for new *Manggala Agni* in 3 provinces • 3 additional fire mechanics for *Manggala Agni* in 3 provinces
	(2) Series of training for officials on GIS modeling carried out and proven remote sensing technology developed	(2) Organized socialization and training: 2 burnt-area estimation and 2 fire-prone map production for the Regional/District officials and *Manggala Agni*

Output/Activities	Indicators of achievement	Achievement of interventions
	(3) One set technology/system of SMART integrated patrol reporting application developed and installed in 3 target provinces	(3) The System Monitoring and Reporting Technology for Fire Prevention Patrol (SMART Patrol Information System) has been developed and applied in regions Sumatra and Kalimantan, and subsequently initiated to be applied throughout Indonesia. The system is completed with Manual of parameter measurement and user manual video. In addition, it also carried out officially Launching of the system and National Seminar on Fire Prevention: Policy, Social Approach, and Technological Innovations
	(4) One Standard Operational Procedure on Forest and Land Fire Control developed	(4) Handbook: Procedure for Forest and Land Fire Brigade
	(5) Personal protective clothing properties and safety equipment of *Manggala Agni* in target location available	(5) Provided set of personnel protective clothes and fire equipment: • 1,110 Safety Coats • 580 Safety Shoes • 16 portable fire water pumps • 8 motorcycles • 7 GPS • 58 Handy Talkies 90 portable oxygen tubes

The matching process in Table 22 clearly indicated that all output's indicators had been met by realized results of the interventions. Hence, Output 2 had been fully achieved and delivered.

4.5.Lessons learned

Among the important lessons learned from the implementation of planned activities under Output 2 are:

- Fire brigades (*Manggala Agni*) and Regional/ District officials should be trained periodically to maintain and improve their capacities in fire management,
- Fire equipment should be revitalized over time to ensure that the fire equipment steadily meet required quality and quantity,
- The huge-complex works of fire management require synergy and collaboration from all stakeholders including Government, *Manggala Agni*, private sector, communities/*Masyarakat Peduli Api*, universities, NGOs, and even international agencies.

5 COOPERATION AMONG LOCAL INSTITUTION, PRIVATE SECTOR AND COMMUNITIES IN FOREST AND LAND FIRE PREVENTION STRENGTHENED

5.1. Introduction

This chapter presents the process on strengthening of synergy and cooperation among local institutions, private sector, and communities for forest and land fire prevention. Management of forest and land fire is a huge-complex issue, so cannot be overcome by any single party. The works are common tasks and responsibilities of all stakeholders, hence require participation and collaboration of the stakeholders with their own capacities and resources. Those involved stakeholders include Government (Central, Province, District, and even Village), Academies, private sector, NGOs, communities, and also the international entities. The issue of strengthening cooperation is in line with Mr. President's direction in the implementation of forest and land fire control, on the need to increase coordination and synergy among stakeholders continuously and prioritize fire prevention programs than suppression actions.

The Minister Regulation of Environment and Forestry nr. P.32/MenLHK/Setjen/ Kum.1/3/2016 states that institutional arrangement for forest and land fire control should be carried out by moving up from Districts, Province, to National levels depending on fire scales and intensities. All involved stakeholders must engage in fire management execution under their own capacities and competencies as well as resources. That regulation in strengthening synergy and cooperation is more robust with the enactment of President Instruction nr 3 of 2020 regarding forest and land fire suppression.

5.2. The project interventions

To strengthen synergy and cooperation among stakeholders in forest and land fire control, the project had designed and implemented four activities as highlighted below:

Activity 3.1 **To improve and strengthen the institutional coordination of the Task Force for Control on Forest and Land Fire Management at the national and provincial/district level**

The activity was deliberately designed for strengthening institutional coordination and synergy among the stakeholders involved in the control of forest and land fire management. Under the

activity, three workshops were organized: one national workshop and two regional workshops in Ogan Komering Ilir and Pulang Pisau for South Sumatera and Central Kalimantan regions, respectively.

5.2.1. Strengthening coordination in the central level

The national workshop on strengthening synergy and collaboration between stakeholders at the central level was organized on 30 August – 01 September 2021; its main objective was to improve institutional coordination and consolidation on sharing data and information to support forest and land fire management. Data and information are a critical element of a successful fire control operation that they must be valid, update and timely available. In fact, data and information are available with different such institutions as LAPAN-BRIN, BMKG, MPRA, GIA, and MoEF but they are not readily available for use in fire management operation due to weak data management by individual institutions and weak institutional coordination and synergy.

The workshop was conducted in two sessions. The first session in the first day was devoted to brainstorming and discussion involving all stakeholders. During this session, needed data and information were identified and the institutions in-charge of providing the data and information were also identified. The procedures for accessing data were also made clear by the institution in-charge of that particular data. During the second session on the next two days, bilateral discussion was held between MoEF and the institutions in-charge of the data and information required for forest and land fire management. The main objective of these discussions was to develop institutional cooperation and collaboration in management of data and information by defining specific terims and conditions that have to be observed by the parties. Surely, the workshop had not resolved yet the issue on data and information management and sharing; indeed the workshops had paved the way for a better future cooperation and collaboration among the institutions concerned with forest and land fire management. The discussions during the workshops indicated support on cooperation and collaboration in the management and sharing of data and information at the national level. The workshop was attended by 33 participants comprising 24 males and 9 females.

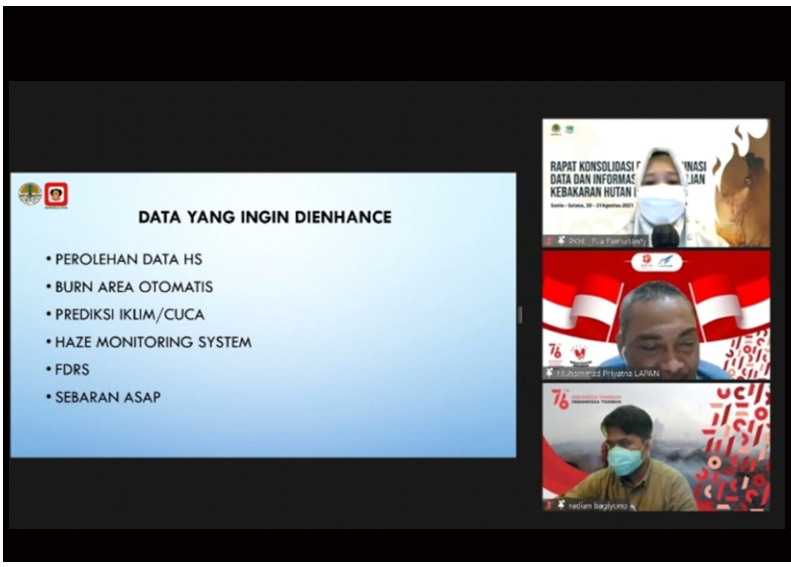

Figure 28. Improving coordination and consolidation on sharing data and information

Table 23. Identification of needed of data and information for fire management

NO	INSTITUTION	DATA & INFORMATION	STATUS
1	National Institute of Aeronautics and Space of Indonesia (LAPAN-BRIN)	Hotspot, satellite imagery, burnt-area estimation	Ongoing cooperation
2	Meteorology, Climatology, and Geophysical Agency (BMKG)	Weather, Fire Danger Rating System, haze	Need update
3	Geospatial Information Agency (BIG)	Area administration, fire-prone map	Need update
4	Indonesian Center for Agricultural Land Resources Research and Development	Peat map, horticultural species map	Need update
5	National Disaster Management Agency	Volunteers for disaster response, distribution of disaster-responsive villages, disaster management infrastructures	Need update
6	Mangrove and Peat Restoration Agency	Peat hydrological area map, ground-water level measurement stations, distribution of canal blocking	Need update
7	MoEF (internal unit)	Air quality index, concession permits, fire management report of concession permit units, social forest, customary forest, conservation forest and its fire management reports, burnt-area estimation, and others geospatial data	Ongoing/need update

Forest and land fire prevention is a collaborative task and the responsibility of all parties involved in protecting communities from the threat of fires

Tekson
(Head of BPBD Pulang Pisau, Central Kalimantan)

Figure 29. Statement of stakeholder (Head of BPBD)

5.2.2. Strengthening coordination at the Regional and District levels

Workshops on strengthening synergy and collaboration among stakeholders in supporting fire control implementation were also organized at the regional/district levels. These workshops focused on improving the institutional arrangements for implementing fire management by collectively identifying 'who (institutions) will implement what actions'; also identified was potential contribution of resources. The workshops were organized in South Sumatra and Central Kalimantan and were moderated by academies of University of Sriwijaya and professional of TVRI of Central Kalimantan, respectively. Participants of the workshops are listed in Table 24.

Table 24. Organized regional workshops and involved stakeholders

NO	LOCATION (District, Province)	DATE	PARTICIPANTS			INVOLVED INSTITUTIONS
			Female	Male	Total	
1	Ogan Komering Ilir, South Sumatra	15 Mar 22	2	26	28	• Regional Disaster Management Agency • Provincial/district unit of Army • District unit of Police • Unit Services of Provincial Government (Forest Management Units) • Provincial Meteorological, Climatological and Geophysical Agency • Unit Services of District Government (Environment Agency, Agricultural Agency, Fisheries Agency, Plantation Agency, Community and Village Development Agency) • CCFLFM Regional Agency • University of Sriwijaya • Association of Indonesia Forest Concession Holders (APHI) regional South Sumatra • Private sectors • Provincial Implementing Unit of MoEF (Natural Conservation Unit, National Park Unit) • Provincial Coordinator *Manggala Agni,* Local Fire Stations
2	Pulang Pisau, Central Kalimantan	24 Mar 22	4	20	24	• Regional Disaster Management Agency • Unit Services of Provincial Government (Forest Management Units) • Unit Services of District Government (Environment Agency, Agricultural Agency, Plantation Agency, Community and Village Development Agency) • CCFLFM Regional Agency • Indonesian Palm Oil Association (GAPKI) regional Central Kalimantan • Private sectors • Provincial Coordinator *Manggala Agni,* Local Fire Stations
	TOTAL		**6**	**46**	**52**	

The workshops in South Sumatera and Central Kalimantan were each resulted in the signing of a declaration on common understanding and commitment by all involved stakeholders. The signed declaration consisted of commitment to supporting fire prevention and fire control, improving synergy and collaboration among stakeholders in fire management, contributing resources for fire management and encouraging participation of communities/*Masyarakat Peduli Api* in fire management. The declarations signed by participants of each workshop are presented as ANNEX 2.

Figure 30. Strengthening synergy and collaboration stakeholders

Activity 3.2 **To hold dialogues on forest and land fire management/action with private sector and other local institutions**

The activity was designed to facilitate dialogue on strengthening stakeholder cooperation for fire prevention and land preparation without burning practices. Based on the project document, the dialogue should engage private sector and other local institutions. However, the dialogue also involved Head of Village Government, University, and, of course, communities and *Masyarakat Peduli Api*. These workshops emphasized identification and elaboration of potential contributions by all involved stakeholders to support promotion of land preparation without burning practices (support on PLTB promotion) by the communities. Furthermore, it was also encouraged to strengthen synergy and collaboration among stakeholders on the support on PLTB promotion which can be implemented as integrated activities. Under this intervention, two workshops on supporting the promotion of land preparation without burning practices were organized in Banyuasin, South Sumatra, and Pulang Pisau, Central Kalimantan.

Figure 31. Dialogues on strengthening stakeholder cooperation

Table 25. Organized dialogues of communities' on PLTB

NO	LOCATION (District, Province)	DATE	PARTICIPANTS			INVOLVED INSTITUTIONS
			Female	Male	Total	
1	Pulang Pisau, Central Kalimantan	24 Mar 22	4	20	24	• Regional Disaster Management Agency • Unit Services of Provincial Government (Forest Management Units) • Unit Services of District Government (Environment Agency, Agricultural Agency, Plantation Agency, Community and Village Development Agency) • CCFLFM Regional Agency • Indonesian Palm Oil Association (GAPKI) regional Central Kalimantan • Private sectors • Pilang Village • Community/ *Masyarakat Peduli Api* • Provincial Coordinator *Manggala Agni,* Local Fire Stations

NO	LOCATION (District, Province)	DATE	PARTICIPANTS			INVOLVED INSTITUTIONS
			Female	Male	Total	
2	Banyuasin, South Sumatra	20 Apr 22	-	21	21	• Regional Disaster Management Agency • Unit Services of Provincial Government (Forest Management Units) • Unit Services of District Government (Environment Agency, Agricultural Agency, Plantation Agency, Industrial and Trade Agency, Community and Village Development Agency) • CCFLFM Regional Agency • University of Sriwijaya • Indonesian Palm Oil Association (GAPKI) regional South Kalimantan • Private sectors • Head of Lubuk Lancang Village • Community/ *Masyarakat Peduli Api* • Provincial Coordinator *Manggala Agni,* Local Fire Stations
	TOTAL		**4**	**41**	**45**	

Similar to the workshops on strengthening stakeholder cooperation under Activity 3.1, the two dialogues on supporting the promotion of land preparation without burning practices (support on PLTB promotion) by the communities also resulted in a declaration on common understanding and commitment by all involved stakeholders. The signed declaration consists of commitment to support fire prevention and fire control, to improve synergy and collaboration among stakeholders in fire management, to encourage stronger participation of communities and *Masyarakat Peduli Api* in fire prevention in the form of land preparation without burning practices, to encourage community economic empowerment, and to steadily assist the communities in fire prevention actions. The signed declarations by representatives of the workshops appear as ANNEX 2.

The Land Preparation without Burning program significantly contributes to the prevention of forest and land fires in our area. I appreciate it a lot.

Ivada Candrasari

(Head of South Candi Laras Sub-district, Tapin District, South Kalimantan)

Figure 32. Statement of Head of South Candi Laras sub-district

Activity 3.3 To organize a sub-regional workshop for prevention and management of forest and land fires in Southeast Asia with an emphasis on Indonesia

The activity organized a sub-regional workshop on prevention and management of forest and land fires focused in Southeast Asia. Initially, the workshop was designed as an on-site workshop inviting fire experts and academies in Southeast Asia. Considering the wide spread of Covid-19 pandemic, the arrangement was modified to become a series of seven on-line webinar, each with the same topics and target. The implementation of the webinar series on forest and land fires management engaged Faculty of Forestry and Environment, IPB University, in particular the Regional Fire Management Resource Center-South East Asia (RFMRC-SEA) which was led by Prof. Dr. Bambang Hero Saharjo.

The fire management webinar series were meant as a tool for exchanging experiences in good practices in fire management, strengthening research network, and preparing reports on fire management practices that had been conducted by ITTO member countries in the region. The webinar series had been accomplished through several phases, including:

1) Preparing topic of the webinar series
2) Identifying the keynote speakers
3) Developing webinar work programme
4) Providing minutes and documentations of the webinar
5) Arranging publication of country reports on fire management comprising lessons learned, experiences, breakthroughs, and its recommendations; and
6) Providing a final report on implementation of the activity.

The 1st fire management webinar series consisted of seven monthly webinars. The topics, speakers and participants of the 1st webinar series are presented in Table 26.

Table 26. The 1st fire management webinar series

NO	TOPIC	SPEAKER	DATE	PARTICIPANTS		
				Female	Male	Total
	Opening remarks	• Laksmi Dhewanthi, MA, IPU (MoEF, Indonesia)				
	Remarks	• Dr. Naresworo Nugroho (IPB University, Indonesia) • Dr. Hwan-ok MA (ITTO, Japan)				
1	Forest Fire in Southeast Asia: Policy and Research Development in Indonesia	• Ir. R. Basar Manullang, MM (MoEF, Indonesia) • Prof. Dr. Bambang H. Saharjo (RFMRC-SEA), Indonesia)	21 Jul 21	115	135	250
2	Prevention and Management of Forest and Land Fires in Southeast Asia with an Emphasis on Indonesia	• Dr. Veerachai Tanpipat (Kasetsart Univ, Thailand) • Prof. Dr. Bambang H. Saharjo (RFMRC-SEA), Indonesia)	26 Aug 21	125	126	251

NO	TOPIC	SPEAKER	DATE	PARTICIPANTS		
				Female	Male	Total
3	The FDRS with Anthropogenic and New Technologies and Innovations	• Prof. Dr. A. Ainuddin N. (INTROP, Malaysia) • Hartanto Sanjaya, M.Sc. (BRIN, Indonesia) • Dr. Richard Woord (Guest sp.) (Charles Sturt Univ., Australia)	23 Sep 21	62	127	189
4	Mitigation and Collaboration Governance Model for Fire Prevention	• Dr. Wida SH Suhaili (UTB, Brunei) • Dody Ruswandi (BNPB, Indonesia) • JM Dumaz (Guest sp.) (RCD Attache, Singapore)	21 Oct 21	92	121	213
5	Forest Fire Prevention: Early Warning, Monitoring, and Field Implementation	• Dr. Agie Wandala (BMKG, Indonesia) • Dr. Hoang Viet Anh (VAFS, Vietnam) • Georg Bulchoh (Guest sp.) (GIZ, Germany)	25 Nov 21	57	68	125
6	Forest Fire Prevention Management and Rehabilitation	• Jhun B Barit (FRS Division, Philippine) • Dr. Janice SH Lee (Nanyang Univ, Singapore) • Dr. Yenni Vetrita (BRIN, Indonesia) • Dr. Sue Yip (Guest sp.) (BRACE, Hongkong) • Hillario Padilla (Guest sp.) (BRACE, Hongkong)	21 Dec 21	39	34	73
7	Forest Fire Prevention is Really Needed	• Dr. Veerachai Tanpipat (Kasetsart Univ, Thailand) • Peter Thavone (Government, Lao PDR) • Michael A. Brady (Guest sp.) (CIFOR, Indonesia) • Sihol Aritonang (APRIL, Indonesia)	27 Jan 22	114	124	238
	TOTAL			**735**	**604**	**1,339**

The webinar of Encouraging Community Participation in Fire Prevention is very interesting and very well organised. I enjoyed hearing the presentations, the questions, and the answers.

Dr. Peter Moore
(Food and Agriculture Organization)

Figure 33. Statement of speaker from FAO

Table 27. The titles of presentation in the 1st fire webinar

NO	TITLE	SPEAKER
1	Recent Development of Forest and Land Fire Policies and Programs in Indonesia	Ir. R. Basar Manullang, MM
	Research for Fire Prevention Management in Indonesia (Smoke, Haze, GHG Emission Reduction, Deforestation)	Prof. Dr. Bambang H. Saharjo
2	Community Based Fire and Water Management in Thailand	Dr. Veerachai Tanpipat
	Research of Indonesian GHG Emission assessment from forest and land fires	Prof. Dr. Bambang H. Saharjo
3	Preparing for future forest fires: New Technologies and Innovations	Prof. Dr. A. Ainuddin N.
	Advancing the FDRS with Anthropogenic as an inclusive factor	Hartanto Sanjaya, M.Sc.
	The Australian wildfire season 2019/2020 and an overview of wildfire investigation procedure	Dr. Richard Woord (Guest sp.)
4	Peatland Forest Fire: Mitigation and Conservation Management in Brunei	Dr. Wida SH Suhaili
	Collaborative Governance Model of Wildfire Prevention in Indonesia	Dody Ruswandi
	Adapting the Response Organization to the Whole Challenges of the Forest Fires	JM Dumaz (Guest sp.)
5	BMKG's Fire Danger Rating System for Forest Fire Mitigation and Prevention	Dr. Agie Wandala
	Vietnam Forest Fire Monitoring System: Overview of Technology and Operation	Dr. Hoang Viet Anh
		Georg Bulchoh (Guest sp.)
6	Forest fire prevention, response and management: Philippine context	Jhun B Barit
	Revegetation of tropical peatlands for fire management 2021	Dr. Janice SH Lee
	The challenges, opportunities and prospects of mapping Indonesia's fire history using remote sensing data	Dr. Yenni Vetrita
	Science-backed burn-free farming campaign	Dr. Sue Yip (Guest sp.)
	Low cost, easy and yield-boosting burn-free farming solutions	Hillario Padilla (Guest sp.)
7	Northern Thailand's fire situation and some of its solutions	Dr. Veerachai Tanpipat
	Forest fire management in LAO PDR	Peter Thavone
	Fire prevention in peatlands: lessons from Indonesia	Michael A. Brady (Guest sp.)
	Fire Free Village program	Sihol Aritonang

Unplanned activities

Considering the importance of sharing policy approaches and experiences on fire management from worldwide fire stakeholders, the project collaborated with MoEF to continue organizing the 2nd webinar series on forest and land fire prevention. Under the 2nd webinar series, five single webinars had been completed as specified in Table 28.

Table 28. The 2nd fire prevention webinar series

NO	TOPIC	SPEAKER	DATE	PARTICIPANTS		
				Female	Male	Total
	Opening remarks	• Laksmi Dhewanthi, MA, IPU (MoEF, Indonesia)				
1	Forest and Land Fire Management and Its Potential Contribution in Achieving Indonesia's FOLU Net Sink 2030	• Belinda A. Margono, Ph.D (MoEF, Indonesia) • SPM Budisusanti, M.Sc (MoEF, Indonesia) • Prof. Dr. Lailan Syaufina (IPB University, Indonesia)	7 Apr 22	423	268	691
2	Encouraging Community Participation in Fire Prevention	• Dr. Peter Moore (FAO, Italy) • Dr. Saptadi Darmawan (BRIN, Indonesia) • Dr. Sue Yip (BRACE, Hongkong) • Hillario Padilla (BRACE, Hongkong) <u>Discussants</u> • I Made Gandi (*Manggala Agni*, Indonesia) • M Zainuddin (MPA, Indonesia)	26 Apr 22	175	93	268
3	Sharing Best Practices from Forest Fire Brigade in ASEAN	• Dr. Ahmad Faiz bin Tharima (Bomba, Malaysia) • Fitria Sri Handayani (*Manggala Agni*, Indonesia) • Dr. Veerachai Tanpipat (Fire Brigade, Thailand)	19 May 22	460	177	637
4	Development of Technology and Innovation in Supporting Fire Management	• Eva Famurianty, M.Si. (MoEF, Brunei) • Sigit Pramono, MT (ITTP, Indonesia) • Dr. Matthew Adams (Landgate, Australia) • Dr. Nion Sirimongkonlertkun (Rajamangala Univ., Thailand) • Aekkapol Aekakkararungroj (Asian Disaster, Thailand)	7 Jun 22	283	172	455
5	National Seminar on Fire Prevention: Policy, Social Approach, and Technological Innovations	• Ir. R. Basar Manullang (MoEF, Indonesia) • Dr. Hwan-ok MA (ITTO, Japan) • Prof. Dr. Lailan Syaufina (IPB University, Indonesia)	29-30 June 22	122	407	529

NO	TOPIC	SPEAKER	DATE	PARTICIPANTS		
				Female	Male	Total
		• Prof. Bambang Hero Saharjo (RFMRC-SEA, Indonesia) • Dr. Rahmat Arief (BRIN, Indonesia)				
TOTAL				1,748	832	2,580

Table 29. The titles of presentation in the 2nd fire webinar

NO	TITLE	SPEAKER
1	Indonesia's FOLU Net Sink 2030 for Controlling Climate Change	Belinda A. Margono, Ph.D.
	Protection and Management of Peatland Ecosystem in Indonesia for FOLU Net Sink 2030	SPM Budisusanti, M.Sc.
	Forest and Land Fire Management: Contribution to FOLU Net Sink 2030	Prof. Dr. Lailan Syaufina
2	Community Base Fire Management (CBFiM)	Dr. Peter Moore
	Biomass Utilization from Land Preparation using Integrated Charcoal Technology	Dr. Saptadi Darmawan
	Science-Backed Burn-Free Farming Campaign	Dr. Sue Yip
	Low-cost, Easy and Yield-Boosting Clean Air Farming Solutions	Hillario Padilla
3	Sharing Best Practices from Forest Fire Brigade in Asia	Dr. Ahmad Faiz bin Tharima
	Sharing Implementasi Pengendalian Kebakaran Hutan dan Lahan	Fitria Sri Handayani
	Forest Fire Brigades in Thailand	Dr. Veerachai Tanpipat
4	SiPongi: Forest and Land Fire Monitoring System	Eva Famurianty, M.Si.
	SiHutla: Forest Fire Detection System	Sigit Pramono, MT
	FireWatch: Mapping, Monitoring and Predicting Bushfires Capability Overview	Dr. Matthew Adams
	Smoke Watch: Mobile Application for Fire Management Operations	Dr. Nion Sirimongkonlertkun
	Burn Check Application: Agricultural Fire Management	Aekkapol Aekakkararungroj, M.Sc.
5	Policy in Forest and Land Fire Management	Ir. R. Basar Manullang
	Tropical Forest Fire Management	Dr. Hwan-ok MA
	Social Aspect in Forest and Land Fire Management	Prof. Dr. Lailan Syaufina
	Regional collaboration in Forest and Land Fire Management	Prof. Bambang Hero Saharjo
	Remote Sensing Technology Implementation in Fire Prevention	Dr. Rahmat Arief
	Implementation of Forest and Land Fire Management in Indonesia	Dr. Raditya Jati (BNPB)
	Development of Peat Restoration Information System to Support Fire Prevention	Dian N. Amalia (BRGM
	BMKG's Innovations to Support Fire Prevention	Dr. danang E. Nuryanto (BMKG)
	Role of Information Technology in Fire Prevention	Prof. Imas S. Sitanggang (IPB Univ.)
	Fire Dynamics in OKI District, South Sumatra	Dr. Ati D. Nurhayati (IPB Univ.)
	Community Participation in Fire Prevention	Prof. Dr. Indroyono S. (APHI)

Figure 34. International fire webinar series

Activity 3.4 **To develop dissemination of the outcomes of the project and asses of its replication in other area**

The activity was designed to disseminate implementation of different activities and their outcomes to wider parties. That dissemination was published or issued on various platforms including official website, mass media, online media, visual media/TV, as well as participation in different events. Regarding participation in events, the project took part in the Indonesian Pavilion COP26 Glasgow on 31 October – 12 November 2021, Festival Iklim 2021 from 5-21 October 2021 and Indonesia Climate Change Expo and Forum 2022 from 6-8 June 2022. The project also provided 5 fire leaflets and 5 project videos in two languages, English and Bahasa. The complete detailed dissemination activities are shown in Table 30.

Table 30. Platforms used for outreaching

NO	PLATFORM	NEWS/POST
1	Official website (DG of Climate Change, SiPongi)	74
2	Online Media	43
3	Visual Media/TV	11
4	Mass Media	17
5	Social Media (ITTO Fire Project)	
	• Instagram	158
	• Twitter	240
	• Facebook	115
	• YouTube	9
	TOTAL	**667**

Table 31. Topics of outreaching leaflets

NO	LEAFLETS
1	Capacity Building on Forest and Land Fire Management in Indonesia
2	Technical Training on Forest and Land Fire Management
3	Providing Personal Safety Equipment for Fire Brigade (*Manggala Agni*) and Fire Control Equipment
4	Training of Integrated Zero Burning Practices Development for Community
5	Establish Demonstration Plots of Zero Burning Practices

Table 32. Title of outreaching videos

NO	VIDEOS
1	Project Introduction: Capacity Building on Forest and Land Fire Management in Indonesia
2	Development of Land Preparation without Burning. Encouraging Community Participation in Forest and Land Fire Prevention
3	Capacity Building of *Manggala Agni*. Improving Professionalism in the Forest and Land Fire Control
4	Tutorial: SMART Patrol Information System
5	Project Implementation: Capacity Building on Forest and Land Fire Management in Indonesia

Unplanned activities

In terms of improving the project dissemination and further supporting the fire prevention campaign to wider stakeholders, the project presented poster and took part in video competition. On poster competition tendered the theme “Community Participation in fire prevention” while the video topic was the utilization of the SMART Patrol Information System. The poster competition was followed by 31 posters while the video competition reached 14 contestants. The winners were determined by a panel of jury consisting of 3 competent persons in related subjects from the Directorate of Forest and Land Fire Management and IPB University. The publications used or cited for the project implementation and reporting are listed in Annex 3.

Figure 35. Poster and video competitions

5.3.Discussion on the interventions

Since management of forest and land fire is the huge-complex work, no single institution can accomplish the task alone. That task is the common responsibility of all stakeholders. For that reason, the project had introduced four interventions aimed at strengthening cooperation of stakeholders in fire prevention efforts as highlighted below.

1) Activity 3.1 organized three workshops on improving and strengthening institutional coordination and synergy among the relevant stakeholders for controlling forest and land fire management at the national and provincial/district levels comprising one national workshop and two Regional/District workshops and produced declarations on common understanding and commitment by the stakeholders. The national workshop focused more on sharing and managing of fire data and information while the Regional/District workshops emphasized on institutional arrangements for implementing fire management, i.e. 'who (institutions) will implement what actions' as well as identification of potential contribution of resources. The stakeholder's cooperation workshops were very important thus should be continuously carried out to maintain and improve synergy and collaboration among the fire stakeholders and further promote their resource contribution and encourage community participation in fire management action.

2) Under Activity 3.2, two workshops/FGDs on were held purposed to support the communities on the development of land preparation without burning practices (support of PLTB development). The practices consisted of 2 aspects, namely the agricultural aspect regarding no burning activity on land preparation and the economic aspect related to improving community income. The synergy and collaboration among stakeholders were very prominent and should be continuously maintained and strengthened to encourage the stakeholders' resources contribution to support the development of integrated PLTB which can be implemented in the integrated activities.

3) Under Activity 3.3, a webinar series on forest and land fire management had been completed, consisted of 7 and 5 monthly webinar series, respectively. The fire webinar series were very important to improve the capacity of fire stakeholders through sharing policy approaches, experiences, and also best practices on fire management from external fire stakeholders. Information on experience sharing events should be conducted periodically to update fire management approaches and improve capacity of institutions and parties in-charge of forest and land fire management. Such a webinar can also be employed to build up institutional network and cooperation.

4) Activity 3.4 dealt with outreaching task, i.e. to disseminate information resulting from the interventions using different platforms including official website, mass media, online media, visual media/TV as well as participation in different exhibitions/events. The intervention also produced 5 fire leaflets and 5 project videos in English and Bahasa for campaigning purpose. The outreaching task is important to inform wider stakeholders and beneficiaries on the applied practices and approaches that had been developed and produced under the project to support fire prevention program.

5.4. Achievement of the intervention assessed

The four interventions that had been completely implemented under the project were:

- Activity 3.1 To improve and strengthen the institutional coordination of the Task Force for Control on Forest and Land Fire Management at the national and provincial/district level;
- Activity 3.2 To hold dialogues on forest and land fire Management/action with private sector and other local institutions
- Activity 3.3.To organize a sub-regional workshop for prevention and management of forest and land fires in Southeast Asia with an emphasis on Indonesia
- Activity 3.4.To develop dissemination of the outcomes of the project and asses of its replication in other area

The interventions were designed and expected to strengthen cooperation among local institutions, the private sector, and communities in forest and land fire prevention. Had the interventions achieved their designed, intended purpose? To answer this question, there is a need to match defined indicators of achievement of Output 3 with realized outcomes of the interventions. The matching process is exhibited in Table 33.

Table 33. Assessment of intervention achievement

Output/Activities	Indicators of achievement	Achievement of interventions
Output 3 Forest and land fire prevention action increased	(1) MOU among stakeholders (task force) to exchange information, conduct policy dialogues, strengthen cooperation implemented	(1) Organized 3 strengthened cooperation workshops: • 1 workshop in the central level • 2 regional/district workshops in South Sumatra and Central Kalimantan completed with declaration of common understanding and commitment
	(2) Two dialogue series to support Land Preparation without Burning *(Pembukaan Lahan Tanpa Bakar/PLTB)* with private sector and local institutions implemented	(2) Organized 2 dialogues on strengthening stakeholder cooperation to support the development of communities' *(Masyarakat Peduli Api)* zero burning practices in South Sumatra and Central Kalimantan
	(3) A sub-regional workshop for prevention and management of forest and land fires in Southeast Asia with an emphasis to Indonesia conducted	(3) Organized 1st webinar series: 7 fire management webinar series of Southeast Asia regions. Continue organized 2nd webinar series: 5 international fire prevention webinar series
	(4) Dissemination of the outcomes of the project developed in various forms such as leaflets, film and report/social media	(4) Disseminated the project implementation in various platforms (official website, mass media, online media, visual media/TV) and participation in exhibitions/events. The project also provided 5 fire leaflets, 5 project videos, as well as organized poster and video competitions.

The matching process in Table 33 clearly indicated that all indicators of achievement of Output 3 had been fully met by realized outcomes of the interventions. Hence, it is reasonable to conclude that Output 3 as it was originally defined had been fully achieved and delivered.

5.5. Lessons learned

From the implementation of four activities in Output 3, cooperation among local institutions, private sector and communities in forest and land fire prevention strengthened. The important several lessons learned from the process on implementing the interventions were:

- The huge-complex works of fire management require synergy and collaboration from all stakeholders including Government, *Manggala Agni*, private sector, communities/*Masyarakat Peduli Api*, universities, NGOs, and even international agencies.
- Considering the national policy on burning prohibition, community participation in fire prevention should be encouraged, assisted, and accompanied continuously by the Government and other stakeholders.
- Sharing updated information and experiences in good practices on fire management should be organized continuously to improve knowledge and skills of stakeholders on forest and land fire management operations.

6 GENERAL DISCUSSION

6.1. Achievement of the specific objective

The project proponent conceptualized that the full implementation of planned project activities will deliver the three outputs defined while full delivery of all defined outputs will achieve the targeted specific objective. This conceptualization was well illustrated by the solution tree that had been constructed as the mirror of the problem tree.

Delivery of the defined individual outputs was assessed in Sections 3.4; 4.4; and 5.4 respectively. That assessment concluded that three defined outputs had been fully delivered. If so, the specific objective had also been achieved. To verify this statement or otherwise, there is a need to match indicators of achievement of the specific objective as defined in the logical framework contained in the project document with realized outcomes of implemented project activities; the matching process is exhibited in Table 34. It was clearly demonstrated in Table 34 that all defined indicators of the specific objective had been fully satisfied by realized outcomes of the activities implemented under different outputs. In other words, the specific objective had been achieved at completion of the project. This conclusion indeed confirms the previous statement made on the achievement of the specific objective based on full delivery of all defined outputs.

Table 34. Indicators of the specific objective versus realized outcomes of activities

Specific Objective	Measurable indicators	Realized Activities
To improve prevention of forest and land fire through strengthening management and technical capacity of stakeholders at three targeted provinces and national level	1. Community in 8 villages in 3 provinces apply best practice agriculture (land preparation without burning).	1. Local community/ *Masyarakat Peduli Api* in 8 villages had been trained with zero burning practices and had developing demonstration plots. Among that 3 communities/villages of them had also been trained with community economic empowerment and had developing fish ponds farming
	2. Capacity of Forest and Land Fire Brigade *(Manggala Agni)* & officials in 3 provinces improved.	2. Capacity of Forest and Land Fire Brigade (*Manggala Agni*) is improved through organized technical training comprising 11 fire management, 3 basics fire management, as well as 3 fire mechanics . *Manggala Agni* was also provided by SMART Patrol Information System and 7 items of fire equipment. Specifically for regional officials, their capacity is improved through participation in the burnt-area estimation and fire-hazard map production training, involvement in zero burning practices training and demplots development, as well as participation in the fire webinar series

Specific Objective	Measurable indicators	Realized Activities
	3. Proven technology on reporting and detection of forest fires and forest burnt area to support Monitoring System available	3. The SMART Patrol Information System is completely developed and is applied by *Manggala Agni* . *Manggala Agni* and other regional officials were also trained the burnt-area estimation and fire-hazard map production with proven and standardized methodology delivered by competent-official agencies (National Institute of Aeronautics and Space of Indonesia/LAPAN-BRIN; Geospatial Information Agency/BIG; MoEF)
	4. Personal protective clothing properties and safety equipment of *Manggala Agni* in target location available	4. Procured 7 items of safety equipment that had been distributed to *Manggala Agni* in 3 provinces. Those items comprise 1.110 Safety Coats, 580 Safety Shoes, 16 portable water pumps, 8 motorcycles, 7 GPS, 58 Handy Talkies, and 90 portable oxygen tubes
	5. Main stakeholder awareness in three provinces on forest fire prevention improved	5. Raising stakeholder awareness was conducted through involvement in 3 (three) strengthening institutional synergy and collaboration as well as 2 (two) stakeholders dialogues on supporting zero burning practices (PLTB). Stakeholders were also invited and/or involved in the training of zero burning practices and developing demonstration plots, as well as participation in the fire webinar series In addition, stakeholders were also involved in the training of burnt-area estimation and fire-hazard map production

Referring to Table 34, it is confirmed that the project-specific objective was satisfactorily achieved. That achievement is evidenced by realized activities that answer the defined measurable indicators.

on behalf of ITTO, we are very pleased to contribute to combating forest and land fire disasters in Indonesia and tropics.

Tetra Yanuariadi
(Projects Manager, ITTO Secretariat, Japan)

Figure 36. Statement of ITTO Secretariat (Dr. Tetra Yanuariadi)

6.2. An appropriate trajectory to achieve the project's development objective

It had been previously explained that all planned project activities had been completely implemented, that all project outputs had been successfully delivered and the project's specific objective had been fully achieved. However, there is still another intervention strategy that should be assessed based on the project design which is the development objective of the project. The project's development

objective implies an impact that would occur sometime after completion of the project, i.e. after achieving the specific objective. Defined development objective and its measurable indicators are as follows:

- **Development Objective**

  Support the capacity building for the implementation of integrated forest fire prevention program and reduce the effects of fires on forest cover, natural wildlife habitats and livelihood

- **Measurable Indicators**

  There are three measurable indicators as tools for assessing delivery of project impacts. The problem with those indicators as a measuring tool is the absence of time bond, i.e. it is not clear on the timing for realizing expected impacts. For purpose of initial assessment, it is assumed that the time bound is year 2022, i.e. by end of the project.

  i) Forest burnt area reduced 10% from 2019

  The indicator says that burnt area will reduce by 10% compared to 2019. For analytical purpose, data on burnt area (estimation) sourced from MoEF are shown in Table 35.

Table 35. Burnt area (estimation) in three target provinces

NO	PROVINCE	BURNT AREA (Ha)		CHANGE
		2019	2021	(%)
1	South Sumatra	336.798	5.245	98,4
2	Central Kalimantan	317.749	3.652	98,9
3	South Kalimantan	137.848	8.625	93,7
	T O T A L	**792.395**	**17.522**	**97,8**

Table 35 shows the burnt area in three targeted provinces in 2019 had significantly decreased compared to 2021, with an average percentage of reduction reaching 97%. While the percentage in reduction has met the indicator of the development objective, the reduction cannot be claimed as attributable solely to implementation of the project. There are many approaches and interventions that have been implemented by the Government and the relevant stakeholders in the management of forest and land fires in Indonesia that have significantly contributed to suppressing forest and land fires. However, to some extent and for the long run, continued implementation of the interventions introduced under the project will surely contribute to reducing forest and land fires, thus burnt areas in Indonesia.

ii) Hotspot in target area reduced 10 % from 2019

The indicator says that hotspot will reduce for about 10% compared to 2019. For analytical purpose, data on hotspot (estimation) sourced from the MoEF are shown in Table 36.

Table 36. Number of hotspot (Satellite TERRA/AQUA – NASA, confidence level HIGH)

NO	PROVINCE	HOTSPOT		CHANGE
		2019	2021	(%)
1	South Sumatra	3872	25	99,4
2	Central Kalimantan	4028	392	90,3
3	South Kalimantan	906	16	98,2
	T O T A L	**8.806**	**433**	**95,1**

Similar to reduction in burnt area, Table 36 indicates that number of hotspots in three targeted provinces in 2019 had also decreased substantially compared to 2021, with an average percentage of 95%. Although the percentage of reduction had also met the indicator of the development objective, this reduction cannot be claimed as the result of the project implementation alone. Again, there are a number of approaches and interventions that have been implemented by the Government and the relevant stakeholders in the management of forest and land fires in Indonesia that significantly contributed to the success reduction of hotspot. However, it is also reasonable to say that the project, to some extent, had contributed to reducing the hotspot. At this stage, magnitude of the contribution is not easy to quantify.

iii) Number of *Manggala Agni* or community having accident with forest fire decreased up to 90%

Available data with MoEF from three project provinces indicated that number of Manggala Agni accidents in 2019-2020 reached four victims, while no accidents occurred in 2021. That decrease in number of fire accident was also not caused solely by implementation of the project. However, the various interventions introduced by the project especially such trainings on health and safety, provision of safety clothes and fire equipment, development procedures of forest and land fire brigade, and also strengthening synergy and collaboration among stakeholders had, to some extent, contributed to minimizing the accidents of fire personnel.

6.3. Lessons learned

Several lessons learned from the project implementation process include:

1) In terms of smoothing the project implementation, good communication and understanding are truly needed among the Executing Agency, Project Management Unit, Agencies of FLFM, and Local Fire Stations in the field. It also demands cooperation, commitment, and support from those parties in the implementation of the project activities entirely.
2) The huge-complex works of fire management require synergy and collaboration from all stakeholders including Government, *Manggala Agni*, private sectors, communities/*Masyarakat Peduli Api*, universities, NGOs, and even international agencies.
3) Considering the national policy on burning prohibition, communities and farmers require alternative technologies, approaches, and practices to meet that prohibition policy and accomplish their farming tasks.
4) Community participation in fire prevention should be encouraged, assisted, and accompanied continuously by Government and other stakeholders.
5) Community economic empowerment is required to increase their income as an incentive to participate in fire prevention program.
6) Fire brigades (*Manggala Agni*) should be trained periodically to maintain and improve their capacities in fire management.
7) Fire equipment should be revitalized over time to meet needed of quality and of quantity.
8) In terms of project completion, the project should provide sufficient working time and supporting inputs to carry out the technical final evaluation and reporting as well as administrative-financial closing of the project.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1. Conclusions

1) The project was well formulated with strong adherence to the ITTO Manual for project formulation: origin of the project was clear, the key problem addressed was relevant, and deeply analyzed involving stakeholders to reveal the cause and effect relationship which had been used as the basis for constructing the project design.
2) Regarding the national policy on burning prohibition, communities should be provided with alternative approaches to zero burning practices, improved their economic performance and encouraged to actively participate in fire prevention.
3) Fire brigades (*Manggala Agni*), officials and other stakeholders should consistently improve their management and technical capacity through periodic participation in various training.
4) Fire equipment of *Manggala Agni* and other stakeholders should be provided and continuously revitalized in terms of quantity and quality in order to adequately support the implementation of fire management operations.
5) Synergy and collaboration in the implementation of fire management among the main stakeholders should be continuously strengthened to increase their contributions.
6) Good communication and understanding among Executing Agency, Project Management Unit, Agencies of FLFM, and Local Fire Stations in the field were the critical points of successful project implementation to achieve the specific objective, in addition to the cooperation, commitment, and support from those parties involved in the project implementation.

7.2. Recommendations

1) Since human activities have become the main driving force in forest and land fires in Indonesia, involvement of communities is strongly needed in fire prevention and management in the field. For that concern, community participation should be encouraged, assisted, and accompanied continuously by the Government and other stakeholders.
2) The needs for technical training regarding fire management and working safety aspect for *Manggala Agni* and other stakeholders are very important to maintain and improve their capacities in implementing fire management, the training should be carried out periodically

and reach all fire brigades (*Manggala Agni*) since fire management operation is a high-risk activity.

3) The fire equipment utilized by *Manggala Agni* should be revitalized over time to provide sufficient fire equipment in terms of quantity and quality.
4) Since fire management is a huge work that requires enormous resources, its implementation must be carried out with synergy and collaboration by all stakeholders.
5) The fire budget allocation at the National and Regional Governments can be increased either by digging potency of funding from donors and other sources or carrying out synergy and collaboration among stakeholders to optimize use of available resources.
6) Implementing similar projects and activities in other provinces that are historically prone to fire incidents is strongly advisable.

Gratitude to the Japanese government and the ITTO for their kind assistance and facilitation in efforts to reduce forest and land fires in Indonesia through the implementation of this joint activity with the Ministry of Environment and Forestry (MoEF). Hopefully, this level of collaboration and assistance could be maintained and expanded in the future in order to reduce and prevent forest and land fires in Indonesia and the tropics

R. Basar Manullang
(Director of Forest and Land Fire Management, MoEF)

Figure 37. Statement of Director of Forest and Land Fire Management

ANNEX 1. Agenda Launching and National Seminar

AGENDA

Day 1 (Hybrid) : Wednesday, 29 June 2022
Venue : Ballroom 3 IPB Convention Center-Bogor
ZOOM : https://ipb .link/semnaskarhutla-29jun22

Time	Agenda
08.00 – 08.30	Registration
08.30 – 09.00	Report from Organizing Committee
	Presentation: 1 st session
	Moderator: Dr. Israr Albar – Directorate of Forest and Land Fire Management, MoEF
09.00 – 09.15	Policy on Forest and Land Fire Management in Indonesia
	R. Basar Manullang, MM – Director of Forest and Land Fire Management, MoEF
09.15 – 09.30	Tropical Forest Fire Management
	Dr. Hwan-Ok MA – Officer in Charge, Division of Forest Management, ITTO
09.30 – 09.45	Social Approaches on Fire Prevention
	Prof. Dr. Lailan Syaufina – IPB University
09.45 – 10.00	Regional Cooperation on Fire Prevention
	Prof. Dr. Bambang Hero Saharjo – Regional Fire Management Resource Center (RFMRC-SEA)
10.00 – 10.20	Discussion
10.20 – 10.40	Coffee break
	Presentation: 2 nd session
	Moderator: Dr. Omo Rusdiana – Head of Silviculture Department, IPB University
10.40 – 10.55	Support National Board for Disaster Management (BNPB) on Fire Management
	Dr. Raditya Jati – Deputi of System and Strategy, National Board for Disaster Management
10.55 – 11.10	Implementation of Remote Sensing Technology on supporting Fire Prevention
	Dr. Rahmat Arief - Acting Head of Remote Sensing Research Center, BRIN
11.10 – 11.25	Development Information System of Peat Restoration on supporting Fire Prevention
	Dian Nur Amalia, M.Si – Head of Working Group, BRGM
11.25 – 11.40	Innovation on Supporting Fire Prevention
	Dr. Danang Eko Nuryanto – Meteorology, Climatology, and Geophysical Agency (BMKG)
11.40 – 12.00	Discussion
12.00 – 14.00	Break
	(Playing video competition of the utilization of SMART Patrol Information System)

LAUNCHING SMART PATROL INFORMATION SYSTEM	
14.00 – 14.20	• Remarks from Head of Research Institute and Community Service IPB University
	(Prof. Dr. Sugeng Heri Suseno)
	• Remarks from Director General of Climate Change, MoEF
	(Laksmi Dhewanthi, MA, IPU)
14.20 – 14.40	• Foreword from Dean of Faculty Mathematics and Natural Science, IPB University
	(Dr. Berry Juliandi)
	• Launching of SMART Patrol Information System by Rector of IPB University (Prof. Arif Satria), accompanied by all the partners.
14.40 – 15.00	SMART Patrol Information System
	Prof. Dr. Imas Sukaesih Sitanggang – IPB University
15.00 – 15.15	Announcement the winners of SMART Patrol Information System video competition
15.15 – 15.30	Closing

Day 2 (online) **: Thursday, 30 June 2022**
ZOOM **: https://ipb .link/semnaskarhutla-30jun22**

Time	Agenda
08.00 – 08.30	Registration
	Presentation: 3 rd session Moderator: Anis Susanti Aliati, M.Si – Directorate of Forest and Land Fire Management, MoEF
08.30 – 08.50	Role of Information Technology on Fire Prevention Prof. Dr. Imas Sukaesih Sitanggang – IPB University
08.50 – 09.10	Dynamics of peatland fires in OKI District, South Sumatra Dr. Ati Dwi Nurhayati – IPB University
09.10 – 09.30	Community Participation on Fire Prevention Prof. Dr. Indroyono Soesilo – Indonesian Forest Entrepreneur Association (APHI)
09.30 – 09.50	Discussion
09.50 – 10.00	Coffee break
10.00 – 11.45	Parallel Session 1st Parallel Session : Paper presentation of Policy and Social Approach to Fire Prevention 2nd Parallel Session : Paper presentation of Technology Innovations to Fire Prevention Moderator: Prof. Dr. Imas Sukaesih Sitanggang – IPB University
12.00 – 12.25	Announcement of best presenters
12.25 – 12.30	Closing

ANNEX 2. Declaration on common understanding and commitment of stakeholders

RUMUSAN HASIL *FOCUS GROUP DISCUSSION* (FGD)
PENGUATAN SINERGI DAN KOLABORASI

Pada hari ini tanggal lima belas bulan Maret tahun Dua Ribu Dua Puluh Dua bertempat di Kantor Daops Manggala Agni Sumatera XVII/OKI di Kabupaten OKI, Sumatera Selatan, kami yang bertandatangan di bawah ini, telah melakukan *Focus Group Discussion* (FGD) dalam rangka penguatan sinergi dan kolaborasi untuk mendorong upaya pencegahan kebakaran hutan dan lahan di Provinsi Sumatera Selatan, khususnya Kabupaten Ogan Komering Ilir.

Berdasarkan hasil *Focus Group Discussion* (FGD), kami secara bersama-sama memiliki kesepemahaman dan komitmen sebagai berikut:

1. Untuk selalu mendukung upaya pencegahan dan pengendalian kebakaran hutan dan lahan
2. Untuk selalu meningkatkan sinergi dan kolaborasi dengan para pihak dalam upaya pencegahan dan pengendalian kebakaran hutan dan lahan
3. Turut berkontribusi dalam penggunaan sumber daya (*resources*) dalam rangka mendukung upaya pencegahan dan pengendalian kebakaran hutan dan lahan
4. Untuk selalu mendorong kemudahan pertukaran (*sharing*) dan pemanfaatan data dan informasi dengan para pihak dalam rangka mendukung upaya pencegahan dan pengendalian kebakaran hutan dan lahan
5. Mendorong partisipasi masyarakat/Masyarakat Peduli Api yang lebih besar dan nyata dalam upaya pencegahan dan pengendalian kebakaran hutan dan lahan

Demikian Rumusan Hasil *Focus Group Discussion* (FGD) ini disusun dan disepakati dengan penuh kesadaran dan tanggung jawab bersama, serta untuk dapat dipergunakan sebagaimana mestinya dengan penuh tanggung jawab dan saling menghormati antar para pihak.

Ogan Komering Ilir, XX Maret 2022

BPBD Kab. OKI Listiadi Martin S.Sos. MM	Komando Distrik Militer 0402/OKI-OI Edi gunawan.	Kepolisian Resor OKI AKP. TARMIZI, SH
Balai PPIKHL Wil. Sumatera	Dinas Lingkungan Hidup Kab. OKI	Dinas Perikanan Kab. OKI ROMICO. ISWANDY, S.Pi., M.Si
BMKG Provinsi Sumsel	KPHP Wil IV Sungai Lumpur - Riding	KPHP Wil V Lempuing Mesuji Ali Hanafiah
Perguruan Tinggi Universitas Sriwijaya DR. Momons	Asosiasi APHI	Badan Usaha Benni Gurning.

RUMUSAN HASIL DIALOG

Pada hari ini tanggal Dua Puluh Empat bulan Maret tahun Dua Ribu Dua Puluh Dua bertempat di Kota Palangkaraya, Kalimantan Tengah, kami yang bertandatangan di bawah ini, telah melakukan dialog dan diskusi dalam rangka mendorong upaya pencegahan kebakaran hutan dan lahan di Provinsi Kalimantan Tengah, khususnya Kabupaten Pulang Pisau.

Berdasarkan hasil dialog dan diskusi, kami secara bersama-sama memiliki kesepahaman dan komitmen untuk:

1. Mendukung upaya pencegahan dan penanggulangan kebakaran hutan dan lahan
2. Meningkatkan sinergi dan kolaborasi dengan para pihak dalam upaya pencegahan dan penanggulangan kebakaran hutan dan lahan
3. Mendorong partisipasi masyarakat yang lebih besar dan nyata dalam upaya pencegahan dan penanggulangan kebakaran hutan dan lahan, salah satunya dalam bentuk pengembangan praktik penyiapan lahan tanpa bakar oleh masyarakat
4. Mendorong pemberdayaan dan/atau peningkatan ekonomi masyarakat
5. Melakukan pendampingan terhadap masyarakat secara berkala, baik dalam aspek partisipasi masyarakat maupun pemberdayaan dan/atau ekonomi masyarakat
6. Kesepahaman dan komitmen tersebut di atas, dilaksanakan melalui kegiatan-kegiatan yang ada dalam organisasi stakeholder

Demikian Rumusan Hasil Dialog ini disusun dan disepakati dengan penuh kesadaran dan tanggung jawab bersama, serta untuk dapat dipergunakan sebagaimana mestinya dengan penuh tanggung jawab dan saling menghormati antar para pihak.

Palangkaraya, 24 Maret 2022

BPBD Kab. Pulang Pisau Tekson, S.Sos Kepala Bidang Pencegahan & Kesiapsiagaan	Balai PPIKHL Wil. Kalimantan Johny Santoso, S.Hut., M.A. Kepala Balai PPIKHL Wil. Kalimantan	Dinas Lingkungan Hidup Kab. Pulang Pisau Veronica Lenny P. Kabid pengendalian Pencemaran & Kerusakan Lingkungan
Dinas Pertanian Kab. Pulang Pisau Tata Ali Sumitra, S.Hut. Kepala Bidang Perkebunan	KPHP Kahayan Hilir Joko Listyanto, S.Hut, M.Si Kepala KPHP	PT Best Agro Turyono Humas
PT. Industrial Forest Plantation Denny J.	PT. Menteng Kencana Mas Anwar Siddiq Koordinator Sustainability	PT. Antang Sawit Perkasa Deni Supriyadi Asisten EHS

RUMUSAN HASIL DIALOG

Pada hari ini tanggal Dua Puluh bulan April tahun Dua Ribu Dua Puluh Dua bertempat di Kabupaten Banyuasin, Sumatera Selatan, kami yang bertandatangan di bawah ini, telah melakukan dialog dan diskusi dalam rangka mendorong upaya pencegahan kebakaran hutan dan lahan di Provinsi Sumatera Selatan, khususnya Kabupaten Banyuasin.

Berdasarkan hasil dialog dan diskusi, kami secara bersama-sama memiliki kesepemahaman dan komitmen untuk:

1. Mendukung upaya pencegahan dan pengendalian kebakaran hutan dan lahan.
2. Meningkatkan sinergi dan kolaborasi dengan para pihak dalam upaya pencegahan dan pengendalian kebakaran hutan dan lahan.
3. Mendorong partisipasi masyarakat yang lebih besar dan nyata dalam upaya pencegahan dan pengendalian kebakaran hutan dan lahan, salah satunya dalam bentuk pengembangan praktik penyiapan lahan tanpa bakar oleh masyarakat.
4. Mendorong pemberdayaan dan/atau peningkatan ekonomi masyarakat.
5. Melakukan pendampingan terhadap masyarakat secara berkala, baik dalam aspek partisipasi masyarakat maupun pemberdayaan dan/atau ekonomi masyarakat.
6. Kesepemahaman dan komitmen dimaksud di atas, dilaksanakan melalui kegiatan-kegiatan yang sudah ada dan/atau menjadi rencana kegiatan para pihak.

Demikian Rumusan Hasil Dialog ini disusun dan disepakati dengan penuh kesadaran dan tanggung jawab bersama, serta untuk dapat dipergunakan sebagaimana mestinya dengan penuh tanggung jawab dan saling menghormati antar para pihak.

Banyuasin, 20 April 2022

BPBD Kab. Banyuasin Ricky Hardiansyah, SE Analis Kebencanaan	Balai PPIKHL Wil. Sumatera Ferdian Krisnanto, S.Hut., M.P. Kepala Balai PPIKHL Wil. Sumatera	Dinas Lingkungan Hidup Kab. Banyuasin Abas Kurib, S.T, M.Si Kabid Pengendalian Pencemaran dan Kerusakan lingkungan
Dinas Pertanian Tanaman Pangan dan Hort. Kab. Banyuasin Didik Supriyanto, SP Analis Pasar Hasil Pertanian	Dinas Perkebunan dan Peternakan Kab. Banyuasin Sukito, SP Kasi Perlindungan	Dinas Koperasi, Perindustrian, dan Perdagangan Kab. Banyuasin Sujak, S.Pd., MM Kabis Pengelolaan Pasar

ANNEX 3. Publication list of the project implementation and reporting

NO	NEWS	DATE	LINK - MEDIA
1	Kick off Meeting	15 Feb 21	http://ditjenppi.menlhk.go.id/berita-ppi/3791-kerjasama-itto-klhk-pada-forest-fire-project-resmi-dimulai.html
2	Training of Fire Management, Central Kalimantan	25-27 May 21	http://ditjenppi.menlhk.go.id/berita-ppi/3926-klhk-bersama-itto-tingkatkan-keterampilan-dalkarhutla-manggala-agni.html
		25-27 May 21	http://sipongi.menlhk.go.id/publikasi/read/175/klhk-bersama-itto-tingkatkan-keterampilan-dalkarhutla-manggala-agni
		25-27 May 21	https://kalteng.co/2021/05/27/personel-manggala-agni-tingkatkan-k3-dan-kapasitas-pengendalian-karhutla/
		27 May 21	https://kaltengonline.com/2021/05/28/personel-manggala-agni-asah-kemampuan-kendalikan-karhutla/
3	Development of SMART Patrol System	4 Jun 21	http://sipongi.menlhk.go.id/publikasi/read/177/direktorat-pkhl-ipb-itto-kembangkan-smart-patrol-information-system-karhutla
4	Training of Fire Management, South Kalimantan (Banjar, Tanah Laut)	15 Jun 21	https://apahabar.com/2021/06/kendalikan-karhutla-kalsel-klhk-kerja-sama-dengan-itto/
		16 Jun 21	https://poroskalimantan.com/tingkatkan-sdm-hadapi-karhutla-74-brigadir-manggala-agni-ikuti-bimtek/
		16 Jun 21	Radar Banjarmasin
		16 Jun 21	https://kalsel.prokal.co/read/news/41749-waspada-bmkg-prediksi-kemarau-tahun-ini-di-atas-normal/6
		16 Jun 21	https://www.beritapembaruan.id/2021/06/puluhan-brigadir-manggala-agni-ikuti.html
		16 Jun 21	https://poroskalimantan.com/tingkatkan-sdm-hadapi-karhutla-74-brigadir-manggala-agni-ikuti-bimtek/
		16 Jun 21	https://koranbanjar.net/kementerian-lhk-ri-bekerjasama-dengan-itto-kendalikan-kebakaran-hutan-dan-lahan/
		17 Jun 21	http://ditjenppi.menlhk.go.id/berita-ppi/3964-direktorat-pkhl-itto-bppikhl-wilayah-kalimantan-perkuat-kapasitas-manggala-agni-di-kalimantan-selatan.html
		17 Jun 21	http://sipongi.menlhk.go.id/publikasi/read/182/direktorat-pkhl-itto-bppikhl-wilayah-kalimantan-perkuat-kapasitas-manggala-agni-di-kalsel
		17 Jun 21	http://ditjenppi.menlhk.go.id/berita-ppi/3974-manggala-agni-daops-kalimantan-v-banjar-tingkatkan-keterampilan-di-bidang-pengendalian-karhutla,-k3-dan-evakuasi-satwa.html
5	Training of Fire Management, South Sumatra (OKI, Lahat)	8 Jul 21	http://ditjenppi.menlhk.go.id/berita-ppi/3987-klhk-itto-laksanakan-bimtek-pengendalian-karhutla-bagi-manggala-agni-se-sumatera-selatan.html
		8 Jul 21	http://sipongi.menlhk.go.id/publikasi/read/188/klhk-itto-laksanakan-bimtek-pengendalian-karhutla-bagi-manggala-agni-se-sumatera-selatan
		8 Jul 21	Sumatera express
		10 Jul 21	https://nawacitalib.com/2021/07/10/peserta-antusias-ikuti-bimtek-pengendalian-karhutla/
		10 Jul 21	https://realitainfo.com/gelar-bimtek-pengendalian-karhutla-direktorat-gandeng-itto/
		10 Jul 21	http://www.detiksriwijaya.com/2021/07/09/peserta-antusias-ikuti-bimtek-pengendalian-karhutla/
		10 Jul 21	http://lahatonline.com/247115-manggala-agni-lahat-ikuti-bimtek-pengendalian-karhutla.html
6	1st Semester Project Evaluation	10 Jul 21	http://ditjenppi.menlhk.go.id/berita-ppi/3989-ditjen-ppi-gelar-evaluasi-kegiatan-kerjasama-klhk-itto-pada-forest-fire-project-semester-1.html
		10 Jul 21	http://sipongi.menlhk.go.id/publikasi/read/190/ditjen-ppi-gelar-evaluasi-kegiatan-kerjasama-klhk-itto-pada-forest-fire-project-semester-1
7	1st Fire Webinar (1# series)	22 Jul 21	http://ditjenppi.menlhk.go.id/berita-ppi/3998-kolaborasi-klhk-itto-bersama-ipb-dan-rfmrc-sea-gelar-webinar-pengendalian-karhutla-tingkat-asia-tenggara.html

NO	NEWS	DATE	LINK - MEDIA
8	2nd Fire Webinar 1# series)	26 Ags 21	http://sipongi.menlhk.go.id/publikasi/read/201/klhk-itto-bersama-ipb-dan-rfmrc-sea-selenggarakan-seri-ke-2-webinar-dalkarhutla-asia-tenggara
		26 Ags 21	http://ditjenppi.menlhk.go.id/berita-ppi/4024-klhk-itto-bersama-ipb-university-dan-rfmrc-sea-selenggarakan-seri-ke-2-webinar-dalkarhutla-asia-tenggara.html
9	Coordination and consolidation data and information for fire management	1 Sep 21	http://ditjenppi.menlhk.go.id/berita-ppi/4026-pkhl-bersama-itto-selenggarakan-konsolidasi-dan-koordinasi-data-dan-informasi-dalkarhutla.html
		1 Sep 21	http://sipongi.menlhk.go.id/publikasi/read/203/pkhl-bersama-itto-selenggarakan-konsolidasi-dan-koordinasi-data-dan-informasi-dalkarhutla
10	3rd Fire Webinar (1# series)	23 Sep 21	http://ditjenppi.menlhk.go.id/berita-ppi/4033-klhk-itto-gelar-seri-ketiga-webinar-pengendalian-karhutla-tingkat-asia-tenggara.html
		23 Sep 21	http://sipongi.menlhk.go.id/publikasi/read/209/klhk-itto-gelar-seri-ketiga-webinar-pengendalian-karhutla-tingkat-asia-tenggara
11	Training of zero burning practices, South Kalimantan (Tapin, Banjar)	5 Oct 21	http://ditjenppi.menlhk.go.id/berita-ppi/4050-klhk-dan-itto-selenggarakan-seri-pelatihan-praktik-dan-pembangunan-demplot-penyiapan-lahan-tanpa-bakar-bagi-masyarakat.html
		5 Oct 21	http://sipongi.menlhk.go.id/publikasi/read/210/klhk-dan-itto-selenggarakan-seri-pelatihan-praktik-dan-pembangunan-demplot-pltb
		5 Oct 21	https://banjarmasin.tribunnews.com/2021/10/05/masyarakat-desa-sungai-rutas-hulu-tapin-dilatih-pembukaan-penyiapan-lahan-tanpa-bakar
		5 Oct 21	https://matabanua.co.id/2021/10/05/klhk-gelar-pelatihan-dan-praktik-pembukaan-lahan-tanpa-bakar/
		5 Oct 21	Tapin TV https://www.youtube.com/watch?v=bsG2wsw-SGk https://studio.youtube.com/video/YnmXMgMtfOM/edit
		6 Oct 21	https://kalsel.antaranews.com/berita/285177/kementerian-lingkungan-hidup-ajak-masyarakat-cegah-kebakaran-hutan-dan-lahan
		6 Oct 21	https://koranbanjar.net/warga-banjarbaru-dilatih-pembukaan-lahan-tanpa-bakar-oleh-klhk/
		7 Oct 21	TVRI Kalsel https://youtu.be/r5-BYsV7cu0 https://studio.youtube.com/video/r5-BYsV7cu0/edit
12	Training of zero burning practices, Central Kalimantan (Pulang Pisau, Barito Selatan)	19 Oct 21	http://ditjenppi.menlhk.go.id/berita-ppi/4053-pkhl-itto-kembali-menyelenggarakan-pelatihan-praktik-dan-pembangunan-demplot-pltb-bagi-masyarakat.html
		19 Oct 21	http://sipongi.menlhk.go.id/publikasi/read/213/pkhl-itto-kembali-menyelenggarakan-pelatihan-praktik-dan-pembangunan-demplot-pltb-bagi-masyarakat
		19 Oct 21	Antara News https://kalteng.antaranews.com/video/2469309/klhk-bekali-anggota-mpa-pengetahuan-mitigasi-perubahan-iklim
		19 Oct 21	Antara News https://studio.youtube.com/video/r9_IhKh49n0/edit
		20 Oct 21	SCTV Palangkaraya https://studio.youtube.com/video/dZsW-0v57wo/edit
		21 Oct 21	TVRI Kalteng https://studio.youtube.com/video/mvt6ZZyw4y4/edit
		25 Oct 21	INews Kalteng https://studio.youtube.com/video/tkBQaEiXFmQ/edit
13	4th Fire Webinar (1# series)	21 Oct 21	http://ditjenppi.menlhk.go.id/berita-ppi/4056-klhk-itto-gelar-seri-keempat-webinar-mitigasi-dan-model-manajemen-kolaborasi-pencegahan-karhutla.html
		21 Oct 21	http://sipongi.menlhk.go.id/publikasi/read/203/pkhl-bersama-itto-selenggarakan-konsolidasi-dan-koordinasi-data-dan-informasi-dalkarhutla
		21 Oct 21	IPB Today edisi 674

NO	NEWS	DATE	LINK - MEDIA
14	Socialization and training of SMART Patrol Information System	16 Nov 21	http://ditjenppi.menlhk.go.id/berita-ppi/4103-klhk-ipb-itto-laksanakan-sosialisasi-dan-bimtek-sipp-karhutla.html
		16 Nov 21	http://sipongi.menlhk.go.id/publikasi/read/226/klhk-ipb-itto-laksanakan-sosialisasi-dan-bimtek-sipp-karhutla
15	Socialization and training of burnt-area estimation and fire-prone map production, Central Kalimantan	17 Nov 21	http://ditjenppi.menlhk.go.id/berita-ppi/4104-klhk-dan-itto-tingkatkan-kapasitas-para-pihak-dalam-penghitungan-luas-karhutla-dan-pembuatan-peta-rawan-karhutla.html
		17 Nov 21	http://sipongi.menlhk.go.id/publikasi/read/227/klhk-dan-itto-tingkatkan-kapasitas-para-pihak-dalam-penghitungan-luas-karhutla
		18 Nov 21	Kalteng Pos
		18 Nov 21	https://www.intimnews.com/klhk-dan-itto-petakan-wilayah-rawan-karhutla-di-kalteng/
		19 Nov 21	https://kalteng.antaranews.com/video/2533217/klhk-wilayah-kalteng-bekali-kemampuan-pengendalian-karhutla
16	Field test of further development SMART Patrol Information System	18 Nov 21	http://ditjenppi.menlhk.go.id/berita-ppi/4105-klhk-ipb-itto-lakukan-uji-lapangan-sipp-karhutla-di-kalbar-dan-kalsel.html
		18 Nov 21	http://sipongi.menlhk.go.id/publikasi/read/228/klhk-ipb-itto-lakukan-uji-lapangan-sipp-karhutla-di-kalbar-dan-kalsel
17	Socialization and training of burnt-area estimation and fire-prone map production, South Sumatra	24 Nov 21	http://ditjenppi.menlhk.go.id/berita-ppi/4109-klhk-dan-itto-tingkatkan-kapasitas-para-pihak-dalam-penghitungan-luas-karhutla-di-sumsel.html
		24 Nov 21	http://sipongi.menlhk.go.id/publikasi/read/232/klhk-dan-itto-tingkatkan-kapasitas-para-pihak-dalam-penghitungan-luas-karhutla-di-sumsel
18	5th Fire Webinar (1# series)	25 Nov 21	https://ipb.ac.id/news/index/2021/11/webinar-pencegahan-kebakaran-hutan-ipb-university-studi-banding-indonesia-dan-vietnam/92caac5c734391e3958124d49d4f07e7
19	Training of zero burning practices, South Sumatra (Banyuasin – Musi Banyuasin)	13 Des 21	http://ditjenppi.menlhk.go.id/berita-ppi/4128-mendorong-partisipasi-masyarakat-dalam-pencegahan-karhutla-melalui-pelatihan-pembangunan-demplot-pltb.html
		14 Des 21	Sumatera Express
		16 Des 21	https://www.mubaonline.com/berita/alternatif-solusi-larangan-membakar-warga-dapat-pelatihan-langsung-dari-tim-ahli-peneliti-klhk-muba165nc?fbclid=IwAR2jOUjWcyogyGIxasHGnvOs7QUnnHh8_0q9sRHCmWWd7BrrbL52r6MuPXU https://m.facebook.com/story.php?story_fbid=4784140668311076&id=1360899557301888&sfnsn=wiwspwa
		17 Des 21	https://www.mubaonline.com/berita/edukasi-masyarakat-dalam-pencegahan-karhutla-melalui-pelatihan-praktik-dan-pembangunan-demplot-penyiapan-lahan-tanpa-bakar-muba83nx
20	6th Fire Webinar (1# series)	21 Des 21	http://ditjenppi.menlhk.go.id/berita-ppi/4131-klhk-%E2%80%93-itto-gelar-seri-keenam-webinar-forest-fire-prevention-management-and-rehabilitation.html
		21 Des 21	http://sipongi.menlhk.go.id/berita/278-klhk-itto-gelar-seri-ke-6-webinar-forest-fire-prevention-management-and-rehabilitation
		21 Des 21	IPB Today edisi 708
21	Training of zero burning practic es, South Sumatra (OKI – Muara Enim)	10 Jan 22	http://ditjenppi.menlhk.go.id/berita-ppi/4141-pelatihan-praktik-penyiapan-lahan-tanpa-bakar-di-oki-dan-muara-enim.html
		10 Jan 22	https://sipongi.menlhk.go.id/berita/279-pelatihan-praktik-penyiapan-lahan-tanpa-bakar-di-oki-dan-muara-enim
		10 Jan 22	http://ditjenppi.menlhk.go.id/berita-ppi/4140-libatkan-masyarakat-dalam-pencegahan-karhutla,-ini-solusi-dari-klhk.html
		11 Jan 22	http://ditjenppi.menlhk.go.id/berita-ppi/4142-pltb-menjadi-solusi-cegah-karhutla.html
		12 Jan 22	https://sumeks.co/libatkan-masyarakat-pencegahan-karhutla-melalui-praktik-dan-pembangunan-demplot-pltb/
		12 Jan 22	Sumatera Express
		13 Jan 22	https://lahatpos.sumeks.co/alternatif-solusi-larangan-membakar-melalui-pelatihan-praktik-dan-pembangunan-demplot-pltb/

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		14 Jan 22	https://sumselupdate.com/30-peserta-ikuti-pelatihan-pltb-solusi-larangan-membuka-lahan-dengan-membakar/
		14 Jan 22	https://gemasriwijaya.net/2022/01/14/alternatif-solusi-larangan-membakar-melalui-pelatihan-praktik-dan-pembangunan-demplot-penyiapan-lahan-tanpa-bakar/
		14 Jan 22	http://sriwijayaonline.com/99804-alternatif-solusi-larangan-membakar-melalui-pelatihan-praktik-dan-pembangunan-demplot-penyiapan-lahan-tanpa-bakar-pltb.html
		14 Jan 22	https://selatannews.com/2022/01/14/alternatif-solusi-larangan-membakar-melalui-pelatihan-praktik-dan-pembangunan-demplot-penyiapan-lahan-tanpa-bakar-pltb/
		14 Jan 22	http://komeringonline.com/klhk-dorong-peran-serta-masyarakat-cegah-kebakaran-hutan-dan-lahan-melalui-pelatihan-praktik-dan-pembangunan-demplot-penyiapan-lahan-tanpa-bakar-pltb/
		14 Jan 22	http://lahathotline.com/2022/01/14/alternatif-solusi-larangan-membakar-melalui-pelatihan-praktik-dan-pembangunan-demplot-penyiapan-lahan-tanpa-bakar/
		14 Jan 22	Lahat Pos
22	Basic fire training for new Manggala Agni, South Kalimantan		https://koranbanjar.net/klhk-dan-itto-mengadakan-pelatihan-dasar-pengendalian-karhutla/
23	Basic fire training for new Manggala Agni, South Sumatra	12 Jan 22	http://ditjenppi.menlhk.go.id/berita-ppi/4144-eks-bakti-rimbawan-wilayah-sumatera-ikuti-pelatihan-dasar-dalkarhutla.html
		12 Jan 22	https://sipongi.menlhk.go.id/berita/281-eks-bakti-rimbawan-wilayah-sumatera-ikuti-pelatihan-dasar-dalkarhutla
		12 Jan 22	Sumatera Express 14 Jan
24	2nd PSC Meeting	2 Feb 22	http://ditjenppi.menlhk.go.id/berita-ppi/4161-direktorat-pkhl-itto-lakukan-evaluasi-proyek-kerja-sama-capacity-building-on-forest-and-land-fire-management-in-indonesia.html
		2 Feb 22	https://sipongi.menlhk.go.id/berita/286-direktorat-pkhl-itto-lakukan-evaluasi-proyek-kerja-sama-capacity-building-on-forest-and-land-fire-management-in-indonesia
25	Training of Fire Management, Central Kalimantan (Kotawaringin Barat, Barito Utara)	16 Feb 22	http://ditjenppi.menlhk.go.id/berita-ppi/4176-direktorat-pkhl-itto-bppikhl-wilayah-kalimantan-perkuat-kapasitas-manggala-agni-di-kalimantan-tengah.html
		16 Feb 22	https://sipongi.menlhk.go.id/berita/288-direktorat-pkhl-itto-bppikhl-wilayah-kalimantan-perkuat-kapasitas-manggala-agni-di-kalimantan-tengah
		17 Feb 22	https://kumparan.com/infopbun/klhk-bersama-itto-tingkatkan-kapasitas-pengendalian-karhutla-1xW9fXThSMZ?utm_source=kumMobile&utm_medium=whatsapp&utm_campaign=share&shareID=5C6GSa6SP9pA
		17 Feb 22	https://kalteng.antaranews.com/video/2710141/klhk-tingkatkan-keterampilan-personel-manggala-agni
		17 Feb 22	https://beritasampit.co.id/2022/02/17/manggala-agni-muara-teweh-gelar-bimtek-pengendalian-hutan-dan-lahan/
		18 Feb 22	Batara TV https://www.youtube.com/watch?v=aeqzmoIsG9A&t=13s
		19 Feb 22	Kalteng Pos
		22 Feb 22	SCTV Palangkaraya https://www.youtube.com/watch?v=IbRuy5zMU4k&t=11s
26	Monitoring and field visit of project activities	2 Mar 22	https://nusakalimantan.com/2022/03/03/pembuatan-demplot-penyiapan-lahan-tanpa-bakar-cegah-karhutla/
27	Preparation for organizing fire webinar series (2nd series) hosted by MoEF	12 Mar 22	http://ditjenppi.menlhk.go.id/berita-ppi/4196-pkhl-dan-itto-persiapkan-seri-webinar-dalkarhutla.html
		12 Mar 22	https://sipongi.menlhk.go.id/berita/290-pkhl-dan-itto-persiapkan-seri-webinar-dalkarhutla
28	Workshop of strengthening stakeholder cooperation, South Sumatra	15 Mar 22	http://ditjenppi.menlhk.go.id/berita-ppi/4198-klhk-itto-tingkatkan-sinergi-antisipasi-karhutla-para-pihak-di-oki.html
		15 Mar 22	https://sipongi.menlhk.go.id/berita/291-klhk-itto-tingkatkan-sinergi-antisipasi-karhutla-para-pihak-di-oki
		17 Mar 22	Sumatera Ekspres (Hal 14)

NO	NEWS	DATE	LINK - MEDIA
29	Training of Fire Management, South Sumatra (Banyuasin-Musi Banyuasin)	18 Mar 22	Sumatera Ekspres (Hal 10)
		18 Mar 22	http://ditjenppi.menlhk.go.id/berita-ppi/4201-klhk-dan-itto-gelar-bimtek-pengendalian-karhutla-bagi-manggala-agni-sumsel.html
		18 Mar 22	https://sipongi.menlhk.go.id/berita/292-klhk-dan-itto-gelar-bimtek-pengendalian-karhutla-bagi-manggala-agni-sumsel
		18 Mar 22	https://www.mubaonline.com/berita/klhk-bersama-itto-gelar-bimbingan-teknis-pengendalian-kebakaran-hutan-dan-lahan-bagi-manggala-agni-sumatera-selatan-muba8694
		18 Mar 22	https://www.gatra.com/news-538687-sumbangsel-mitigasi-karhutla-manggala-agni-kembali-digembleng-pengendalian-api-dan-evakuasi-satwa.html
30	Training of community economic empowerment, Central Kalimantan (Pulang Pisau)	22 Mar 22	http://ditjenppi.menlhk.go.id/berita-ppi/4204-pemberdayaan-ekonomi-masyarakat-untuk-cegah-karhutla.html
		22 Mar 22	https://sipongi.menlhk.go.id/berita/293-pemberdayaan-ekonomi-masyarakat-untuk-cegah-karhutla
		22 Mar 22	https://nusakalimantan.com/2022/03/23/klhk-dan-itto-tingkatkan-kerja-sama-budidaya-ikan-untuk-pltb/
31	FGD of communities' PLTB support, Central Kalimantan	24 Mar 22	http://ditjenppi.menlhk.go.id/berita-ppi/4218-sinergi-dan-kolaborasi-dalam-mendorong-pengembangan-praktik-pltb-masyarakat.html
		24 Mar 22	https://sipongi.menlhk.go.id/berita/294-sinergi-dan-kolaborasi-dalam-mendorong-pengembangan-praktik-pltb-masyarakat
		25 Mar 22	TVRI Kalteng (Menit 1:21:17) https://www.facebook.com/tvrikalimantantengah/videos/1097946917417637/
		25 Mar 22	https://youtu.be/cXUBH6Epu18
		26 Mar 22	Kalteng Pos (Hal 3)
32	1st Fire Webinar_MoEF (2nd series)	7 Apr 22	http://ditjenppi.menlhk.go.id/berita-ppi/4226-folu-net-sink-2030-dalam-seri-webinar-dalkarhutla.html
		7 Apr 22	https://sipongi.menlhk.go.id/berita/296-folu-net-sink-2030-dalam-seri-webinar-dalkarhutla
33	ITTO Secretariat, monitoring and field visit of project activities	15 Apr 22	http://ditjenppi.menlhk.go.id/berita-ppi/4238-direktorat-pkhl-bersama-itto-lakukan-supervisi-implementasi-kerjasama-di-tiga-provinsi.html
		15 Apr 22	https://sipongi.menlhk.go.id/berita/298-direktorat-pkhl-bersama-itto-lakukan-supervisi-implementasi-kerjasama-di-tiga-provinsi
34	Training of community economic empowerment, (Banyuasin)	19 Apr 22	http://ditjenppi.menlhk.go.id/berita-ppi/4240-mendorong-pemberdayaan-masyarakat-untuk-cegah-karhutla.html
		19 Apr 22	https://sipongi.menlhk.go.id/berita/299-mendorong-pemberdayaan-masyarakat-untuk-cegah-karhutla
		20 Apr 22	Sumatera Ekspres 20 April 2022, Hal 12
35	FGD of communities' PLTB support, South Sumatra	19 Apr 22	http://ditjenppi.menlhk.go.id/berita-ppi/4241-penguatan-dukungan-para-pihak-untuk-pengembangan-praktik-pltb.html
		19 Apr 22	https://sipongi.menlhk.go.id/berita/300-penguatan-dukungan-para-pihak-untuk-pengembangan-praktik-pltb
		19 Apr 22	Sumatera Ekspres 22 April 2022, Hal 12
36	2nd Fire Webinar_MoEF (2nd series)	26 Apr 22	http://ditjenppi.menlhk.go.id/berita-ppi/4256-pltb-solusi-cegah-karhutla.html
		26 Apr 22	https://sipongi.menlhk.go.id/berita/304-pltb-solusi-cegah-karhutla
37	3rd Fire Webinar_MoEF (2nd series)	20 May 22	http://ditjenppi.menlhk.go.id/berita-ppi/4270-pemadam-karhutla-asean-berbagi-pengalaman-di-webinar-pkhl-itto.html
38	Training of community economic empowerment, South Sumatra (OKI)	24 May 22	https://sipongi.menlhk.go.id/berita/311-berdayakan-ekonomi-masyarakat-melalui-pltb-terintegrasi
		24 May 22	http://ditjenppi.menlhk.go.id/berita-ppi/4273-berdayakan-ekonomi-masyarakat-melalui-pltb-terintegrasi.html

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39	Training of Fire Management, South Kalimantan (Tanah Bumbu)	31 May 22	https://sipongi.menlhk.go.id/berita/315-klhk-dan-itto-kuatkan-kapasitas-manggala-agni-di-kalimantan-selatan
		31 May 22	http://ditjenppi.menlhk.go.id/berita-ppi/4278-klhk-dan-itto-kuatkan-kapasitas-manggala-agni-di-kalimantan-selatan.html
		31 May 22	https://www.lugasnusantara.co.id/2022/05/31/kerja-sama-klhk-dan-itto-54-anggota-manggala-agni-di-kalsel-diberi-keterampilan-pengendalian-karhutla/
		31 May 22	https://apahabar.com/2022/05/kuatkan-kapasitas-manggala-agni-di-kalsel-klhk-dan-itto-gelar-bimtek-pengendalian-karhutla/
40	4th Fire Webinar_MoEF (2nd series)	8 Jun 22	http://ditjenppi.menlhk.go.id/berita-ppi/4290-seri-fire-webinar-ke-4-pkhl-itto-tampilkan-teknologi-canggih-pengendalian-karhutla.html
41	Training of fire mechanics, Central Kalimantan	9 Jun 22	http://ditjenppi.menlhk.go.id/berita-ppi/4292-bimtek-mekanik-peralatan-karhutla-manggala-agni.html
		9 Jun 22	https://kalteng.antaranews.com/video/2929717/agar-selalu-prima-manggala-agni-kalteng-dilatih-mekanik-peralatan
42	Training of fire mechanics, South Kalimantan	9 Jun 22	https://koranbanjar.net/bimbingan-teknis-mekanik-peralatan-pengendalian-karhutla-di-mandiangin-barat/
		9 Jun 22	https://www.katajari.com/bimbingan-teknis-mekanik-peralatan-pengendalian-karhutla-bagi-anggota-manggala-agni/
43	Training of fire mechanics, South Sumatra	10 Jun 22	Koran Sumatera express halaman 10
44	Launching SMART Patrol Information System	29 Jun 22	http://ditjenppi.menlhk.go.id/berita-ppi/4305-sipp-karhutla-resmi-diluncurkan.html
		29 Jun 22	https://sipongi.menlhk.go.id/berita/320-sipp-karhutla-resmi-diluncurkan

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