Data Collection Survey on Forest & Peatland Fire Control and Peatland Restoration in Indonesia

Final Report

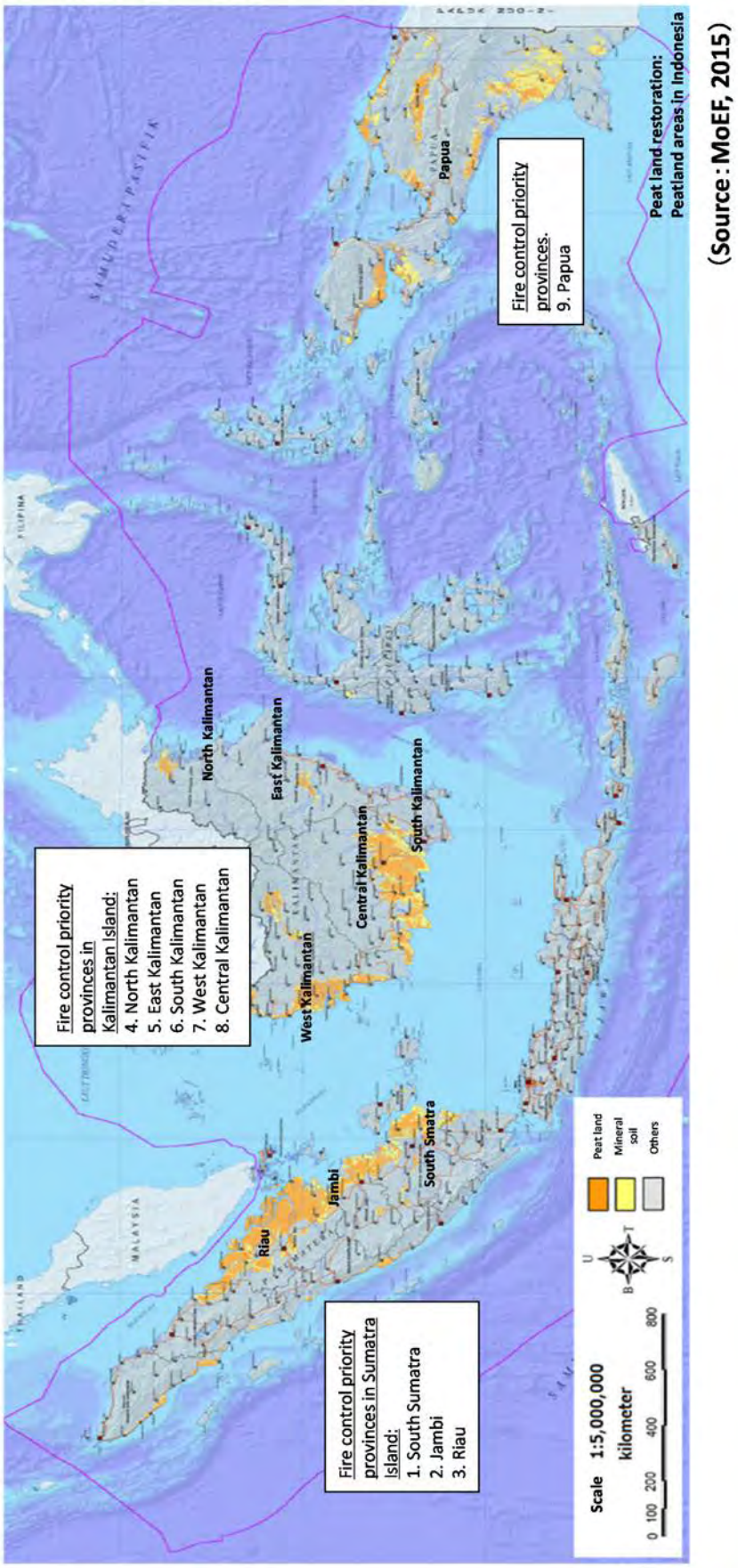
May 2017

Japan International Cooperation Agency (JICA)

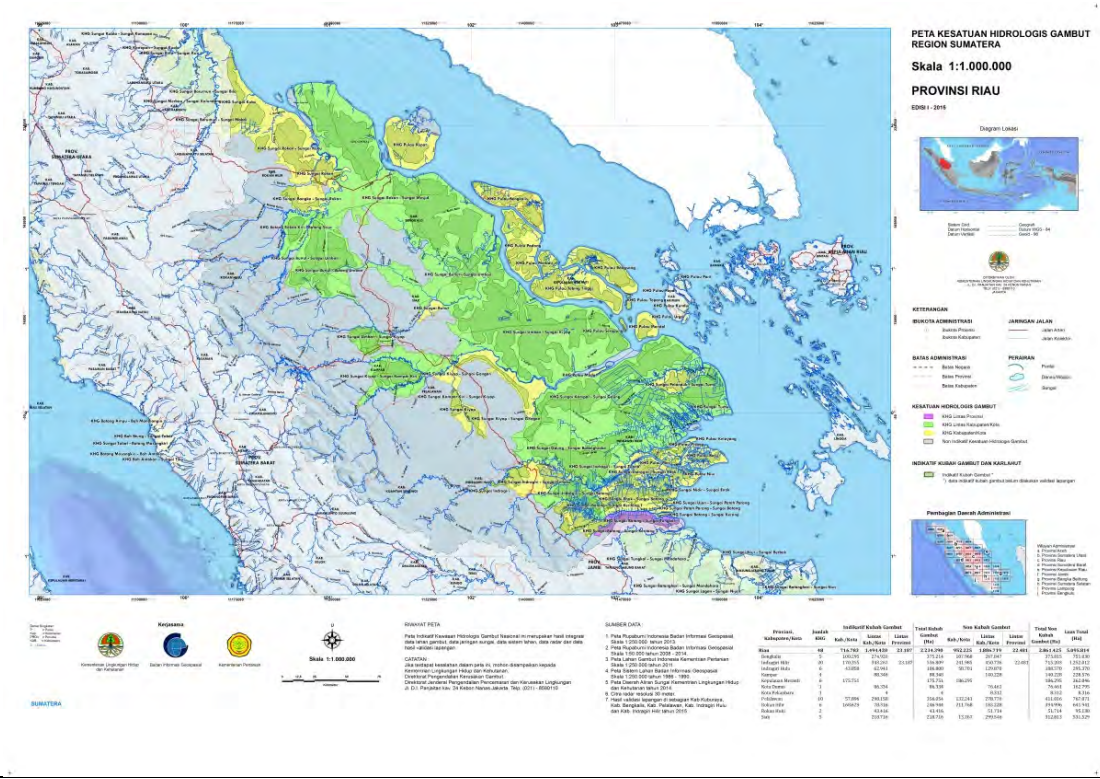
Japan Forest Technology Association
Nippon Koei Co. Ltd.

GE
JR
17-049

Location Map on Survey Site



Location Maps on Peatland Hydrological Unit (KHG) in the Target Provinces by New Technical Cooperation



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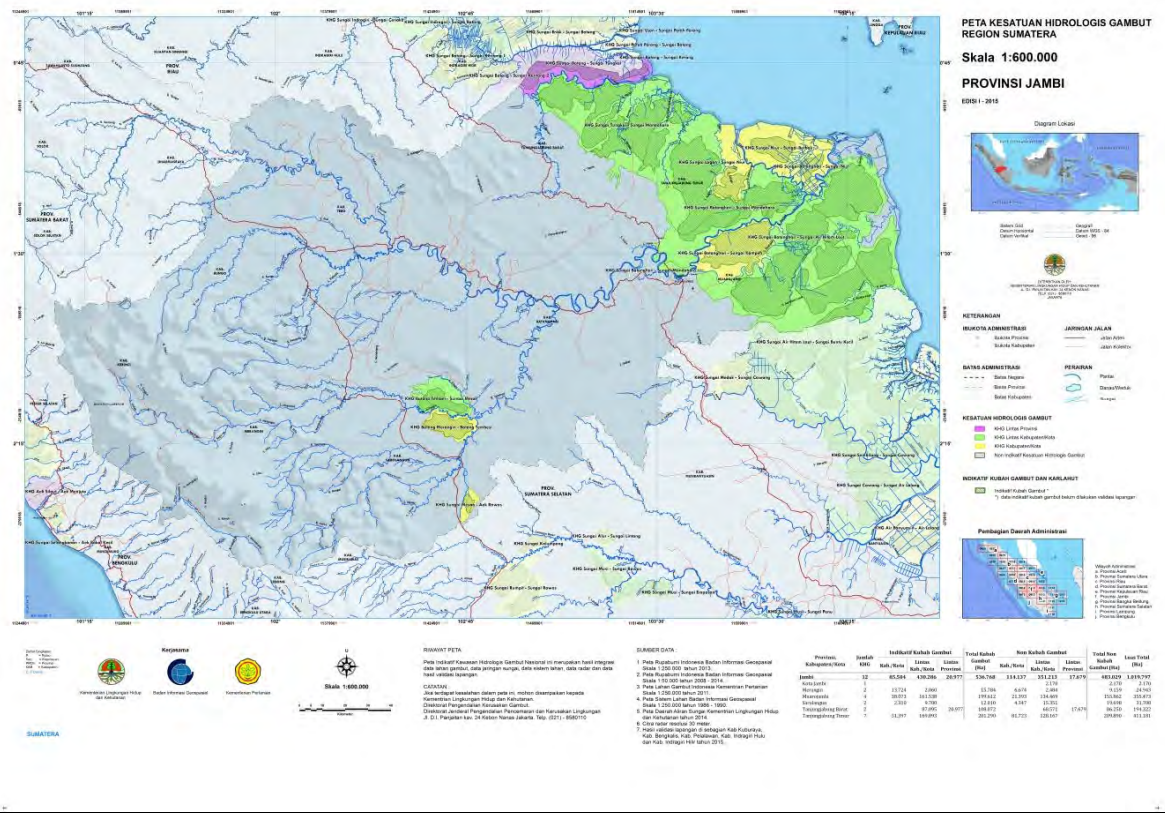

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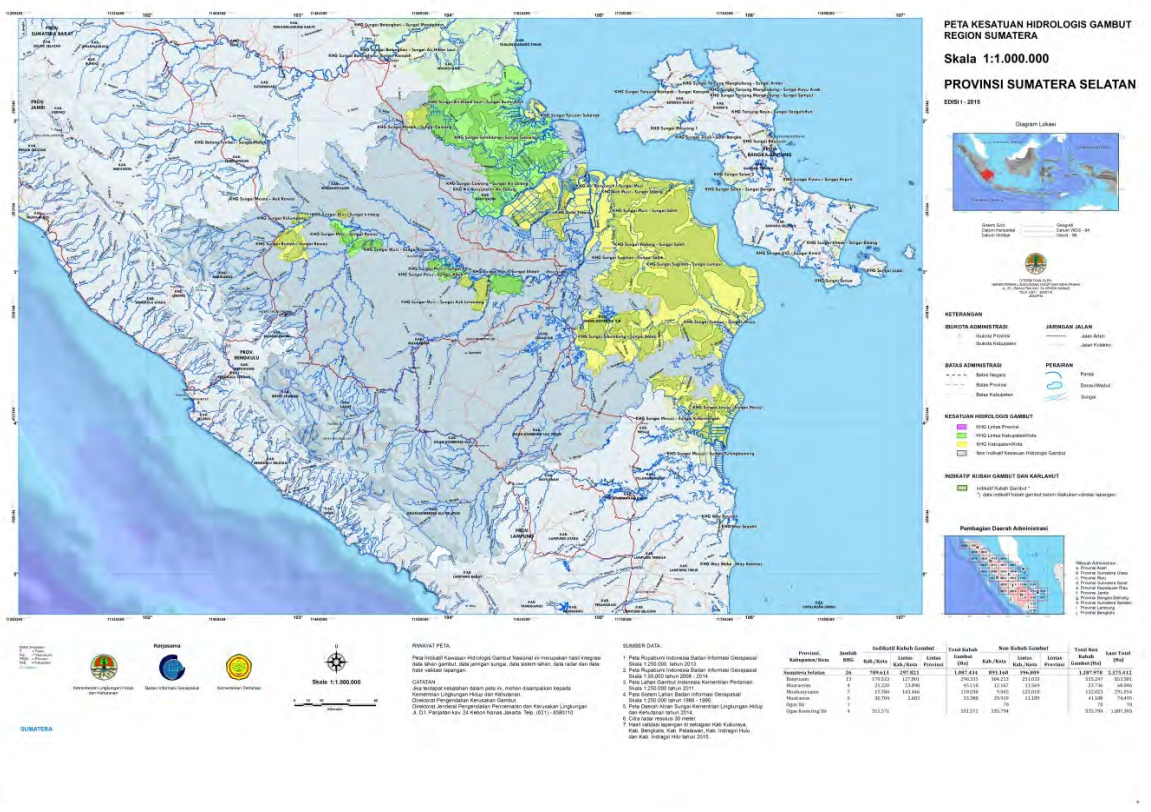

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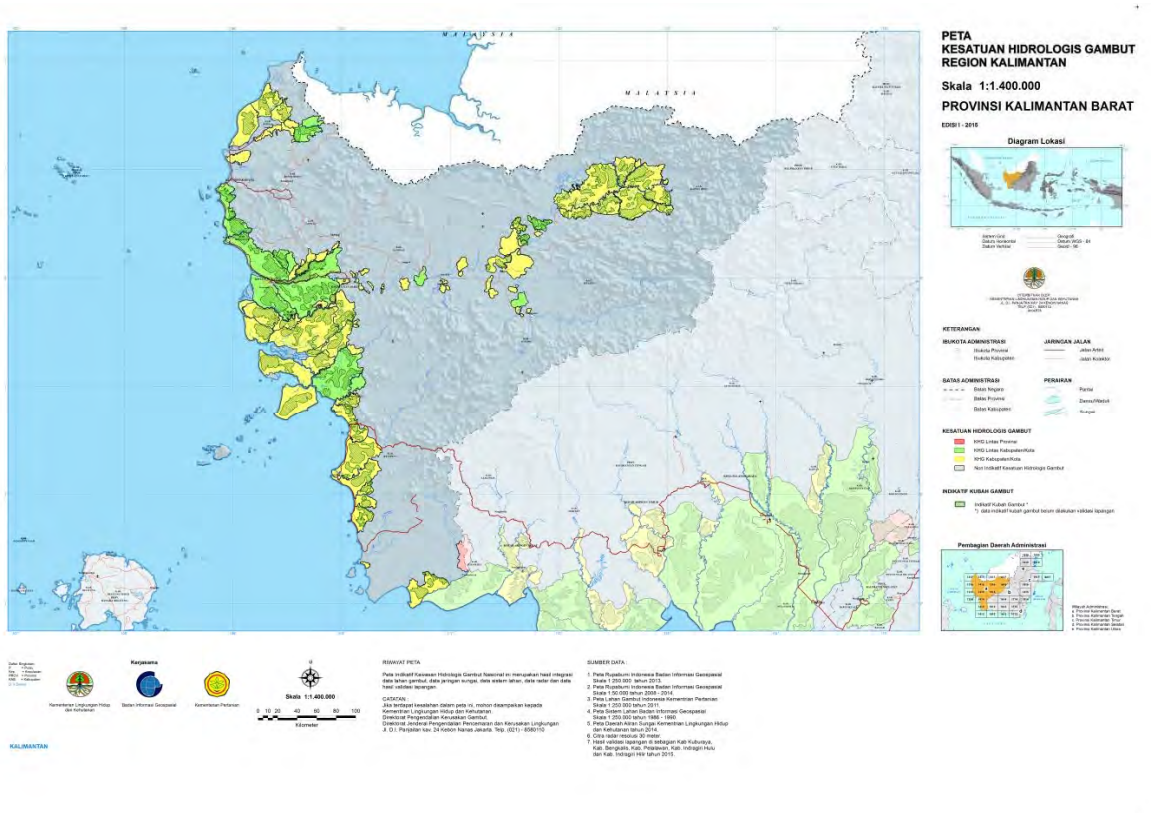
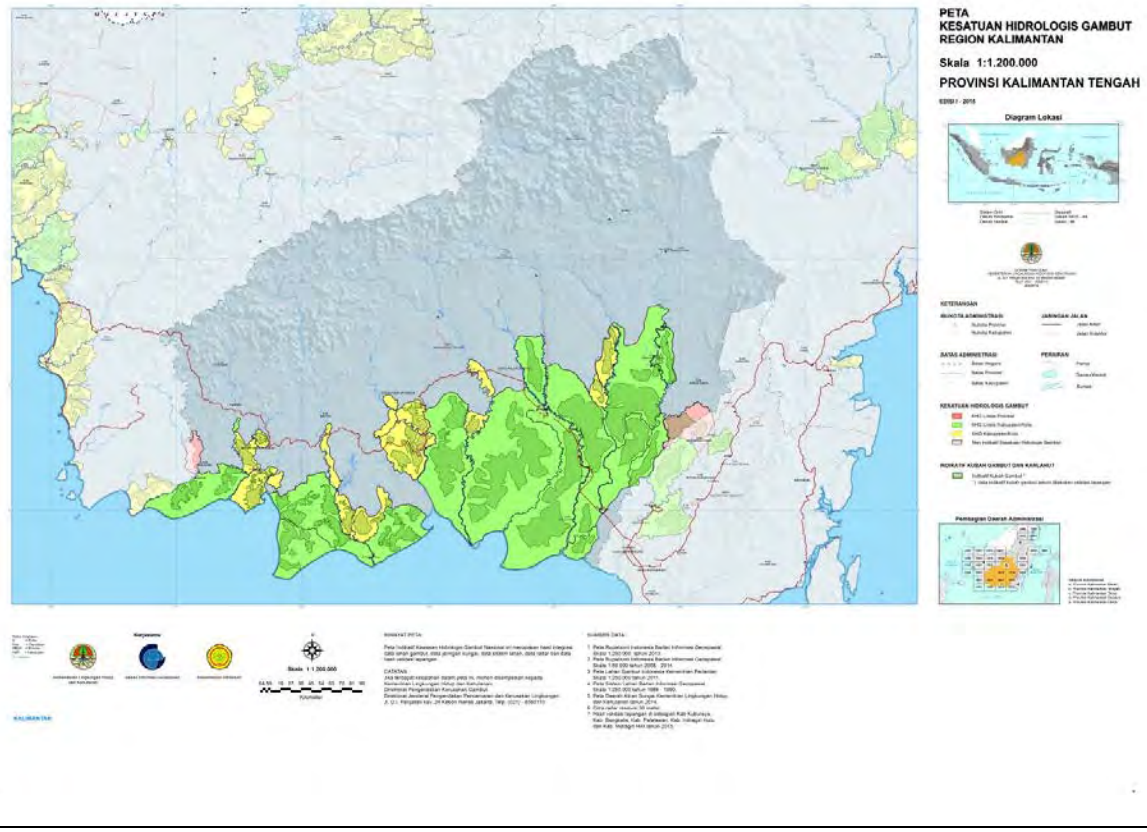
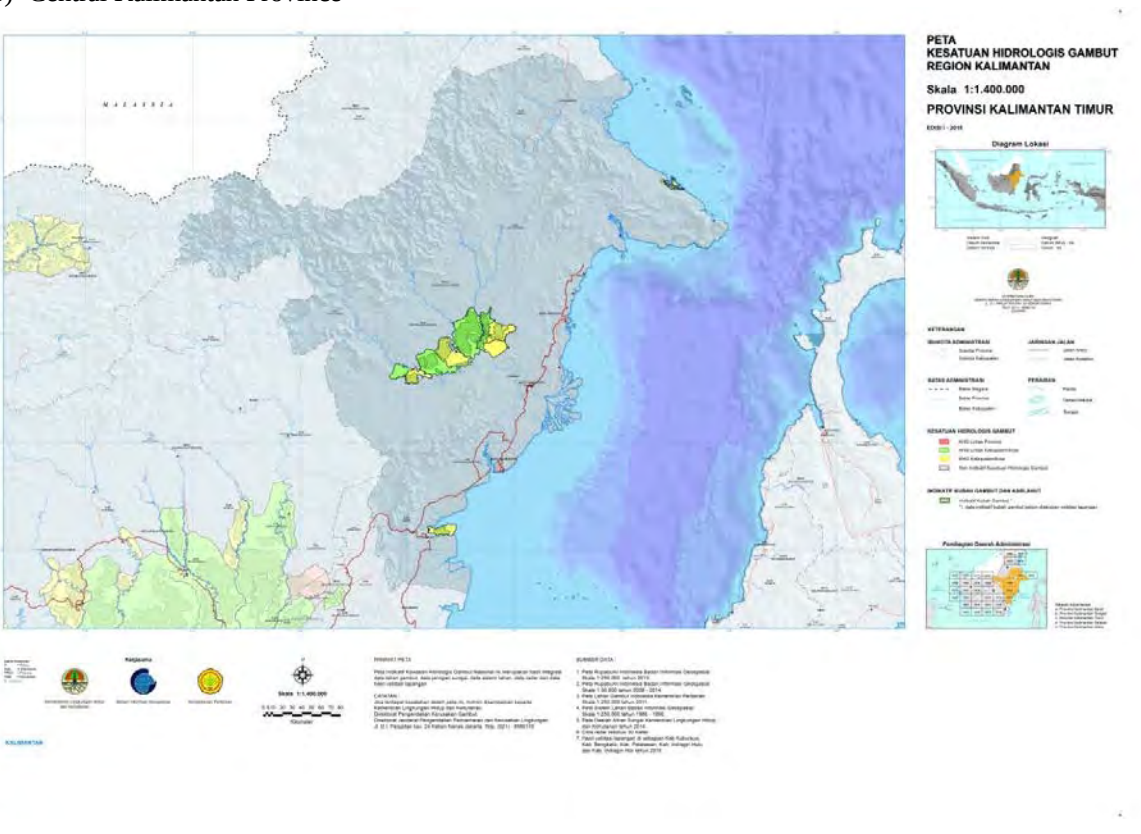


(4) West Kalimantan Province



(5) Central Kalimantan Province



(6) East Kalimantan Province

Abbreviation and Acronym

Abbreviation/ Acronym	Indonesian wording	Abbreviation/ Acronym	English wording (translation)
-		*AATHP*	*ASEAN Agreement on Transboundary Haze Pollution*
AD	Anggaran dasar	-	*Articles of association*
APL	Areal Penggunaan Lain		
ART	Anggaran rumah tangga	-	*By-laws*
-	-	*APFP*	*ASEAN Peatland Forest Project*
APHI	Asosiasi Pengusaha Hutan Indonesia	-	*Association of Indonesian Forest Concessions Holders*
B(B)KSDA	Balai (Besar) Konservasi Sumber Daya Alam	*NRCC*	*Natural Resources Conservation Center*
Bap(p)eda	Badan Perencanaan (Pembangunan) Daerah	-	*Regional (Development) Planning Agency*
Bappenas	Badan Perencanaan Pembangunan Nasional	-	*National Development) Planning Agency*
BBSDLP	Balai Besar Litbang Sumberdaya Lahan Pertanian:	-	*Center for Research and Development on Agricultural Land Resources*
BIG	Badan Informasi Geospasial	-	*Geospatial Information Agency*
BLHD	Badan Lingkungan Hidup Daerah	-	*Regional Environmental Agency*
BMKG	Badan Meteorologi, Klimatologi dan Geofisika		*Meteorological, Climatological and Geophysical Agency*
BNPB	Badan Nasional Penanggulangan Bencana	-	*National Disaster Management Agency*
BPBD	Badan Penanggulangan Bencana Daerah	-	*Regional Disaster Management Agency*
BPN	Badan Pertanahan Nasional:	-	*National land Agency*
BPPT	Badan Pengkajian dan Penerapan Teknologi		*Agency for the Assessment and Application of Technology*
BRG	Badan Restorasi Gambut	*PRA*	*Peat Restoration Agency*
-		*CH*	*Concession Holder*
-	-	*CIMTROP*	*Center for International Cooperation in Sustainable Management of Tropical Peatlands*
-		*DANIDA*	
Daops	Daerah Operasi	-	*Office of Forest Fire Control*
Des	Desa	-	*Village*
Dus	Dusun	-	*Hamlet*
-	-	*ENSO*	*El Nino Southern Oscillation*
-		*FCP*	*Program of Community Development of Fires Control in Peat Land Area (MoF-JICA)*
-		*FFPMP(-1/2)*	*Forest Fire Prevention and Management Project(MoF-JICA) (Phase-1/Phase-2)*
-		*FFPP*	*Forest Fire Prevention Project by Initiative of People in Buffer Zone (MoF-JICA)*
GAPKI	Gabungan Pengusaha Kelapa Sawit Indonesia	-	*Indonesia Oil Palm Business Union*
-		*GHG*	*Green House Gas*
HGU		-	*Palm Oil Plantation Concession*
HPH		-	*Logging concession*
HTI		-	*Industrial Forest Plantation Concession*
-		*JICA*	*Japan International Coooperation Agency*
Kemendagri	Kementerian Dalam Negeri	*MoHA*	*Ministry of Home Affairs*
Kemendes	Kementerian Desa, Pembangunan Daerah Tertinggal dan Transmigrasi	*MoDDRT*	*Ministry of Village, Disadvantage Region and Transmigration*
Kemenkoperekonomian	Kementerian Koordinator Bidang Perekonomian		*Coordinating Ministry of Economic Affairs*
KemenkoPMK	Kementerian Koordinator Bidang Pembagunan Manusia dan Kebudayaan		*Coordinating Ministry of Human Development and Culural Affairs*
Kemenkopolhukam	Kementerian *Koordinator Bidang* Politik, Hukum, dan Keamanan		*Coordinating Ministry of Politic, Legal and Security Affairs*
Kementan	Kementerian Pertanian	*MoA*	*Ministry of Agriculture*
KHG	Kesatuan Hidrologis Gambut	*PHU*	*Peatland Hydrological Unit*
KLHK	Kementerian Lingkungan Hidup dan Kehutanan	*MoEF*	*Ministry of Environment and Forestry*
KLN	Biro Kerjasama Luar Negeri		*International Cooperation Bureau*
KPH P/L/K	Kesatuan Pengelolaan Hutan Produksi/ Lindung/ Konservasi	*Prod./Prot./Conser. FMU*	*Production/ Protection/ Conservation Forest Management Unit*
HGU	Hak Guna Usaha	-	*Business use right*
-	Titik panas	*HS*	*Hotspot*
INPRES	Instruksi Presiden	-	*Presidential Instruction*
IUPHHK-HT/HA	Izin Usaha Pengelolaan Hasil Hutan Kayu Hutan Tanaman/Hutan Alam		*Nature/ Plantation Forest Timber Forest Product Management Business Permit*
Kab.	Kabupaten	*District*	*District, Regency*
Karhutla	Kebakaran Hutan dan Lahan	-	*Forest and (farm) land fires*
Kec.	Kecamatan	-	*Sub-district*
LAPAN	Lembaga Penerbangan dan Antariksa Nasional		*National Institute of Aeronautics and Space*

Abbreviation/ Acronym	Indonesian wording	Abbreviation/ Acronym	English wording (translation)
MA	Manggala Agni	-	*MoF's Forest Fire Brigade*
MPA	Masyarakat Peduli Api	-	*Fire Care Community Group*
Musrenbang	Musyawarah Perencanaan Pembangunan Desa	-	*Development Planning Conference*
-	Tabel Desain Proyek	*PDM*	*Project Design Matrix*
Pemda	Pemerintah Daerah	-	*Local government*
Pemkab/Pemprov.	Pemerintah Kabupaten/Provinsi	-	*District/ Provincial government*
Permen	Peraturan Menteri	-	*Ministerial Decree*
Perdirjen.	Peraturan Dirjen.	-	*Director General's Decree*
Perpres	Peraturan Presiden	-	*Presidential Decree*
PKG	Direktorat Pengendalian Kerusakan Gambut	*PDC*	*Directorate of Peat Damage Control*
PKH(L)	Direktorat Pengendalian Kebakaran Hutan (dan Lahan)	*FLFC*	*Directorate of Forest and Fire Control*
PLTB	Persiapan/Pembukaan/ Pengolahan Lahan Tanpa Bakar	-	*Land Preparation/Clearing/Handling without Burning*
POKJA	Kelompok Kerja	-	*District Working Group*
RO	Rencana Operasional	*PO*	*Plan of Operation*
PP	Peraturan Pemerintah	-	*Government Regulation*
PPI	Direktorat Jenderal Pengendalian Perubahan Iklim	*CCC*	*Directorate General of Climate Change*
Prop./Prov.	Propinsi/ Provinsi	-	*Province*
PU-PR	Kementerian Pekerjaan Umum dan Perumahan Rakyat	*PU-PR*	*Ministry of Public Works and People's Housing*
Pusdarkarhutla	Pusat Pengendalian Kebakaran Hutan dan Lahan	-	*Provincial authorities' institutional arrangements for farm & forest fire control*
RAKORNIS	Rapat Koordinasi Restorasi Gambut	-	*Peat Restoration Coordination Meeting*
Renstra	Rencana Strategis	-	*Strategic Plan*
RPJM	Rencana Pembangunan Jangka Menengah	-	*Mid-term Development Plan*
RoD	Rekaman Diskusi Kerjasama Teknis JICA	*R/D*	*Record of Discussion*
RT	Rukun Tetangga	-	*Neighborhood association*
RW	Rukun Warga	-	*Citizen association*
Satgas	Satuan Kerja	*TF*	*Task force*
SATREPS	-	-	Science and Technology Research Partnership for Sustainable Development
SKPD	Satuan Kerja Pemerintahan Daerah	-	*Local Government's Work Unit*
Sosek	Sosial Ekonomi	-	*Social economy*
Satlakdalkarhutla/ Poskodalkarhutla	Satuan Pelaksana Pengendalian Kebakaran Hutan dan Lahan/ Pos Komando Pengendalian Kebakaran Hutan dan Lahan	-	*District authorities' institutional arrangements for farm & forest fire control*
-	-	*SOP*	*Standard Operating Procedure*
TN	Taman Nasional	*NP*	*National Park*
TPD	Tim Pendamping Desa Pencegahan Karhutla	*VFT*	*Village Facilitation Team for Land and Forest Fire Prevention*
-		*UNDP*	
UNPAR		*UNPAR*	*University of Palangka Raya*
UU	Undang-undang	-	*Law*

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CHAPTER 1 INTRODUCTION

1.1 Background of Survey

The Republic of Indonesia (hereafter referred to "Indonesia") has the third largest country of tropical forest area in the world. Such tropical forest area contributes to maintain the biological diversity as the habitat of wildlife in the world. In recent years, importance of protection and rehabilitation of tropical forests in Indonesia is also paid attention by international community in the perspective of climate change control. However, the pressures of deforestation and forest degradation by forest fires and agriculture development, land use conversion to establish oil palm plantations and illegal logging become high so that counter measuring to deal with the pressure becomes the urgent issues.

Tropical peatlands accumulate the large amount of carbons and around 70% of tropical peatlands in the world exist in the Southeast Asia. The most of the tropical peatland locates extensively in lowland areas in Indonesia. However, as the consequence of establishing large scale of channels and logging in tropical peatland forests at the end the 20th century, carbon emissions from peatland has increased because of fire outbreaks and decomposition by microbe. In addition to the difficulties of extinguishing fire in peatland, the extension of the fire causes further carbon emissions.

JICA has implemented the 3 phases of technical cooperation for forest fire control since 1996. The project outputs include supporting development of system by formulating ministerial and director general's decrees, building early warning system utilizing satellites, developing fire extent control focusing on national parks and fire prevention system. Moreover, the five-years technical cooperation until July 2015 "Program of Community Development of Fires Control in Peatland Area (hereafter referred to as "FCP")" was implemented. The results in the targeted provinces by applying village-based fire prevention activities by village facilitation team (Tim Pendamping Desa/ TPD) composed of fire brigade (Manggala Agni/MA) and community groups in Riau and West Kalimantan Provinces showed the decreased numbers of burning by community residents resulting in the reduction of hotspots.

1.1. Outline of MoEF- JICA Cooperation on Forest Fire Control

Technical cooperation

Title	FFPMP Phase 1	FFPMP Phase 2	FFPP (Phase 3)	FCP (Phase 4)
Period	1996-2001	2001-2006	2006-2009	2010-2015
Target area	State F. (Production F, 1 NP) ● Jambi Prov. ● W. Kalimantan Prov.	State F. (4 NPs) ● Jambi Prov. ● Riau Prov. ● Lampung Prov. ● W. Kalimantan Prov.	State F. (Conservation F. in peat land <outside of NPs>) ● Jambi Prov. ● Riau Prov. ● W. Kalimantan Prov.	State F. & surrounding <Peat land> ● Riau Prov. ● W. Kalimantan Prov.
Approach	Development of Early Detection (HS) System Capacity Development of Initial Fire Fighting Capacity Development of Extension/ Awareness Raising Development of **fuel** prevention method (Green Fire Belt) Development of fire prevention method (Participatory) Development of **fire source** prevention method (Village-based)		Policy and Organizational Strengthening	

Financial cooperation (Grant aid)

Title	The Project for Rehabilitation of the Degraded National Park by Forest Fire	The Project for Improvement of Forest Fire Equipment
Period	2000-2004	2001-2002
Target area	State F. (1 NP) ● Lampung Prov.	State F. (4 NPs) ● Jambi Prov. ● Riau Prov. ● Lampung Prov. ● W. Kalimantan Prov.
Approach	Initial investment for rehabilitation model of ex forest fire forest ● Reforestation ● Construction of fire control infrastructure/ Provision of equipment	Initial investment for fire control in national parks ● Construction of fire control infrastructure/ Provision of equipment

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration. 2016

Figure 1.1.1 Outline of Past MoEF-JICA Cooperation on Forest and Peatland Fire Control

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

Additionally, JICA implemented scientific research cooperation, so called SATREPS, "the Project for Wild Fire and Carbon Management in Peat Forests in Indonesia" for 4 years and 4 months since December 2009 in collaboration with University of Hokkaido. The project outputs include building fire detection system and carbon evaluation model by using data collected through measurement, remote sensing and simulation models according to each output for developing peat forest management methodology.

In 2015, large scale of forest and peatland fires was broken out due to the influence of El Nino. The adverse impacts include large amount of GHG emission equivalent to the emission in Germany in one year and increased respiratory diseases and cancellation of flights due to haze and diffusion to the neighboring countries of haze.

To respond to these circumstances, JICA and Ministry of Environment and Forestry (MoEF) has agreed to add new output (activities to reduce emission throughout forest and land fire control in West Kalimantan Province) to "Indonesia-Japan Project for Development of REDD+ Implementation Mechanism (hereafter referred to as "IJ-REDD+")" that was commenced since June 2013. In 2016, discussing Plan of Operation to collaborative implementation of MoEF's "Integrated Patrol Program" in Ketapang District in West Kalimantan Province. The program utilizes JICA's knowledge on TPD model developed in FCP.

In addition, an application for Japan's Technical Cooperation "Project for Community Movement Program on Forest and Land Fire Prevention" was submitted to the Government of Japan through Bappenas in 2015. It comprehensively covers from the dissemination of outputs of FCP cooperation, building and strengthening systems both central and local government for fire prevention up to policy support.

In January 2016, JICA dispatched a mission on forest and peatland fires in Indonesia. And then since May 2016 the JICA Data Collection Survey on Forest and Peatland Fire Control and Peatland Restoration has conducted data collection and analysis focusing on the fire control prioritized provinces. In Sep. 2016 the Detailed Planning Survey Team dispatched by JICA has basically concluded the basic cooperation framework of the new technical cooperation. The Detailed Planning Survey Team received the request from Peatland Restoration Agency (BRG) established in 2016 to conduct the urgent study of the prioritized 4 districts in 3 provinces. To respond the request, the first phase of study was started by supporting pilots of trial peatland monitoring after the information collection to examine and specify the contents which JICA can cooperate.

1.2 Objectives and Scope of Survey

1.2.1 Objectives of Survey

In order to prepare for a next cooperation and taking into consideration the information collected so far, the content of next cooperation will be proposed by collecting and analyzing data on present conditions, issues and needs relating forest and peatland fire control as well as peatland restoration through conducting holding meetings, seminars, and site visit surveys.

Table 1.2.1.1. Objectives of JICA Survey for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia

No.	Objectives
1	Collect data of fact, issues and needs on Forest and Peatland Fire Control in Indonesia and analyze cooperation potential (focusing on 7 priority provinces, and including examination of exit strategy of the requested technical cooperation)
2.	Collect data of fact, issues and needs on peatland restoration in Indonesia and analyze cooperation potential (nationwide, not limited at the requested technical cooperation)
3.	Propose contents of cooperation in future and to assist JICA in preparation for future cooperation: 1) Next technical cooperation on forest and peatland fire control requested 2) Related strategic mid-term potential cooperation
4.	Assist JICA in realizing the contents of cooperation with BRG relating No. 2 above as follows:

No.	Objectives
	1) Collect the information necessary to examine and define the cooperation contents that will be applicable by JICA in future relating the BRG's request of preliminary feasibility study from BRG (the 1st amendment for extension)。 2) Assist focusing on starting pilot implementation of peatland monitoring and holding the international symposium (15-16 Dec. 2016; field excursion 18-20 Dec. 2016) which are most prioritized by BRG in the study activities based on the BRG's written request (28 Oct. 2016)[1] and the following minutes of meetings on basic survey on peatland restoration in Indonesia (11 Nov. 2016)[2] (the 2nd amendment for extension).

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2017

1.2.2 Scope of Survey

(1) Survey Area

The surveys on forest and peatland fire control focused on the 7 prioritized provinces (Riau, Jambi, South Sumatra, West Kalimantan, Central Kalimantan, South Kalimantan and Papua), while the surveys on peat restoration targets the nationwide without focusing on specific provinces. But the focused area changes according to the following situation.

a) According to the result of Kickoff Meeting held on 31 May 2016, Papua Province was replaced by East Kalimantan Province.

b) Based on the Mintuse of Meeting dated on 11 Nov. 2016, the target areas in realzing contents of coopeartion with BRG are 4 districts in 3 provinces: Kepulauan Meranti District in Riau Province, Ogan Komering Ilir (OKI) and Musi Banyuasin (MUBA) Districts in South Sumatra Province and Pulang Pisau District in Centrtal Kalimantan Province.

(2) Survey Work

The survey work in Indonesia was conducted phased ways as show in the table below.

JICA dispatched a HQ's Mission for Detailed Planning Survey Team of Requested New Technical Cooperation between 14-23 Sep. 2016. As a result, this survey work period is extended by the end of 2017. And then JICA Survey conducts the survey to examine and define the cooperation contents on preliminary feasibility study for the prioritized 4 districts, as well as to start pilot implementation of peatland monitoring in 2 districts in South Sumatra and holding stakeholder coordination meetings including the international symposium according to the BRG's request.

Table 1.2.1.2. Works in Indonesia of Data Collection Survey on Forest & Peatland Fire Control and Peatland Restoration in Indonesia

Steps	Assignment	Main works in Indonesia	Remarks
Preparation	Preparatory works in Japan		
1st Step	From the middle of May till the end of Jun. 2016	a) Prepare Inception Report(Ic/R) b) Collect and analyze trend c) Preliminary site surveys (Riau, Jambi, East Kalimantan Provinces) d) Prepare progress report	Progress reporting/ coordination at the beginning of Jul. at JICA HQ
2nd Step	From the middle of Jul. till the end of Sep. 2016	a) Examine proposed cooperation contents b) Preliminary site surveys (South Sumatra, West Kalimantan, Central Kalimantan and South Kalimantan Provinces) c) Assist and accompany with Detailed	Reporting brief of progress at the middle of Aug. at JICA HQ

[1] BRG Letter No. S.167/BRG-KB/10/2016 Subject: Proposal of Urgent Cooperation Action 2016-2017 between BRG-JICA (28 Oct. 2016

[2] Minutes of Meetings between Peatland Restoration Agency of the Government of Republic of Indonesia and Japan International Cooperation Agency for Basic Information Survey on Peatland Restoration in Indonesia

Steps	Assignment	Main works in Indonesia	Remarks
		Planning Survey Team on the Requested New Technical Cooperation d) Prepare Progress/Report	
3rd Step (1st extention)	From the beginning of Oct. till end of Nov. 2016	a) Survey to define cooperation contents for support for Pre-Feasibility Study need by BRG b) Follow-up for Detailed Planning Survey Team	Progress reporting to the Japanese Stakeholders at the middle of Oct. at JICA Indonesia (Tele-conference)
4th Step (2nd extention)	From the end of Nov. till the end of Dec. 2016	a) Support for preparation for installation and installation of peatland monitoring equipment at pilot implementation of peatland monitoring in 2 districts in South Sumatra b) Support for preparation and holding the international symposium according to the BRG's request. c) Prepare Draft Final Report(Df/R)	Reporting brief of progress at the end of Dec. at JICA HQ
5th Step (2nd extention)	From the mid Jan. till mid Feb. 2017	a) Facilitate to preparation and starting of implementation of peatland monitoring at pilot implementation sites where most prioritized in 2 districts in South Sumatra Province (including holding the 1st ToT Training) b) Facilitate to start stakeholder coordination meetings c) Prepare Final Report (F/R)	Submission of Df/R at JICA HQ around the mid Feb.2017
Closing	Works in Japan		Submission of F/R at JICA HQ around the mid April 2017

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2017

1.3 Framework of Surveys

1.3.1 Counterpart Agencies of Survey

Based on the request of new technical cooperation, International Cooperation Bureau (KLN) in Secretariat General and Directorate of Forest and Land Fire Control (PKHL) in Directorate General of Climate Change Control (PPI) of MoEF are the counterpart agencies in central level. In addition, in the survey related to peatland restoration, the mission was in cooperation too with Directorate of Peat Damage Control (PKG) in Directorate General of Environmental Damage dan Pollution Control (PPKL) of MoEF and Peat Restoration Agency (BRG). In local level, the mission got assistance from Climate Change and Forest and Land Fire Control Office (Balai PPI) and Nature Resources Conservation Office (BKSDA) in Directorate General of Ecosystem and Nature Resources Conservation (KSDAE), which is still manage MoEF's Fire Brigade "Manggala Agni (MA)" temporary in this year.

Meanwhile assisting BRG was conducted in cooperation with the Provincial Peatland Restoration Team (TRGD) in addition to BRG.

Those agencies cooperate to activities in central and local level by coordinating with the relevant authorities and facilitating the survey sites and survey mission.

1.3.2 Composition of JICA Survey Mission

The survey team is composed of a total of 3 international experts as show below.

Table 1.3.2.1 Outline of JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia

Responsibility	Name	Affiliation	Assignment in Indonesia
Team Leader/ Forest & Peatland Fire Control	KUNO Hiromitsu	Japan Forest Technology Association (JAFTA)	a) 17 May-1 Jul. 2016 b) 13 Jul.-21 Aug. 2016 c) 26 Aug.-26 Sep. 2016 d) 11-31 Oct 2016 (1st extention) e) 27 Nov.- 24 Dec. 2016 (2nd extention) f) 18 Jan-12 Feb. 2017 (2nd extention)
Peatland Restoration	SAKURAI Akihito	Nippon Koei Co. Ltd.	a) 23 May-30 Jun. 2016 b) 14 Jul. -22 Jul. 2016 c) 2 -30 Aug. 2016 d) 30 Nov.-10 Dec. 2016 (2nd extention)
Utilization of satellite data/ Coordinator	HASHIGUCHI Hozumi	Japan Forest Technology Association (JAFTA)	a) 19 May-11 Jun. 2016 b) 6-22 Aug. 2016

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2017

Furthermore, a total of 2 Indonesian experts to assist the field of peatland restoration and satellite data utilization are employed for smooth data collection and analysis.

And to develop application of JICA cooperation assets, two local consultancy firm are also employed for the survey, especially data collection on monitoring post FCP was entrusted to University of Tanjunpura (UNTAN) located in West Kalimantan Province, and drafting concept of fire prevention movement in the field was entrusted to University of Indonesia (UI) who has experiences to support risk reduction by BNPB.

University of Sriwijaya (UNSRI) are employed in assisting for facilitation of preparation and starting of implementation of peatland monitoring at pilot implementation sites where most prioritized in 2 districts in South Sumatra Province because UNSRI not only belong to the Expert Group of BRG but also the Expert Group of TRGD and also to the Expert Group for PKG in piloting peatland monitoring in private sector's managed lands.

1.3.3 Survey Activities

(1) Data collection and analysis

Data collection and analysis were conducted by interviews and brainstorming at the ministries and agencies relating with fire control and peatland restoration such as MoEF, concerned provincial and district government authorities with fire control and peatland restoration focusing on 7 prioritized fire prone provinces as well as private sectors and international cooperation donors.

(2) Holding meeting and seminars

In addition to activities shown in (1) above, the following activities as meetings and seminars were conducted by focusing on facilitating brainstorming of stakeholders in order to enhance the stakeholders' ownership of the new cooperation contents.

A seminar on forest and peatland fire control in Indonesia was postponed from the targeted May 2016 because PKHL and JICA sides were not able to build consensus on program design that is PKHL assumed a conservative attitude to the JICA proposal to hold a seminar at Jakarta and involving a speaker from a Japanese private sector too. While PKHL proposed a program to hold seminar focusing on speakers form community and also to announce the singing R/D of the new cooperation even holding at Jakarta. As the result the seminar discussed was canceled due to starting the R/D negotiation itself was postponed to Jan. 2017.

In addition, holding the international symposium organized by BRG and MoEF held on 15-16

Dec. 2016 was assisted by coordinating and collaborating with the secretariat established by BRG-UNDP in examining program and speakers as well as logistic matters for holding seminar.

Table 1.3.3.1. Outline of Meetings and Seminars in Data Collection Survey on Forest and Peatland Fire Control in Indonesia (except to support JICA HQ's Mission for Detailed Planning Survey Team)

Data(Place)	Held by	Meeting & seminars	Remarks
25 May 2016 (Meeting room in PKHL)	PKHL	Preliminary kickoff Meeting internal PKHL	
31 May 2016 (Meeting room in KLN)	KLN	Overall kick-off Meeting (Reporting & discussing Draft Inception Report)	Participated by JICA HQ's Mission
21 Jun. 2016 (Meeting room in BKSDA Jambi)	BKSDA Jambi	Limited stakeholder meeting in Jambi provincial level	Participated by PKHL
21 Jul. 2016 (Meeting room in BKSDA Sumsel)	BKSDA Sumsel	Limited stakeholder meeting in South Sumatra provincial level	Participated by PKHL
30-31 Jul. 2016 (Former FCP targeted villages in Bengkayang District)	BKSDA Kalbar	Joint review on community-based fire prevention based on FCP Outputs in West Kalimantan with the representatives of 7 candidate targeted provinces	a) Moderator by UNTAN-UI b) Resources by BKSDA & TPD c) Participated by PKHL
2 Aug. 2016 (Meeting room in DAOPS Palangkaraya)	BKSDA Kalteng	Limited stakeholder meeting in Central Kalimantan provincial level	Participated by Setditjen. PPI, PKG
3 Aug. 2016 (Former SATREP target site, UNPAR)	UNPAR	Joint review on SATREPS outputs with PKG	Resources by UNPAR
5 Aug. 2016 (Meeting room in BKSDA Kelsel)	BKSDA Kalsel	Limited stakeholder meeting in South Kalimantan provincial level	Participated by Setditjen. PPI, PKG
11 Aug.2016 (Meeting room in PKHL)	PKHL	Preliminary discussion on draft PDM	Inside PKHL
16 Aug. 2016 (Meeting room in PKHL)	KLN	Preliminary discussion on draft PDM	Participated by Setditjen. PPI
19 Aug. 2016 (Meeting room in PKHL)	KLN	Preliminary discussion on draft PDM and draft R/D	Participated by Setditjen. PPI, PKG
17 Oct. 2016 (Meeting room in PKHL)	PKHL-JICA Indonesia Office	Confirmation for finalizing the draft minutes of meetings and attachments for facilitating signing of the Minutes of Meeting by the Detailed Planning Survey Team	Participated by Setditjen. PPI & PPKL
15-16 Dec. 2016 (Hotel Borobudur)	BRG-KLHK	International Symposium "Towards National Scale Integrated Peatland Restoration Action"	In cooperation with UNDP etc.
3 Feb. 2017	BRG	1st FGD for Detailed Planning for Harmonized National Peatland Hydrological Monitoring	
7 Feb. 2017	BRG	1st Stakeholder Meeting for Investment Engagement in Peatland Restoration	
9-10 Feb. 2017	BRG-TRGD of South Sumatra Province	1st ToT Training for Provincial Peatland Hydrological Monitoring in South Sumatra	

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2017

Figure 1.3.3.1 Overview of Works for Data Collection and Confirmation

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

1.3.4 Structure of Report

As the table below, the report comprise 5 chapters of body and annex part. Relating Chapters 3 and 4, drastic trend change on government regulations and standars as well as cooperation and collaboration in peatland restoration will be examined in detail in the follwoing survey (phase 2) after enough collection and reconfrimation of information.

Table 1.3.4.1. Structure of Final Report on Data Collection Survey on Forest & Peatland Fire Control and Peatland Restoration in Indonesia

Chapter	Major contents	Remarks
Chapter 1	Introduction and background	
Chapter 2	Fact, issues and needs and cooperation potential related to forest and peatland fire control	Including area for utilization of satellite date
Chapter 3	Fact, issues and needs and cooperation potential related to peatland restoration	The most recent information will be exanmed in a report of the following surveys.
Chapter 4	Trend and collaboration potential related to cooperation and collaboration in forest and peatland fire control, and peatland restoration	Ditto
Chapter 5	Proposed contents of future cooperation	Including draft PDM and R/D for the requested technical cooperation for forest and peatland fire control
Chapter 6	Support in urgent study activities and implementation of the 1st phae implementation of the study for peataland restoration in the prioritized 4 districts in 3 provinces	1st & 2nd extension
Annex	a) Outline of Meetings (Kickoff Meeting and Meetings by Detailed Planning Survey Team etc.) b) New Ministerial Decree on Fire Control (English Translation) c) Draft PDM, PO	

Chapter	Major contents	Remarks
	d) Organization charts of the relevant authorities e) Breakdown of Potential Targeted Area for Peatland Restoration f) Case Study on Telemetry for Peatland Restoration g) Outline of FDRS h) List of Collected References i) List of Interviewees	
Separate Information (only English & Indonesian)	Proceeding of BRG International Symposium	Please refer to Secretariat web site (http://peatlandsymposium2016.info/)

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2017

This survey was conducted by consultant-based mission so this report does not express any views and way of thinking of JICA and JICA Experts as well MoEF and BRG.

CHAPTER 2 FOREST AND PEATLAND FIRE CONTROL

2.1 Policy, Regulation, and Organization Structure in relation to Forest and Peatland Fire Control

2.1.1 Historical Regulatory Framework of Forest and Land Fire Control

In Indonesia, as if to respond to AATHP[3] situation, legal regulations on the zero burning were developed, Manggala Agni and the fire stations were established by the Ministry of Forestry and the Ministry of Home Affairs, respectively, and regional disaster management agency and disaster response mechanism were created mainly by the National Disaster Management Agency (see Table below). Accoridng to PKHL's needs, "Governmental Regulation on Control of Pollution and Devastation of Living Environment Derived from Land/Forest Fire (No.1/2001)" and "Governmental Regulation on Forest Protection (No.45/2004)" should be revised[4].

Table 2.1.1.1 Outline of Historical Regulatory Framework Concerned with Forest and Peatland Fire Control (by 2014)

Year	Regulation	Points/Characteristics	Remarks
1999	Law on Local Administration (22/1999)	To start local autonomy	
	Law on Forestry[5]	To prohibit land burning in forests (Article 50)	
2001	Governmental Regulation on Control of Pollution and Devastation of Living Environment Derived from Land/Forest Fires(PP1/2001)[6]	● To clarify Law No. 23, 1997 ● To prohibit burning forests/farms (Article 11)	
2002	Decision of Director General of Forest Protection and Nature Conservation on Standard to Organize Forest Fire Brigade in Indonesia[7]	-	Manggala Agni was established.
2004	Governmental Regulation on Forest Protection(PP45/2004)[8]	To clarify Law on Forestry	
	Law on Estate[9]	To prohibit burning at establishing estate (Article 26 & 48)	
	Law on Local Administration (32/2004)	To revise the Law on Local Administration	
2005	Governmental Regulation on Village(72/2004)	Obligation and right of village etc.	
2007	Law on Disaster Management[10]	-	
	Ministerial Decree of Agriculture on Standard of Permission of Estate Business[11]	-	
	Governmental Regulation on Assignment of Duty among Central, Provincial. District/ City Government[12]	To clarify obligated duty of local government	

[3] ASEAN AGREEMENT ON TRANSBOUNDARY HAZE POLLUTION (10 June 2002)
[4] Information from the participants in PDM Drafting Meeting on 16 Aug. 2016.
[5] Undang-undang Republik Indonesia Nomor 41 Tahun 1999 tentang Kehutanan (30 September 1999)
[6] Peraturan Pemerintah No. 4 Tahun 2001 tentang Pengendalian Kerusakan dan atau Pencemaran Lingkungan Hidup yang berkaitan dengan Hutan dan atau Lahan (6 February 2001)
[7] Keputusan Direktur Jenderal Perlindungan Hutan dan Konservasi Alam Nomor 21/Kpts/DJ-IV/20022 tentang Pedoman Pembentukan Brigade Pengendalian Kebakaran Hutan di Indonesia
[8] Peraturan Pemerintah Nomor 45 Tahun 2004 tentang Perlindungan Hutan (10 October 2004)
[9] Undang-undang Republik Indonesia Nomor 18 Tahun 2004 tentang Perkebunan (12 July 2004)
[10] Undang-Undang Republik Indonesia Nomor 24 Tahun 2007 tentang Penanggulangan Bencana (26 April 2007)
[11] Peraturan Menteri Pertanian Nomor: 26/Permentan/OT.140/2/2007 tentang Pedoman Perizinan Usaha Perkebunan (28 February 2007)
[12] Peraturan Pemerintah No. 38 Tahun 2007 tentang Pembagian Urusan Pemerintah Antara Pemerintah, Pemerintah

Year	Regulation	Points/Characteristics	Remarks
2008	Governmental Regulation on Implementation of Disaster Response[13]	-	
	Law on Local Administration (12/2008)	To revise the Law on Local Administration	
2009	Ministerial Decree of Forestry on Standard of Forest Fire Control[14]	To Clarify Governmental Regulation on Forest Protection	
	Law on Management and Protection of Living Environment (Revision of Law No. 23, 1997[15])	To prohibit land clearance by burning (Article 69)	
2010	Ministerial Decree of Environment on Mechanism for Pollution Protection/ Environment Devastation Derived from Forest/ Land Fire[16]	To give permission system to land burning by traditional community who follow customary laws (Article 4)	
2011	Presidential Instruction on Forest and Land Fire Control Enhancement[17]	To share role and collaborate among ministries/agencies at central level and among central and local level	
2012	Circular of Minister of Home Affairs on Acceleration of Implementation of Presidential Instruction No. 16, 2011 on Enhancement of Fire Control[18]	● Coordinator in provincial level: Provincial BPBD ● Coordinator in district level: Fire Department	
	Ministerial Decree of Home Affairs on Revision of Ministerial Decree No. 62, 2008 on Standard on Minimum Administration Service of Home Affairs in District/City[19]	Standard on fire affairs system that should be arranged at lease by district government	
	Decree of Head of National Disaster Management Agency on Standard on Disaster Response Operation Center[20]	Organizational development of core of disaster control	
2014	Decree of Director General of Forest Protection and Nature Conservation on Organization and Jurisdictional Area of Manggala Agni(Revision of Decision of Director General of Forest Protection and Nature Conservation, 2002)[21]	Organizational development of Manggala Agni	
	Ministerial Decree on Brigade and Standard of Estate/ Land Fire Control and Prevention[22]	Standard on brigade arrangement in estate	

Daerah Provinsi, dan Pemerintah Daerah Kabupaten/Kota (9 Juli 2007)

[13] Peraturan Pemerintah No. 21 Tahun 2008 tentang Penyelenggaraan Penanggulangan Bencana (28 Februari 2008)

[14] Peraturan Menteri Kehutanan Nomor:p. 12/ Menhut-II/2009 tentang Pedoman Pengendalian Kebakaran Hutan (23 Pebruari 2009)

[15] Undang-undang No.32 Tahun 2009 tentang Perlindungan dan Pengelolaan Lingkungan Hidup (3 Oktober 2009)

[16] Peraturan Menteri Negara Lingkungan Hidup Nomor 10 tahun 2010 tentang Mekanisme Pencegahan Pencemaran Dan Atau Kerusakan Lingkungan Hidup Yang Berkaitan Dengan Kebakaran Hutan Dan/Atau Lahan

[17] Instruksi Presiden Republik Indonesia Nomor 16 Tahun 2011 tentang Pengingkatan Pengendalian Kebakaran Hutan dan Lahan (30 November 2011)

[18] Surat Edaran Nomor 364/2493/SJ tentang Percepatan Implementasi Inpres Nomor 16 Tahun 2011 Tentang Peningkatan Pengendalian Kebakaran Hutan Dan Lahan (2 Juli 2012)

[19] Peraturan Menteri Dalam Negeri Republik Indonesia Nomor 69 Tahun 2012 tentang Perubahan atas Peraturan Menteri Dalam Negeri Nomor 62 Tahun 2008 tentang Standar Pelayanan Minimal Bidang Pemerintahan Dalam Negeri di Kabupaten/Kota (23 Oktober 2012)

[20] Peraturan Kepala BNPB Nomor 15 Tahun 2012 tentang Pedoman Pusat Pengendalian Operasi Penanggulangan Bencana (Pusdalops PB)

[21] Peraturan Direktur Jenderal Perlindungan Hutan dan Konservasi Alam Nomor p.3/IV-Set/2014 tentang Organisasi Manggala Agni dan Wilayah Kerja Daerah Operasi Pengendalian Kebakaran Hutan (19 Mei 2014)

[22] Peraturan Menteri Pertanian Nomor 47 tahun 2014 tentang Brigade dan Pedoman Pelaksanaan Pencegahan Serta

Year	Regulation	Points/Characteristics	Remarks
2014	Governmental Regulation on Protection and Management of Peatlands[23]	● To prohibit land burning in peatland ● To make obligation of water management	
	(Draft) Joint Ministerial Regulation of Home Affairs, Forestry, Agriculture, National Disaster Management Agency on National Standard of Operation of Land and Forest Fire Prevention[24] (Unissued)	To mobilize community in fire response	● Not issued because of lacking signature of Minister of Home Affairs
	Law on Estate[25]	● To prohibit land burning in soil processing in addition to establishment of estate (Article 56) ● To obligate arrangement of equipment, material, system of fire control (Article 56); To cancel estate business permission if not satisfied (Article 67)	
	Law on Local Administration (23/2014)	To revise the Law on Local Administration	
	Law on Village (6/2014)	To enlarge village autonomy	
	Governmental Regulation on Execution of Law on Village (43/2014)	To clarify Law on Village	

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

2.1.2 Recent Policy and Regulation

Both regulation as well as development and political direction immortalize fire prevention.

(1) Regulation

The changes in the end of 2015 after large scale fire outbreaks till December 2016 are shown in table below.

Table 2.1.2.1 Outline of Recent Change of Regulation Concerned with Forest and Peatland Fire Control (as of Dec. 2016)

Year	Regulations	Points/Characteristics	Remarks
2015	Decree of Director General of Forest Protection and Nature Conservation on Standard of Village Facilitation of Village-based Forest and Land Fire Prevention [26]	Standard on TPD method	
	Decree of Director General of Forest Protection and Nature Conservation on Standard of MA Patrol in Collaboration with	Standard on MA patrol method in collaboration with community	

Pengendalian Kebakaran Lahan Dan Kebun

[23] Peaturan Pemerintah Republik Indonesia Nomor 71 Tahun 2014 tentang Perlindungan dan Pengelolaan Ekosistem Gambut (12 September 2014)

[24] Draft Peraturan Bersama Menteri Dalam Negeri, Menteri Kehutanan, Menteri Pertanian, Menteri Lingkungan Hidup dan Kepala Badan Nasional Penanggulangan Bencana, tentang Pedoman Prosedur Operasi Standar Nasional Pencegahan Kebakaran Hutan dan Lahan

[25] Undang-undang Republik Indonesia Nomor 39 Tahun 2014 tentang Perkebunan (17 Oktober 2014)

[26] Peraturan Direktur Jenderal Perlindungan Hutan dan Konservasi Alam Nomor P.3/IV-Set/ 2015 tentang Pedoman Pendampingan Desa dalam Pencegahan Kebakaran Hutan dan Lahan Berbasis Desa (23 April 2015)

Year	Regulations	Points/Characteristics	Remarks
	Village Community in Forest and Land Fire Prevention [27]		
2015	Presidential Instruction on Forest and Land Fire Control Enhancement[28]	To revise Presidential Instruction on Forest and Land Fire Control Enhancement of 2011 ● First coordinator: Coordinating Ministry on Political, Legal and Security Affairs ● Coordinator in fire control implementation: MoEF ● BNPB: Normal phase focuses on reducing disaster risk and preparedness to disaster reaction; Disaster emergency phase focus on commanding inputs and supporting firefighting operation ● Army: To mobilize army forces to support fight fighting and disaster reaction duty by local government ● Police: To enhance preventive measures in law enforcement	
2016	Ministerial Decree of Environment and Forestry on Standard of Forest and Land Fire Control[29]	To revise Ministerial Decree of Forestry on Standard of Forest Fire Control of 2009 ● To add the definition of TPD ● To standardize infrastructure/ equipment and activities (Prevention, Fire Fighting, Post-incident) ● To obligate land right holder as concession to empowerment of community group as MPA ● With audit system to land right holders with rewarding and sanctions ● Diverse fire prevention including village activities as land management as agroforestry, Social movement approach as (national)fire prevention movement、Facilitation to MPA, Establishing village regulation, Activating farmers groups	
	Government Regulation on Revision of the Government Regulation on Protection and Management of Peatland[30]	Revision of the Government Regulation on Protection and Management in 2014 (Supplement and strengthening of some provisions) ● Designation of Protection Zone more than 30% of KHG ● Prohibition of building drainage in Protection Zone ● Maintaining 0.4m water table from the benchmark in Cultivation Zone ● Prohibition of not only burning but also leaving burning alone in peatland ● Peatland user should restore within 30 days since degradation from fires.	

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Des. 2016)

The ministerial decree obligate for the land users to strengthen empowerment of community

[27] Peraturan Direktur Jenderal Perlindungan Hutan dan Konservasi Alam Nomor P.4/IV-Set/ 2015 tentang Pedoman Patroli Manggala Agni Bersama Masyarakat dalam Pencegahan Kebakaran Hutan dan Lahan (23 April 2015)

[28] Instruksi Presiden Republik Indonesia Nomor11 Tahun 2015 tentang Peningkatan Pengendalian Kebakaran Hutan dan Lahan (24 Oktober 2015)

[29] Peraturan Menteri Lingkugan Hidup dan Kehutanan Nomor P.32/MenLHK/Setjen/Kum.1/3/2016 tentang Pengendalian Kebakaran Hutan dan Lahan

[30] Peaturan Pemerintah Republik Indonesia Nomor 57 Tahun 2016 tentang Perubahan atas Peraturan Pemerintah Nomor 71 Tahun 2014 terntang Perlindungan dan Pengelolaan Ekosistem Gambut (2 Desember 2016)

groups because fire outbreaks increas at the remote area as buffer zones where private sectors are difficult to secure management. In the decree, fire prevention acitvity diveres in the perspective of community-based fire prevention, including land management as agroforesty, forumulation of village regulation and activating farmers' group which the experiences and lessons learned of JICA ccoperation concludes the important. The decree cover also village level scheme as MDK and Proklime .

(2) Development Plan

Fire control is one of important issues in the national development since 2015.

Table 2.1.2.2. Outline of Recent Change of Development Plan Concerned with Forest and Peatland Fire Control (as of Dec. 2016)

Year	Regulations	Points/Characteristics	Remarks
2015	National Midterm Development Plan (RPJMN) 2015-2019[31]	● This RPJMN has 9 national development agenda, in which is to enhance human living quality in Indonesia. ● One of national strategies to achieve the agenda is to realize economic independence with promote domestic strategic economic sectors. One of approaches to realize the strategy is protecting nature resources and environment as well as disaster management.	
	Midterm Strategic Plan of MoEF (Renstra KLHK) 2015-2019 [32]	● This Renstra KLHK 2015-2019 has a purpose to assure environment conditions to human living and resources. ● One of indicators of programs to support the purpose is to achieve restoration of peatland (PKG) and decrease of numbers of hotspots and burned area (PKHL) ● One of strategies is to enhance impact from Forest Management and Conservation as well as Biodiversity Conservation ● "Forest and Land Fire Control" in "Climate Change Control" in the strategy have indicators □ Percentage of decrease of numbers of hotspots in non-conservation forests and land in Sumatra, Kalimantan and Sulawesi Islands is 10% and maximum numbers of hotspot decreases to 19,631 spots at 2019. □ Percentage of decrease of burned area in non-conservation forests and land in Sumatra, Kalimantan and Sulawesi Islands is 10% and maximum numbers of hotspot decreases to 448,863 ha at 2019.	
2016	Government Work Plan in 2017[33]	● Human Development by Health, one of National Development Priorities. ● One of the prioritized program is strengthening promotion and prevention "National Movement for Health", which can be contributed by "Healthy Environment" ● To support the program, Land and Forest Fire Control becomes one of prioritized sector development in Nature Resource and Environment Sector. ● One of objectives of the program is decrease of burned area in Forest Management Unit (KPH).	
	Grand Design on Forest/ Farm/ Land Fire Prevention 2017-2019[34]	● Coordinating Ministry of Economic Affair' role of coordinator of fire prevention ● Integrating peatland restoration of 2.4 million ha by BRG and village intervention to 731 fire prone villages by KLHK ● 5 strategies (*important role by KLHK, ** important role by	Draft version of Nov.

[31] Peraturan Presiden Republik Indonesia Nomor 2 Tahun 2015 tentang Rencana Pembangunan Jangka Menengah Nasional Tahun 2015-2019 (8 Januari 2015)

[32] Peratruan Menteri Lingkugnan Hidup dan Kehutanan Republik Indonesia Nomor: P. 39/ Menlhk-Setjen/2015 tentang Rencana Strategis Kementeri Lingkungan Hidup dan Kehutanan Tahun 2015-2019 (7 Juli 2015)

[33] Peraturan Presiden Republik Indonesia Nomor 45 Tahun 2016 tentang Rencana Kerja Pemerintah Tahun 2017 (14 Mei 2016)

[34] Kementerian Koordinator Bidang Perekonomian, Kementerian Perencanaan Pembangunan Nasional/BAPPENAS, Kementerian Lingkungan Hidup dan Kehutanan (KLHK). Grand Design Pencegahan kebakaran hutan, kebun dan lahan 2017 - 2019

Year	Regulations	Points/Characteristics	Remarks
		BRG) 1) Economic incentive/ disincentive * 2) Strengthening of role of village community/ social control* 3) Synchronization of law enforcement, laws and regulation as well as permission 4) Infrastructure arrangement** ● Strengthening initial response	
2016	Standard on Forest, Farm and Land Fire Prevention[35]	Trial of procedure at pre-outbreak stage by Coordinating Ministry of Economic Affairs	

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016(as of Dec. 2016)

(3) Policy direction

The policy directs to make impact in village level by utilizing all village activities as village level movement even in fire control as shown in table below.

Table 2.1.2.3. Outline of Recent Change of Policy Direction Concerned with Forest and Peatland Fire Control (as of Aug. 2016)

Year	Regulations	Points/Characteristics	Remarks
2015	Decisions of Coordinating Minister on Human Empowerment and Culture on Integrated Village Development Movement36	● Integrated Village Development Movement (Village Movement) Model coordinating, synchronizing, synergy and integrating program and activities in rural areas and village-based by ministries and agencies, local government and community to enhance quality of human life and culture	Needs to apply by PKHL[37]
	Surakarta Declaration for Disaster Risk Reduction for Sustainable Human Development of "Disaster Risk Reduction Month" organized by BNPB[38]	● To execute concrete actions to solve forest and land fires and haze disaster risk and transboundary risk	
2016	President Directions in Jan. 2016[39]	● Prevention and early warning ● Reward and punishment ● Improvement of ecosystem control ● Field observation ● Law enforcement ● Synergy between central and local government	
	Letter of Minister of Environment and Forestry to Ministry of Development of Village, Disadvantage Regions and Transmigration [40]	● Target: 731 fire prone villages ● To request to allow to use Village fund (Dana Desa) for fire control	
2016	Decision and its revision by Ministry	● Prioritizing also construction and	Potential

[35] Kementerian Koordinator Bidang Perekonomian. Desember 2016. Standar Pencegahan Kebakarkan Hutan , Kebun dan Lahan

[36]
- Kemenko PMK. 2015. Gerakan Pembangunan Desa Semesta (Gerakan Desa) Berbasis Kawasan Untuk Pembagunan Manusia dan Kebudayaan (28 April 2015)
- SK Menko PMK No.2 Tahun 2015 tentang Tim Koordinasi Penguatan Pemerintah Desa, Pemberdayaan Masyarakat, Pembangunan Desa dan Kawasan Perdesaan
- SK Kemenko PMK tentang Desa Lokasi Gerakan Pembangunan Desa Semesta Tahun 2015 No.49 tahun 201

[37] Information from the participants in PKHL Kickoff Meeting on 25 May 2016.

[38] BNPB. 2015. Peringatan Bulan Pengurangan Risiko Bencana Tahun 2015 Surakarta, 16-18 Oktober 2015 *Deklarasi Surakarta* tentang Pengurangan Resiko Bencana untuk Pembangunan Manusia yang Berkelanjutan (18 Oktober 2015)

[39] Arahan Presiden pada Rapat Koordinasi Nasional Pencegahan Kebakaran Hutan dan Lahan 2016 (18 Januari 2016)

[40] S.203/Menlhk/PPI/PPI4/4/2016 (5 April 2016)

Year	Regulations	Points/Characteristics	Remarks
	of Development of Village, Disadvantage Regions and Transmigration on Priority for Village Fund Use in 2016[41]	development of infrastructure for renewable resources as well as environment protection activities ● Other program can be prioritized as far as building consensus in village planning assembly.	application for TPD[42]

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

BNPB has also initiated Disaster Resiliency Village (Desa Siaga Bencana) program since before.

2.1.3 Organization and Institutional Arrangement

(1) Overview

Indonesia has developed decentralization. Basically, there has autonomous fire affairs system based on the autonomy. This system includes establishment Fire Department under Public Works Service in Local Government and arrangement of Fire Fighter System under the instruction of Ministry of Home Affairs. Meanwhile land use manager should do self-defense fire affairs and should organize self-defense fire brigade. Ground firefighting is done by the autonomous fire affairs and self-defense fire affairs systems.

However, Indonesia regards fires as disasters. When the reginal heads apply Disaster Preparedness Status, BNPB and BPBD strengthen preparation to disaster response. At the application of Disaster Emergency Status, emergent response power concentrate with BNPB and BPBD and implement large scale response including rainmaking and firefighting by air. Thus in the recent years the Fire Department and BPBD tend to merge each other.

Integrated fire management approach has also developed a system to support the local governments' fire control especially fire prevention by each ministries and agencies based on the Presidential Instruction. At preventation stage, Coordinating Ministry of Economic Affairs play coordinator in polic and nationwide arrangement. The duty of MoEF divers including as coordinator in fire control in usual status, as focal point of AATHP Agreement, and as MoF and MoE to provide guidance of fire control. Manggala Agni, the fire brigade developed originally from self-defense fire brigade of Conservation Forests where the central government directly manages, has increased the function to support all forest and land fire controls including ground firefighting due to the recent revision of regulation. The self-defense fire brigade for Conservation Forests should newly be strengthened in the situation few fire outbreaks in Conservation Forests.

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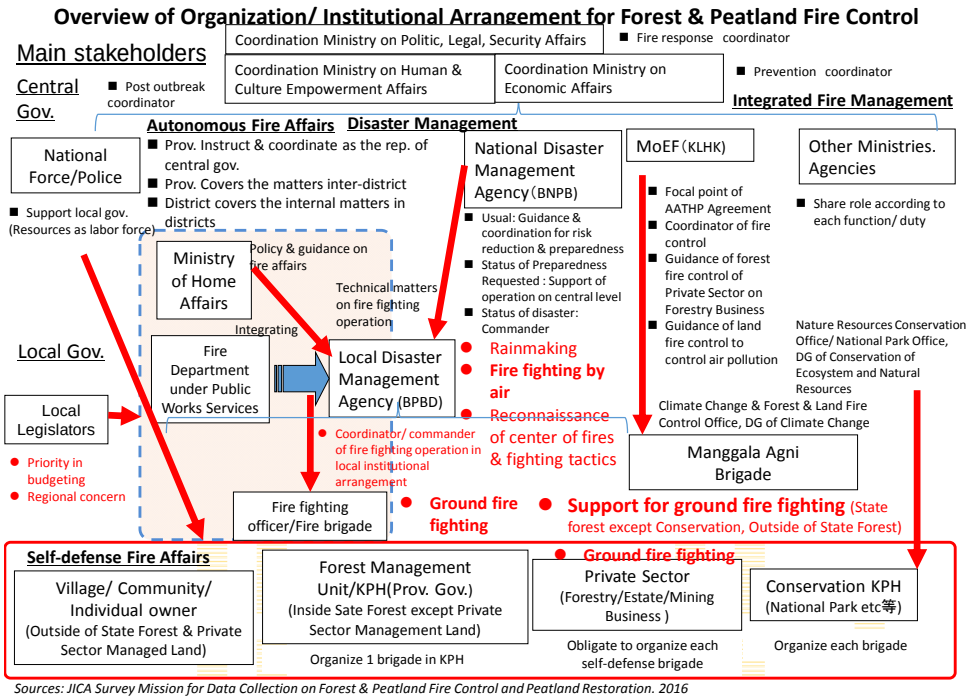
- Peraturan Menteri Desa, Pembangunan Daerah Tertinggal, dan Transmigrasi Republik Indonesia Nomor 21 Tahun 2015 tentang Penetapan Prioritas Penggunaan Dana Desa Tahun 2016(22 Desember 2015)
- Peraturan Menteri Desa, Pembangunan Daerah Tertinggal, dan Transmigrasi Republik Indonesia Nomor 8 Tahun 2016 tentang Perubahan Atas Peraturan Menteri Desa, Pembangunan Daerah Tertinggal, dan Transmigrasi Republik Indonesia Nomor 21 Tahun 2015 tentang Penetapan Prioritas Penggunaan Dana Desa Tahun 2016(24 Mei 2016)

42 Information from PKHL personnel who participated in training activity in Central Kalimantan Province on 2 Aug. 2016



Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration. 2016

Figure.2.1.3.1. Outline of Stakeholder Concerened with Forest and Land Fire Control (As of Dec. 2016)

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016(As of Dec. 2016)

Daily fire control is one of the administration duties for district/city government. However, with the revision of Law on Local Administration in2014 the authority of administration on natural resource management sifted to a provincial government[43]. Therefore, it is pointed out that this shift makes the division of role in district/ city governments in fire control become vaguer. On the other hand, community and private sector's enterprises become more important as in charge of self-firefighting. The establishment of Law on Village in 2014 enlarges the autonomy in villages applying Village Fund (Dana Desa) from the national budgetary subsidy. It is estimated to become more important to develop capacity of fire prevention admonition in village autonomy for autonomous firefighting in village level in the future.

(2) Classification of Autonomous Firefighting Organization and Institutional Arrangement

The following classification of stakeholders in autonomous firefighting is assumed in addition to the responsible parties of self-fighting to develop fire control focusing forest and land fires. Leader groups as local assembly members and Worker group as BPBD will be important to enhance understanding of forest and land fire prevention in autonomous firefighting.

Table 2.1.3.1. Draft Classifcation of Stakeholders of Autonomous Firefighting

Group	Major stakeholders	Remarks
Leader	● Government executives ● Legislators (e.g. Local Assembly/DPRD)	Legislators can bring community's needs to Legislation Office
Workers	● Officers ● Local governments' fire fighters ● Local Disaster Management Agency (BPBD)	Implementers of government policy
Sympathizers	● Manggala Agni ● MPA ● NGO/ CBO	Sympathizers can collect needs from community

[43] In addition organizational change of "Badan" which majors in coordination function will be also changed into Dinas

Group	Major stakeholders	Remarks
Village community	● Institution: Village head etc. ● Supporting group ● Villagers who hold a land ● Villagers who doesn't hold a land	

Sources: Prepared from Final Report of Pre-design Survey on Social Movement for Fire Prevention [44]

2.2 Current Conditions, Technical Review as well as Issues and Needs on Forest and Peatland Fire Control

2.2.1 Current Conditions on Fire and Haze Outbreaks

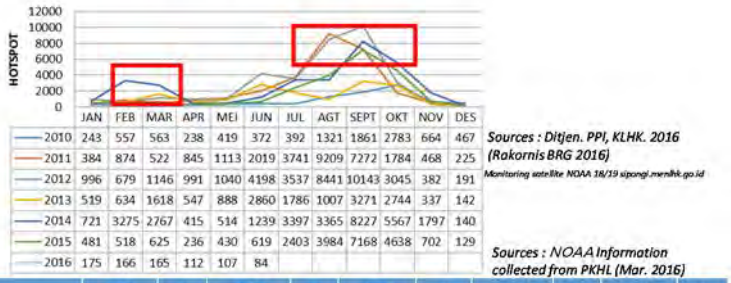
(1) Recent Hotspot Distribution

In Indonesia, there are no any statistics of fire occurrence with confidence because some fire outbreaks are not reported. Therefore, hotspots (HS) where higher land temperature sites measured by satellite image data were utilized for early detection of fire outbreaks. PKHL etc. analyzes HS data utilizing NOAA 18 Satellite imagery data.

Table below shows the HS trend from 2011 to 2015, which is collected by PKHL. Indonesia has 2 fire danger season around Feb-Mar. and Aug.-Oct. Abnormal El-Nino and Southern Oscillation in 2015 has affected abnormal dry conditions but more fire outbreaks were implicated in 2012 and 2014 not in 2015. It describes that more HS were reported in "the outside of State Forest Area" so-called rural areas than others. More HS were measured in "Production Forest Area" in the State Forest Area. The ratio of HS measured in "Conservation Forest Area", "Protection Forest Area" and "Estate Concession Area" is slightly increasing.

Table 2.2.1.1 Overview of Hotspot Distribution

Overview of Fire Outbreaks



	JAN	FEB	MAR	APR	MEI	JUN	JUL	AGT	SEPT	OKT	NOV	DES
2010	243	557	563	238	419	372	392	1321	1861	2783	664	467
2011	384	874	522	845	1113	2019	3741	9209	7272	1784	468	225
2012	996	679	1146	991	1040	4198	3537	8441	10143	3045	382	191
2013	519	634	1618	547	888	2860	1786	1007	3271	2744	337	142
2014	721	3275	2767	415	514	1239	3397	3365	8227	5567	1797	140
2015	481	518	625	236	430	619	2403	3984	7168	4638	702	129
2016	175	166	165	112	107	84						

Sources : Ditjen. PPI, KLHK. 2016 (Rakornis BRG 2016)
Monitoring satellite NOAA 18/19 sipongi.menlhk.go.id

Sources : NOAA Information collected from PKHL (Mar. 2016)

Increase of HS
1. Aug.-Oct.
2. Feb.-Mar.

Increase of annual HS:
1. 2012
2. 2014

HS Distribution
1. Outside of State Forest
2. Production Forest in State Forest

	2011	%	2012	%	2013	%	2014	%	2015	%
Nationwide	28,474	100	34,789	100	19,353	100	31,424	100	21,933	100
Sate Forest	13,414	47	16,739	48	10,400	54	16,379	52	11,980	55
Conservation F.	1,220	4	1,472	4	889	5	1,714	5	1,497	7
Protection F.	1,408	5	1,774	5	1,120	6	1,821	6	1,476	7
Production F.	10,786	48	13,493	39	8,391	43	12,844	41	9,007	41
Outside of State Forest	15,060	53	18,505	52	8,953	46	15,046	48	9,953	45
Estate Companies	1,306	5	1,716	5	1,256	6	1,978	6	1,235	5
Others	13,754	48	16,789	47	7,697	40	13,068	42	8,718	40

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration. 2016

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

(2) Priority area

Not whole Indonesia has severe fire outbreaks but fire control priority sites distributes in

[44] UI-JAFTA. 2016. Final Report, Pre-basic Design Survey on Community Movement for Forest and Land Fire Prevention Nationwide. Chapters 4.a

Sumatra and Kalimantan Islands. Such area is located near the neighbor countries as Singapore and Malaysia where haze disaster control is important because transboundary pollution can affect to damage in the neighbor countries.

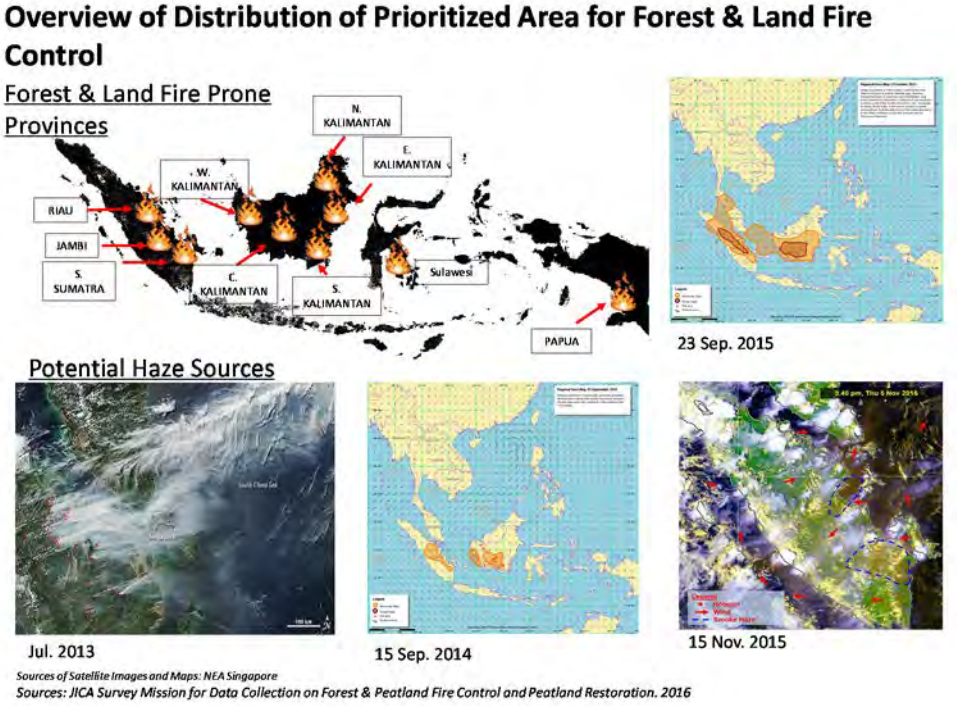


Figure. 2.2.1.1 Overview of Forest and Peatland Fire Control Priority Area

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

At the beginning of 2016, 7 fire control priority provinces are same as peat restoration priority area by BRG: Riau, Jambi, South Sumatra, West Kalimantan, Central Kalimantan and South Kalimantan and Papua Provinces. And then in Apr. 2016 based on the letter of Ministry of Environment and Forestry to Ministry of Development of Village, Disadvantage Regions and Transmigration (S.203/Menlhk/PPI/PPI4/4/2016) on prioritized fire control village fire control priority provinces consists of 6 provinces same before: Riau, Jambi, South Sumatra, West Kalimantan, Central Kalimantan and South Kalimantan and added 2 provinces East Kalimantan and North Kalimantan Provinces. In Riau, Jambi and Central Kalimantan Provinces more HS distributes in Sate Forest than outside/APL.

The table below shows the assumed targeted fire prone sites: 56 districts, 251 sub-districts, and 731 villages as well as targeted major stakeholders: 80 units of KPH damaged by fires in 2015. Integrated Patrol Program (Patrol Terpadu) initiated in 2016 covered 400 villages about half of targeted fire prone villages.

BRG estimated about 1,400 villages located in peatland restoration targets in 7 provinces. 300 villages will be targets of "Program for Model Village of Peatland Management (Desa Peduli Gambut) by BRG[45].

[45]Deputi Edukasi, Sosialisasi, Partisipasidam Kemitraan BRG. 21 Juni 2016. EDUKASI DAN PARTISIPASI DALAM PERLINDUNGAN DAN PENGELOLAAN GAMBUT (Paparan Rapat Koordinasi Pelaksanaan Restorasi Gambut)

Table 2.2.1.2 Overview of Fire Prone Sites in 8 Fire Control Priority Provinces

Outline of Prioritized Area for Forest & Land Fire Control

Prov.	Riau	Jambi	S. Sumatra	W. Kalimantan	C. Kalimantan	S. Kalimantan	E. Kalimantan	N. Kalimantan	Total	Remarks
HS in State Forest	More	More			More			N/A		
Drought correlation to El-Nino	No	Yes	Yes	No (Partly South)	No (Partly south)	No (Partly east)	Yes			
Burned Area 2015*1 (ha) ☐ Peat ☐ Mineral ☐ Total	110,025 73,268 183,293	68,493 55,397 123,890	327,902 343,931 671,833	31,773 60,578 92,351	441,279 310,609 751,888	12,642 183,616 196,258	11,006 64,997 76,003 ☐ Fewer by 2014 ☐ No haze			
Fire prone district *2	13	6	4	11	10	5	5	2	56	Mean: 7 district/ prov.
Fire Prone sub-district*1	42	37	18	80	23	21	22	8	251	
Fire Prone village*2	127	102	61	193	65	41	90	52	731	
Mean (sub-district/district)	3	6	5	7	2	4	4	4	5	
Mean (village/district)	10	17	15	18	7	8	18	26	13	
Mean (village/sub-district)	3	3	3	2	3	2	4	7	3	
First Priority KPH *3 (Burned 2015) (unit)	23	8	13	11	21	4	**	**	80	
Community peatland: First priority for monitoring & restoration (Only Dome & burned 2015)*3(ha); [ ]: district; < >: villages	0 [0] <0>	3,695 [5] <17>	30,854 [5] <55>	6,193 [4] <22>	113 [1] <1>	6,319 [5] <14>	983 [2] <3>	0 [0] <0>	48,157 [22] <112>	
Priority	2-2	1	1	2-4	2-1	3-1	2-3	3-2		

*Sources: *):Ministry of Environment and Forestry, Republic of Indonesia. 2015. Understanding Estimation of Emission From Land and Forest Fires in Indonesia 2015*
**2: Surat Menteri LHK S. 203/Menlhk/PPI4/4/2016; :*3: Dit. RPPWPH, Ditjen. PK-TL. Jun. 2016;*3) Dit. PKG. 2016*
Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration. 2016

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

2015 became strong El Nino and strong dry conditon resulted in large scale of fire outbreaks and haze disaster since July until the end of year. The airport in Jambi and Central Kalimantan closed due to lack of haze mitigation equipment and lasted several month especially Jambi. Meanwhile East Kalimatnan Province has also strarted to examine to declare disaster but became normal before decaring.

As the table above in 2015, burnt area in South Sumatra and Central Kalimantan Provinces accounts for more than ones in Riau and West Kalaimantan Provices where usually have more HS distribtuion . In South Sumatra, West Kalimantan and South Kalimantan, burnt area in mineral soil accouts for more than ones in peatland.

2.2.2 Technical Reviews on Forest and Peatland Fire Control

Indonesia has addressed fire control for about 20 years since strong El Nino in the extreme dry years of 1996-97 was happened and resulting in the large scale of fire and haze outbreaks. Fire control can be roughly classified into Prevention, Response or Firefighting and Post Outbreak. While preparedness approach to be ready for disaster including preparing firefighting equipment was prioritized in the past, preventive approach to prevent from fire outbreak beforehand has been put the importance in recent years.

(1) Limit of fire response/firefighting

No any drastic measures which can assure initial firefighting effective to fire prevention and firefighting that can assuredly extinguish quickly were found as the issues show in the table below.

Table 2.2.2.1 Overview of Technical Issues to Forest and Land Fire Response/Firefighting

Issues in Fire Response/Fighting(Mainly information on fire response in 2015 in Jambi & South Sumatra Prov.)

Class	Outline	Issues
Ground fire fighting	Water spraying within 500m from the water sources according to the current standard equipment package	■ No water sources enough storage to extinguishing fire ■ No fire fighting at fires locating far from the water sources ■ No fire fighting at fires locating no accessible by vehicle or motor bike transporting the equipment
	Joint work with National Force and Police who don't bring the fire fighting equipment	■ Becoming lower efficiency in Manggala Agni/Fire Department/BPBD who brings the equipment ■ Tendency to happen re-outbreak of fire due to early decision on fire extinguished.
	Fire fighting based on the self-defense fire affairs	■ Tendency to decrease fire fighting upon self-defense fire affairs by depending on fire fighting by BNPB-BPBD at the status of disaster ■ There is success case to extinguish fires without watering by removing and accumulating burning peat (& trees and crops on the fired peatland) while also removing and accumulating unburned peat into another direction using heavy machinery at the private sector managed lands. Fighting tactics are more important (than water).
Fire fighting by air	Dropping water for extinguishing by aircraft	No extinguished by dropping water to center of fires due to little visibility in haze.
		No watering due to difficulty for aircraft to approach to the above of targeted center of fires

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration. 2016

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

After recent president regime starts, army and police participant actively in forest and land fire control. Presidential Instruction in 2015 orders army to have command power in institutional arrangement for forest and land firefighting. However, by co-work with army and police who don't have firefighting equipment, firefighting efficiency by fire department-BPBD and MA who have firefighting equipment tends to drop. Misjudgment to command firefighting tactic without specific training on fires by army tends to become re-outbreaks of fires at the suppressed sites.

Even having firefighting equipment, the recent firefighting equipment system covers just 500m from the water sources. There are many fire outbreaks where cannot do firefighting. To enhance capacity to design firefighting tactics with effective use of firefighting equipment system is one of important issues. Meanwhile there is success case to extinguish fires without watering by removing and accumulating burning peat (& trees and crops on the fired peatland) while also removing and accumulating unburned peat into another direction using heavy machinery at the private sector managed lands. Now is a chance to review firefighting depending on watering.

(2) Potential of Enhanced Early Warning

The information by existing system cannot be diffused effectively to targets (stakeholders of fire prevention and/or initial firefighting) so that fire extinguishment cannot be done efficiently. To resolve such problems is one of the prioritized issues. This year PKHL starts Integrated Patrol Scheme by patrolling at fire prone sites in village and facilitating the fire prevention targets by 6 persons of patrol team including community applying TPD approach in FCP village-based fire prevention. The following improvement has started to seek solutions for the issues synchronizing Integrated Patrol Scheme.

a) One of members' house of Integrated Patrol Teams (Patrol Terpadu) are selected as fire control operation room (Posko) in village level, which functions as a hub to deliver the related information in village level.

b) There often happnes to deliver the fire danger informatio by Integrated Patrol Team through patrol at fire prone sites. By delivering infromation of FDRS predicted at

DAOPS MA, there is a potential to enhance early warning system which can deliver the infromation to targets. Fire Care Community groups called by MPA plays role in addition to Integraed Patrol Team.

c) PKHL has started development application for mobile phone (HS Verifier) which can develiver HS data and then feedback the verified results at field level. Integrated Patrol Team bringin HS Verifier will have a pontential to verify HS.

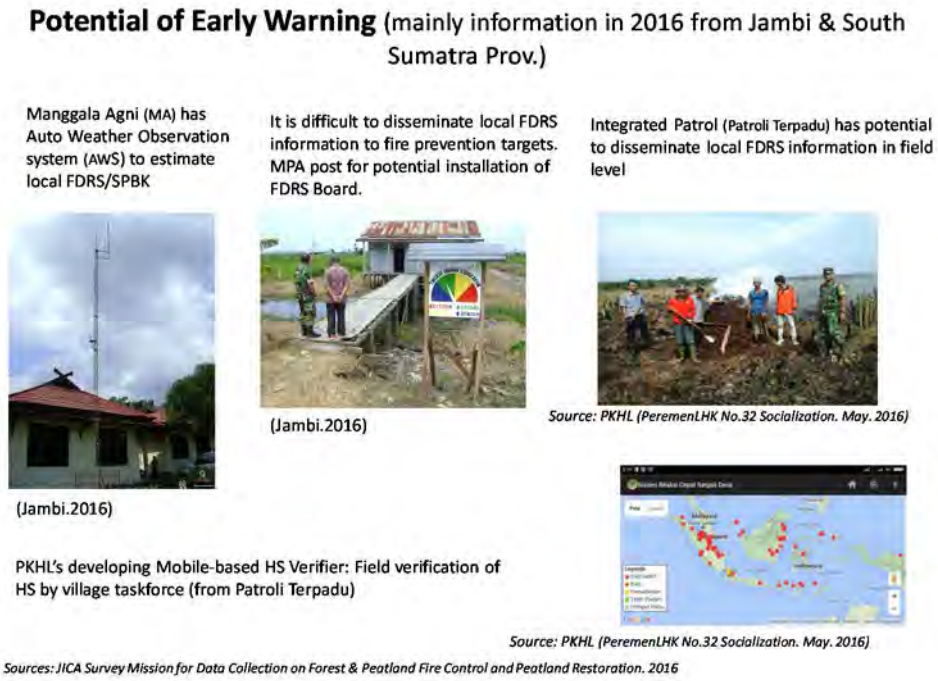


Figure 2.2.2.1 Overview of Technical Issues and Needs on Early Warning

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

2.2.3 Issues and Needs in Forest and Peatland Fire Prevention

(1) Effective methods to transform land burning behaviors

Use of fire on land is regarded to be the main cause of fire and possible wide variety of motivations and purposes of fire use are shown in Figure below. The motivations and purposes differ by the environment where land managers are in and they are likely to act in combination to become motivation of the act of burning. Thus, fire is a symptom of challenges of natural resource management mainly on land and it is important to enhance natural resource management comprehensively in fire control as causal treatment.

Fire prevention needs solution to causes but we couldn't reduce land burning behaviors by the past measures and efforts. Thus effective methods to transform land burning behaviors is one of important issues in forest and peatland fire prevention.

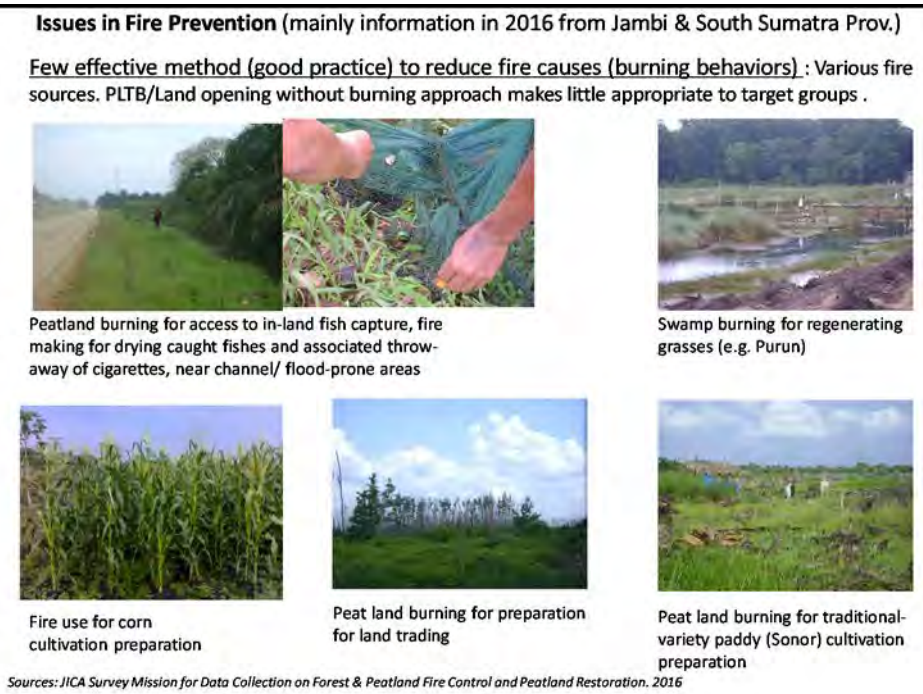
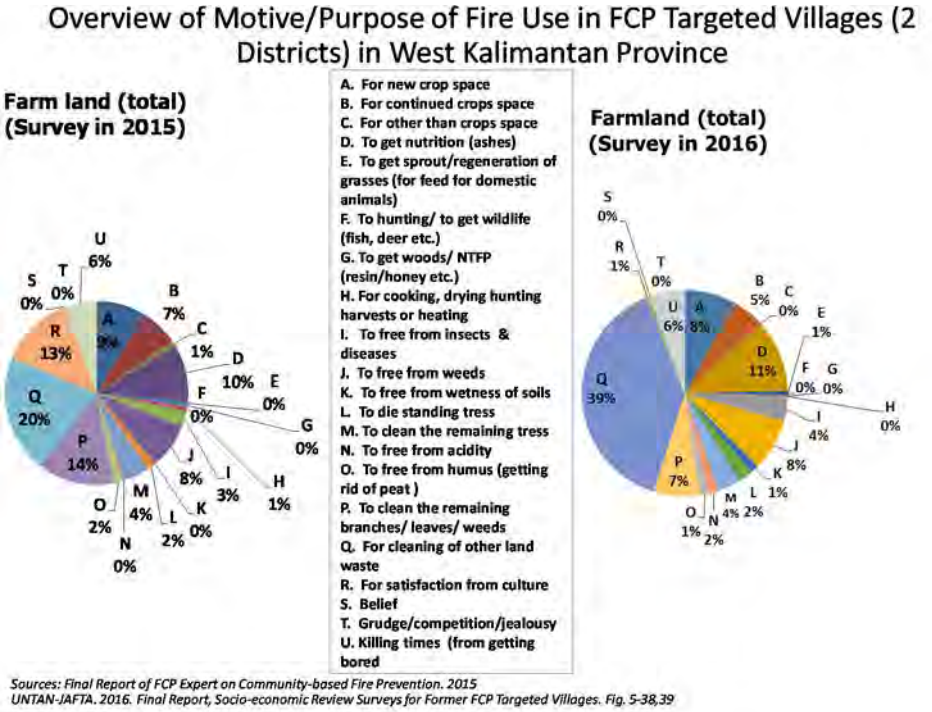


Figure 2.2.3.1. Overview of Information on Land Burning Purpose in Preliminary Site Visits at Priority Provinces

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

As shown in figure below, in FCP targeted village, the survey in 2015 and 2016 shows ”To clean the rest of branch/leaves/weeds “To clean up other land waste” is large proportion of purpose in the whole farmers. The proportion of “For satisfaction from culture” in 2016 became smaller than 2015



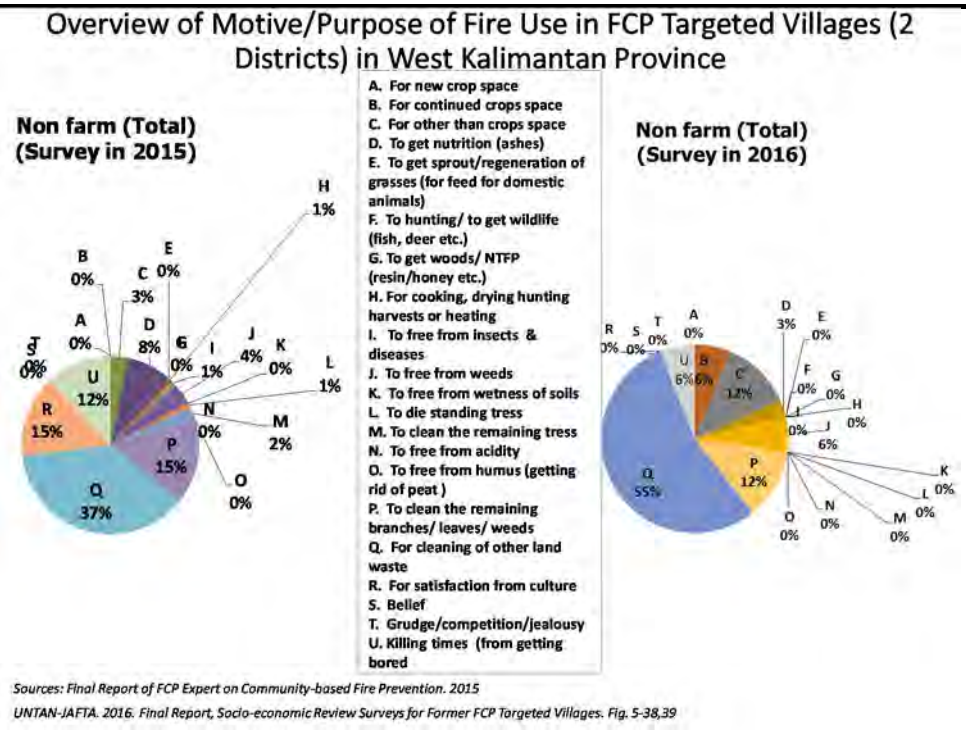


Figure 2.2.3.2 Outline of Purpose of Land Burning in FCP Targeted Villages

Sources: Prepared from Final Report of FCP Expert on Community-based Fire Prevention. 2015[46] *and Final Report of Socio-economic Review Surveys for Former FCP Targeted Villages*[47]

Meanwhile other than farmers tends to similar with the farmer but including "Kill free time".

The account for "For satisfaction from culture" in 2016 became smaller than 2015 while the account for "For other than crop space" in 2016 became larger than 2015[48].

Thus only promoting using weeds by making compost organic fertilizer of the main Indonesian Government approach so far cannot contribute to resolve fire use purpose. This becomes issues and requires developing extensive applicable methods of land management without land burning to promote environmental friend land-based business based on appropriate land management approach without burning by reducing land burning motives.

(2) Preventive measures synchronizing to early warning/ reaction and post outbreak (restoration of damage areas)

According to the trends in a FCP targeted village, fire often occur at the same fire occurred sites in village. Therefore, mapping fire prone sites and alerting earlier around such fire prone sites is needed to utilize method to detect unwatched burnings.

Otherwise land owners tend to refrain from intensive land use at such fire prone sites due to repeated damages by fire. In the end the lands becomes easy combustible due to extensive land use with shrubs and weeds or unused/ fallowed land without land use. This issue requires to reducing fire extent risk at fire prone sites in order utilize reducing shrubs and weeds by

[46] KUNO Hiromitsu. 2015.FINAL REPORT Long-term Expert Services for Community-based Fire Prevention Village-based Land and Forest Fire Model: Implication of More Effective Method for Reducing GHG Emission and Haze Disaster Derived from Forest and Peatland Fires and Land Biomass Burning *(LAPORAN AKHIR Jasa Tenaga Ahli Jangka Panjang Bidang Pencegahan Kebakaran Berbasis Masyarakat Model Pencegahan Kebakaran Hutan dan Lahan Berbasis Desa: Implikasi Motode yang Lebih Efektif dalam Penurunan Emisi GRK dan Bencana Asap yang Berasal dari Kebakaran Hutan dan Lahan Gambut serta Pembakaran Biomassa)*

[47] UNTAN-JAFTA. 2016. Final Report, Socio-economic Review Surveys for Former FCP Targeted Villages. Fig.5-38, 39

[48] It is necessary to make definition more objective of fire use purpose and motives, and not to changethe definition in each survey.

restoring land covers with intensive land use. Especially it will be needed to develop integrated fire prevention synchronizing early warning/ reaction as well as post outbreaks at the fire prone sites locating far from demographic centers as settlement or water sources.

Figure 2.2.3.3 Overview on Trend of Fire Prone Sites in FCP Targeted Villages

Sources: Prepared using Final Report of Community-based Fire Prevention Expert for FCP[49]

2.3 Outputs of JICA Cooperation on Forest and Peatland Fire Control and These Dissemination Approaches

2.3.1 Overview of FCP's TPD Model of JICA Cooperation Outputs

(1) Village-based community-based fire prevention model (TPD model)

As the results of the past technical cooperation for forest fire control (see Chapter 1 above) have tried to develop methods to assure to prevent fire outbreaks, FCP as the 4th phase has developed Village-based Fire Prevention Model or TPD model.

As show in figure below, TPD model is the approach to facilitate bottom-up planning actions for fire prevention independently by firstly making stakeholders in village level as a facilitation team for functioning as change agents. This model can result in planning fire prevention actions which can be implemented independently without any assistance in village. It was implicated that this model will impact to reduce land burning behaviors which were difficult by the past usual measures. Therefore it will be potential to become one of potential method to drive implementation of land management without land burning (PLTB) independently.

The MoEF established "Integrated Patrol (Patrol Terpadu)" for 7 priority provinces focusing in Sumatra and Kalimantan Islands utilizing TPD method and collaborative patrol method with villagers by the MoEF's fire brigade (MA), which were developed through FCP.

[49] KUNO Hiromitsu. 2015.FINAL REPORT Long-term Expert Services for Community-based Fire Prevention Village-based Land and Forest Fire Model: Implication of More Effective Method for Reducing GHG Emission and Haze Disaster Derived from Forest and Peatland Fires and Land Biomass Burning *(LAPORAN AKHIR Jasa Tenaga Ahli Jangka Panjang Bidang Pencegahan Kebakaran Berbasis Masyarakat Model Pencegahan Kebakaran Hutan dan Lahan Berbasis Desa: Implikasi Motode yang Lebih Efektif dalam Penurunan Emisi GRK dan Bencana Asap yang Berasal dari Kebakaran Hutan dan Lahan Gambut serta Pembakaran Biomassa)*

As discussed in 2.1.1 above, Ministerial Decree of Environment and Forestry on Standard of Forest and Land Fire Control No. 32/2016 stipulates the definition of TPD and incorporates the activities that were important in TPD activities into recommendable fire prevention activities.

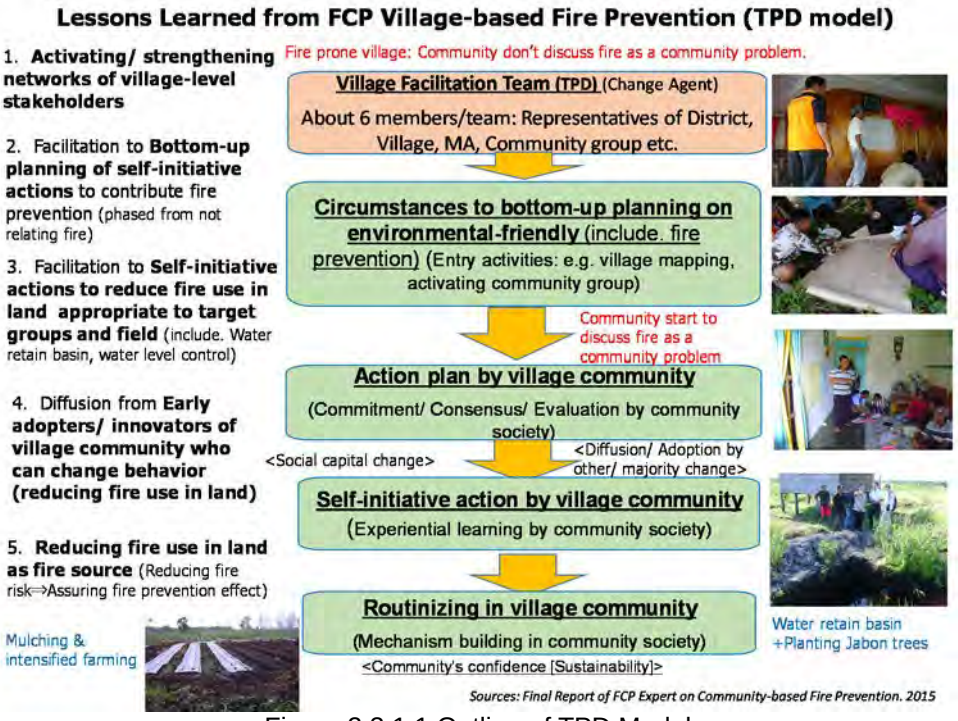


Figure 2.3.1.1 Outline of TPD Model

Sources: Prepared using Final Report of Community-based Fire Prevention Expert for FCP[50]

(2) Limitation of impact to reduce land burning behavior in the whole region by FCP

FCP tried to verify impact of fire prevention using land burning behavior indicators (Probability, Frequency and Area) by conducting socio-economic surveys not only baseline time but also annual progress as the PDM's socio-economic baselines surveys[51]. The figure

[50] KUNO Hiromitsu. 2015.FINAL REPORT Long-term Expert Services for Community-based Fire Prevention Village-based Land and Forest Fire Model: Implication of More Effective Method for Reducing GHG Emission and Haze Disaster Derived from Forest and Peatland Fires and Land Biomass Burning *(LAPORAN AKHIR Jasa Tenaga Ahli Jangka Panjang Bidang Pencegahan Kebakaran Berbasis Masyarakat Model Pencegahan Kebakaran Hutan dan Lahan Berbasis Desa: Implikasi Motode yang Lebih Efektif dalam Penurunan Emisi GRK dan Bencana Asap yang Berasal dari Kebakaran Hutan dan Lahan Gambut serta Pembakaran Biomassa)*

[51]

a) FCP 1st Year Survey Report: UNTAN-PKH/MoF-JICA. 2011. Final Report "First-year's Baseline Surveys"
A baseline survey (general qualitative analysis) was conducted for a total of four villages, including two targeted villages selected in the first year (the targets were to be selected by Regency TCs every year). The range of data collected was focused on extensive burning practices for clearing farmland (in the past five years).

b) FCP 2nd Year Survey Report: UNTAN-PKH/MoF-JICA. 2012. Final Report "Second-year's Baseline Surveys"
A total of 10 villages were surveyed, among which four villages were monitored for follow-up from the first year survey and six villages including three targeted villages selected in the second year were surveyed for baseline data. The range of data collected was expanded to include small-scale and sporadic burning on farmland. A statistical analysis (regression analysis) was started using the data collected on the occurrence (probability) of burning practices as well as community profiles. Although it was difficult to identify patterns at the village and regency levels, the statistical analysis performed at the provincial level by integrating all the collected data seemed to be able to suggest certain patterns. Therefore, it was decided to conduct the remaining statistical analysis at the provincial level.

c) FCP 3rd Year Survey Report: UNTAN-PKH/MoF-JICA. 2013. Final Report "Third-year's Baseline Surveys"
A total of 22 villages were surveyed, among which 10 villages were monitored for follow-up from the second year survey and 12 villages including six targeted villages selected in the third year were surveyed for baseline data. The analysis model was developed through trial and error to be used for the

below shows the overview of general change of land burning behavior in the targeted villages collected from the results of socio-economic surveys at FCP and ones in 2016 at post FCP in the survey (Bengkayang District and village average). However simple comparison between before project intervention (2011) and after intervention (2016) doesn't implicate any differences. The land burning behavior tends to change by other factors than TPD model. Thus only TPD model applied in the project is difficult to change land burning behavior.

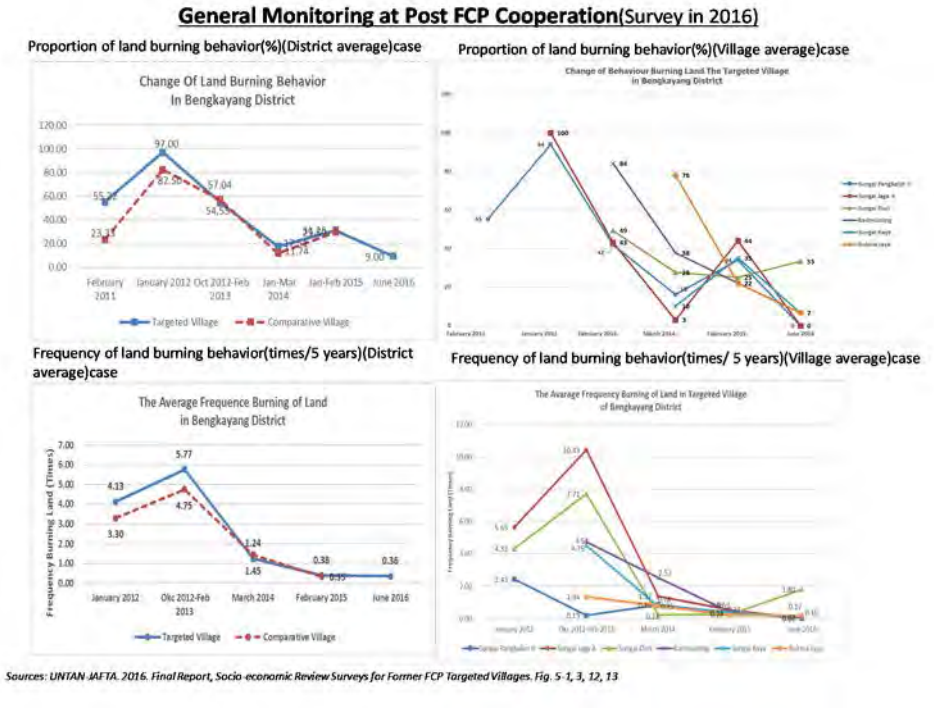


Fig. 2.3.1.2 Cases of General Change of Land Burning Behavior Indicators at FCP Targeted Villages

Sources: Prepared from Final Report of Socio-economic Review Surveys for Former FCP Targeted Villages[52]

In the figure above, survey conditions differs according to survey year as follows.

provincial-level regression analysis (The range of data collected on the use of fire was expanded to include the frequency and area of burning by user type).

d) FCP 4th Year Survey Report: UNTAN-PKH/MoF-JICA. 2014. Final Report "Fourth-year's Baseline Surveys"
A total of 30 villages were surveyed, including villages monitored for follow-up from the third year survey (Based on the recommendation of the mid-term review study team, the number of non-target villages to be monitored for comparison with the targeted villages was reduced) and five targeted villages selected in the fourth year (as well as villages surveyed at the expense of the investigators). The total number of households surveyed was 2,031 (approximately 70 households per village). The range of data collected was expanded to include the use of fire outside of farmland (e.g., in the vicinity of houses). Moreover, a supplement survey was conducted to collect detailed information on actual usage situations (e.g., the purposes, locations, and timing of fire use). A test of statistical deference with/without project was started by village level.

e) FCP 5th Year Survey Report: UNTAN-PKH/MoF-JICA. 2015. Final Report "Fifth-year's Baseline Surveys"
A total of 27 villages were surveyed, including 24 villages in West Kalimantan Province monitored for follow-up from the fourth year survey (Based on the recommendation of the mid-term review study team, the number of non-target villages to be monitored for comparison with the targeted villages was reduced) and three targeted villages in Riau Province surveyed for baseline data for the Ex-post evaluation The total number of households surveyed was 1,724 (approximately 70 households per village), consisting of 1,560 households in West Kalimantan Province and 164 households in Riau Province. The scope of the analysis covered all possible types of fire use (categorized by purpose and motive). The scope of the supplement survey on the actual use of fire was also expanded to include the estimated amount of biomass and peat which may be affected by the use of fire as well as the people who had discontinued burning practices and who had adopted PLTB.

[52] UNTAN-JAFTA. 2016. Final Report, Socio-economic Review Surveys for Former FCP Targeted Villages.

a) The 16 targeted villages were selected among the fire prone villages while the comparative villages were selected among the neighboring villages both by the district fire prevention working group.
b) The starting TPD activities were: 1 village each district in 2011, 2 village each district in 2012, 2 villages in Bengkayang District and 4 villages in Kubu Raya District in 2013 and 2 villages each district in 2014.
c) Basically TPD activities were conducted during 2 years while just only 1 years in the targeted villages started in 2014. In TPD model, TPD team plans facilitating contents and conduct facilitation to the whole village and/or the whole fire prone hamlet in a village. Each village each time face different intervention contents and place by TPD.
d) Because it is difficult to collect information of reality of land burning behavior, FCP's socio-economic surveys applied try and error approach on survey methodology like how to ask such information.
e) Limited collection of panel data who should continue to survey to same household every year due to limited time resulted in the impossible analysis by specifying the household who change land burning behavior. FCP surveys were obliged to apply analysis on factors to change land burning behavior from the relation between land burning behavior and socio-economic factors.
f) Based on the recommendation of mid-term review mission, numbers of survey target villages of comparative villages were reduced from the third years.
g) While the socio-economic surveys at post project in 2016 in this survey tried to same survey method with 2015 in FCP socio-economic surveys[53], however the numbers of samples in survey target villages ware reduced and no any surveys in the comparative villages due to limited budget and time.

Based on the feature of survey conditions mentioned above, it is inferred that FCP's socio-economic surveys were not conducted in the method level required in impact evaluation[54]. One of the lessons learned is that it is better to start implementation of project activities after designing impact evaluation including data collection method.

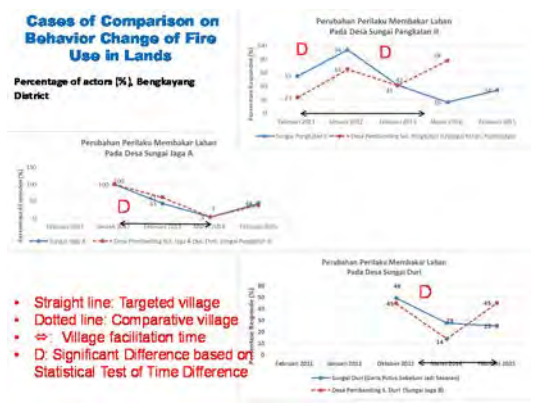
(3) Case of reducing land burning behavior in village level by TPD model

The figure is the summary of the results of statistical test on difference according to with/without TPD by interval of survey years based on the collected data so far at FCP's socio-economic survey in 2015[55]. The code D shows the time of statistical differences by TPD model in village level comparison. It is implicated that any statistical significant differences were shown according to with/without TPD in a certain village in a certain term in a certain land burning indicator like frequency. However there is no tendency to reduce land burning behavior with anytime statistical difference. Thus the future JICA cooperation will be requested to continue to analze the causes the time of with and without statistical difference.

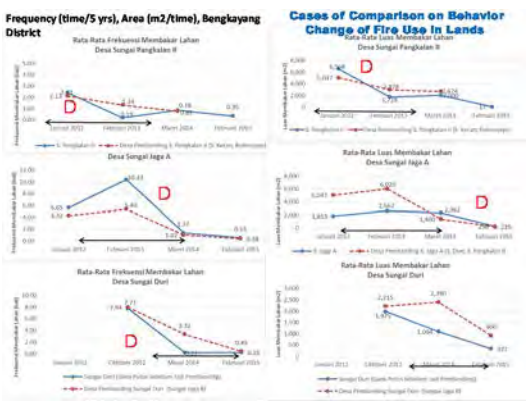
[53] UNTAN-JAFTA. 2016. Final Report, Socio-economic Review Surveys for Former FCP Targeted Villages.

[54] The target sample group and comparative sample group should be selected objectively so numbers of targeted villages should be increased. The survey method also should not differed according to the survey time.

[55] In the socio-economic surveys at post project in 2016, no any surveys in the comparative villages due to limited budget and time required, therefore no statistical test on differences in the interval of 2015-2016 was conducted.



Proportion of land burning behavior in Bengkayang District



Frequency and area of land bunring behavior in Bengkayang District

Fig.2.3.1.3. Cases of Change of Statistical Difference by Village
(FCP Socio-economic Surveys in 2015)

Sources: Prepared using Final Report of Community-based Fire Prevention Expert for FCP[56]

(4) Improvement of facilitation contents in TPD model

According to the results of FCP's socio-economic surveys, TPD approach was implicated to contribute to transformation of land burning behavior by working to significant variables like "Activeness of work together" and "Cosmopolitan (influence of social capitals from outside)", "Level of imitation" and "Observance of rules" of social capitals. But the productivity as labor cost can be also affected. And also at the end of Jul. 2016, Joint Review on TPD model was held between TPD and community in FCP targeted villages in Bengkayang District by involving the representatives of 6 fire prone provinces. The represenatives from provincial level and community of FCP targeted villages pointed out Work Together (Gotong Royong) contribute to reduce land burning. It is implicated that facilitation to group strengthening as as to enhance work together for enhanced productivity will be effective for reducing land burning behavior.

The following implications were inferred based on the correlation analysis using variables on the perception drawing on 3 approaches in TPD model and the land burning behavior indicators from the villagers in TPD targeted villages.

[56] KUNO Hiromitsu. 2015.FINAL REPORT Long-term Expert Services for Community-based Fire Prevention Village-based Land and Forest Fire Model: Implication of More Effective Method for Reducing GHG Emission and Haze Disaster Derived from Forest and Peatland Fires and Land Biomass Burning *(LAPORAN AKHIR Jasa Tenaga Ahli Jangka Panjang Bidang Pencegahan Kebakaran Berbasis Masyarakat Model Pencegahan Kebakaran Hutan dan Lahan Berbasis Desa: Implikasi Motode yang Lebih Efektif dalam Penurunan Emisi GRK dan Bencana Asap yang Berasal dari Kebakaran Hutan dan Lahan Gambut serta Pembakaran Biomassa)*

Table 2.3.1.1 Outline of Correlation Analysis Result on 3 Approaches Perception of TPD Model with Land Burning Behavior

Correlation Analysis on Land Burning Behavior 2016 with TPD Facilitation Approaches Perseption in 16 FCP Targeted Villages

Variables (Significance<0.05)		**Y1** (Probability)		**Y2** (Frequency)	**Y3** (Area)
		Coef.	Exp(B)	Coef.	Coef.
X1	Group strengthening	-	2.934	-0.113	-0.117
X2	Economy enhancement	-	1.345	-0.130	-0.65
X3	Land management control	-	1.069		
Constant			0.133	-28.728	-26,183.855
Adjust. R^2			0.650	0.700	0.566
N			480	44	44

X1	:	Group strengthening	To draw enhancement of village community group activities based on the respondents' perception: Activeness of group a) Increase (Score 3); b) Stable (Score 2); c) Decrease (Score 1)
X2	:	Enhancing economy	To draw enhancement of village community economic activities based on the respondents' perception: 1: Activeness to economic activities a) Increase (Score 3); b) Stable (Score 2); c) Decrease (Score 1) 2: Diversity to economic activities: a) Increase (Score 3); b) Stable (Score 2); c) Decrease (Score 1) Then sum up the 2 indicators (Total 6-2).
X3	:	Land management control	To draw enhancement of land management control in village environment based on the respondents' perception: 1:To land use control in village a) Better (Score 3); b) Stable (Score 2); c) Worse (Score 1) 2: To clearness of land holding status: a) Better (Score 3); b) Stable (Score 2); c) Worse (Score 1) Then sum up the 2 indicators (Total 6-2).

Sources: UNTAN-JAFTA. 2016. Final Report, Socio-economic Review Surveys for Former FCP Targeted Villages. Fig. 6-5,6

Sources: Prepared from Final Report of Socio-economic Review Surveys for Former FCP Targeted Villages[57]

a) Numbers of villagers who conduct land burning show the correlation with all 3 approaches. Because of larger Exp., the numbers of villages who conduct land burning show more correlation with the approach for strengthening groups.
b) Land burning frequency shows the correlation with both approaches for strengthening groups and enhancing economic activities
c) Land burning area tends also like land burning frequency but because of larger coefficient, land burning area shows more correlation with the approach for enhancing economic activities.

Such tendency also implicates in the targeted districts in FCP changing the land burning behavior shows more correlation with the change of activeness of group. Therefore in improvement of TPD model, it is recommendable to focus on Strengthening groups for enhancing economic activities which can be easily interested by community, even though it is better to continue to apply 3 approaches. For example, facilitation topics will be assumed to design business from land management by marketing.

2.3.2 Dissemination Approaches of Outputs of Community-based Fire Prevention

(1) Integration of social movement for fire prevention (Integrated approach)

The following figures show the outline of background and needs of the requests for cooperation

Indonesia now takes forward to create national movement for fire prevention operation according to Surakarta Declaration in commemorate of the Fire Risk Reduction Month which was organized by National Disaster Management Agency (BNPB) in 2015 by following up the proposal for national movement for fire prevention at FCP Final Seminar. Moreover, the needs to develop more effective method in order to show fire prevention effect in whole district level increased than follow-up of FCP because of the fact that large scale and frequent fire and haze disaster in nationwide occurred in the last year, PKHL proposed importance of social movement for fire prevention by reflecting project title.

[57] UNTAN-JAFTA. 2016. Final Report, Socio-economic Review Surveys for Former FCP Targeted Villages.

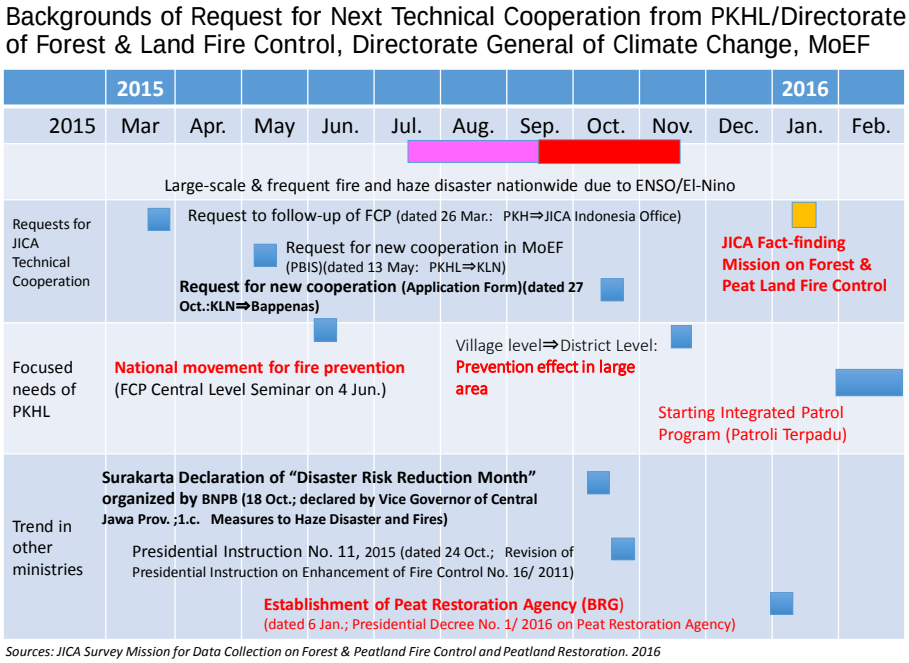


Figure 2.3.2.1 Outline of Background of Request for New Cooperation

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

In pre-design on social movement for fire prevention, the process in the figure below was proposed because the following matters are important.

a) To support social learning for enhancing better understanding on fire setting and its impacts
b) To support strengthening social cohesiveness so as to change paradigm and life patterns
c) To enhance local leadership to have fire utilization norms and beliefs for public betterment
d) These supports will contribute to reduce intentional land burning and pyromania fire use

Figure 2.3.2.2. Proposed Draft Concept of Social Movement for Fire Prevention

Sources: Prepared from Final Report of Pre-design Survey on Social Movement for Fire Prevention [58]

The brainstorming to prepare drat PDM held by PKHL in Aug. 2016 proposes the following utilization approaches.

a) TPD method is applied at the starting stage in order to enchance inisitatives and sustainability of fire prevention.

b) And then campainging to promote goor practices of land management and/or business by community who don't conduct land burning.

c) To support campaining, peer learning from community who don't conduct land burning are supported while estabilishing and promoting environmental friend village business without land burning and utilzing weeds which easily becomes combustible matters.

d) Integrated Patrol is also applied mainly at more fire danger time for acceletating early reaction.

(2) Modeling Funding to Fire Prevention by Focusing on Community-based Fire Prevention

The following figure shows the proposed logics to influence effect by fuding to fire prevention focusing on community-based fire prevention.

a) Fire prevention movement approach is an approach to integrate attentions and inisiatives of all stakeholders to fire prevention so as to enahance local social attention to fire prevention.

b) And also the movement cover all effective approaches. The core is community-based fire prevention to reduce Enerty to Ignition but also strenthening intitutional arrangment for fire control in fied level is combined to drive early warning and reaction.

c) Moreover it is combined to promote Community-based Peatland Water Management in peatland and village business using combusitible matters in order to decrease combustiblility.

[58] UI-JAFTA. 2016. Final Report, Pre-basic Design Survey on Community Movement for Forest and Land Fire Prevention Nationwide. Chapters 4.a and 5

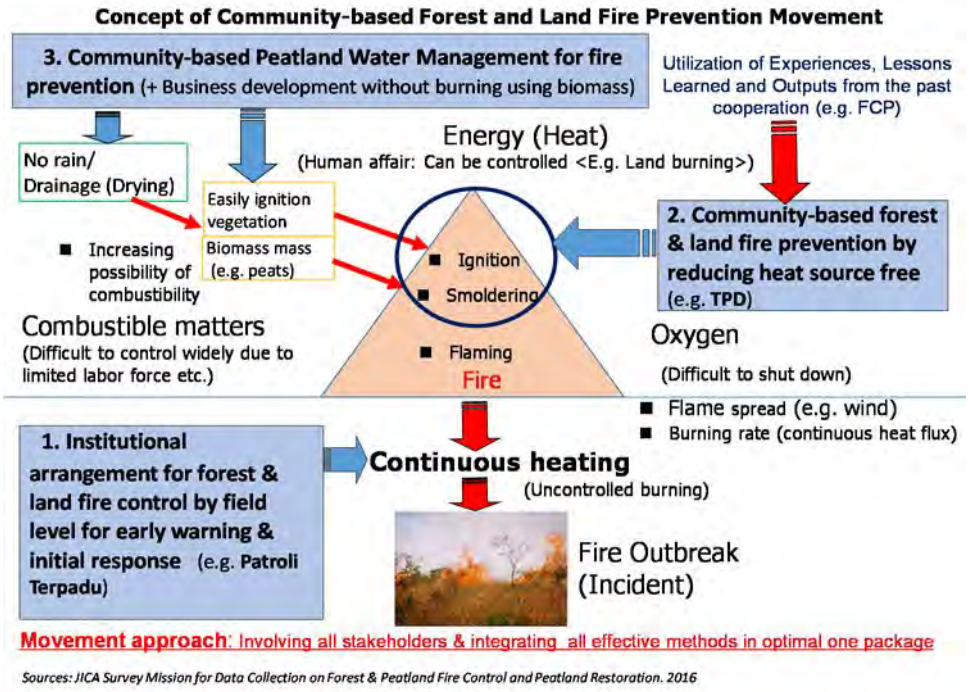


Figure 2.3.2.3 Draft Logics of Fire Prevention by Community-based Fire Prevention Movement

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

Based on the discussion above, a model to show how to affect by funding to community-based fire prevention is assumed as follows.

a) To strengthen social capital as collective actions by improve and strengthen change agents in village level as TPD and *Patrol Terpadu* through development of institutional arrangement in field level

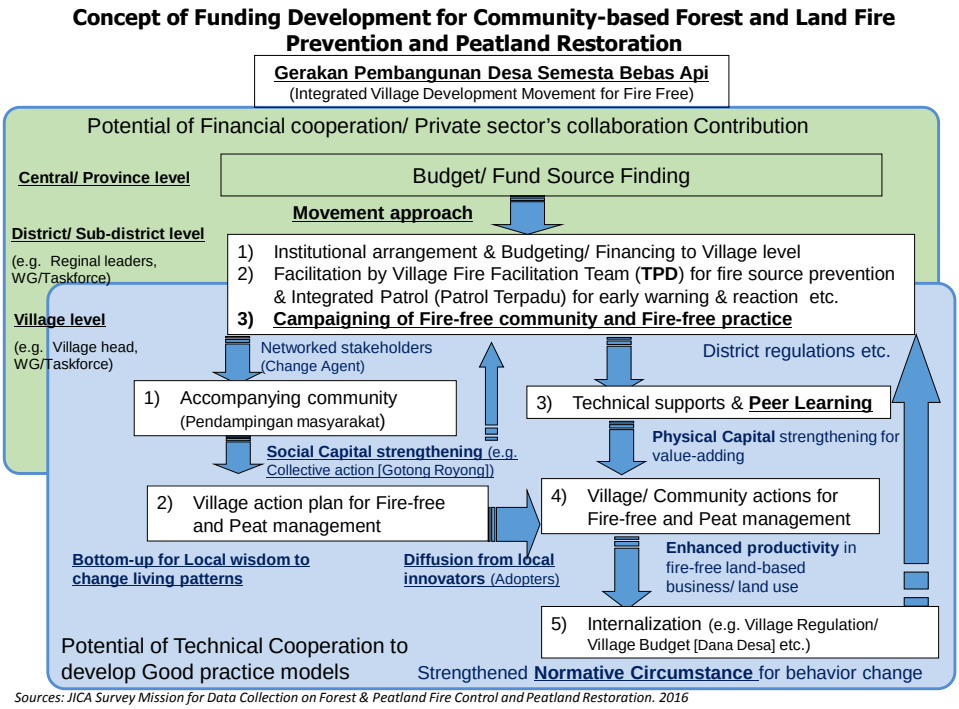
b) To drive to reduce land burning behaviors by disseminating information on good practice community and methods while preparing bottom-up action plan to reduce land burning, inventory of community who stopped land burning and their methods.

c) To strengthen also physical capital to land management and peatland management without land burning through Peer Learning from the good practice community and technical support to action plan

d) To enhance land productivity and/or to create business with higher land productivity as decreased cost to land management and increase benefit

e) Finally to enhance sustainability by strengthening village level norms through establishing village regulation for without land burning and application to village budget on village level activities

f) To affect to extensive impact by supporting to establishment of local regulation based on the good practice at the implemented villages in addition to Peer Learning from Good Practice



Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration. 2016

Figure 2.3.2.4 Draft Funding Model for Community-based Fire Prevention

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

2.3.3 Area for Improvement in Project Formulation Process under JICA Technical Cooperation

A trend in unsmooth progress of implementation in JICA technical cooperation in forest sector in recent years as the table below. This JICA Survey Mission has tried to make much efforts based on the lessons in examining process on cooperation contents of requested new technical cooperation.

Table 2.3.3.1. Comparison of Implementation Process of JICA Technical Cooperation in Forest Sector in Indonesia (as of Aug. 2016)

Items	IJREDD+	FCP	Lessons learned/ Consideration in requested new technical cooperation
Design of proposed request	KLN (Not Dit. PJL)	Dit. PKH	It is better to design by implementation body
Original R/D	MM-Start: More than 10 months	MM-Start: More than 7 months	a) No attachment of draft R/D in IJREDD+MM. b) It is better to attach draft R/D in MM.
Planner of PDM Design draft	By Short-term Expert in FFORTRA	Consultant in Detail Planning Survey	-
Work together in design through site surveys	No central side participants	Participants ex-PKH personnel	Sub-directors in Dit. PKHL
Pre-coordination to target sites before R/D signing	No preliminary audience by project director to target province and district	Preliminary audience by Director of PKH to target districts	It is better to propose as supplementary surveys after signing MM.
Signer of Indonesian side	Sekjen. MoEF	Dirjen.	Proposed representing 1 Dirjen.

Items	IJREDD+	FCP	Lessons learned/ Consideration in requested new technical cooperation
Amendment of R/D	MM-Actual signing: More than 8 months	MM-Actual Signing: More than 3months	
Decision to revise PDM	Mid-term Evaluation	JCC	It is better to prescribe to decide to revise PDM at JCC, in R/D.
Drafting revision of PDM design	JICA HQs side	Long-term expert+ C/P level (Include. Amendment of R/D)	It is better to prescribe to drafting revised PDM by implementation level in enough time discussion, in R/D
Decision of Amendment of R/D including revised PDM	JICA HQs Mission	Extra JCC (Participated by Joint Mid-term Evaluation Team)	It is better to prescribe to decide at JCC, in R/D
C/P assignment	No C/P assignment by written paper	Assigned C/Ps of PKH and BKSDA by Decision by Director of PKH (Cost to mobilize stakeholders out of C/P's List is paid by project)	It is better to request to appoint C/P.
Project Staff (Include. National Coordinator, National Expert; Exclude Drivers)	a) JKT: 6 persons b) PNK:3 persons c) KTG: 4 persons	a) JKT: 3 persons b) PNK:2 persons c) Outsourcing Local Consultant as needed	It is better to examine institutional arrangement by utilizing Local Consultant.

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

As far as the information collected through accompanying partners from MoEF in the survey activities, it is inferred the following lessons was examined in review process in MoEF on Amendment of R/D of IJREDD+.

a) Lot of meetings, seminar and workshops, trainings as well as research and surveys lack of implementation of concrete actions in local and field level
b) Large cost proportion to Japanese experts and national staff contracted by project to support Japanese experts. It is better to limit experienced Japanese experts and to utilize national experts and consultants.

Broad review on ways of implementation in JICA technical cooperation management and improvement including expenditure standards will be needed to cope the lessons above even though it is difficult to improve drastically in short time.

Collaboration with external funds by other donors and internal funds by Indonesian Government Budgets and private sectors will contribute to mutual compensate the constraints in each stakeholders cooperation management.

Although the information to suggest improvements in JICA technical cooperation are collected, information on needs and hope to JICA technical cooperation are also collected as follows[59].

a) Survey to review KPH and suggest to improve KPH
b) Surveys to advocacy for oil palm industry to change to environmental friend industry
c) Development of model of garbage in watershed management

2.4 Early Detection System, and Cooperation Possibilities of JAXA Climate Change Monitoring Satellites

2.4.1 Current Condition, Issues, and Needs on Early Detection System

[59] Accoridng to the information at the inverview with the special staff of the Minister of Environement and Forestry

In order to address forest and peatland fire prevention and early reaction in Indonesia, there are two kinds of activities including (1) Fire Danger Prediction System and (2) Early Fire Outbreak Detection System.

Based on the decision by the Minister of Environment and Forestry, MoEF and BNPB will be users of data of early detection system. LAPAM will be the sole analyzer of satellite data as HS while BMKG will be the sole analyzer of fire danger rating since 2016.

(1) Fire outbreak danger rating prediction system

Fire danger rating prediction system is the system to evaluate meteorological factors affecting fire outbreaks and disseminate information and guidelines for fire management[60]. The system is called Fire Danger Rating System (FDRS) and calculates the rate of 4 fire occurrence possibility levels including low, moderate, high, and extreme. It was developed based on the Canadian Forest Fire Weather Index (CFWI)[61] with concerned agencies such as LAPAN, BMKG, MOEF, and BNPB.

(a) Fire Danger Rating System by BMKG

FDRS was designed to prevent and mitigate fire outbreaks in 2001. It has been managed by BMKG in 2002[62]. The system calculates danger rates based on four weather parameter including daily temperature, relative humidity, wind speed, and 24 hour-rainfall data collected by 177 BMKG weather ground stations (WGS) nationwide. Based on these weather parameters, Fire Weather Index (FWI) is calculated and published through BMKG's website including FAX, SNS, and mailing list.

Fire Weather Index (FWI) is also calculated by automatic weather system (AWS) at field level and it is operated by *Manggala Agni* (MA). It is used for fire prevention at field levels. Currently, FDRS of BMKG as officially published in national and province levels and FDRS managed by MA at field levels have been separately operated.

Figure 2.4.1.1 Current FWI in whole Indonesia by BMKG (Retrieved: August 30, 2016)

Sources: BMKG's Web Sites. 30 Aug. 2016 (http://www.bmkg.go.id/BMKG_Pusat/Informasi_Cuaca/Sistem_Kebakaran_Hutan.bmkg?w=1&u=2).

[60] Israr Albar et al..2013. Operational Fire Danger Rating System in Indonesia, Presentation documents for International Workshop on Inventory, Moddeling and Climate Impacts of Greenhouse Gas Emission (GHG's) and Aerosols in the Asia Region, June 2013.

[61] LAPAN. 2016. Effective use of space-based information to monitor disasters and its impacts Lessons Learnt from Forest and Land Fires in Indonesia, UN-SPIDER regional support office.

[62] Guswanto and Eko.H.. 2009. Operational weather system for national fire danger rating, ISSN: 1411-3082

As far as the interview to BMKG in June 2016, there are several needs for improvements. Firstly, 177 WGSs of BMKG are unevenly distributed nationwide and mainly located at city areas where far from actual fire outbreak areas. Secondly, fire danger rate does not consider land cover and use types. The scales of fire outbreaks are partially rely on materials covering ground. Ground materials such as grasses and trees become fire fuels. Hence, it is important to consider of land cover and use.

Additionally as far as the interview to PKHL in June 2016, the causes of fire outbreaks derive from mostly human activities for their livelihoods. It would be effective if FDRS was convened with these human activity patterns such as the seasonal trends that people often put fires. Moreover, the FDRS managed by BMKG do not respond to FWI in district (village) level, and this affects to the fire prevention implementation. Such matters are one of rooms for improvement in early warning system.

(b) Other measures

i. GAMBUT project: UNOPS funded by USAID

GAMBUT (Generating Anticipatory Measure for Better Utilization of Tropical Peat Land) project has published fire outbreak risk prediction through the website in both Indonesian and English. On this website, weather, El Nino and La Nina, precipitation and HS and fire outbreak risk prediction are apublilshed. Especially, fire outbreak risk is predicted based socio-economic surveys. Indoenesia has various sources of satelite data but LAPAN will be the sole sources on satelite data to avoid confusion. It wil be one of issues to share the role with the SiPongi managed by MoEF as discussed later.

ii. APEC Climate Center (APCC)

In order to address ASEAN haze issues, APEC Climate Center (APCC) based in Korea provided research funds to Columbia University, Malaysian Meteorological Department, Bogor Agriculture University, LAPAN etc. through Asia Pacific Network based in Kobe, Japan. The research was conducted for two years from 2013 to 2015. Its result shows that fire outbreak risk prediction in August to October in which frequent fire occurred months would be possible the weather conditions during April to July for following dry season[63].

(2) Early Detection System

One of the activities to mitigate damages caused by field fire is to detect fire outbreaks as soon as possible using Hotspot (HS) where higher temperature sites analyzed on satellite imagery as follows. Forest and peatland HS information from LAPAN and MOEF is mainly used for fire detection until firefighting.

(a) LAPAN

LAPAN is the only agency to provide officially satellite data and remote sensing information including HS data according to the decision by the Minister of Environment and forestry in Apr. 2016 (S.218/MENLHK/PPI/PPI.4/4/2016). HS data in Indonesia has been obtained from Terra/Aqua MODIS for daytime and NPP VIIRS for night time monitoring provided by NASA.

LAPAN downloaded the data detected by the above mentioned satellites from NASA and then provided MoEF. MOEF publishes HS data through own website named "*Sipongi*". This means that LAPAN is the key institution over satellite data utilization for HS detection, and their recommendation is necessary over the utilization of satellite data utilization.

Table 2.4.1.1 shows the list of satellite to detect wild fires. The point to detect wild fires by satellites are frequent observations and accurate location detection. The frequency helps to quick detection of HS. Accurate detection of location provide fire fighters to figure out best route to access HS. In terms of frequency, Himawari 8/9 takes images

[63] Yoo et al. 2015. Toward a Fire and Haze Early Warning System for Southeast Asia, Asia Pacific Network

every 10 minutes. As second highest frequency, Terra/Aqua and NPP perform twice a day. On the other hand, location detection depends on the resolution of images. While Terra and Landsat series provide higher resolution images but their images delivered every 16 days. NPP, which has 380-750m resolution, is better utilization with is frequent image provisions. Although Gcom-C provide higher resolution, 250m, it has not launched yet. As long as the research team interviewed JAXA, six months' time duration is also needed in order to calibrate Gcom-C's satellite images to be utilized.

Table 2.4.1.1 List of Satellite Data to Monitor Wild Fires

Satellite	Sensor	Resolution	Interval	Organization
Terra/Aqua	MODIS (Moderate resolution Imaging Spectro-radiometer)	1 km	0.5 day	NASA
NOAA	AVHRR (Advanced Very High Resolution Radiometer)	1.1 km	0.5 day	NASA
Terra	ASTER (Advanced Space borne Thermal Emission and Reflection Radiometer)	90 m	16 days	NASA
Landsat	ETM (Enhanced Thematic Mapper)	60 m	16 days	NASA
Landsat 8	OLI/TIRS (Operational Land Imager/Thermal Infrared Sensor)	30 m	16 days	NASA
NPP	VIIRS (Visible Infrared Imaging Radiometer Suite)	375-750 m	0.5 days	NASA
UNIFORM1	BOL (Bolometer Camera)	150 m	7 days	Wakayama Univ. and others
Himawari6/7 (MTSAT)	MTSAT (Multifunctional Transport Satellite)	4 km	30 minutes	JAXA
ALOS 2	CIRC (Compact Infrared Camera)	200 m	7 days	JAXA
JEM/CALET	CIRC (Compact Infrared Camera)	130m	7 days	JAXA
Himawari 8/9	AHI (Advanced Himawari Imager)	1-2 km	10 minutes	JAXA
Gcom-C	SGLI (Second Generation Global Imager)	250 m	2-3 days	JAXA

Sources: Modified from documents by JAXA (May 2016) and Wataru Takeuchi (2008[64])

(b) SiPongi

MoEF has obtained HS data of NOAA from ASEAN Specialized Meteorological Center (ASMC) and of HS data of Terra/Aqua MODIS which LAPAN obtained from NASA and published through *SiPongi* on website (Figure below is the capture of SiPongi. Red spots are detected HS). SiPongi publishes only HS data by Terra/Aqua and NPP with more than 80% confidence level. The confidence levels divided into three; these are Low-confidence : <30 %, Normal-confidence: 30-80 %, and High-confidence: >80%[65]. Once HS was detected, this information goes to Manggala Agni. Then, they go to check HS area for its validation. In order to verify whether or not there is a fire outbreak, HS verification has started by fire patrol team by PKHL using Smartphone based application called HS Verifier.

[64] Wataru Takeuchi.2008.Forest fire monitoring from space、Measurement and Control、47 (12)
[65] Louis Giglio. 2013. MODIS Collection 5 Active Fire Product User's Guide

Figure 2.4.1.2 Current 'Sipongi' system by MoEF (Retrieved: August 30, 2016)

*Sources: Sipogi Web Site. 30 Aug. 2016 (*http://sipongi.menlhk.go.id/home/main*)*

(c) CCTV based fire detection

CCTV with ultra-red sensor based fire detections are under trial in mainly palm oil plantations. CCTV with ultra-red sensor based detection introduced in a seminar organized by PKHL can detect fires of $2m^2$ within 5 km. Within 10km (8,000ha), fires of $3m^3$ could be detected[66]. The area to detect fires are smaller area than that of satellite images, it would be useful within limited area such as plantations. Cost to install the system would be high as around 1 ten million yen (excluding Solar pannel, towar, and communication system).

A way to detect a fire using drone is also started in South Sumatra Province etc.

(d) Issues of Hotspot detection

According to LAPAN, there is a room for improvement in HS detection. For example the accuracy of HS and the life time of MODIS satellite which is conducting HS observation becomes issues. While one of the needs in field level is to be difficult to detect fire using satellite data which cannot provide pin-point location information of initial stage of fires which can be extinguished. Therefore, the field attaches importance to the interval to near real-time than the accuracy of detected data or resolution of satellite data[67].

Table below shows the Hotspot data source and its accuracy provided by LAPAN. The accuracy is calculated confirmed fire occurrences from the total number of HS detected by satellites[68]. Although night fire detection by VIIRS has higher accuracy as 87 % with the monitoring interval of three weeks, the HS data from NOAA ASMC has 12 % accuracy and MODIS with 80% confidence level is around 43 %. Moreover, MODIS with all confidence level has higher accuracy as 64%. This implies that the confidence level of MODIS is not fully worth to take in the case of Indonesia. The confidence level in terms of hotspot detection is employed and developed by Gigilio in 2003 and improved in 2016[69].

Table 2.4.1.2 Hotspot Data Sources and Its Accuracy

Hotspot Data	Intervals	Accuracy	Reference
NOAA-ASMC	Daily	12 %	LAPAN, 2013
MODIS - all confidence level	Daily	64 %	LAPAN, 2013
MODIS - confidence level >80%	Daily	42-43 %	Vetrita et al. 2012

[66] According to brochure of HAS Inc.
[67] According to the inverviews at DAOPS OKI in Sep. 2016.
[68] Yenni et al (2014) Lesons learned on hotspot monitoring from satellite and ground truth data
[69] Gigilio et al (2016) The collection 6 MODIS active fire detection algorithm and fire products, Remote Sensing of Environment 178, 31-41

Hotspot Data	Intervals	Accuracy	Reference
			LAPAN, 2013
VIIRS Night Fire	3 weeks	87%	LAPAN 2014

Sources: Modified from LAPAN presentation: JAXA-LAPAN seminar (August 2, 2016)

HS detection by satellites is done by using brightness temperature[70] and utilized the wavelength of 3–15μm[71]. As far as the interviews to HS researchers in Faculty of Forestry and Faculty of Computer science, Bogor Agriculture University, there are several reasons for lower accuracy of HS detection. One of the reasons is that the threshold to detect HS set by NASA as the source data is not suitable for HS detection in Indonesia. For example, large area of sands, zincs of roof tops, and chimney of factories are miss-detected as HS. In order to provide solutions, IPB's scientists tried to figure out what kind of tendencies of HS occurrence shown on satellite images are more likely to be real HSs. Furthermore, in thick cloud and thick haze due to fires it is difficult to detect fire outbreaks smaller than 100ha as MODIS and NOAA HS.

In order to address these issues, one of the LAPAN's needs is to obtain satellite data from their own ground station for having appropriate satellite image correction suitable for Indonesian condition by themselves because current HS data downloaded from NASA has already had correction by NASA.

Secondly, it is anticipated that the life time of Terra/Aqua as the main HS detection sources will end within one or two years. LAPAN has started to find next satellite usage for HS detection. Currently, one of the alternatives is NPP (National Polar-orbiting Partnership).

They have applied Suomi NPP NPOEASS preparatory project since 2015. NPP has its resolution with 375m to 750m and the monitoring interval of twice a day (day and night). NPP's HS data (Confidence level 80%) has already published through Sipongi since August, 2016. Also, since NPP has higher resolution than MODIS and NOAA, it would be possibility to integrate land cover and use into FDRS. During the interview to PKHL and BMKG in June 2016, they consider to integrate land cover and use data into FDRS.

2.4.2 Potential Collaboration with JAXA Climate Change Monitoring Satellites

(1) Posibility of JAXASatellites

JAXA has launched several satellites to monitor and detect wild fires. For HS detection, monitoring intervals and its resolutions are crucial in order to detect fire outbreaks more quickly and to identify the exact fire location more accurately. LAPAN mainly uses Terra/Aqua MODIS. On the other hand, designed life time of MODIS is anticipated to end within 1 to 2 years so that LAPAN has started to find alternatives. As far as the interview in June 2016, NPP is the one of the candidates. However, LAPAN's staff mentioned that there is a high possibility to be utilized JAXA's satellites to detect HS if there are satellite data, which is better than NPP, can be downloaded by their own ground station.

Considering about these criteria, combination usage of Himawari 8/9 and Gcom-C have a potential to be utilized for the HS monitoring. The interval of Himawari 8/9 is every 10 minutes and its data will be downloaded by LAPAN's ground station. However, based on interview to JAXA, Gcom-C having sensors to detect HS with higher resolution (250m) will be launched at the end of 2016[72].

(2) Potential Collaboration with JAXA Satellites

Figure below shows the ideas to improve current systems such as early fire warning system and early detection system based on the needs of Indonesia side.

[70] Muller M. and Stefan S. 2011. Can the MODIS active fire hotspots be used to monitor vegetation fires in the Lao PDR?. GIZ
[71] Wataru Takeuchi.2008.Forest fire monitoring from space, Measurement and Control, 47(12)
[72] JAXA. 2016. Gcom-C's brochure

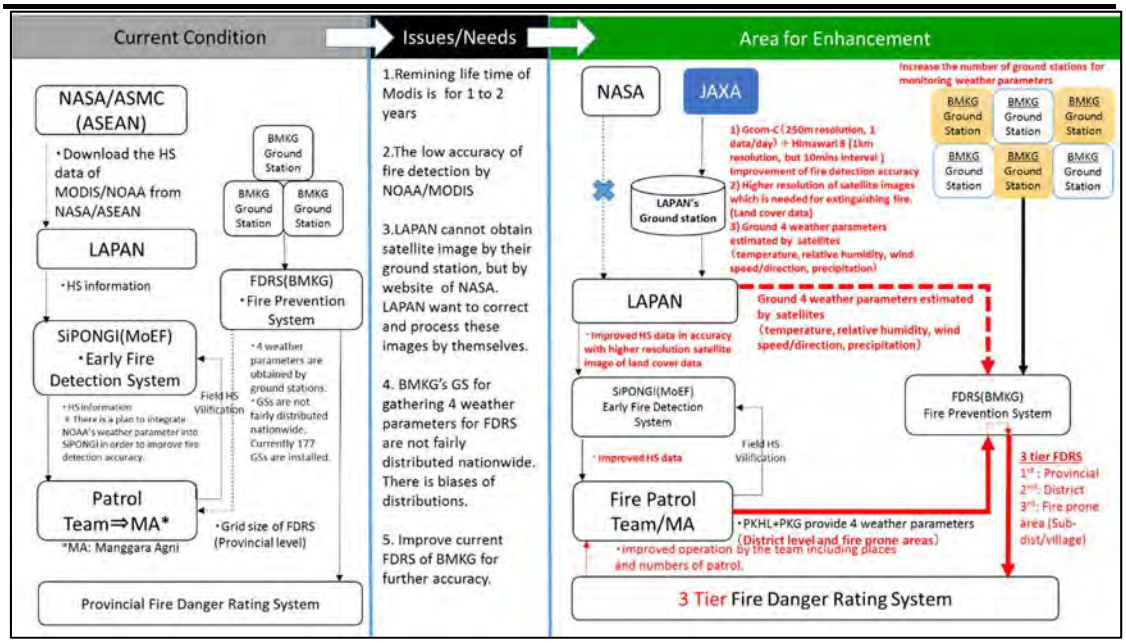


Figure2.4.2.1. Concept of Improvements on Early Fire Warning and Detection System

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

(a) The improvement of FDRS

The data flow of FDRS is one of the enhancement areas to improve FDRS. It is recommended to integrate FWI data by fire patrol team and/or MA into FDRS of BMKG. Since the main actor to patrol, validate, and extinguish fires is fire patrol team and MA at field level, they also calculate FWI by themselves. Also currently, the distribution and number of WGS of BMKG has not fairly distributed for covering whole country. Due to this limitation, current FDRS by BMKG is not useful to be utilized at field level. By integrating FWI run by fire patrol team and MA into FDRS of BMKG, the system can be delivered the field level information. It would be effective because this improvement takes advantage from current existing system. This means that this improvement can be achieved by connecting existing separated systems into one system. Therefore, relevant and effective with high impact will be expected.

(b) The improvement of Hotspot early detection

Another improvement is to make accuracy of early HS detection higher. To achieve this, new satellite data utilization is recommended including using the combination of Himawari 8 and Gcom-C managed by JAXA. Monitoring intervals of Himawari 8/9 is 10 minutes with resolution 1km. The resolution of Gcom-C has 250m with 2-3 days interval. Both satellites have sensors to detect HS. Combination of the new satellite will have potential to improve HS detection with positive impact and effectiveness.

CHAPTER 3 PEATLAND RESTORATION

3.1 Policy, Regulation and Organization Structure in Relation to Peatland Restoration

3.1.1 Government Regulations and Policies on the Peatland Management

The following regulations are the fundamental and basement for the Indonesian Government to implement the peatland restoration (see brief contents of the below regulations in the Annex Volume).

Table 3.1.1.1 List of Regulations and Policies on Peatland Restoration

Concerned Agency	No. and Title of regulation
MoF	Law No. 41 year 1999 regarding Forestry Affairs, dated on September 30, 1999, as amended by Government Regulation in Lieu of Law No. 1 year 2014 regarding the Amendment of Law No. 41 year 1999, dated March 11, 2004 (*UU No.41/1999*)
PU-PR	Presidential Instruction No. 02 year 2007, dated March 16, 2007, regarding Acceleration of Rehabilitation and Revitalization for Peatland Areas in Central Kalimantan Province (*Inpres No. 02/2007*)
MoF	Government Regulation No. 37 year 2012, dated March 1, 2012, regarding Watershed Management *(PP No. 37/2012)*
MoF/ MoEF	a) Presidential Instruction No. 10 year 2011, dated May 20, 2011, on Moratorium on the Granting of New Permit and the Improvement of Primary Natural Forest and Peatland Management (*Inpres No. 10/2011*) b) Presidential Instruction No. 06 year 2013, dated February 13, 2013, regarding Moratorium on the Granting of New Permit and the Improvement of Primary Natural Forest and Peatland Management *(Inpres No. 06/2013)* c) Presidential Instruction No. 08 of 2015, dated May 13, 2015, regarding Postponement of Moratorium on the Granting of New Permit and the Improvement of Primary Natural Forest and Peatland Management *(Inpres 08/2015)*
MoF	Minister for Forestry Regulation No. P.12/Menhut-II/2012, dated on March 12, 2012, regarding Second Amendment on Minister for Forestry Decree No. P.32/MENHUT-II/2009 concerning Procedure for Technical Planning Formulation of Forest and Watershed Area Rehabilitation (RTk RHL-DAS) *(Permenhut No.P.12/Menhut-II/ 2012)*
MoF	Minister for Forestry Regulation No. P.09/Menhut-II/2013, dated on January 28, 2013, regarding Procedure for the Implementation of Supporting Activities and Incentive Provision for Forest and Land Rehabilitation *(Permenhut No. P.09/Menhut-II/ 2013)*
MoF	Director General for Management of Watershed Area and Social Forestry Regulation No. P.01/V-Set/2013, dated May 5, 2013, regarding Technical Guidelines for Forest and Land Rehabilitation (*Perdirjen PDASPS P.01/V-Set/2013)*
PKG/ MoE	Government Regulation No. 150 year 2000, dated December 23, 2000, regarding Control on Soil Degradation for Biomass Production *(PP No.150/2000)*
PKG/ MoE	Law No. 32 year 2009, dated on October 03, 2009, regarding Environmental Protection and Management *(UU No.32/2009)*
PKG/ MoEF	Government Regulation No. 71 year 2014, dated on September 12, 2014, regarding Protection and Management of the Peat Ecosystems *(PP No.71/2014)*
BRG	Presidential Decree No. 1 year 2016, dated on January 6, 2016, regarding Peatland Restoration Agency (BRG) *(PrePres No.01/2016)*
PU-PR	Minister for Public Works and Public Housing Regulation No. 29/PRT/M/2015, dated on May 26, 2015, regarding Swamp *(PermenPUPr No. 29/2015)*
PU-PR	Minister for Public Works and Public Housing Regulation No. 11/PRT/M/2015, dated on April 6, 2015, regarding Exploitation and Maintenance of Reclamation Network on Tidal Swamp *(PermenPUPr No.11/2015)*
PU-PR	Minister for Public Works and Public Housing Regulation No. 16/PRT/M/2015, dated on April 21, 2015, regarding Exploitation and Maintenance of Irrigation Network on Lowland Swamp *(Permen PUPr No. 16/2015)*

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

3.1.2 Organizations on Peatland Management

(1) Ministry of Environment and Forestry

Directorate of Peat Damage Control (PKG: Direktorat Pengendalian Kerusakan Gambut), the Directorate General of Pollutant and Environmental Degradation Control under the Ministry of Environment and Forestry is the Directorate to have duties to engage in the peatland management and restoration.

PKG was under Ministry of Environment, and based on the Regulation of the Minister of Environment and Ministry of Forestry No. P.18/MENLHK-II/2015 concerning Organization and Working Procedures of the Ministry of Environment and Ministry of Forestry, the PKG has the following duties and functions as follows:

Table 3.1.2.1 Duties and Functions of PKG

Duties: (Article 662)
Directorate of Peat Damage Control has duty to prepare the formulation, implementation, coordination and synchronization of policies, technical guidance and evaluation of technical guidance and supervision of the conduct of the affairs in the field of peat ecosystem damage control.
Functions: (Article 663)
a. Preparation of policy formulation on inventory and confirmation, preparation and evaluation of plans, prevention and mitigation of damages and restoration of peatland ecosystem functions;
b. Preparation of policy implementation on inventory and confirmation, , preparation and evaluation of plans, prevention and mitigation of damages and restoration of peatland ecosystem functions;
c. Preparation of coordination and synchronization of policy on inventory and confirmation, preparation and evaluation of plans, prevention and mitigation of damages and restoration of peatland ecosystem functions;
d. Preparation of norms, standards, procedures, and criteria for inventory and determination, preparation and evaluation of plans, prevention and mitigation of damages and restoration of peatland ecosystem functions;
e. Provision of technical guidance and evaluation of technical guidance inventory and determination, preparation and evaluation of plans, prevention and mitigation of damages and restoration of peatland ecosystem functions;
f. Supervision over the conduct of the inventory and determination, preparation and evaluation of plans, prevention and mitigation of the damage and the recovery of the functions of peatland ecosystems in the area; and
g. Administration of the Directorate.

Sources: Regulation of the Minister of Environment and Ministry of Forestry No. P.18/MENLHK-II/2015

In order to fulfill the functions mentioned above, the PKG is composed in the four (4) sub-divisions on each specific function, and the organization chart is shown in below.

Table 3.1.2.2 Tasks of each Sub-Directorate/ Sub-Division under PKG

Sub-Directorate	Tasks	Section
Sub-Directorate of Inventory and Designation	To prepare the formulation, implementation, coordination and synchronization of policies, technical guidance and evaluation of technical guidance and supervision of the conduct of the inventory and determination of peatland ecosystems. (Article 665)	a. Section of Inventory Function of Peatland Hydrological Unit; and b. Section of Determination Function of Peatland Hydrological Unit
Sub-Directorate of Peat Damage Control Planning	To prepare the formulation and implementation of policies, administration and evaluation of the provision of technical assistance in the areas of peatland damage control planning. (Article 669)	a. Section of Planning; and b. Section of Plan Evaluation
Sub-Directorate of Peat Ecosystem Conservation	To prepare the formulation and implementation of policies, administration and evaluation of the provision of technical assistance in the field of conservation of peatland ecosystems. (Article 673)	a. Section of Prevention and Monitoring; and b. Section of Prevention and Recovery.
Sub-Division of Administration	To manage the affairs of administration, program and budget, personnel, finance, housekeeping, archival and reporting Directorate. (Article 677)	-

Sources: Regulation of the Minister of Environment and Ministry of Forestry No. P.18/MENLHK-II/2015

(2) Peatland Restoration Agency (BRG)

The Peatland Restoration Agency (Badan Restorasi Gambut: BRG) was established based on the Presidential Decree No. 1 of 2016 (Perpres 1/2016), in order to facilitate and accelerate the peatland restoration in Indonesia. The mandate of BRG is as follows:

a. BRG is responsible for coordinating and facilitating the restoration of peat in the provinces of Riau, Jambi, South Sumatra, West Kalimantan, Central Kalimantan, South Kalimantan and Papua.
b. Restoration of peatland ecosystems for a period of 5 (five) years covering 2,000,000 ha.

Its functions are stipulated in the Presidential Decree No.1 of 2016 as follows:

a. Strengthening policy coordination and implementation of peatland restoration,
b. Planning, control and cooperation to provide peatland restoration,
c. Mapping Peatland Hydrological Units,
d. Zoning functions and functions of protected/cultivation areas
e. Infrastructure construction (rewetting) and all the ancillary works,
f. Rearrangement of burnt peat area management,
g. Socialization and education on the peatland restoration,
h. Implementation of supervision in the construction, operation and maintenance of infrastructure in the concession areas, and
i. Implementation of the other functions given by the President.

The establishment of BRG is also due to the strong requests from the Norway Government, and the BRG is the essential element for the progress of the two-party partnership. By referring the Plan of Operation of BRG for the Norway Collaboration, dated on February 3, 2016. Based on the Plan of Operation, the following deliverables of BRG are required:

Table 3.1.2.3 Required Plan of Operation of BRG for the Norway Cooperation

(1) By 1 June 2016, the completion of the official Indonesian Government process of codifying the promulgating Government Regulation to full implementation of President Instruction to enforce a moratorium on any clearing, drainage and/ or conversion of currently unopened peatland. (2) By 1 December 2016, BRG will have implemented comprehensive and transparent monitoring system on status of peatland protection and restoration, which covers: (i) Implementation of preparing an Indonesia-wide baseline map of peatland (ii) Mapping of peatlands in priority landscapes as defined in the BRG Plan of Operation, (iii) Progress reports on Implementation of the moratorium on peatland clearing and drainage, peat rewetting and reforestation on degraded peat, including the status of burnt areas. (iv) Satisfactory implementation of the BRG Action Plan, including enforcement of and compliance with the peat moratorium.

Sources: Plan of Operation of BRG for the Norway Collaboration, dated on February 3, 2016

In order to fulfill the functions mentioned above, the BRG is composed in the four (4) deputies on each specific function, and the organization chart is shown in below.

Table 3.1.2.4 Tasks and Functions of Deputies under BRG

Title	Tasks	Function
Planning and Cooperation (Deputy 1)	Planning and management of cooperation on peatland restoration	a. Planning, control and cooperation to provide restoration of peatland, b. Regional planning, mapping and zoning of protected areas and cultivation peat areas, c. Development of relations and cooperation abroad in order for financing needs, science and technology management of peat and peat restoration management, d. Coordination with appropriate regional coordinators on duties and functions, and e. Monitoring and evaluation in the field of planning and cooperation.
Construction, Operation and Maintenance	Carrying out the construction, operation and maintenance of	a. Rearrangement of management of burnt peat areas, b. Infrastructure construction for peat wetting (rewetting) and all the ancillary works, c. Conduct of operations and maintenance of infrastructure for peat

Title	Tasks	Function
(Deputy 2)	infrastructure on the peat wetting (rewetting)	wetting (rewetting) and all the ancillary works, d. Implementation of conservation techniques in the protected peat zones, e. Implementation of cultivation techniques in the peat cultivation areas with crops, fodder and a system suitable for the purposes of public welfare support, f. Coordination with appropriate regional coordinators on duties and functions, and g. Monitoring and evaluation in the field of construction, operation and maintenance.
Education, Socialization, Participation and Partnership (Deputy 3)	Socialization and education as well as participation and community support	a. Socialization and education about peat restoration, b. Mobilization and participation, and community support, c. Supevising in construction, operation and maintenance of infrastructure in cocession lands; d. Coordination with appropriate regional coordinators on duties and functions, and e. Monitoring and evaluation in the field of education socialization, participation and partnership.
Research and Development (Deputy 4)	Carrying out research and development	a. Research and development continuously for governing peatland hydrological units, b. Development of high conservation value forests on peatland to support the control of climate change, c. Coordination with appropriate regional coordinators on duties and functions, and d. Monitoring and evaluation in the field of research and development.

Sources: Presidential Decree No. 1 of 2016 on Peatland Restoration Agency (2016)

The Provincial BRG Teams has also being established in 7 provinces in order to facilitate the restoration activities in each province.

After establishing BRG on January 2016, progresses of some activities are as follows.

Table 3.1.2.5 Progress of Activities for Peatland Restoration by BRG (as of August 2016)

No.	Name of Activities	Quantity/ Areas/ No. KHGs, etc.	Progress	Brief Contents and Issues
1	Compilation of data and maps from Stakeholders	84 KHG cover about 2,6 million hectares	All of 84 KHG Indicative Maps on scale of 1:250,000 have been collected from KLHK	- The data distributed in Bappenas action 2011 – 2016 known as macro zoning - Data from KHLK created by PKG are for five (5) KHGs on scale of 1:50,000 for peat depth. Only one of these maps is the target of BRG action.
2	Planning of landscape and peat mappings	4 target KHG in 2016	Still waiting for the agreement from donor	- Planning should be done on June – July 2016. But the administration procedures still not completed yet. - At this moment, not sure yet when can be done or still can be done this next closed future months
3	Socialization to provinces	7 priority provinces	3 provinces have been done at Sumsel, Kalsel, and, Riau.	- During July and August - Still to be done in August depending on the structuring the Provincial Peat Restoration Team (TRGD). - Jambi soon will be finalized - Socialization of the actions, such as deep well, nursery, and canal blocking in Riau, and Central Kalimantan
4	Formulation of provincial BRG team (TRGD)	7 priority provinces	6 provinces have been done at Riau, Jambi, Sumsel, West Kalimantan, Central Kalimantan, South	- Headed by different local authorities such as Bappeda, Local Environment agency, local university expert - TRGD Papua is not yet formed.

No.	Name of Activities	Quantity/ Areas/ No. KHGs, etc.	Progress	Brief Contents and Issues
			Kalimantan	
5	Formulation of Peatland Restoration Work Plan	7 priority provinces	3 provinces have been done a Riau, South Kalimantan and West Kalimantan	- These work plans are not clear yet, due to lack of basic biophysical information.

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

(3) Ministry of Public Works and Public Housing (PU-PR)

The Sub-Directorate of Lowland under Directorate of Irrigation and Lowland, Directorate General of Water Resources under PU-PR, is the sub-directorate to manage the lowland areas, including peatland. Directorate General of Water Resources has the task of organizing the formulation and implementation of policies in the field of water resources management in accordance with the provisions of law. Sub-Directorate of Lowland is one of the sub-directorate under Director General of Water resources, and has the tasks of fostering the implementation of norms, standards, procedures, and criteria, advices to construction management, monitoring, evaluation, reporting progress and results of the audit of the construction, as well as fostering the preparation for the operation and maintenance of facilities and infrastructure in the lowland swamp areas.

The tasks of Sub-Directorate of Lowland are stipulated in the Ministerial Regulation No. 15/PRT/M/2015 as follows:

a. Fostering the implementation of norms, standards, procedures, and criteria on the activities in the lowland/ swamp;
b. Implementation of guidance on construction for lowland/ swamp control;
c. Implementation of the monitoring, evaluation and reporting of progress and results of the audit on the implementation of construction for lowland/ swamp; and
d. Implementation of preparation for the operation and maintenance of facilities and infrastructure in the lowland/ swamp.

Also, Sub-Directorate of Technical Guidance under Directorate of Irrigation and Lowland is also one of the sub-directorates, which provides guidance and technical assistance, management, making preparation plans of operation and maintenance of facilities and infrastructure, fostering the implementation of technical audit and preparation of detailed design document on the construction of irrigation and lowland/ swamp. The Sub-Directorate of Technical Guidance managed to implement the lowland (peatland) restoration based on the Master Plan for the Rehabilitation and Revitalization of the Ex-Mega Rice Project Area in Central Kalimantan, but due to the instruction of the Director General, this task has been transferred to the Sub-Directorate of Lowland.

3.1.3 Plans and Standards related to Peatland Management

Three (3) organizations; PKG, BRG and PU-PR, are the main organizations to conduct peatland restoration activities, and have issued / plan to issue plans and standards related to peatland management, including peatland monitoring.

(1) Plans and standards related to peatland management by PKG

From the time of establishing the organization after merging two ministries: Ministry of Environment and Ministry of Forestry, PKG is the main actor on peatland restoration and monitoring the restoration activities in Indonesia. Their target areas are all peatland in Indonesia, including both concession areas and APL land (community areas). In order for the effective and efficient implementation of peatland restoration, PKG has issued the following plans and documents.

Table 3.1.3.1 List of Plans and Standards on Peatland Restoration by PKG

<table>
<tr><th>No.</th><th>Name of Documents</th><th>Issued date / to-be-issued date</th><th>Brief Contents and Issues</th></tr>
<tr><td>1</td><td>Strategic Plan 2015-2019 for Directorate General of Pollution and Environmental Degradation Control</td><td>November 2015</td><td>- RENSTRA of the Directorate General of Pollution and Environmental Degradation Control
- Goals of 3 Sub-Directorates under PKG are:
<table>
<tr><th>Sub-Directorate</th><th>Goals</th><th>Main Activities</th></tr>
<tr><td>Inventory and Designation</td><td>Availability of data and inventory information and establishment of peatland ecosystem</td><td>- Peat distribution map (national, province, district level)</td></tr>
<tr><td>Peat Damage Control Planning</td><td>Effectiveness of planning of control of increasing peatland damage</td><td>- Draft Peat Ecosystem Protection and Management Plan (National, Province, district level)</td></tr>
<tr><td>Peat Ecosystem Conservation</td><td>Effectiveness of peatland damage control</td><td>- Restoration of peatland
- Monitoring peatland</td></tr>
</table></td></tr>
<tr><td>2</td><td>Report of Accomplishment in 2015 and the Work Plan 2016 of Sub-Directorate of Peat Ecosystem Conservation</td><td>April 2016</td><td>- Based on the RENSTRA, reporting the accomplishment of the Sub-directorate in 2015, and Work plan for 2016.
- The target areas have been changed and increased in extents as following table.
-</td></tr>
<tr><td>3</td><td>Strategic Plan 2015-2019 for Directorate of Peat Damage Control</td><td>August 2016</td><td>- Based on the RENSTRA for Directorate General of Pollution and Environmental Degradation Control, PKG established their own RENSTRA for 2015-2019.
- The target areas and quantities have been revised in accordance with the accomplishment in 2015 as following table.</td></tr>
<tr><td>4</td><td>Maps of Peatland Hydrological Unit (KHG)</td><td></td><td>- Map of Indonesian forestry land with different status such as area for protection, conservation, biodiversity, concession, etc.
- Mapping peat depth on scale of 1:250,000 based on existing map created by difference sources of maps such as Wetland International, BBSDLP (former Puslitanah), Former Ministry of Transmigration.
- Mapping peat depth in 1:50,000 scale (5 KHG has been done).</td></tr>
<tr><td>5</td><td>Minister for Environmental and Forestry Regulation No. P 14/ MENLHK/SETJEN/ KUM.1/2/ 2017 regarding Procedure for Inventory and Designation of Peat Ecosystem Function</td><td>February 2017</td><td>- The peat dome is determined based on natural drainage, peat depth, the surface land elevation, and land cover.
- This draft of MoEF regulation is for applying stipulations in Article 8 and Article 13 of Government Regulation No. 71 year 2014, dated on September 12, 2014, regarding Protection and Management of Peat Ecosystems.
- This ministerial regulation governs the implementation procedure for Inventory of Peatland Ecosystem Characteristics (by satellite imagery and/or aerial photography), implementation procedure for Stipulation of Peat Ecosystem Function (by involving community and delivering presentation of Map for Peat Moss Ecosystem Characteristics and</td></tr>
</table>

No.	Name of Documents	Issued date / to-be-issued date	Brief Contents and Issues
			Map for Peatland Ecosystem Function), and financing.
6	Minister for Environmental and Forestry Regulation No. P 15/ MENLHK/SETJEN/ KUM.1/2/2017 regarding Method of Measurement of Soil Water Table at Control Points in Peat Ecosystem	February 2017	- This draft of MoEF regulation is based on the Government Regulation No. 71/2014. - This ministerial regulation governs the planning, monitoring and reporting, evaluation, institutional setup, guidance and supervision, and financing on the water management for peat ecosystem. - Based on this ministerial regulation, any persons who conduct business / activities in the peat ecosystem require to conduct water management plan for peatland ecosystem, including setting water management zones, preparation of water management plan and determination of ground water monitoring points - As mentioned later, details on the ground water level monitoring are stipulated in the ministerial regulation, including selection procedure of measuring points, measuring items and frequency, reporting, and so on.
7	Minister for Environmental and Forestry Regulation No. P 16/ MENLHK/SETJEN/ KUM.1/2// 2017 regarding Technical Guideline of Recovery of Peat Ecosystem Function	February 2017	- This draft of MoEF regulation is based on the Government Regulation No. 71/2014 and under considerations into synchronizing the drafted Minister of Environmental and Forestry Regulation regarding Procedure for Inventory and Stipulation of Peat Ecosystem Function (being drafted) - This Ministerial Regulation is intended to provide a reference on implementation of the Peatland Ecosystem restoration for a. business and/or activities, b. Local government, c. Central government, and, d. community. - This ministerial regulation (draft) stipulates the recovery principles, damage criteria, liabilities to recover the peatland, and recovery goals. - This ministerial regulation (draft) governs the planning, implementation, monitoring and reporting, and evaluation on the peatland ecosystem restoration. - This regulation also stipulates the implementation methods for Peat Ecosystem Restoration at Peatland Hydrological Unit through: a. restoration of hydrological functions, b. rehabilitation of vegetation; and/or c. another way according to the development of science and technology.

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Feb. 2016)

Table 3.1.3.2 Target of Directorate of Peat Damage Control, by Performance Indicating Activity, planned in RENSTRA 2015-2019 for Directorate General of Pollution and Environmental Degradation Control

No.	Performance Indicating Activity	2014 (baseline)	Target				
			2015	2016	2017	2018	2019
1	Number of peatland ecosystems, mapped KHG	-	5KHG	3KHG	173 KHG	353 KHG	504 KHG
2	Number of peatland ecosystems, defined as peat protected functions			3KHG	173 KHG	353 KHG	504 KHG
3	Number of peatland, which are monitored quality status			3KHG	173 KHG	353 KHG	504 KHG
4	Area of degraded peatlands, restored	-	50ha	100ha	200ha	300ha	500ha

Sources: RENSTRA 2015-2019 (Director General of Pollution and Environmental Degradation Control) [73]

[73] Direktorat Jenderal Pengendalian Pencemaran dan Kerusakan Lingkungan. 2015 (9 Nov.). Rencana Strategis

However, due to the Performance Agreement in 2015, PKG has changed their target areas to recover the peatlands and increased the extents as following table.

Table 3.1.3.3 Differences in the Targets of Increasing the Recoverable Peatland Area

Goals		Increased peatland areas are recovered by 5% of the predetermined KHG						
No.	Indicator	2014 (baseline)	2015	2016	2017	2018	2019	Reasons in Difference
1	Target in RENSTRA 2015-2019	-	50ha	100ha	200ha	300ha	500ha	Locations are outside forest areas
2	Target in Performance Agreement in 2015	-	50ha	2,000ha	4,000ha	6,000ha	10,000ha	Locations in the forest areas and the areas outside forest areas

Sources: Sub-Directorate of Peat Damage Control. 2016. Performance Achievement Report 2015[74]

In August 2016, PKG has established the RENSTRA of their office, and revised the target areas and quantities in accordance with the updated data and information due to the accomplishment in 2015 as following table.

Table 3.1.3.4 Target of PKG, in RENSTRA 2015-2019 for Directorate of Peat Damage Control

No.	Performance Indicating Activity	2014 (baseline)	Target				
			2015	2016	2017	2018	2019
1	Number of peatland ecosystems, mapped KHG	-	5KHG	13KHG	232 KHG	453 KHG	657 KHG
2	Number of peatland ecosystems, defined as peat protected functions			5 KHG	13 KHG	17 KHG	30 KHG
3	Number of peatland, which are monitored quality status			30KHG	40 KHG	50 KHG	60 KHG
4	Area of degraded peatlands, restored	-	50ha	2,000ha	4,000ha	6,000ha	10,000ha

Sources: Directorate of Peat Damage Control. 2016. RENSTRA 2015-2019[75]

(2) Plans and standards related to peatland management by BRG

BRG is one of the main actors on peatland restoration in Indonesia. As BRG is the 5-year-limited organization, which has been established by Presidential Decree No.01/2016, in order to facilitate the peatland restoration in the seven (7) high priority provinces, and coordinate with related ministries and national agencies. After establishing the BRG on January 2016, BRG has been preparing following plans and documents for restoration of the peatland.

Table 3.1.3.5 Draft List of Plans and Standards on Peatland Restoration by BRG (As of Aug. 2016)

	Name of Documents	Issued date / to-be-issued date	Brief Contents and Issues
	BRG Five-Year Strategic Plan		- RENSTRA of BRG. - Completed by end of June 2016, and now under final approval. - RENSTRA plans that in 2016, planning for four (4) KHGs and in 2017, and implementation of the first four (4) KHGs and planning for 80 KHGs, and the rest of the years, plans implementation/action of the 84KHGs.
	Peatland Restoration Action Plan		- Based on the Five-year Strategic Plan, this action plan is prepared, which include the detailed planning in each site of the whole KHG, combined with hydrology, vegetation and socioeconomic actions.

Tahun 2015-2019

[74] Direktorat Pengendalian Kerusakan Gambut. 2016 (8 Apr.). Laporan Capaian Kinerja Tahun 2015 dan Capaian serta Rencana Kerja 2016 Sub. Direktorat Pengendalian Kerusakan

[75] Direktorat Pengendalian Kerusakan Gambut. 2016. RENSTRA Unit Kerja Direktorat Pengendalian Kerusakan Gambut

	Name of Documents	Issued date / to-be-issued date	Brief Contents and Issues
			- However, there is no progress on preparation, and there are no discussion among the Expert Team of BRG.
	Peatland Restoration Work Plan		- Based on the Peatland Restoration Plan, each provincial government need to prepare the work plan for each year. - As of August 2016, three (3) provinces; i.e. Riau, South Sumatra and Central Kalimantan, have created the work plans in the three provinces prioritized in 2016. - However, these work plans are not clear yet, due to lack of basic biophysical information.
	KHG mapping and zoning		- Make peat depth maps of the KHG in scale of 1: 50,000. - Make large-scale landscape maps of the KHG in scale of 1:2,500. - Prepare the Zoning Planning for each KHG, based on those maps above.
	Technical Guidelines		- Mostly drafted in June, 2016, and planned to be completed during July 2016, however, as of August, all of the guidelines are still under modification and/or re-editing. - Following guidelines are under preparation: ➢ Guideline on Peat Rewetting Infrastructure Construction ➢ Guideline on how to make the bore wells to prevent forest and peatland fires in Indonesia ➢ Guideline on establishing nurseries in peatlands ➢ Guideline on nursing seedlings for peatland forests ➢ Guideline on planting on peatland and maintenance ➢ Guideline on social safeguard for peatland restoration ➢ Guideline and manual on monitoring of ground water level

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

Peatland Restoration Agency Strategic Plan Year 2016-2020 (RENSTRA) is the fundamental and planning document for the overall implementation of peatland restoration period of 5 (five) years, starting from 2016 until 2020 in carrying out the mandate given by the Presidential Decree No. 1 of 2016. The RENSTRA for BRG is still under approval process. Based on the RENSTRA on the national level, the Peatland Restoration Work Plan, which is a planning document for the period of 1 (one) year, will be formulated by the provincial government, including the formulation of detailed activities and the amount of funding.

As far as the interviews in Aug. 2016 at Deputy of Planning and Cooperation, BRG, BRG has plans to conduct mapping as following table.

Table 3.1.3.6 Proposed Planned Mapping Activity of KHG by BRG

No.	Activity	Target					Remarks
		2016	2017	2018	2019	2020	
1	Mapping of KHG	4 KHG	24 KHG	24 KHG	-	-	

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

(3) Plans and standards related to peatland management by PU-PR

Directorate General of Water Resources in PU-PR is one of the main actors on peatland restoration in Indonesia. The Sub-Directorate of Lowland under Directorate of Irrigation and Lowland has responsibilities to protect and maintain especially lowland swamp areas, including peatland. Although there are not so much plans and documents, issued by PU-PR, related to peatland restoration, the following plans and documents are related documents on the peatland.

Table 3.1.3.7 List of Plans and Standards on Peatland Restoration by PU-PR

No.	Name of Documents	Issued date / to-be-issued date	Brief Contents and Issues

No.	Name of Documents	Issued date / to-be-issued date	Brief Contents and Issues
1	Master Plan for the Rehabilitation and Revitalization of the Ex-Mega Rice Project Area in Central Kalimantan	October 2008	- Strategic framework and guidance for the implementation of Presidential Instruction 2/2007. - A spatial zoning of the area is proposed based on natural hydrological landscape units that defines four main management zones: Protection Zone (773,500 ha), Limited Development Buffer Zone (353,500 ha), Development Zone (295,500 ha) and Coastal Zone (40,000ha). - Six main programs are proposed: (1) Fire prevention and management, (2) Spatial management and infrastructure, (3) Sustainable forest & peatland management and conservation, (4) Agricultural revitalization, (5) Community empowerment and socioeconomic development and (6) Institutional development and capacity building.
2	Strategic Plan 2015-2019 for Directorate General of Water Resources	December 2015	- RENSTRA of the Directorate General of Water Resources under PU-PR. Not so much descriptions on swamp (peatland) management are mentioned.

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

(4) Other related ministries and government agencies

Aside from those three (3) ministries and agency mentioned above, those organizations also have plans and activities related to peatland restoration.

Table 3.1.3.8 List of Plans and Standards on Peatland Restoration by Other related Ministries and Government Agencies

Organizations	Plans and Documents
Local government, TRGD	-
BIG (Badan Informasi Geospasial: Geospatial Information Agency)	- Technical team for mapping - Data acquisition especially from satellite imagery such as landsat and DEM (landscape morphology)
BBSDLP (Balai Besar Litbang Sumberdaya Lahan Pertanian: Center for Research and Development on Agricultural Land Resources)	- Guidance soil survey in different published scale, coincide with the Soil Survey Manual - Data acquisition for peat depth mapping (by BBSDLP, Ministry of Agriculture)
BPN (Badan Pertanahan Nasional: National land Agency)	- Mapping land status in APL (out of forestry land) in different scale

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

3.2 Current Conditions, Issues and Needs and Technical Review in Relation to Peatland Monitoring

3.2.1 Peatland Hydrological Units (KHG)

(1) National Indicative Maps

From the updated data derived from Indicative Map Description on National Peatland Hydrological Unit (2015), which is supervised by PKG, 26 million ha are covered as Peatland Hydrological Units (KHG: Kesatuan Hidrologis Gambut) as shown in the following table.

Table 3.2.1.1 Summary of Areas of Peatland Hydrological Units (KHG) per Province

Province	No. of KHG	Area of KHG (ha)			
		Peatland	Mineral Soil land	Total	%
Aceh	40	215,636	121,307	336,943	3.5
Bangka-‐Belitung	17	44,842	69,746	114,587	1.2

Province	No. of KHG	Area of KHG (ha)			
		Peatland	Mineral Soil land	Total	%
Bengkulu	3	12,038	10,724	22,762	0.2
Jambi	12	617,142	312,061	929,203	9.6
Kepulauan- - Riau	4	7,874	8,121	15,995	0.2
Lampung	5	49,504	58,697	108,200	1.1
Riau	48	3,848,583	1,248,741	5,097,325	52.8
Sumatera Barat	12	94,883	51,053	145,936	1.5
Sumatera Selatan	26	1,206,006	1,150,280	2,356,286	24.4
Sumatera Utara	24	290,131	233,811	523,941	5.4
Total Sumatra	**186**	**6,386,638**	**3,264,540**	**9,651,179**	**100**
Kalimantan Barat	91	1,670,368	1,353,639	3,024,007	34.4
Kalimantan Selatan	4	105,021	235,788	340,810	3.9
Kalimantan Tengah	32	2,778,621	1,865,697	4,644,317	52.8
Kalimantan Timur	12	165,161	248,268	413,430	4.7
Kalimantan Utara	10	170,744	197,649	368,393	4.2
Total Kalimantan	**147**	**4,889,915**	**3,901,041**	**8,790,957**	**100**
Sulawesi Barat	2	14,087	17,195	31,282	64.9
Sulawesi Tengah	3	9,720	7,213	16,933	35.1
Total Sulawesi	**5**	**23,807**	**24,408**	**48,215**	**100**
Papua	198	2,587,408	3,466,724	6,054,132	77
Papua Barat	122	971,142	838,352	1,809,494	23
Total Papua	**320**	**3,558,550**	**4,305,076**	**7,863,626**	**100**
Total	**658**	14,858,911	11,495,065	26,353,976	

Sources: MoEF. 2015. Indicative Map Description on National Peatland Hydrological Unit)

(2) 7 prioritized provinces

Among all the KHGs in four (4) islands, the seven (7) provinces are selected as the priority provinces to restore peatland by the Presidential Decree No. 1 of 2016, from the point of view of the extension of the peatland. Based on the data from the Indicative Map Description on National Peatland Hydrological Unit (2015), among the total areas of KHGs (26.4 million ha), approximately 76 % of the KHGs in the areas (20.2 million ha) are located in the priority seven provinces as listed in the following table.

Table 3.2.1.2 Summary of Areas of Peatland Hydrological Units (KHG) in the Seven Priority Provinces

No	Island/ Region	Province	No. of KHG	Area of KHG (ha)			Percentage	
				Peatland	Mineral Soil land	Total	In total of 7 provinces	In total of all KHG
1	Sumatera	Total Sumatra	86	5,671,731	2,711,082	8,382,814	41.7%	31.8%
		Riau	48	3,848,583	1,248,741	5,097,325	25.3%	19.3%
		Jambi	12	617,142	312,061	929,203	4.6%	3.5%
		Sumatera Selatan	26	1,206,006	1,150,280	2,356,286	11.7%	8.9%
2	Kalimantan	Total Kalimantan	127	4,554,010	3,455,124	8,009,134	39.8%	30.4%
		Kalimantan Barat	91	1,670,368	1,353,639	3,024,007	15.0%	11.5%
		Kalimantan Tengah	32	105,021	235,788	340,810	1.7%	1.3%
		Kalimantan Selatan	4	2,778,621	1,865,697	4,644,317	23.1%	17.6%
3	Papua	Total Papua	198	2,587,408	3,466,724	6,054,132	30.1%	23.0%
		Papua	198	2,587,408	3,466,724	6,054,132	30.1%	23.0%
Total of 7 Priority Provinces			411	9,728,826	10,388,572	20,117,398	100.0%	76.3%
Total of 4 islands/ Region			656	14,858,911	11,495,065	26,353,976		100.0%

Sources: MoEF. 2015, Indicative Map Description on National Peatland Hydrological Unit (2015)

3.2.2 Peatland to be restored

(1) National-wise peatland

Basically, the peatland areas in Indonesia are delineated into KHGs by Ministry of Environment through Indicative Map Description on National Peatland Hydrological Unit (2015), as mentioned above. After establishing BRG on January 2016, BRG is focusing on the peatland areas in seven (7) priority provinces, whilst PKG under MOEF is focusing on peatland areas other than seven (7) provinces and peatland used by the concession holders in all the provinces. During the first half of 2016, both offices use the same original data set on

the peatland, but analyze those data separately. Therefore, there become some discrepancies in the areas, which are analyzed by them. In order to unify the data of the peatland, both offices agreed to use the same data (areas of peatland) at the Peat Restoration Technical Coordination Meeting (RAKORNIS), held on June 21 and 22, 2016 at Jakarta.

For the peatland areas in the national level, PKG analyzed the existing data and information by using criteria below. These criteria (*1 in the table: Priority I ~ Priority VIII) are used for the RAKORNIS on June 21 and 22, 2016, and the areas are agreed among PKG and BRG. After RAKORNIS, both PKG and BRG also agreed to revise the criteria, and both are re-calculating the areas by the re-classed criteria (*2 in the table).

Table 3.2.2.1 Matrix of Criteria Determination by PKG

Criteria *1	Peat Dome	Fire	Land Cover Change	Drainage	Code of Re-Classed Criteria *2	Criteria (Re-Class) *2
Priority I	Peat Dome	Burned	Not Moratorium	Canal	1	Priority
				Non Canal	3	Priority
Priority II			Moratorium	Canal	5	Priority
				Non Canal	7	Priority
Priority III		Not Burned	Not Moratorium	Canal	9	Moratorium
				Non Canal	11	Moratorium
Priority IV			Moratorium	Canal	13	Moratorium
				Non Canal	15	Moratorium
Priority V	Non Dome	Burned	Not Moratorium	Canal	2	Priority
				Non Canal	4	Priority
Priority VI			Moratorium	Canal	6	Priority
				Non Canal	8	Priority
Priority VII		Not Burned	Not Moratorium	Canal	10	Non Priority
				Non Canal	12	Non Priority
Priority VIII			Moratorium	Canal	14	Moratorium
				Non Canal	16	Moratorium

*Note: *1: Criteria by PKG as of RAKORNIS, on June 21 and 22, 2016, *2: Re-classed criteria, after discussion at RAKORNIS, on June 21 and 22, 2016*
Sources: Indicative Map Description on National Peatland Hydrological Unit (2015)

The following tables show the indicative areas of Peatland Hydrological Unit (KHG) in all the provinces by restoration priority, indicated in the table above, and function, prepared by PKG. The criteria on priority is based on the peat dome, burned/ not burned, and land cover (concession or non-concession).

Table 3.2.2.2 Indicative Area of Peatland Hydrological Unit (KHG) for Peat Ecosystem Restoration, prepared by PKG

Provinse	Priority I (Dome-Burned-NonConcession)	Priority II (Dome-Burned-Concession)	Priority III (Dome-NonBurned-NonConcession)	Priority IV (Dome-NonBurned-Concession)	Priority V (Non Dome-Burned-NonConcession)	Priority VI (Non Dome-Burned-Concession)	Priority VII (Non Dome-NonBurned-NonConcession)	Priority VIII (Non Dome-NonBurned-Concession)	Total (Ha)
Aceh	567	139	118,432	71,576	146	52	111,920	33,509	336,341
Bangka-Belitung	1,268	983	29,114	12,186	386	841	50,354	19,055	114,189
Bengkulu	48		11,801	0			10,808	18	22,676
Jambi	29,855	23,828	323,809	159,276	25,954	5,931	374,259	76,885	1,019,797
Kepulauan Riau			7,707	142			6,190	1,819	15,857
Lampung	2,308		53,676	35	480		51,416	55	107,971
Riau	30,563	44,238	966,993	1,192,596	28,339	15,955	1,876,070	941,060	5,095,814
Sumatera Barat	1,595		60,275		811		64,725	18,167	145,573
Sumatera Selatan	104,130	173,664	403,954	405,686	76,953	101,804	815,409	293,812	2,375,412
Sumatera Utara	487	191	185,113	81,987	122	31	224,138	34,136	526,205
Total Sumatera	**170,821**	**243,044**	**2,160,875**	**1,923,485**	**133,191**	**124,615**	**3,585,288**	**1,418,515**	**9,759,834**
Kalimantan Barat	13,248	1,283	595,065	275,712	39,457	3,178	1,644,589	481,144	3,053,676
Kalimantan Selatan	10,564	2,100	79,870	8,849	35,578	1,261	160,716	18,542	317,480
Kalimantan Tengah	187,859	15,644	1,166,553	118,913	280,460	32,078	2,390,546	297,264	4,489,316
Kalimantan Timur	1,052	37	133,168	17,783	729	325	204,963	50,720	408,778
Kalimantan Utara	0	2,074	81,407	37,589	729	914	154,051	82,362	359,127
Total Kalimantan	**212,724**	**21,138**	**2,056,062**	**458,846**	**356,954**	**37,757**	**4,554,865**	**930,032**	**8,628,377**
Sulawesi Barat	0	0	7,942	3,773	0	0	12,702	15,348	39,766
Sulawesi Tengah	0	0	7,844	49	0	0	12,368	118	20,378
Total Sulawesi	**0**	**0**	**15,786**	**3,822**	**0**	**0**	**25,070**	**15,466**	**60,144**
Papua	31,496	6,414	2,041,372	492,249	14,567	3,586	2,033,843	898,514	5,522,042
Papua Barat	1,041	1,511	464,730	130,093	2,336	1,021	549,660	268,857	1,419,249
Total Papua	**32,537**	**7,926**	**2,506,103**	**622,342**	**16,903**	**4,606**	**2,583,504**	**1,167,372**	**6,941,292**
Total Indonesia	**416,082**	**272,108**	**6,738,827**	**3,008,494**	**507,048**	**166,978**	**10,748,726**	**3,531,385**	**25,389,647**

Sources: Directorate General of Pollution and Environmental Degradation Control.2016. Presentation at BRG Peat Restoration Technical Coordination Meeting (22 Jun. 2016) [76]

When reviewing the peatland areas by existence of fires, concession and functions (Protected function area [Protected forest function, Protected function], Cultivation function area [Cultivated land function, Cultivation function]), among 10.4 million hectare protected areas, only 0.7 million hectares are burned areas, and rest of them are non-burned areas. In concession area 0.3 million hectares are burned area and 3 million hectares are non- burned areas. And among 15 million hectares of cultivation areas, only 0.7 million hectares are burned areas, and rest of them are non-burned areas, in which 0.2 million hectares are concession areas, and in which there occur many fires in the non-concession areas.

[76] Direktorat Pengendalian Pencemaran dan Kerusakan Lingkungan, KLHK. 22 Juni 2016. Peta Kesatuan Hidrologi Gambut (KHG), Indikatif Fungsi Lindung Gambut, dan Areal Restorasi Ekosistem Gambut Sumatera, Kalimantan dan Papua

Table 3.2.2.3 Indicative Area of Peatland Hydrological Unit (KHG) for Peat Ecosystem Restoration by Function, prepared by PKG

Provinse	Indicative Function for Protected Forest				Total for Protected Forest (Ha)	Indicative Function for Cultivation				Total for Cultivation Area (Ha)	Total (Ha)
	Burned Area		Non-Burned Area			Burned Area		Non-Burned Area			
	Concession	Non Concession	Concession	Non Concession		Concession	Non Concession	Concession	Non Concession		
Aceh	139	567	71,576	118,432	190,715	52	146	33,509	111,920	145,627	336,341
Bangka-belitung	983	1,268	12,186	29,114	43,552	841	386	19,055	50,354	70,637	114,189
Bengkulu		48	0	11,801	11,849			18	10,808	10,826	22,676
Jambi	23,828	29,855	159,276	323,809	536,768	5,931	25,954	76,885	374,259	483,029	1,019,797
Kepulauan-riau			142	7,707	7,849			1,819	6,190	8,008	15,857
Lampung		2,308	35	53,676	56,020		480	55	51,416	51,951	107,971
Riau	44,238	30,563	1,192,596	966,993	2,234,390	15,955	28,339	941,060	1,876,070	2,861,425	5,095,814
Sumatera Barat		1,595		60,275	61,870		811	18,167	64,725	83,703	145,573
Sumatera Selatan	173,664	104,130	405,686	403,954	1,087,434	101,804	76,953	293,812	815,409	1,287,978	2,375,412
Sumatera Utara	191	487	81,987	185,113	267,779	31	122	34,136	224,138	258,426	526,205
Total Sumatera	**243,044**	**170,821**	**1,923,485**	**2,160,875**	**4,498,225**	**124,615**	**133,191**	**1,418,515**	**3,585,288**	**5,261,609**	**9,759,834**
Kalimantan Barat	1,283	13,248	275,712	595,065	885,307	3,178	39,457	481,144	1,644,589	2,168,369	3,053,676
Kalimantan Selatan	2,100	10,564	8,849	79,870	101,383	1,261	35,578	18,542	160,716	216,097	317,480
Kalimantan Tengah	15,644	187,859	118,913	1,166,553	1,488,969	32,078	280,460	297,264	2,390,546	3,000,347	4,489,316
Kalimantan Timur	37	1,052	17,783	133,168	152,039	325	729	50,720	204,963	256,738	408,778
Kalimantan Utara	2,074		37,589	81,407	121,071	914	729	82,362	154,051	238,057	359,127
Total Kalimantan	**21,138**	**212,724**	**458,846**	**2,056,062**	**2,748,770**	**37,757**	**356,954**	**930,032**	**4,554,865**	**5,879,608**	**8,628,377**
Sulawesi Barat	0	0	3,773	7,942	11,716	0	0	15,348	12,702	28,050	39,766
Sulawesi Tengah	0	0	49	7,844	7,893	0	0	118	12,368	12,486	20,378
Total Sulawesi	**0**	**0**	**3,822**	**15,786**	**19,608**	**0**	**0**	**15,466**	**25,070**	**40,536**	**60,144**
Papua	6,414	31,496	492,249	2,041,372	2,571,533	3,586	14,567	898,514	2,033,843	2,950,510	5,522,042
Papua Barat	1,511	1,041	130,093	464,730	597,375	1,021	2,336	268,857	549,660	821,874	1,419,249
Total Papua	**7,926**	**32,537**	**622,342**	**2,506,103**	**3,168,907**	**4,606**	**16,903**	**1,167,372**	**2,583,504**	**3,772,384**	**6,941,292**
Total Indonesia	**272,108**	**416,082**	**3,008,494**	**6,738,827**	**10,435,510**	**166,978**	**507,048**	**3,531,385**	**10,748,726**	**14,954,137**	**25,389,647**

Sources: Directorate General of Pollution and Environmental Degradation Control.2016. Presentation at BRG Peat Restoration Technical Coordination Meeting (22 Jun. 2016) [77]

When reviewing the peatland areas by land estate status and functions, 1.5 million hectare APL[78] areas are included in the Protection-function peatland, with total areas of 11 million hectares, whilst, 11 million hectare forest areas are included in the cultivation functioned peatland, with total areas 14.3 million hectares.

[77] Direktorat Pengendalian Pencemaran dan Kerusakan Lingkungan, KLHK. 22 Juni 2016. Peta Kesatuan Hidrologi Gambut (KHG), Indikatif Fungsi Lindung Gambut, dan Areal Restorasi Ekosistem Gambut Sumatera, Kalimantan dan Papua

[78] APL (Areal Penggunaan Lain): Land outside the forest estate designated for no forestry use such as agriculture, settlement, etc.

Table 3.2.2.4 Numbers and Areas of Peatland Hydrological Unit (KHG) by Ecosystem Function in the National Level, prepared by PKG

Province	No. of KHG	Protection-function Peatland		Sub Total (Ha)	Cultivation-function Peatland		Sub Total (Ha)	Total (Ha)
		APL	Forest Area		APL	Forest Area		
Aceh	40	115,177	75,887	191,064	117,073	28,204	145,277	336,341
Bangka-Belitung	17	5,061	59,005	64,066	16,088	34,035	50,123	114,189
Bengkulu	3	11,276	1,134	12,409	10,017	250	10,267	22,676
Jambi	12	221,687	330,286	551,972	312,260	155,565	467,825	1,019,797
Kepulauan Riau	4		8,020	8,020		7,837	7,837	15,857
Lampung	5	53,568	2,650	56,218	44,695	7,058	51,753	107,971
Riau	48	4,770	2,278,387	2,283,156	43,262	2,769,396	2,812,658	5,095,814
Sumatera Barat	12	45,363	34,266	79,628	59,100	6,844	65,944	145,573
Sumatera Selatan	26	346,300	858,147	1,204,447	514,809	656,156	1,170,965	2,375,412
Sumatera Utara	24	54,165	215,230	269,395	84,815	171,996	256,810	526,205
Total Sumatera	**186**	**857,366**	**3,863,010**	**4,720,376**	**1,202,120**	**3,837,339**	**5,039,459**	**9,759,834**
Kalimantan Barat	91	330,599	682,986	1,013,585	1,228,462	811,629	2,040,091	3,053,676
Kalimantan Selatan	4	70,066	31,317	101,383	167,730	48,367	216,097	317,480
Kalimantan Tengah	32	1,146	1,487,823	1,488,969	47,566	2,952,782	3,000,347	4,489,316
Kalimantan Timur	12	92,062	59,978	152,039	195,642	61,096	256,738	408,778
Kalimantan Utara	10	75,374	45,697	121,071	163,587	74,469	238,057	359,127
Total Kalimantan	**147**	**569,247**	**2,307,800**	**2,877,047**	**1,802,987**	**3,948,343**	**5,751,330**	**8,628,377**
Sulawesi Barat	2	11,171	6114.62	17,286	17,779	4701.04	22,480	39,766
Sulawesi Tengah	3	7,871	349.33	8,220	11,083	1075.06	12,158	20,378
Total Sulawesi	**5**	**19,042**	**6463.95**	**25,506**	**28,862**	**5,776**	**34,638**	**60,144**
Papua	198	90,081	2,625,131	2,715,212	157,569	2,649,262	2,806,831	5,522,042
Papua Barat	122	23,374	643,689	667,063	86,738	665,448	752,186	1,419,249
Total Papua	**320**	**113,455**	**3,268,820**	**3,382,275**	**244,307**	**3,314,710**	**3,559,017**	**6,941,292**
Total	**658**	**1,559,109**	**9,446,095**	**11,005,204**	**3,278,275**	**11,106,168**	**14,384,443**	**25,389,647**

Sources: Directorate General of Pollution and Environmental Degradation Control.2016. Presentation at BRG Peat Restoration Technical Coordination Meeting (22 Jun. 2016) [79]

(2) Seven (7) prioritized provinces

In accordance with Prepres 01/2016, seven (7) provinces are targeted as the priority provinces; namely, Jambi, Riau, South Sumatra, West Kalimantan, Central Kalimantan, South Kalimantan and Papua. Based on the data from Director General of PPKL (2016), among the 656 KHGs in the national level of Indonesia, 411 KHGs (63%), equivalent to approximately 21.9 million hectares (86%) of KHG areas are located in these 7 provinces, which include the peatland and non-peatland. Also concession areas are inclusive.

Table 3.2.2.5 Numbers and Areas of Peatland Hydrological Unit (KHG) by Ecosystem Function in the 7 Priority Provinces, prepared by PKG

Province	No. of KHG	Protection-function Peatland		Sub Total (Ha)	Cultivation-function Peatland		Sub Total (Ha)	Total (Ha)
		APL	Forest Area		APL	Forest Area		
Jambi	12	221,687	330,286	551,972	312,260	155,565	467,825	1,019,797
Riau	48	4,770	2,278,387	2,283,156	43,262	2,769,396	2,812,658	5,095,814
Sumatera Selatan	26	346,300	858,147	1,204,447	514,809	656,156	1,170,965	2,375,412
Total Sumatera	**86**	**572,756**	**3,466,820**	**4,039,576**	**870,331**	**3,581,116**	**4,451,447**	**8,491,023**
Kalimantan Barat	91	330,599	682,986	1,013,585	1,228,462	811,629	2,040,091	3,053,676
Kalimantan Selatan	4	70,066	31,317	101,383	167,730	48,367	216,097	317,480
Kalimantan Tengah	32	1,146	1,487,823	1,488,969	47,566	2,952,782	3,000,347	4,489,316
Total Kalimantan	**127**	**401,812**	**2,202,126**	**2,603,937**	**1,443,758**	**3,812,777**	**5,256,535**	**7,860,472**
Papua	198	90,081	2,625,131	2,715,212	157,569	2,649,262	2,806,831	5,522,042
Total Papua	**198**	**90,081**	**2,625,131**	**2,715,212**	**157,569**	**2,649,262**	**2,806,831**	**5,522,042**
Total	**411**	**1,064,649**	**8,294,076**	**9,358,725**	**2,471,658**	**10,043,155**	**12,514,813**	**21,873,538**

Sources: Directorate General of Pollution and Environmental Degradation Control.2016. Presentation at BRG

[79] Direktorat Pengendalian Pencemaran dan Kerusakan Lingkungan, KLHK. 22 Juni 2016. Peta Kesatuan Hidrologi Gambut (KHG), Indikatif Fungsi Lindung Gambut, dan Areal Restorasi Ekosistem Gambut Sumatera, Kalimantan dan Papua

Peat Restoration Technical Coordination Meeting (22 Jun. 2016) [80]

(3) BRG Targeted Sites in 7 prioritized provinces

As far as the interview with Deputy of Planning and Cooperation, BRG in Aug. 2016, 408 KHGs, equivalent to approximately 21.7 million hectares are the target KHGs for BRG. Among those areas, approximately 12.9 million hectares are peat areas, in which 8.9 million hectares are defined as the peat dome areas.

Table 3.2.2.6 Areas of Peatland Hydrological Units (KHG) in the Seven Priority Provinces prepared by BRG

No.	Island/ Region	Province	Numbers of KHG	Areas of KHG	Peat Areas	Peat Dome Area	Non-Peat Area
				(ha)	(ha)	(ha)	(ha)
1	Sumatera	Total Sumatra	84	8,463,077	5,685,156	3,839,732	2,777,921
		Riau	47	5,047,104	3,861,400	2,233,020	1,185,704
		Jambi	12	1,409,314	617,561	1,073,057	791,753
		Sumatera Selatan	25	2,006,659	1,206,195	533,655	800,464
2	Kalimantan	Total Kalimantan	125	7,696,173	4,594,584	2,475,551	3,101,589
		Kalimantan Barat	91	2,985,778	1,679,950	885,199	1,305,828
		Kalimantan Tengah	30	4,330,434	2,811,078	1,488,969	1,519,356
		Kalimantan Selatan	4	379,960	103,556	101,383	276,404
3	Papua	Total Papua	226	6,054,132	4,503,966	674,161	1,550,166
		Papua	199	5,515,056	2,652,747	2,574,493	2,862,309
Total of 7 Priority Provinces			408	21,674,305	12,932,487	8,889,777	8,741,818

Sources: Deputy of Planning and Cooperation, BRG. 2016. Presentation at the Coordination Meeting, held on August 9, 2016 at Palembang[81]

BRG, in cooperation with PKG, defined the criteria for peatland restoration, as following table, by using the four (4) indicators, namely fire (burned), peat dome, with/without canals, and land cover (forest, or non-forest). Tables below explain the classification of criteria for peatland restoration, and matrix to determine the criteria by BRG.

Table 3.2.2.7 Classification of Criteria for Restoration of Peatland by BRG

Class/ Criteria	Details
Restoration Priority Post-Burn Incident in 2015	The area of peatland, which were burned in 2015, covering the entire peatlands licensed or not-licensed, dome or not-dome, with canal or without canal, cultivated areas or protected areas.
Restoration Priority of Peat Dome with Canals (protected zone)	The peat dome areas with canals. Although there was not burned in 2015, but have been historically affected by fire. These areas should be categorized as the protected zone.
Restoration Priority of Peat Dome without canal (protected zone)	The peat dome areas that have not developed well / canals have not been constructed, or licensed / not-licensed. These areas consist of peat areas which have been designated as regional moratorium (PIPPIB Rev X), and peat areas, of which licenses are still intact. These areas should be categorized as the protected zone.
Restoration priority of shallow peat with canal (cultivation zone);	The non-peat dome areas that have been cleared for cultivation, indicated by the construction of canals, but suffered a fire in 2015 or in previous years. The hydrological management should be monitored for those areas, in order to prevent from not easily burned.

Sources: Deputy of Planning and Cooperation, BRG. 2016. Presentation at the Coordination Meeting, held on August 9, 2016 at Palembang[82]

[80] Direktorat Pengendalian Pencemaran dan Kerusakan Lingkungan, KLHK. 22 Juni 2016. Peta Kesatuan Hidrologi Gambut (KHG), Indikatif Fungsi Lindung Gambut, dan Areal Restorasi Ekosistem Gambut Sumatera, Kalimantan dan Papua

[81] Deputi Perencanaan dan Kerjasama, BRG. 9 Agustus 2016. Rencana Kerja dan Peta Indikatif Prioritas Restorasi di Sumatera Selatan

[82] Deputi Perencanaan dan Kerjasama, BRG. 9 Agustus 2016. Rencana Kerja dan Peta Indikatif Prioritas Restorasi di Sumatera Selatan

Table 3.2.2.8 Matrix of Criteria Determination by BRG

Fire	Peat Dome	Canal	Forest	Class
1	1	1	1	Restoration Priority Post-Burn Incident in 2015
			0 (non)	Restoration Priority Post-Burn Incident in 2015
		0 (non)	1	Restoration Priority Post-Burn Incident in 2015
			0 (non)	Restoration Priority Post-Burn Incident in 2015
	0 (non)	1	1	Restoration Priority Post-Burn Incident in 2015
			0 (non)	Restoration Priority Post-Burn Incident in 2015
		0 (non)	1	Restoration Priority Post-Burn Incident in 2015
			0 (non)	Restoration Priority Post-Burn Incident in 2015
0 (non)	1	1	1	Restoration Priority of Peat Dome with canal (protected zone)
			0 (non)	Restoration Priority of Peat Dome with canal (protected zone)
		0 (non)	1	Restoration Priority of Peat Dome without canal (protected zone)
			0 (non)	Restoration Priority of Peat Dome without canal (protected zone)
	0 (non)	1	1	Restoration priority of shallow peat with canal (cultivation zone)
			0 (non)	Restoration priority of shallow peat with canal (cultivation zone)
		0 (non)	1	Restoration Priority of Peat Dome without canal without canal (protected zone)
			0 (non)	Restoration priority of shallow peat without canal (cultivation zone)

Sources: Deputy of Planning and Cooperation, BRG (2016). Presentation at the Coordination Meeting, held on August 9, 2016 at Palembang[83]

By using the above-mentioned criteria, BRG categorized peatland in the seven priority provinces as the following table, as of August 2016. Those figures are subject to change.

Table 3.2.2.9 Breakdown of the Peatland Hydrological Unit (KHG) by Criteria by BRG in the Seven Priority Provinces

Restoration Priority	Riau	Jambi	South Sumatra	West Kalimantan	Central Kalimantan	South Kalimantan	Papua	Total
Restoration Priority Post-Burn Incident in 2015	104,299	64,722	288,821	31,811	335,194	12,739	38,115	875,701
Restoration Priority of Peat Dome with canal (protected zone)	1,397,042	243,319	548,757	257,176	291,142	45,593	8,042	2,791,071
Post-Fire Restoration Priorities 2015 (protected zone)	942,378	208,134	142,600	888,122	1,409,969	32,775	2,550,513	6,174,491
Restoration priority of shallow peat with canal (cultivation zone)	1,417,682	101,386	226,018	502,840	774,773	12,449	56,077	3,091,225
Total (ha)	3,861,401	617,561	1,206,196	1,679,949	2,811,078	103,556	2,652,747	12,932,488

Sources: Prepared by the breakdown of priority peatland and derived from the Priority Restoration Maps prepared by BRG (as of August 2016)

[83] Deputi Perencanaan dan Kerjasama, BRG. 9 Agustus 2016. Rencana Kerja dan Peta Indikatif Prioritas Restorasi di Sumatera Selatan

Among the breakdown of the peatland hydrological unit by criteria, BRG re-iterated to analyze and calculate the prioritized peatland, corresponding to the BRG's target areas: restoration of more than 2 million hectare, as following table (see the details of calculation in Annex Volume). However, the figures below are still subject to change.

Table 3.2.2.10 Restoration Priority Areas in the seven Priority Provinces (Restoration target 1)

Restoration Priority	Protected Areas (Kawasan Lindung)				Cultivation Area (Kawasan Budidaya)		
	Licensed Areas (overlapped)			Encroachment *1	Licensed Areas		
	HPH	HTI	HGU		HPH	HTI	HGU
Restoration Priority Post-Burn Incident in 2015	6	447	0	225,881	15,335	215,594	23,047
Restoration Priority of Peat Dome with canal (protected zone)	7	2,057	3,653	195,740	20,961	820,540	315,467
Restoration priority of shallow peat with canal (cultivation zone)	141	1,151	8	263,292	-	-	-
Sub-Total	155	3,654	3,661		36,296	1,036,134	338,514
Total	7,471			684,913	1,410,943		
Restoration Target	2,103,327						

Note: **1: Encroachment Area (Perambahan) mean the un-licensed areas in the protected areas.*
**2: HPH: Logging concession, HTI: Industrial Forest Plantation Concession, HGU: Palm Oil Plantation Concession*

Sources: *Prepared by re-analysis of the results by BRG to estimate the areas for priority peatland and target areas (as of August 2016)*

In addition to the 2-million-hectare peatland restoration, BRG has set the targets related to the peatland restoration: Restoration Target 2: Support Activity of Restoration, and Restoration Target 3: Deconcentration to Local Government, as following tables.

Table 3.2.2.11 Restoration Priority Areas in the seven Priority Provinces (Restoration target 2)

Restoration Priority	Category	Licensed Areas *1			Un-Licensed Areas	Total
		HPH	HTI	HGU		
Post-Fire Restoration Priorities 2015 (protected zone)	Protected areas	2,678	12,979	0		15,657
	Cultivated areas with no canal	464,356	593,767	20,420		1,078,543
	Open areas	2,140	188	0		2,328
	Un-licensed Cultivated areas				2,906,972	2,906,972
	Sub-total	469,174	606,935	20,420	2,906,972	4,003,500
Restoration priority of shallow peat with canal (cultivation zone)		70,054	502,931	176,309		749,294
	Sub-total	70,054	502,931	176,309	0	749,294
Total		539,228	1,109,866	196,729	2,906,972	4,752,795

Note: **1: HPH: Logging concession, HTI: Industrial Forest Plantation Concession, HGU: Palm Oil Plantation Concession*

Sources: *BRG (2016), Presentation for UNDP Climate Dialogue on Fighting Fires and Restoring Peatland in Indonesia on August 29, 2016*[84]

[84] Nazir Foead, BRG (2016): Recovery andn Restoration of Indonesian Peatland, Presentation for UNDP Climate

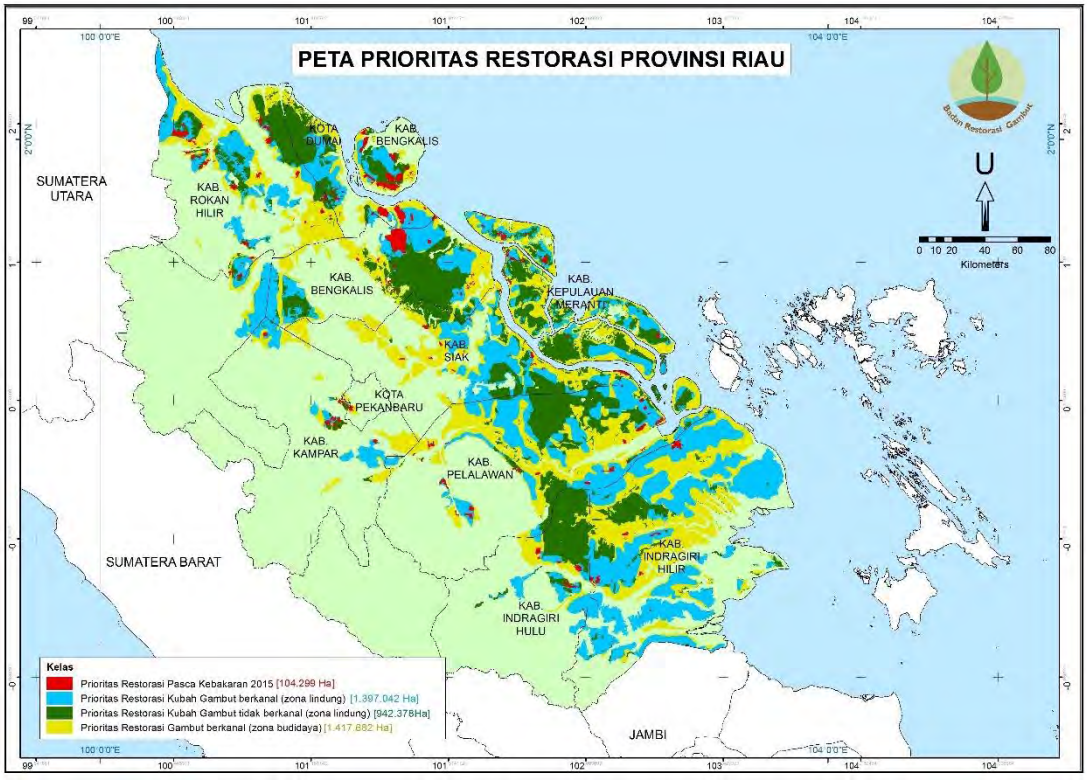
Table 3.2.2.12 Restoration Priority Areas in the seven Priority Provinces (Restoration target 3)

Restoration Priority	Cultivation Area (Kawasan Budidaya)			Total	Remarks
	Un-Licensed Areas				
	Forest	Farmland	Open Area		
Restoration Priority Post-Burn Incident in 2015	0	242,834	154,111	396,945	
Restoration Priority of Peat Dome with canal (protected zone)	64,519	1,266,347	116,382	1,447,248	Convert to Protected Area after restoration
Restoration priority of shallow peat with canal (cultivation zone)	88,581	1,774,969	201,082	2,064,632	Cultivated areas
Total	153,100	3,284,150	471,576	3,908,825	

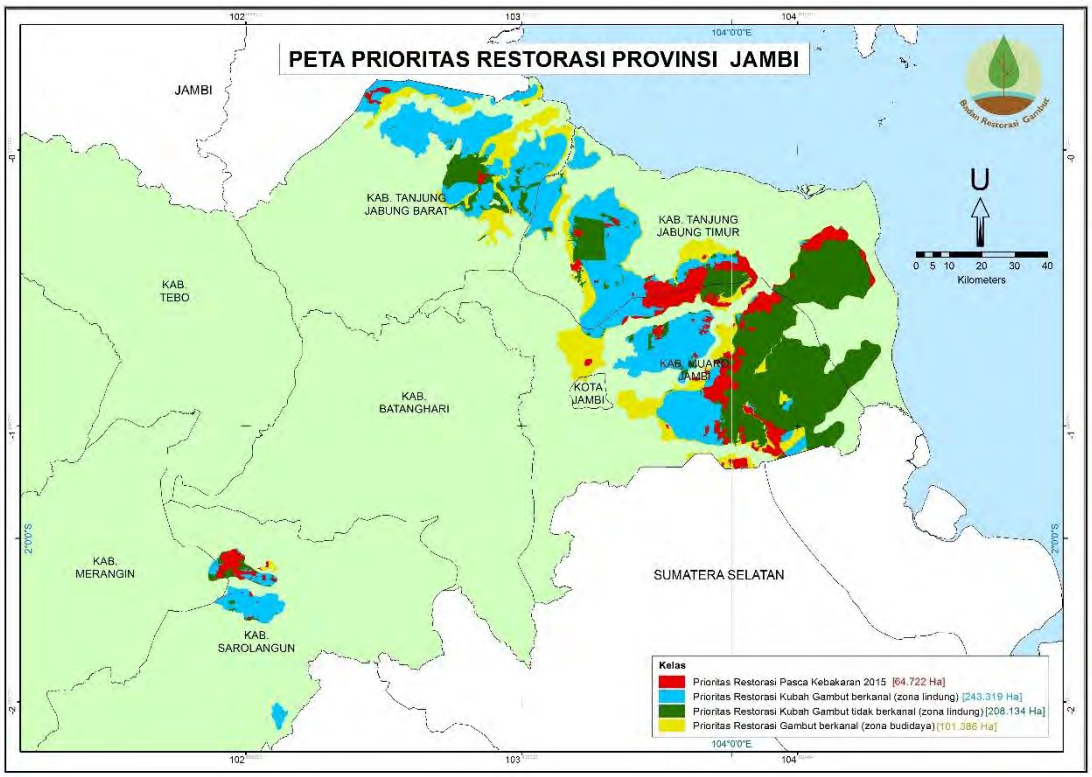
Sources: BRG (2016), Presentation for UNDP Climate Dialogue on Fighting Fires and Restoring Peatland in Indonesia on August 29, 2016

BRG is still working on categorizing high priority peatland in each 7 province as of August 2016, by using the revised classification. As of August 26, 2016, the data only for South Sumatra has been completed, whilst the indicative maps have been prepared for all the seven provinces, as shown in the following figures. For other 6 provinces, BRG continues to analyze the data to prepare breakdown of the priority peatland.

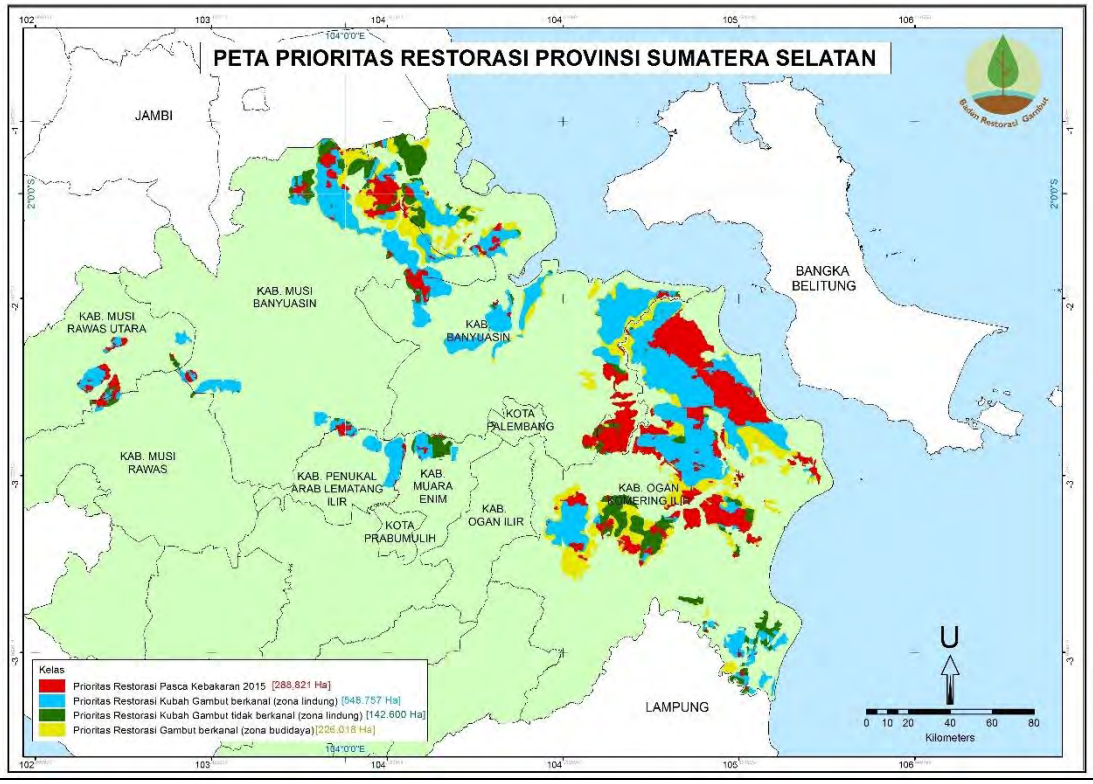
However the 4 categorized peatland restoration potential maps were prepared for whole 7 provinces as follows.



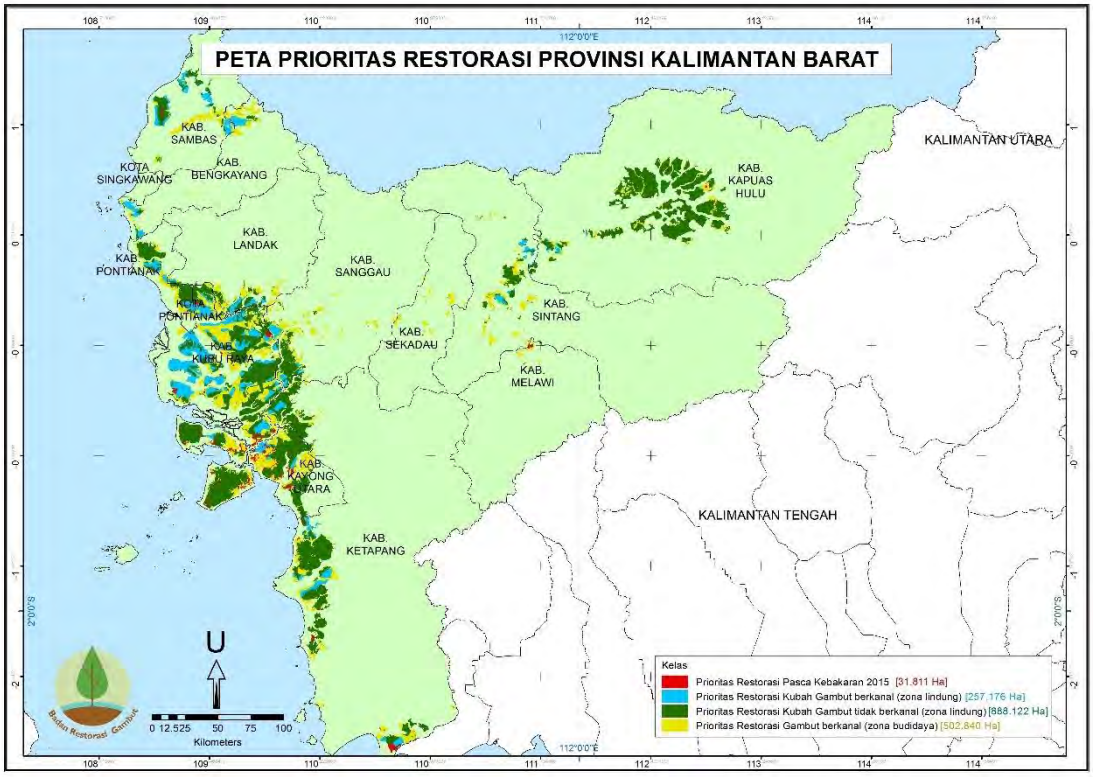
(1) Riau Province



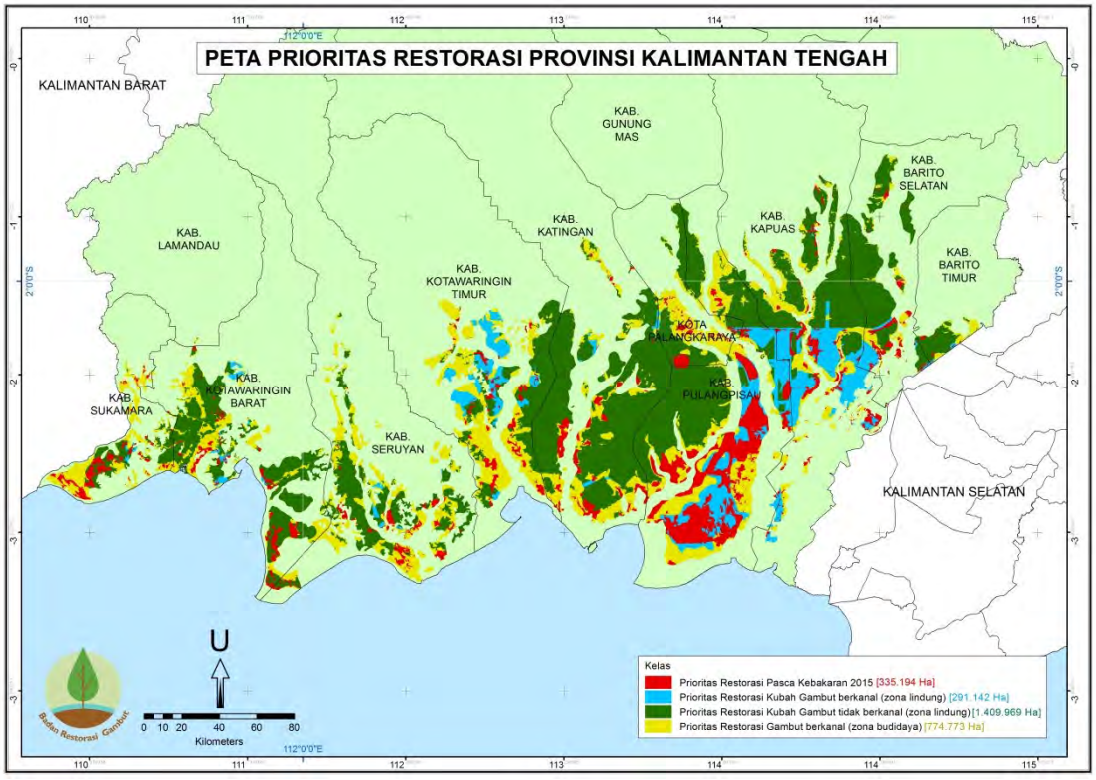
(2) Jambi Province



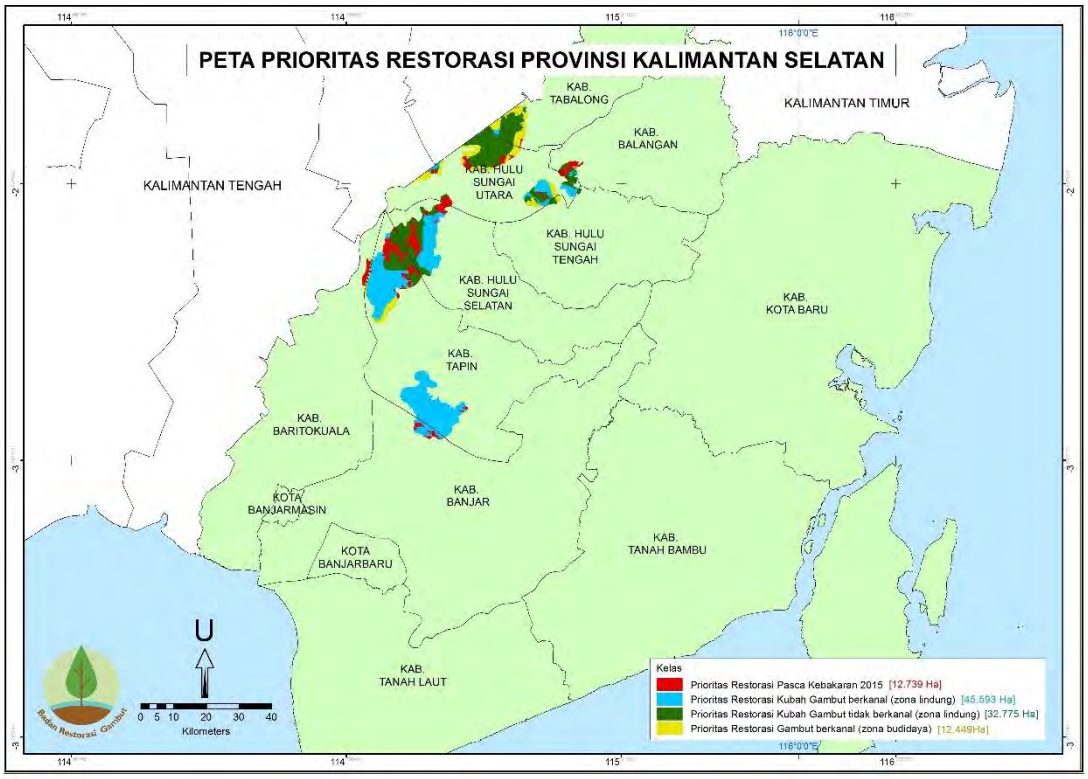
(3) South Sumatra Province



(4) West Kalimantan Province



(5) Central Kalimantan Province



(6) South Kalimantan Province

(7) Papua Province

Figure 3.2.2.1. Priority Peatland Areas to be restored in the 7 Priority Provinces

Sources: Highly Prioritized Peatland Maps by BRG (as of August, 2016)

(4) Priority restoration areas for PKG

Regarding the selection of target areas for new cooperation with PKG on peatland restoration,

including monitoring system, the following criterion are discussed among the persons concerned in PKG and BRG, together with the JICA expert, and tentatively used to select the target areas.

Table 3.2.2.13 Temporal Criteria to Select the Target Areas for Peatland Restoration under the Possible Future Cooperation for Peatland Restoration

Class/ Criteria	Content
Criteria 1	Peat Dome
Criteria 2	APL areas
Criteria 3	Burnt areas in 2015
Criteria 4	Non-concession areas
Criteria 5	Larger than 50 ha
Criteria 6	Community Facilitator

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016), based on the discussions with PKG and BRG

Now, as PKG is conducting the trainings on community facilitators to the concerned provinces, it is difficult to use this criteria (criteria 6) at this moment to select out the villages.

By using the above-mentioned criterion, excluding Criteria 6, the target areas and target numbers of villages are estimated as the following table.

Table 3.2.2.14 Tentative Areas and Numbers of Villages, Estimated Based on the Criteria under the Possible Future Cooperation for Peatland Restoration

Province	Total Area	No. Of Kabupaten	No. Of Village
Jambi	3,695	5	17
South Sumatra	30,854	5	55
Riau	0	0	0
Total Sumatra	34,549	10	72
West Kalimantan	6,193	4	22
Central Kalimantan	113	1	1
South Kalimantan	6,319	5	14
East kalimantan	983	2	3
North kalimantan	0	0	0
Total Kalimantan	13,608	12	40
Total	48,157	22	112

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016), based on the database of peatland of PKG

3.2.3 Stakeholders for Peatland Restoration

Depending on the land tenures/ land ownership, the following stakeholders have the different obligations/ responsibilities on the peatland restoration. The obligations/ responsibilities of each stakeholder, based on the criterion in Table 3.2.2.8 and 3.2.2.10, is shown in the following table.

Table 3.2.3.1 Realistic Demarcation of the Restoration of Peatland (as of Aug. 2016)

Class	Function	License	Demarcation of Responsibilities			
			Planning	Implementation	Monitor	Budget
Restoration Priority Post-Burn Incident in 2015	Protection	License	CH (BRG)	CH	PKG (BRG)/ CH	CH
		Non-license	PKHL (BRG)	PKHL (BRG)	PKHL (BRG)	PKHL (BRG)
	Cultivation	License	CH (BRG)	CH	PKG (BRG)/ CH	CH
		Non-license	PKG (BRG)/ LG	PKG (BRG)/ LG	PKG (BRG)/ LG	PKG/ LG
Restoration Priority of Peat Dome with	Protection	License	CH (BRG)	CH	PKG (BRG)/ CH	CH
		Non-license	PKHL (BRG)	PKHL (BRG)	PKHL (BRG)	PKHL (BRG)

Class	Function	License	Demarcation of Responsibilities			
			Planning	Implementation	Monitor	Budget
canal (protected zone)	Cultivation	License	CH (BRG)	CH	PKG (BRG)/ CH	CH
		Non-license	PKG (BRG)/ LG	PKG (BRG)/ LG	PKG (BRG)/ LG	PKG/ LG
Post-Fire Restoration Priorities 2015 (protected zone)	Protection	License	PKHL (BRG)	PKHL (BRG)	PKHL (BRG)	PKHL (BRG)
		Non-license	PKG/ LG	PKG/ LG	PKG/ LG	PKG/ LG
	Cultivation	License	CH (PKG)	CH	PKG/ CH	CH (PKG)
		Non-license	PKG/ LG	PKG/ LG	PKG/ LG	PKG/ LG
Restoration priority of shallow peat with canal (cultivation zone)	Protection	License	CH (BRG)	CH	PKG (BRG)/ CH	CH
		Non-license	PKHL (BRG)	PKHL (BRG)	PKHL (BRG)	PKHL (BRG)
	Cultivation	License	CH (PKG)	CH	PKG/ CH	CH (PKG)
		Non-license	CH (PKG)	CH	PKG/ CH	CH (PKG)

Note: CH: Concession Holder, LG: Local Government/ Local Agency
Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

As the concession areas are to be managed and utilized by the concession holders, the restoration activities, including monitoring the ground water level, should be conducted by the concession holders, whilst the government offices, like PKG and the provincial government, need to supervise them and monitor their activities to check whether the concession holders keeps implementing the proper restoration works.

3.2.4 Current Condition, Issues and Needs in Peatland Monitoring

(1) Demarcation of peatland monitoring

The monitoring of peatland is firstly stipulated by the Government Regulation 71/2014, and the PKG has responsibility to conduct monitoring all the peatland in Indonesia. Then after publishing the Prepres 01/2016, the BRG become to have responsibility to conduct monitoring for the peatland in the 7 priority provinces. At this moment, the monitoring of peatland has been demarcated as follows:

Table 3.2.4.1 Demarcation between BRG and PKG on the Peatland Monitoring (As of Aug. 2016)

Organization	State Forest (Non-concession)		Non State Forest (Non-concession)		Concession (State Forest/ Non State Forest)	
	7 Priority Provinces	Out of 7 provinces	7 Priority Provinces	Out of 7 provinces	7 Priority Provinces	Out of 7 provinces
BRG	X		X			
PKG		X		X	X	X
CH					X	X

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

(2) Current condition and issues of peatland monitoring by PKG

As of end of August, 2016, PKG has been developing the database to monitor the peatland (water level) in the concession areas, and also held several meetings with concession holders in Indonesia on the monitoring of peatland, based on Government Regulation (PP) 71/2014 and the being-drafted Ministerial Decree on Water Management for Peat ecosystem, including peatland monitoring. During those meetings and based on the explanations by PKG, the concession holders have recognized their responsibilities to monitor the peatland in their concession areas, and understand the monitoring plans and methods, including installing the monitoring instruments. For the concession areas, the concession holders need to install the

monitoring instrument by their own responsibilities; one (1) data logger for ground water level and soil moisture in each management zone[85] and manual ground water levels at least 15% of the total blocks inside one management zone, and they need to report the measurement results to PKG every month. As of end of August 2016, based on Government Regulation (PP) 71/2014 and the being-drafted Ministerial Decree on Water Management for Peat ecosystem, including peatland monitoring, the concession holders are conducting the site surveys and preparing the base maps for their own concession areas. And they will start to prepare the monitoring plans for their lands, including the identification of the locations to install the monitoring equipment.

For the non-concession areas outside of State Forest (APL), basically, the community areas need to be monitored as same way as the concession areas (holders), as stipulated in the being-drafted Ministerial Decree on Water Management for Peat ecosystem. Therefore, PKG has plans to monitor the peatland in the non-concession areas outside of State Forest (APL). The telemetry monitoring system such as SEASME is considered to be installed into the community areas by PKG through financial assistance from the donors. In order for the appropriate management of the monitoring instruments, which will be installed in the community areas, and for the adequate monitoring activities by community, it is necessary to collaborate with community, by increasing the awareness among the community on the necessity to measure the water level. In order for that, PKG has started to conduct the seminars/ meetings with community for fostering the community facilitators and for increasing their capacities to manage monitoring by local people.

(3) Current condition and issues of peatland monitoring by BRG

As of the end of August 2016, BRG has a plan to implement peatland monitoring activities for the restoration priority areas in the seven (7) priority provinces, regardless the functions and concession licenses. These monitoring will be implemented in accordance with the above-mentioned guideline and manual on monitoring of ground water level.

As of the end of August 2016, BRG planned to install more than 100 real-time monitoring systems in both provinces of Riau and South Sumatra, however, as mentioned below, as of December 2016, BRG installed eight (8) numbers of monitoring equipment in four (4) districts in three (3) provinces, which are the priority provinces in 2016 restoration, and started monitoring activities.

(4) Change of needs to peatland monitoring

Relating the needs to develop semi-real time monitoring system of water table of peatland, which was prioritized when the JICA mission visited in January 2016, there is a potential to utilize the SESAME system as long as database and server are developed in PKG, whilst at the present, all the data will be transferred to the servers in a Japanese company and BPPT, through the cloud server. On the other hand, PKG pays attention to the semi-real time monitoring method on water content in peatland developed by a Danish company and introduced to PKG by DANIDA.

As a result, the needs to develop a semi-real time monitoring system of water table at peatland declined.

3.3 Progresses, Issues, Needs and Technical Review in Relation to the Re-wetting of Peatland

3.3.1 Methods of Peatland Restoration

Restoration of the drained peatland is recommendable for preventing the peatland fire and reducing the emission of the greenhouse gasses from the drained peatland. The following methods on peatland restoration are examined/ planned and implemented as the pilot project/ model activities,

[85] Management zone (Zona pengelolaan) is the one landscape, which is delineated by geography (rivers, lakes, etc.) and peat depth inside the Peatland Hydrological Unit.

and also as the actual implementation by stakeholders.

Table 3.3.1.1 List of Methods of Peatland Restoration

	Objectives	Activities	Brief Contents
1	Peat Re-wetting	Canal blocking	Multiple sheet pile dam (box-type dam) Peat compaction dam (Light) Concrete dam
		Canal backfilling	Backfilled with peat materials Local organic materials (trunks, branches, twigs, etc.)
		Deep well	Water source for wetting peat by sprinklers
2	Rehabilitation / Revegetation	Nursery construction	Nurseries to produce seedlings for planting
		Planting	Planting seedlings to vegetate the damaged peatland
		Natural regeneration	Assisted natural regeneration on the peatland
3	Livelihood Improvement	Alternative Livelihood activities	Alternative livelihood activities, such as paldiculture, sago, rattan handicraft, etc.

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

In order for the effective implementation of the peatland restoration activities, it is necessary to establish the proper organization to conduct the peatland restoration activities, and formulate the plans. Based on the Prepres 01/2016, BRG is now conducting the following activities related to the peatland restoration.

3.3.2 Progress and Issues of Peatland Restoration

(1) Re-wetting

The re-wetting of the peatland is the main activities for peatland restoration in order to re-wet the drained peatland by raising the ground water levels. The following table shows the re-wetting activities by several organizations, conducted mainly seven priority provinces.

Table 3.3.2.1 Examples of Re-wetting Activities in Indonesia

Implementers	Locations	Details of Re-wetting
MoE through ASEAN Peatland Forest Project (APFP)	Riau, Central Kalimantan, West Kalimantan	- Multiple sheet pile dams (box-type dams) were constructed as the model projects in 4 provinces in 2014.
PKG	Riau, Central Kalimantan, and West Kalimantan	- Degraded Peatland Rehabilitation Model Project in accordance with the target, stipulated in RENSTRA - Multiple sheet pile dams (box-type dams) were constructed as the model at 5 sites in 3 provinces in 2015 by the government budget - Plans to construct 80 canal blockings in five (5) provinces in 2016.
UNDP	Riau, Jambi, South Sumatra, West Kalimantan and Central Kalimantan	- Community-based construction of Multiple sheet pile dam - Multiple sheet pile dams (box-type dams) were constructed by communities at 89 sites in 23 villages in 3 provinces. - Also 30 sets of water pumps were installed in 1 province, and 118 numbers of bore wells were dug in 4 provinces. - As of August 2016, no activities are conducted in Jambi province.
CIMTROP/ UNPAR	Central Kalimantan	- Multiple sheet pile dams (box-type dams) were constructed as the model at Kalimantan Trial Site.
Ministry of Public Works and Housing (PU-PR)	Central Kalimantan	- Pilot construction of concrete-type dams and Multiple sheet pile dams at the Ex-Mega Rice Project site in 2013 - Construction of concrete-type dams and multiple sheet pile dams at the Ex-Mega Rice Project site in 2015, based on the Master Plan for the Rehabilitation and Revitalization of the Ex-Mega Rice Project Area in Central Kalimantan. - Rehabilitated/ re-constructed the box-type dam, at the same location of the box-type dam, which was constructed by CIMTROP, in 2016

Implementers	Locations	Details of Re-wetting
		- Plans to construct four (4) concrete-type dams in 2017, based on the Master Plan for the Rehabilitation and Revitalization of the Ex-Mega Rice Project Area in Central Kalimantan
Concession holders	Riau, etc.	- Peat compaction dams are constructed in cooperation with the private consulting firms (i.e. Deltares) - Riau Andalan Pulp & Paper (RAPP) and Sinarmas have created blocking canals at 500m distance in their concession for HTI (main canals).

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

1) Multiple sheet pile dams (box-type dams), which are constructed by local government in Central Kalimantan province under Degraded Peatland Rehabilitation Model Project by PKG in 2015

2) Multiple sheet pile dam (box-type dam), which is re-constructed by the PU-PR in 2016, at the same location of the box-type dam, which was constructed by CIMTROP in Central Kalimantan.

3) Concrete-type dams (and Multiple sheet pile dams) at the Ex-Mega Rice Project site, which are constructed through the model project by Ministry of Public Works (PU) in 2013 at Central Kalimantan province

4) Peat compaction dams, which are constructed by the Concession holders, in cooperation with the private consulting firms

Figure 3.3.2.1 Sample Photos of Re-wetting Activities in Indonesia

Sources: 1) PKG (2015), 2) JICA Survey Team (2016), 3) PU-PR (2016), and 4) Deltares (2016)

Based on the results of canal-blocking construction by the several stakeholders, the following aspects are derived as recommendations:

Table 3.3.2.2 Types of Canal Blockings

	Types of Canal Blocking	Results and Recommendations	Recommended locations
1	Box-type dams	- Can be built through the community cooperation - Costs around USD5,000 each, - Takes a few weeks to two months to build - Local materials, such as timber, sand, can be utilized. - Normally do not last long	Community agriculture areas

	Types of Canal Blocking	Results and Recommendations	Recommended locations
		- Without spillway for the boats, sometimes destroyed by the community boat users	
2	Peat Compaction dam	- Can be built by the excavators, and built in one day with excavators - Costs around USD 2,000 each - Consider to build spillway for the boat transportation	Protected areas Concession areas
3	Concrete dams	- Expensive (more than USD10,000 each) - Takes more than half year to construct - Materials should be transported from outside by using the boats. - Does not match with the natural environment. - Even spillways, worries about to be damaged by boat users. - As the dams become stable by bearing piles, the height differences would become higher after subsidence of the peat ground surface.	Wide rivers/ canals, wider than 20m

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

(2) Rehabilitation of vegetation and natural regeneration

As it takes long time to produce the seedlings with adequate height to be planted at the nurseries, the seedling production should be commenced in advance to the planting in the peatland. Indigenous species are recommended to be planted to enrich the peatland vegetation and ecosystem, in addition to support the sustainable livelihood.

In addition to the research by SATREPS, also Banjarbaru Forestry research Institute, Forestry Research and Development Agency conducts the experiments on planting of tree species suitable for peatland more than 30 years. As the results of the trials and experimental plantings, those five (5) tree species are identified as the promising trees to be planted on the peatland areas.

Table 3.3.2.3 List of Tree Species to Be Planted on the Peatland, Recommended by Banjarbaru Forestry Research Institute and SATREPS

Indonesian Name	Scientific Name	SATREPS*1	Banjarbaru Forestry Institute *2
Bintangur	*Callophylum* spp.	X	
Blangeran/ Kahui	*Shorea balangeran*	X	X
Gerunggang	*Callophylum* spp.	X	
Jelutung	*Dyera polyphylla*	X	X
Pulai	*Alstonia* spp.	X	
Punak	*Tetramerista glabra*	X	X
Takapas	*Stemonourus* spp.		X
Tumih	*Combretocarpus rotundatus*	X	
Nyatoh	*Palaquium* spp.		X

*Sources: *1: UNPAR (2016) and Sampang Gaman, et al. (2011)[86], *2 Yuwati, et al. (2014)[87]*

(3) Alternative livelihood activities

Alternative livelihood activities are one of the options for peatland restoration in Indonesia. At this moment, such activities as paldiculture, sago plantation/ utilization, rattan handicraft, are considered to be utilized. Drafted Minister for Environmental and Forestry Regulation regarding Procedures for Peat Ecosystem Recovery in Peatland Hydrological Unit (KHG) indicates the recommended species for paldiculture as following table.

[86] Sampang Gaman, Yuda Prawira and Hideyuki Saito (2011): Ecology of Shorea Balangeran (Kahui)

[87] Tri Wira Yuwati, Dony Rachmanadi, Purwanto Budi Santosa and Rusmana (2014): ”30 Tahun Balai Penelitian Kehutanan Banjarbaru: Kontribusi Pada Rehabilitasi Ekosistem, Rawa Gambut Prosiding Ekspose Hasil Penelitian, “30 Tahun BPK Banjarbaru Dalam Pembangunan Kehutanan”, Banjarbaru, 19 September 2013, p.48-59

Table 3.3.2.4. Some Types of Plants that Grow Naturally in Peatland that could be used for the Rehabilitation of Vegetation and Paludikultur

No.	Benefit	Selected Species
1.	Producers of food (including fruit, carbohydrates, protein, spices and fats / oils)	- Sago (*Metroxylon* spp.): See the Figure below - Asam kandis (*Garcinia xanthochymus*) - Kerantungan (*Durio oxleyanus*) - Pepaken (*Durio kutejensis*) - Mangga kasturi (*Mangifera casturi*) - Mangga kueni (*Mangifera odorata*) - Rambutan (*Nephelium* spp.) - Nipah (*Nypa fruticans*) - Kelakai (*Stenochlaena palustris*) - Tengkawang (*Shorea stenoptera, S. macrophylla*)
2.	Producers of fiber (as a substitute raw material for pulp and paper)	- Geronggang (*Cratoxylum arborescens*) - Terentang (*Campnosperma auriculatum*) - Gelam (*Melaleuca cajuputi*)
3.	The source of bio-energy (wood pellets, briquettes, bio-ethanol)	- Gelam (*Malaleuca cajuputi*) - Sagu (*Metroxylon sago*) - Nipah (*Nypa fruticans*)
4.	Producing sap / latex	- Jelutung (*Dyera polyphylla*) - Nyatoh (*Palaquium leiocarpum*) - Sundi (*Payena* spp., *Madhuca* spp.)
5.	Sources of medicines	- Akar kuning (*Coscinium fenestratum*) - Pulai (*Alstonia pneumatophora*)
6.	The results of other forest	- Gaharu (*Aquilaria* sp.) - Gemor (*Alseodaphne* sp.) - Purun tikus (*Elaeocharis dulcis*) - Rotan irit (*Calamus trachycoleus*)
7.	Wood conservation value	- Ramin (*Gonystylus bancanus*) - Meranti merah (*Shorea macrantha, Shorea balangeran*)

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

1) Cut sago trunks to keep in the river, before treating at the factory

2) Sago starch, just after purified at the factory

Figure 3.3.2.2 Sample Photos of Sago utilization in Riau Province, Indonesia

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

3.4 Outputs of JICA Cooperation including SATREPS on Peatland Restoration and These Dissemination Approaches

3.4.1 Outline of SATREPS on Peatland Restoration

JST-JICA project on "Science and Technology Research Partnership for Sustainable Development (SATREPS)" on Wild Fire and Carbon Management in Peat-Forest in Indonesia was implemented during 2008 till 2014, by Japanese researchers, mainly from Hokkaido University, Japan. The target areas are the ex-Mega Rice Project areas and Palangkaraya University experimental Forest, which

are located in Central Kalimantan province. There are four (4) components in accordance with the four (4) outputs; namely, Component 1: Fire Detection and Fire Prediction Component, Component 2: Carbon Assessment Component, Component 3: Carbon Management Component and Component 4: Integrated Peat Management Component.

Table 3.4.1.1 Outputs and Activities of SATREPS Project

Output	Activities
OUTPUT 1. Fire Detection and Fire Prediction System are established. (Fire Detection and Fire Prediction Component (FF: Fire Detection and Fire Prediction))	1-1. Improve fire hotspot algorithms 1-2. Estimate carbon emission by biomass burning among different ecotypes 1-3. Establish a system to transfer in-situ fire information to each region 1-4. Construct a prediction model of wild fire occurrence 1-5. Construct a model of water regime 1-6. Make a map of land cover and land use change 1-7. Establish a spectral library (plant / soil) in investigation areas 1-8. Validate established system 1-9. Data compiling and report making
OUTPUT 2. Carbon Assessment System is established. (Carbon Assessment Component (CA: Carbon Assessment))	2-1. Estimate carbon balance in various tropical peatland ecosystems 2-2. Estimate amount of carbon in biomass 2-3. Assess peat decomposition and organic carbon loss 2-4. Assessment of carbon efflux through groundwater flow 2-5. Develop carbon balance assessment model 2-6. Data compiling and report making
OUTPUT 3. Carbon Management System is established. (Carbon Management Component (CM: Carbon Management))	3-1. Examine the outflow of groundwater from peat layer 3-2. Based on the above 3.1 and after the verification, propose a method to restore the hydrological conditions 3-3. Develop plan for peat fire control 3-4. Develop manual for fire control 3-5. Quantify the carbon stock amount of above-ground vegetation 3-6. Measure parameters on vegetation growth 3-7. Explicate the process of vegetative restoration after disturbance 3-8. Examine the characteristics of soil organic matter and its impact on the environment 3-9. Examine the relations between water level and water qualities 3-10. Examine the discharge and decomposition process of organic matter in soil 3-11. Understand the changes of aquatic community caused by fire 3-12. Develop technologies to restore forest 3-13. Data compiling and report making
OUTPUT 4. Integrated Peat Management System is developed. (Integrated Peat Management Component (PM: Peat Management))	4-1. Establish a proto-type for database system to integrate the research/survey results 4-2. Operate the database management of the research/survey results 4-3. Support the institutional arrangement of carbon management 4-4. Establish a carbon balance model 4-5. Assess the effect of carbon control based on carbon management system 4-6. Introduce an economic analysis model and analyze with it 4-7. Propose methodology on deforestation for International Standardization 4-8. Organize workshop/symposium/seminar towards establishing international network and information/knowledge dissemination to the public 4-9. Recommend project proposals to government authorities 4-10. Data compiling and report making

Source: Final report of SATREPS (2014)

3.4.2 Outline of Output of JICA Cooperation and These Dissemination Approach

Relating the activities under the Component 3 of the SATREPS, the new data transmission system through mobile digital telecommunication network has been developed. This system can send the field data (water level, rainfall etc.) by using a mobile phone network and data logger with modem, and save in the server automatically. By using this system, the field data can be collected automatically, and checked at the remote office, even in Japan. The image of data collection and data transmission is show in the following figure.

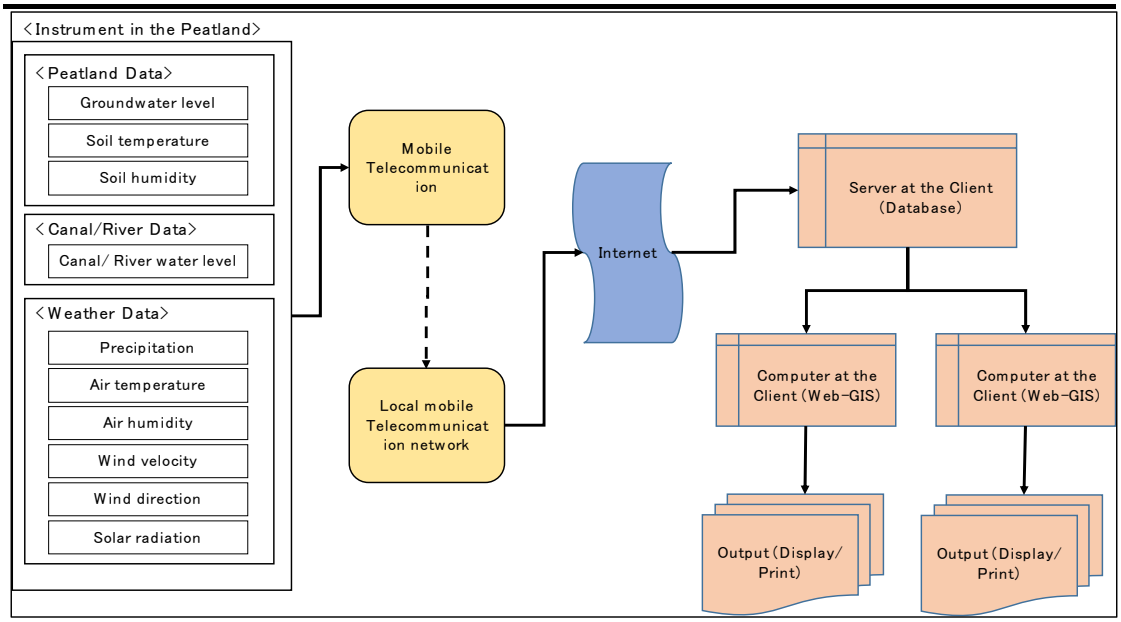


Figure 3.4.2.1 Image of Data Collection and Data Transmission, through Mobile Digital Telecommunication Network

Source: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

This system has been begun to be utilized in the fields in Indonesia. And nowadays, more than 100 systems are installed in Indonesia, and data are being transmitted through telemetry system to the servers of the system, which are located in Japan and also in Indonesia. This kind of instruments to obtain data in the field and transmit the data automatically can be utilized for monitoring the ground water levels on the peatland.

After the completion of SATREPS in 2014, the follow-up of SATREPS on Formulation of a Manual onTrial Calculation of GHG Emission from Peatland in Central Kalimantan was conducted through IJ-REDD project, by researchers of Hokkaido University, Japan during 2015-2016. As the results of the follow-up activity, Hokkaido University produced the Guidebook for estimating carbon emissions from tropical peatland in Indonesia in 2015 (Figure 3.4.X). This guidebook includes the methods to estimate carbon emissions from the peat decomposition, and peat burning, based on the ground water level estimation. The descriptions in the guidebook are general, but applicable not only for Central Kalimantan, but also to other tropical peatlands.

Figure 3.4.2.2 Image of "Guidebook for estimating carbon emissions from tropical peatland in Indonesia"

Sources: Osaki (2016), presentation for the Joint Symposium on "Peat Restoration and Peat Fires Prevention", on May 30, 2016 at Jakarta, Indonesia

3.5 Discussion on New Cooperation Possibilities for Peatland Restoration including Cooperation with other Ministries

3.5.1 Collaboration with On-formulating New JICA Technical Cooperation

Based on the discussions with the concerned agencies and ministries, the following activities are listed as the possible new cooperation for peatland restoration, including cooperation with other ministries/ agencies.

Table 3.5.1.1Possible Future Cooperation for Peatland Restoration

No.	Title of Project	Cooperation Type	Partners
1	Community-based sustainable peatland management for community-based peatland fire prevention to the fire prone sites	Technical cooperation by JICA	PKG/ PKHL
2	Application of equipment for monitoring the peatland at the fire prone villages etc.	Equipment grant aid, including the trainings on equipment	PKG/ BRG/ PKHL
3	Construction of re-wetting infrastructure and reforestation on the peatland	Loan	PUPR

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

Possible collaboration with new JICA technical cooperation are as follows:

Table 3.5.1.2 Proposed Possible Cooperation Contents of New JICA Technical Cooperation for Peatland Restoration

Cooperation contents	Community-based sustainable peatland management for community-based peatland fire prevention to the fire prone sites
Concerned Agency	PKG- PKHL (BRG is collaboration with PKG)
Target areas	Fire prone peatland in the target districts in the target provinces
Outline	1. One of four activities, in the planned technical cooperation by JICA. This project is planned to be commenced by 2017. 2. Strengthen and build capacity of community facilitators and community group

	for peatland management and restoration in village level through the activities for Output 3 3. Facilitate to design and conduct peatland water management and restoration (e.g. channel blocking) in village level 4. Facilitate implementation of peatland monitoring and early warning (using telemetry [e.g. SESAME] too) by village and district/provincial government for peatland fire prevention 5. Facilitate for village community to prepare SOP for utilization of peatland monitoring/water management 6. Facilitate design and build, demonstration plot of alternative livelihood options for sustainable peatland management in village level as well as support peer leaning among community through the activities for Output 3
Remarks	In case that the following equipment assistance would be materialized, the capacity building on management of monitoring instrument for the community will also be conducted through this project.

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

3.5.2 Support to Formulation of New Cooperation

It will be needed to support fomulation of cooperation request based on the the follwoing outline regarding the cooperation possibility of No.2 and 3 in the Table 3.5.1.1. above.

Table 3.5.2.1 Proposed Possible Cooperation Contents of New Grant Aid that is Necessary to Support to Formulation of New Cooperation

Cooperation contents	Application of equipment for monitoring the peatland at the fire prone villages etc.
Cooperation Type	Equipment grant aid, including the trainings on equipment
Concerned Agency	PKG-BRG-PKHL
Target areas	Prioritized areas in non-concession sites in the restoration target areas prioritized for fire prevention
Brief Contents and Issues	1. For the monitoring of the peatland status in the communities, PKG has the responsibilities to monitor the peatland status/ conditions, while BRG has responsibilities to monitor the peatland in the high priority peatland in the seven (7) priority provinces. 2. The monitoring data; i.e. ground water level, air temperature, soil moisture, etc., obtained in the fields will be transferred to the servers installed in the PKG office in Jakarta through telemetry system. 3. Based on the drafted Ministerial Decree on peatland management, the monitoring at communities should also be conducted as same way as the concession areas; i.e. one (1) monitoring instrument be installed in every block, equivalent to 30 hectares.. 4. The installed instrument will be managed by and measured by the local government who collaborate communities. 5. Training for maintenance and management of equipment is recommended to the persons of local governments who are concerned with the maintenance and management of equipment.
Analysis by the JICA Survey Team	1. PKG has instructed to the concessionaires on the peatland areas to commence monitoring of ground water levels, based on the Government Regulation No. 71/2014 and the related Ministerial Decrees, and the concessionaires have started to send the necessary data to PKG. Those data, sent by the concessionaires, are being saved and kept in the server computer, installed in the PKG office in Jakarta. 2. PKG has also commenced to conduct the trainings on monitoring facilitators in the community levels. However, monitoring equipment have not yet been installed in the community levels. 3. Therefore, it has become one of the urgent issues for PKG to procure and install the monitoring equipment in the community levels. 4. In Indonesia, those telemetry-type monitoring systems, which are installed and utilized as of now, are those produced or assembled by Midori Engineering Laboratory Co., Ltd. (Japan), Sartika Mitrasejati (Indonesia), and BPPT (Indonesia), and the Danish products are also being promoted. 5. PKG, which is one of the main C/Ps for this proposed project and manages the community-level monitoring, worries about intentional and/or unintentional leakages of the monitored data. PKG intends to receive data from the monitoring

	equipment directly to the server computer in the PKG office, not through and backed up in the cloud servers, but through the telemetry network, or through e-mail after obtaining data from the data loggers in the monitoring equipment. Therefore, it is necessary for the manufacturers/ suppliers to modify the default data transfer system and/or develop new systems to transfer the obtained data, based on the requests and desires from the C/Ps; such as PKG. As of now, PKG has already developed the system and program to analyze the collected data.
Relationship with Draft Program Model for Forest and Peatland Fire Prevention	1. This proposed project will contribute to "3. Community-based fire prone peatland management", which planned under Draft Program Model for Forest and Peatland Fire Prevention, as mentioned in Chapter 5.1 below.

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

Table 3.5.2.2 Proposed Possible Cooperation Contents of New Loan Aid that is Necessary to Support to Formulation of New Cooperation

Cooperation contents	Construction of re-wetting infrastructure and reforestation on the peatland
Cooperation Type	Loan
Concerned Agency	PUPR (PKG is collaboration with PUPR)
Target areas	Prioritized areas in non-concession sites in the restoration target areas prioritized for fire prevention
Brief Contents and Issues	Loan project on construction of re-wetting infrastructure and reforestation on the peatland. Construction of infrastructures for peatland restoration: i.e. canal blocking, canal backfilling, digging of deep wells The targets are for community land and/or conservation forests Reforestation on the damaged peatland, including the production of the seedlings at the nurseries
Analysis by the JICA Survey Team	BRG is developing the technical guidelines either on peatland rewetting infrastructures, such as canal blocking, canal backfilling, and deep wells for early firefighting, and nursery, seedlings and tree planting on the peatland, for the peatland restoration and peat forest rehabilitation. Therefore, those guidelines should be referred for the new proposed project. Livelihood improvement and development for the target areas and surrounding communities should be considered. Through academic research activities, such as SATREPS by universities and researchers in Japan, the effectiveness of canal blocking construction to the canals for the rewetting the peatland has been indicated in some extent, however, more and further information on the effectiveness of installing facilities; i.e. canal blocking, canal backfilling, deep wells, planting, would be confirmed to supplement and support for the effective designs. In addition to the concrete-type large dams for the large canals, the multi-sheet piles box dams, made from timbers and peat-filled bags, and compacted peat dams, made from peat itself, might be the main structures to be constructed. Therefore, it is necessary to check and consider the lifespans of each type of dams. Installation of the motoring equipment at nearby the construction sites are also considered, in order to measure the effect of installation of the facilities. As PKG is considered to be the most suitable organization to implement monitoring and manage the monitoring data, it is necessary to consider to coordinate with concerned organizations for adequate monitoring activities in advance.
Relationship with Draft Program Model for Forest and Peatland Fire Prevention	This proposed project will contribute to "3. Community-based fire prone peatland management", which planned under Draft Program Model for Forest and Peatland Fire Prevention, as mentioned in Chapter 5.1 below.

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

CHAPTER 4 COLLABORATION IN COOPERATION FOR FOREST AND PEATLAND FIRE CONTROLS AND PEATLAND RESTORATION

4.1 Positioning of Collaboration in Cooperation for Forest and Peatland Fire Prevention as well as Peatland Restoration

4.1.1 Importance of Collaboration in International Development Agenda

The following figure shows the 2 international agenda which will be basis for collaboration in cooperation. To achieve ASEAN Post 2015 Vision, it will be required to develop the more efficient methods to achieve the agenda efficiently in a short time and effective method to influence impact more extensive area.

(1) Post 2015 Development Agenda: Sustainable Development Goals(SDGs)

This agenda targets to achieve by 2030. Measure to haze disaster relates to Goal 11 while mitigation of GHG emission from fire and degraded peatland relates to Goal 12. Restoration of ecosystem will be concerned with Goal 15.

(2) ASEAN Post 2015 Development Vision

This vision aims at prevent haze disaster by 2020.

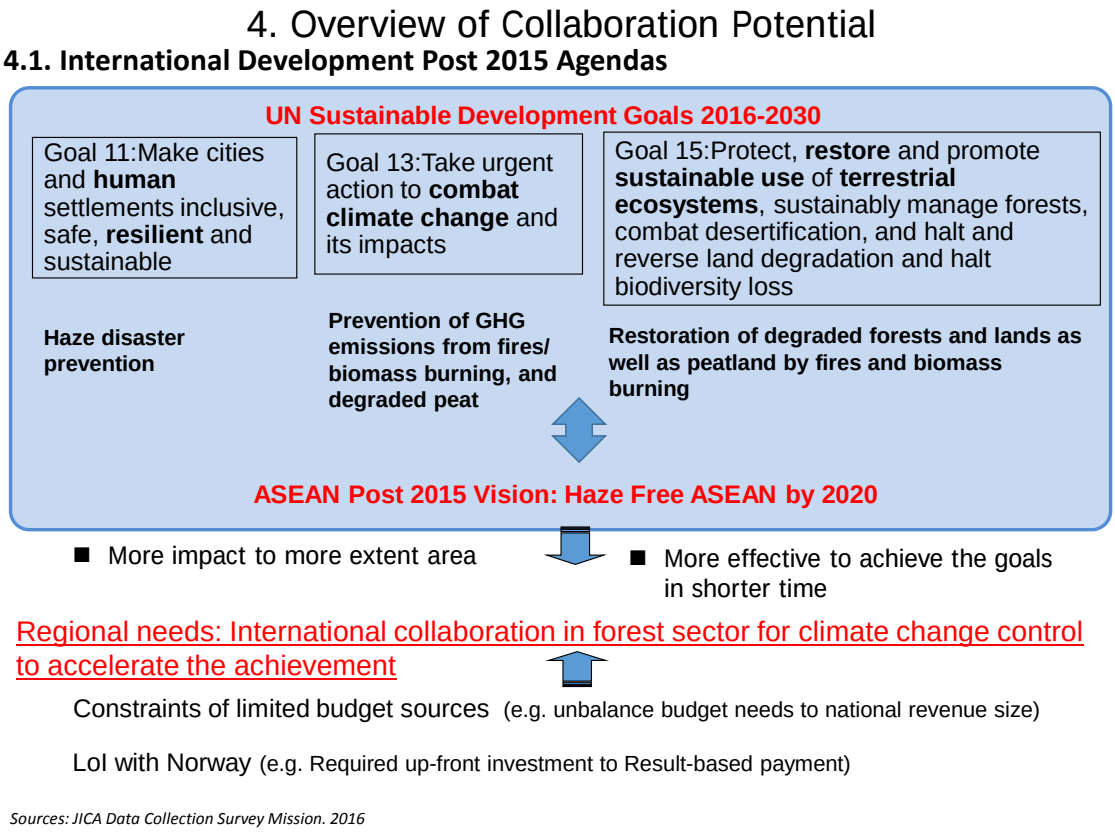


Figure 4.1.1.1 International Development Agendas Relating to Forest & Peatland Fire Prevention and Peatland Restoration

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

To response the needs above, measures to seek budget sources for forest & peatland fire

prevention and peatland restoration will be possible issues due controversial issues of budget needs unbalance to national revenue size. Meanwhile there also is a possible issue to seek up-from investment for possible financial cooperation by Result-based Payment based on LoI with Norway on REDD+ Cooperation[88].

4.2 Trends and Potential Collaboration with External Funds as Other Donors and NGOs, as well as Private Sector and Private Investment

4.2.1 Forest and Peatland Fire Control and Integrated Measures

The trends of external funds and private sectors for forest and peatland fire control and the integrated measures including the associated inter-sectorial issues are as shown in the table below.

There are limited external and private funds having mid-term cooperation or investment program specializing forest and peatland fire controls. Norway funding is also said to focus on peatland restoration after 2016 even the fund supports fire control through UNDP[89].

It will be important to coordinate to develop collaboration in cooperation with international funding agencies as World Bank for external funds and with each private sector at each site.

Table 4.2.1.1. Trends of Financial Cooperation and Investment for Forest and Peatland Fire Control in Indonesia (based on the information collected by Aug. 2016)

Organization (HQs)	Cooperation program (Time)	Field activity sites	Cooperation contents/ Major activities	Fund source/ Partnership (Planned input)
External Fund				
UNDP	REDD+ (Transition from REDD+ Agency to MoEF) (Sep.2015-Sep.2016) *1	a) Riau [3 Districts] b) Jambi [2 Districts] c) S. Sumatra [2 Districts] d) C. Kalimantan [4 Districts] e) W. Kalimantan [2 Districts]	a) Integrating REDD Agency fire monitoring system (PKHL) b) Villages: Small infrastructures grant aid and livelihood production assistance (via local NGOs)<116 villages> c) Training to village level stakeholders (via MoEF's Training Center)	LoI RI-Norway (Phase I)
IFAD	Project on Sustainable Management of Peatland Ecosystem (2016-2019)	Riau [3 Districts]	a) Support for policy b) Fire/Haze Free Village Program with private sector and assessment of potential GHG emission reductions c) Sustainable peatland management partnership and community livelihood from sustainable peatland management enhanced <13 villages>	GEF & IFAD Grant (+ Internal contribution from stakeholders)
UNOP	Research for Early Warning System by IPB-Colombia University	Kalimantan	N/A	USAID
World Bank	Promoting Sustainable Community Based Natural Resource Management	a) Bengkulu b) S. Sumatra c) E. Kalimantan d) C. Kalimantan e) Golontalo f) Sulawesi	a) Strengthening Legislation, Policy and institutional Capacity in Decentralized Forest Management b) Developing the Knowledge Platform c) Improving Forest Management Practices	(22.42 M$)

[88] Letter of Intent between the Government of the Kingdom of Norway and the Government of the Republic of Indonesia on "Cooperation on reducing greenhouse gas emissions from deforestation and forest degradation"
[89] According to the information at the interview at the Norway Embassy in Aug. 2016.

Organization (HQs)	Cooperation program (Time)	Field activity sites	Cooperation contents/ Major activities	Fund source/ Partnership (Planned input)
	and Institutional Development (2016-2021)	Tenggara g) C. Sulawesi h) NTB		
EU	-			
GIZ	Bioclime	S. Sumatra [1 District]	a) UAV fire monitoring b) Livelihood & rehabilitation , Channel blocking <1 villages>	
	Forclime TC(Supplement) (2017-2019)	a) S. Sumatra [4 Districts] b) W. Kalimantan [1 District]	a) UAV fire monitoring b) Community-based fire prevention?	BMG Germany (1M Euro)
KfW	-			
AFD	-			
USAID	Lestari/IFACS	a) Aceh b) C. Kalimantan c) Papua	a) Multi-stakeholder forum (e.g. Land opening without burning/ PLTB promotion) b) Strategic environmental study c) Landscape conservation planning d) Nature conservation consensus	
Kehati/ Euroconsult	Community-based natural resource management grant program (MCA-Indonesia)	a) W. Sumatra b) Jambi c) W. Kalimantan d) E. Kalimantan e) N. Kalimantan f) Sulawesi Island and NTT	a) To enhance productivity and decrease dependence to fissile fuel by increasing use of renewable energy b) To enhance productivity and reduce land-based GHG emission by enhance practice of land use and of natural resources management	Millennium Challenge Corporation
UKAid	MFP	-		
AusAid	-			
IDH (Netherland)	Initiative for Sustainable Landscape	a) S. Sumatra [4 Districts] b) W. Kalimantan c) Jambi d) Aceh	a) Well-being village program with private sector <26 villages>	Norwegian International Climate and Forest Initiative (NICFI)
Private Fund				
April Group	Fire Free Village Program	Riau	a) Village agriculture assistance b) Village fire crew leader c) Air quality monitoring d) No burn village rewards e) Community awareness <9 villages>	
APP Group	Fire care well-being village program (Desa Makmur Peduli Api/ DMPA)	a) Riau <11 villages] b) Jambi [6 villages] c) S. Sumatra [12 villages] d) C. Kalimantan e) W. Kalimantan	a) Village facilitation b) Horticulture c) Domestic husbandry d) Training of special skill <Targeted 500 villages by 2020>	
Badan Pengelolaan Dana Perkebunanan Kelapa Sawit (MoF)	BLU CPO Supporting Fund	N/A	a) Regenerating community oil palm farm b) Biodiesel developement c) HR development d) R & D on oil palm e) Infrastructure & equipment f) Promotion of oil palm farm	CPO exporter/ Oil palm producer

*Notes: *1: Potential extended until the end of 2016 based on the request of Minister of EF.*
Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in

Indonesia. 2016 (as of Aug. 2016)

4.2.2 Peatland Restoration

The trends of external funds and private sectors for peatland restoration are as shown in the table below.

Currently UNDP derived from Norway funding for BRG institutional readiness assists to build up BRG. Various external funds as donors and international NGO, approaches BRG to find and start cooperation. The trend will quickly subject to change.

Table 4.2.2.1. Trends of Financial Cooperation and Investment for Peatland Restoration in Indonesia (based on the information collected by Aug. 2016)

Organization (HQs)	Cooperation program (Time)	Field activity sites	Cooperation contents/ Major activities	Fund source/ Partnership (Planned input)
External Fund				
Establishing BLU	Support BRG Plan of Operation	N/A	a) Peatland mapping b) Protection & restoration activities c) Local community engagement d) Planning e) Peatland sustaining economic development initiatives f) Documenting and securing the land rights of local communities g) Engaging them in restoration & sustainable development initiatives h) Coalition building for peatland protection & restoration with civil society and private sectors i) Policy analysis and harmonization	LoI RI-Norway (Phase II) (50 M$) Future potential: 200M$ LoI RI-Norway (Phase III)
UNDP	BRG Institutional Readiness	BRG	a) Strategic planning including - Detail mapping for first priority - 2 KHG pilot b) BRG structure c) BRG base policy d) Moratorium monitoring information system	LoI RI-Norway (Phase I)
IFAD	See Table 4.2.1.1.			
World Bank	N/A-			
EU	-	N. Sumatra?	a) Enhancing coordination function?	N/A
BMG Germany	N/A	BRG		
	Forclime	BRG	a) Action planning and socialization	
KfW	-			
AFD	-			
USAID	-			
UKAid	-			
AusAid	-			
Danida	-		a) Peatland monitoring?	
Kemitraan (Norway)	N/A	Central Kalimantan	N/A	N/A
Simpurpu (Finland)	N/A	Riau		
IDH (Netherland)	N/A	Riau		

Organization (HQs)	Cooperation program (Time)	Field activity sites	Cooperation contents/ Major activities	Fund source/ Partnership (Planned input)
ICCO (Netherland)	N/A	Riau		
Climate and Land Use Alliance/ CLUA (USA)	N/A	a) Jambi b)Kalimantan (Flexible)	N/A	Ford Grant, Packard Grant, M.A. Cargill Grant, Climate Works Grant etc.
Private sectors				
WRI	Peat Pricing	-	a) Peatland mapping	
Boeing	-	KLHK?	a) Peatland monitoring	
Indonesia Climate Change Trust Fund/ ICCTF (Indonesia)	N/A	South Sumatra	a) Adaptation & Resilience b) Land-based mitigation/Energy	Bappenas, USAID, DANIDA, UKAID
WWF	N/A	N/A	Peatland monitoring	
HPH/HTI	*1	a) Riau b) S. Sumatra c) W. Kalimantan d) S. Kalimantan	a) Constructed channel blocking (7,174 site) b) Constructed deep well (634 sites)	

*Notes: *1. Ditjen. PHPL2016 (Presentation by DG Climate Change, MoEF.2016.BRG Coordination Meeting (22 Jun. 2016)[90])*
Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

BRG has prepared the estimation of fund needs as the table below. Around 2/3 of the required fund will be secured by the State Budget. Thus the funding source for 1/3 of the required fund will be important.

Table 4.2.2.2. Summary of Estimation of Fund Needs by BRG (As of Aug. 2016)

No.	Activities (7 provinces)	Project Amount (Million US$)	State Budget/ APBN (Million US$)	Gap (Million US$)
1	Planning & mapping for peatland restoration	102.19		
2	Technical cooperation & funding mechanism	0.27		
3	Monitoring & evaluation of peatland restoration	0.43		
	Subtotal	102.90	51.95	50.94
4	**Canal blocking**	**111.15**		
5	**Canal backfilling**	**19.23**		
6	**Deep well**	**14.22**		
7	**Maintenance**	**235.07**		
8	**Vegetation**	**1,030.77**		
9	Capacity building for PRM	3.00		

[90] Direktorat Jenderal Pengendalian Perubahan Iklim. 2016. Kebijakan Pengendalian Perubahan Iklim dan Ruang Sinergi dengan Restorasi Gambut (Rapat Koordinasi Pelaksanaan Restorasi Gambut 22 Juni 2016)

No.	Activities (7 provinces)	Project Amount (Million US$)	State Budget/ APBN (Million US$)	Gap (Million US$)
	Subtotal	1,413.44	1,006.58	406.86
10	Economic support for local community on land	7.50		
11	Youth support for peatland	1.20		
12	Early warning & monitoring system	7.60		
13	Pilot project for alternative commodities (Meranti)	2.20		
14	International forum for peatland restoration & R & D Exchange	2.20		
15	Carbon MRV and accounting	12.40		
16	Maintenance	5.70		
	Subtotal	38.80	11.41	27.39
17	Increasing awareness for peatland restoration	5.47		
18	Strengthening of public participation in peatland restoration	4.00		
19	Strengthening the social security, economic & environmental	15.80		
20	Monitoring of peatland restoration by local communities	2.02		
	Subtotal	27.29	17.23	10.06
	Total	**1,555**	**1,087**	**495**

Sources: BRG.2016. Presentation for UNDP Climate Dialog (29 Aug. 2016)[91]

4.3 Trend and Potential Collaboration with ASEAN Secretariat

4.3.1 Backgrounds of Measures to ASEAN Tranbandary Pollution

In Indonesia, massive fires and haze pollution occurred in 1982-83, 1987, 1994, and 1997-98[92] , in 2002 the Conference of the Parties to the ASEAN Agreement on Transboundary Haze Pollution (AATHP) (see table below). Finally Indonesia have not ratified by 2013 but finally ratified the AATHP in 2014[93]. As discussed in 4.1.1 above, ASEAN aims haze free as post 20015 vision.

Table 4.3.1.1. Structure of AATHP

Part	Article
I. General Provision	1. Use of Terms
	2. Objective
	3. Principles
	4. General Obligations
II. Monitoring, Assessment, Prevention and Response	5. ASEAN Coordinating Center for Transboundary Haze Pollution Control
	6. Competent Authorities and Focal Points
	7. Monitoring
	8. Assessment
	9. Prevention
	10. Preparedness
	11. National Emergency Response
	12. Joint Emergency Response through Provision of Assistance

[91] Peat Restoration Agency. 29 August. 2016. Recovery and Restoration of Indonesian Peatland
[92] ADB.2001. Fire, Smoke and Haze –The ASEAN Response Strategy-. pp. xiv
[93] Undang-undang Republik Indonesia Nomor 26 Tahun 2014 tentang Pengesahan ASEAN Agreement on Transboundary Haze Pollution (Persetujuan ASEAN tentang Pencemaran Asap Lintas Batas)(14 Oktober 2014)

Part	Article
	13. Direction and Control of Assistance
	14. Exemptions and Facilities in Respect of the Provision of Assistance
	15. Transit of Personnel, Equipment and Materials in Respect of the Provision of Assistance
III. Technical Cooperation and Scientific Research	16. Technical Cooperation
	17. Scientific Research
IV. Institutional Arrangements	18. Conferences of Parties
	19. Secretariat
	20. Financial Arrangements
V. Procedures	21. Protocols
	22. Amendments of Agreement
	23. Adoption and Amendment of Annex
	24. Rule of Procedure and Financial Rules
	25. Reports
	26. Relationship with Other Agreements
	27. Settlement of Disputes
VI. Final Clauses	28. Ratification, Acceptance, Approval and Accession
	29. Entry into Force
	30. Reservations
	31. Depositary
	32. Authentic Text

Sources: AATHP (2002)

In Singapore, the national parliament approved "the Transboundary Haze Pollution Act No.18/2014[94]" in August 2014, according to some sources. If the act is enacted, complaints can be filed against corporations and individuals where fire occurred at the source of haze estimated based on wind direction and speed when haze pollution has occurred in Singapore. Indonesia has higher needs to ensure fire control in areas with frequent occurrences of fire that causes transboundary haze estimated from the climate conditions in order to take significant haze pollution diplomacy.[95]

4.3.2 ASEAN Coordinating Center for Transboundary Haze Pollution Control

COP-11 in 2015 endorsed to invite ASEAN Coordinating Center for Transboundary Haze Pollution Control (ACC) prescribed in Article 5, AATHP to Indonesia as the proposal by Indonesia. Thus the examination of draft Home Country Agreement for ACC has started.

As far as the information collected by Aug. 2016, the ACC structure will be expected to be as follows.

a) A Committee
b) An Executive Director
c) A Division of Monitoring, Assessment and Joint Emergency Response
d) A Division of Technical Cooperation Program
e) A Division of Information and Knowledge Management
f) Any other division
g) Specialists
h) Support Staff

It is implicated that there is a cooperation potentian to collaborate to organize, manage and activities

[94] Bill No. 18/2014 Transboundary Haze Pollution Act 2014, Singapore

[95] There are several adivice of the special staff of the Minister of Environement and Forestry and PKHL personnel in Jun. 2016 for JICA to be carefully examine if formulating bilateral cooperation directly related with ASEAN haze issues due to the risk to be involved in any diplomatic desputs in ASEAN 2016.

of ACC[96]. Especially one of assumed potential cooperation is to co-organize sharing and dissemination ouputs by collaborating with the Division of Inforamation and Knowledge Management in the above mentioned.

4.3.3 ASEAN Secretariat

In ASEANSecretariat, Environment Division, Cross-Sectoral Cooperation Directorate, ASEAN Socio-Cultural Community Department is in charge of Relating implementation of AATHP. This Division play an role of ACC by managing ASEAN Speciallized Meterorological Center/ASMC as well as ASEAN Haze Action Online and supporting to prepre the follwoing fire managment guidelines before establishing ACC. It will be important to coordinate through Environment Division in ASEAN Secretariat in developing collaboration and cooperation to ACC.

Table 4.3.3.1. ASEAN Guideline for Fire Management

Year	By	Guideline
2003	ASEAN Secretariat	Guidelines for the Implementation of the ASEAN Policy on Zero Burning Use of Terms
2004	ASEAN Secretariat	Guidelines for the Implementation of Controlled Burning Practice Objective
2015	Singapore National Environment Agency (with funding from ASEAN Haze Fund)	ASEAN Guidelines on Peatland Fire Management Principles

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

[96] According to the information from PKHL personnel in Aug. 2016

CHAPTER 5 SUGGESTIONS FOR FUTURE JICA COOPERATION RELATED TO FOREST AND PEATLAND FIRE CONTROL

5.1 Proposed Midterm Strategy and Programs

5.1.1 Proposed Draft Midterm Cooperation Strategy

Based on the discussion in Chapter 2-4 above, the following is proposed as a draft mid-term strategy in cooperation for forest and peatland fire control.

The proposed mid-term strategy is "Integrated capacity development of stakeholders to contribute to mitigate emission from fires and haze disaster in Indonesia". In order to drive effective cooperation which can contribute sustainable impact in extensive area in a short time, a draft strategy based on the following approaches are proposed as follows.

a) To promote combination of the perspectives of climate change control and disaster management
b) To build collaboration with private sector investment and financial cooperation

The following will be prioritized as a cooperation strategy for fire prevention and peatland restoration.

a) To focus on community-based fire prevention that can contribute to prevent fire outbreak causes based on the past experiences and lessons learned
b) To support early warning and initial response by enhancing restoration and monitoring fire prone sited because fire outbreaks tends to distribute at fire prone sites.
c) To try to develop rural business model without land burning in order to obtain attentions by industries by promoting land management without land burning becomes added value.

In order to promote the above strategies, it will be tired to visualize the impact of fire prevention and peatland restoration quantitatively by creating added values as business, land management and household economy in collaboration with stakeholders as private sectors in addition to utilize the past experiences and lessons learned effectively.

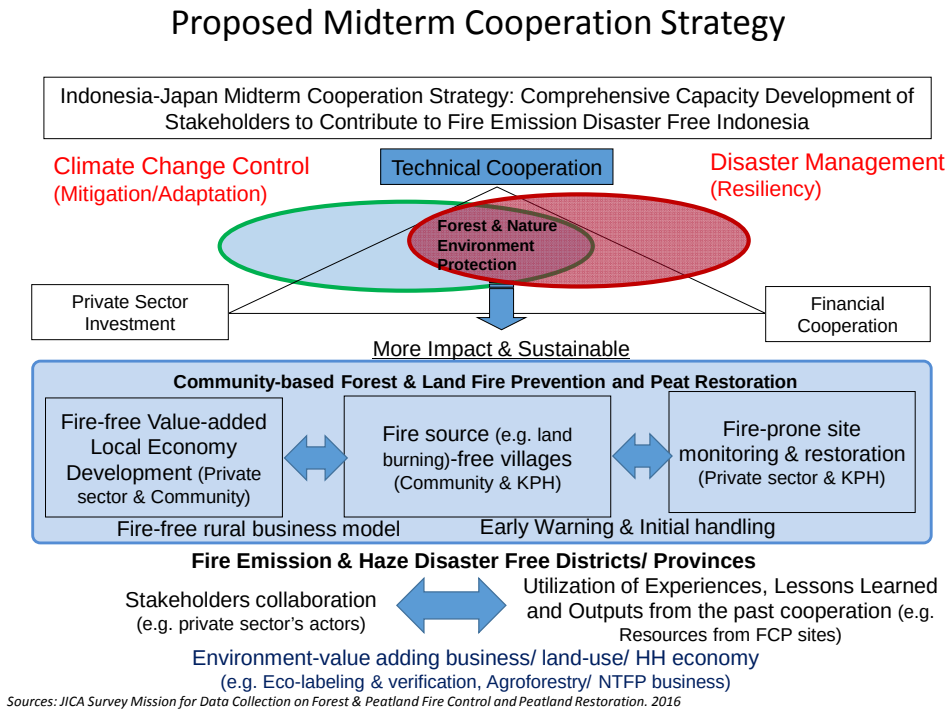


Figure 5.1.1.1. Draft Midterm Strategies in Cooperation for Forest and Peatland Fire Control

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

5.1.2 Proposed Draft Midterm Strategic Program

The following figures show the proposed draft midterm strategic program in cooperation for forest and peatland fire control by applying the strategies above.

The proposed midterm cooperation program is "Fire Emission & Haze Disaster Free Districts and Provinces" The target is 56 fire prone districts (731 fire prone villages) and related 80 fire prone KPH in 10 priority provinces in Sumatra and Kalimantan Islands where are important from the perspectives of impact to ASEAN countries as Singapore and Malaysia. In order to drive effective cooperation which can contribute sustainable impact in extensive area in a short time, a draft strategy based on the following approaches is proposed as follows.

a) To begin by building model districts in fire prevention in each province
b) To duplicate the same program in other fire prone districts in each province
c) To reduce major fire prone sites in each province by the end of ASEAN Haze Free Vision through a) and b) above

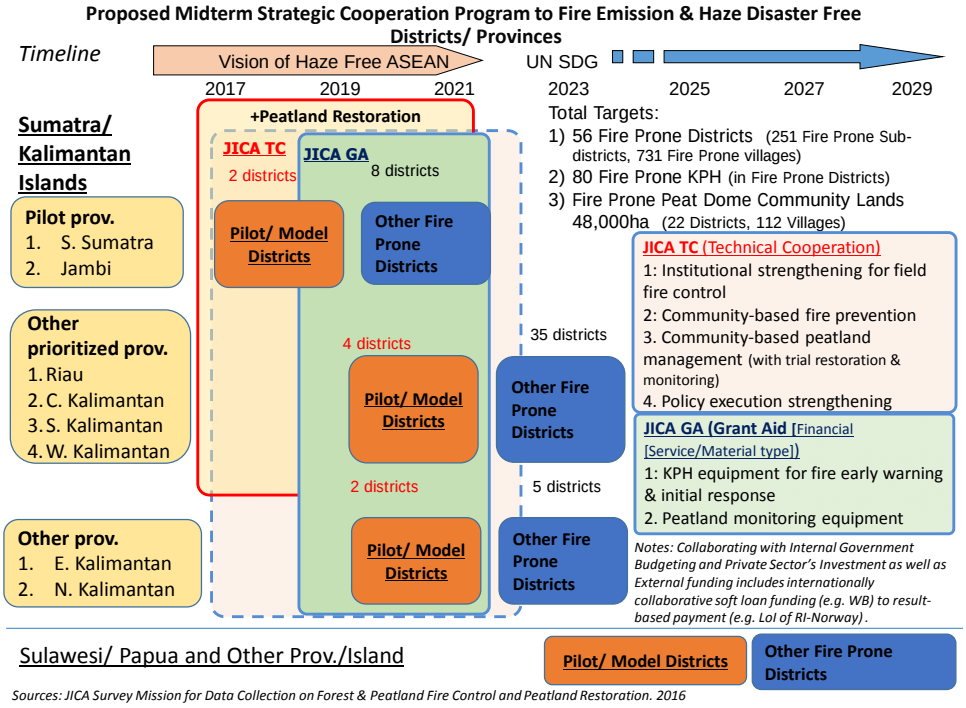


Figure 5.1.2.1. Draft Midterm Strategic Program in Cooperation for Forest and Peatland Fire Control

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration n Indonesia. 2016

5.1.3 Proposed Draft Program Model for Forest and Peatland Fire Prevention

The following table shows the proposed draft program model for forest and peatland fire prevention by applying the approaches above.

(1) Structure of program

The structure of program is proposed as follows.

a) Institutional arrangement for fire control in field level
b) Community-based fire prevention
c) Community-based fire prone peatland management

Table 5.1.3.1. Draft Program Model for Forest and Peatland Fire Prevention

Program Model for Fire Emission & Haze Disaster Free Districts/ Provinces

No.	Program	Target unit	Target output	Activity package
1	**Institutional strengthening for field fire control**			Base for Early Warning & Initial Handling
1.1		Fire prone District (& villages)	WG/ taskforce (core stakeholder network as TPD manager)	**a. Training for WG** b. Meeting c. Tools (Early Warning, Response)
1.2		KPH in fire prone district	Fire brigade (Mobile initial fire response)	a. Equipment/ Facility (Early Warning, Response) b. Training
2	**Community-based fire prevention**			For fire source free & fire free rural business
2.1		Fire prone Village	1. TPD (for fire prevention & peat management) 2. Fire free community campaigning/Peer learning 3. Fire-free/ alternative land manage./ business model	**a. Training for TPD** **b. TPD** **c. Community peer learning** d. Demonstration plot (Work together/ WG assisted)
2.2		More danger villages/ days	1. Early Warning 2. Patroli Terpadu	a. Village FDRS(SPBK), HS verif. b. Patrol
3	**Community-based fire prone peatland management**			Peatland outside of State forest/APL (without private sector)
3.1		Fire prone peat	Monitoring equipment & SOP	a. Equipment (with user training)
3.2		Damaged peat	Small facility/ reforestation	a. Construction/ planting (WG assisted)

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration. 2016

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

(2) Program Cycle

The program cycle is proposes as follows (see figure below).

a) In each fire prone district, 3 years program will be implemented. All fire prone districts will be divided into 2 groups. The fire prone districts in the first groups where the program is implemented will become the place for training to sub district level stakeholders from the fire prone district in the second groups.

b) The earlier years in the 3 years program will focus on developing institutional arrangement for fire control while the later years will focus on community-based fire prone peatland management. All fire prone sub-districts will be divided into 2 groups. The fire prone sub-districts in the first groups where the program is implemented will become the place for training to village level stakeholders from the fire prone sub-district in the second groups.

c) Before starting the activities in fire prone villages, training to stakeholders of WG that will be strengthened in institutional arrangement will be implemented at the former targeted sites as model districts. Team building of TPD will be held 3 times at the before each activity stage (once in former targeted sites, twice in targeting sites). In the course of TPD activities, peer learning by community of the targeted villages in the former targeted sites will be facilitated.

d) Before starting program, a "MOU for Fire Prevention Strengthening Movement" will be concluded at central, and provincial and district level. Based on the MOU, coordination committee will be organized at central level and technical committee will be organized at provincial level to coordinate stakeholders.

e) Program management unit will be organized at provincial level while support unit to field level activities will be organized at district level. Meeting of district WG strengthened for institutional arrangement of fire control will be held once each 3 months while technical meeting at sub district level will be hold monthly to provide chance to review the activities and to obtain technical support by inviting representatives of village WG

and TPD[97].

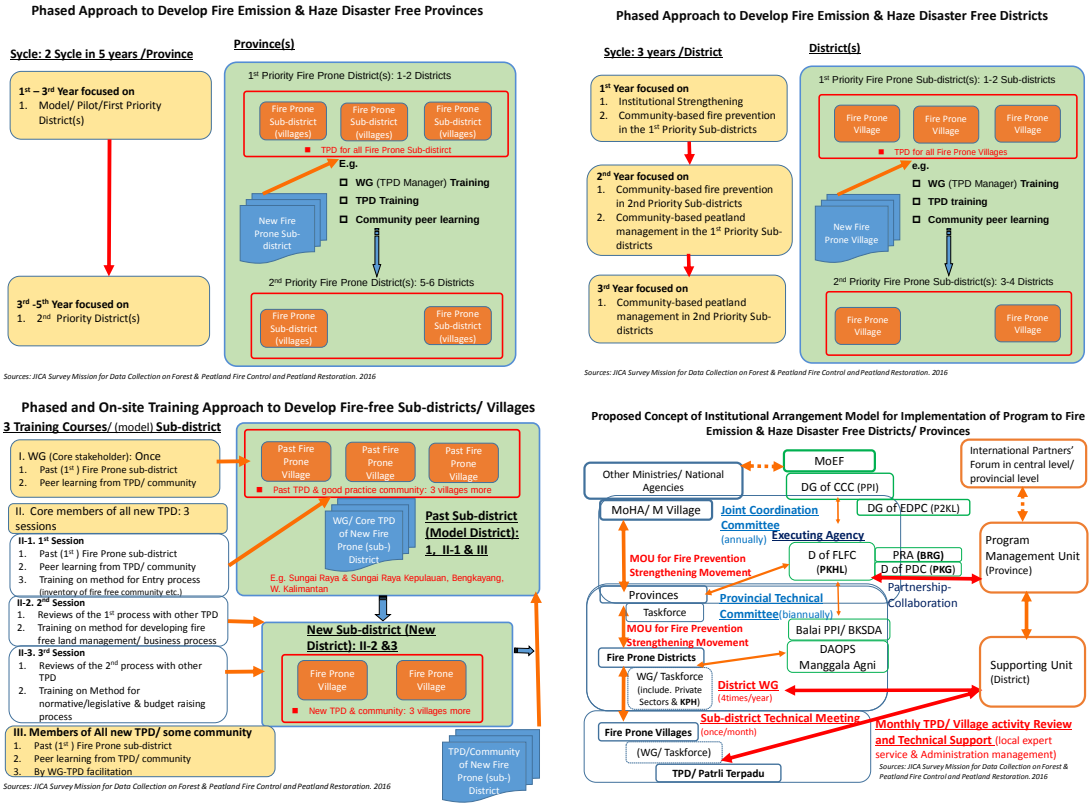


Figure 5.1.3.1. Draft Cycle of Forest and Peatland Fire Prevention Program

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

5.2 Draft Basic Design of Requested Technical Cooperation

5.2.1 Proposed Draft Basic Approaches of New Technical Cooperation

Based on the discussions above, draft exit strategy in new technical cooperation on forest and peatland fire prevention will be proposed as follows.

The proposed exit strategy will be "Strengthening inputs by external and internal funds to fire prevention and peatland management". In order to drive increase of funding inputs by contributing sustainable impact in extensive area in a short time, a draft strategy based on the following approaches is proposed as follows.

a) Firstly to develop community-based fire prevention and peatland management model in district level (model districts)

b) Secondly to strengthen support to dissemination/ scaling up from model districts to other districts and other provinces through supporting application to Grant Aid and collaborating equipment arrangement by Grant Aid

TPD model will be enhanced to develop a model to produce fire prevention impact widely as district level taking into the followings will be prioritized in developing community-based fire prevention and peatland management model, not just scaling up TPD model itself and/or scaling up some good practices in TPD targeted villages without enhancement.

a) To combine developing institutional arrangement for fire control and community-based

[97] At the meeting of district WG and technical meeting at sub district level, potential resouces who can cover the potential needs which will be important in village facilitation or village activities will be organized as a members, while another appropriate resouces will also be invited according the potential topics in each meeting.

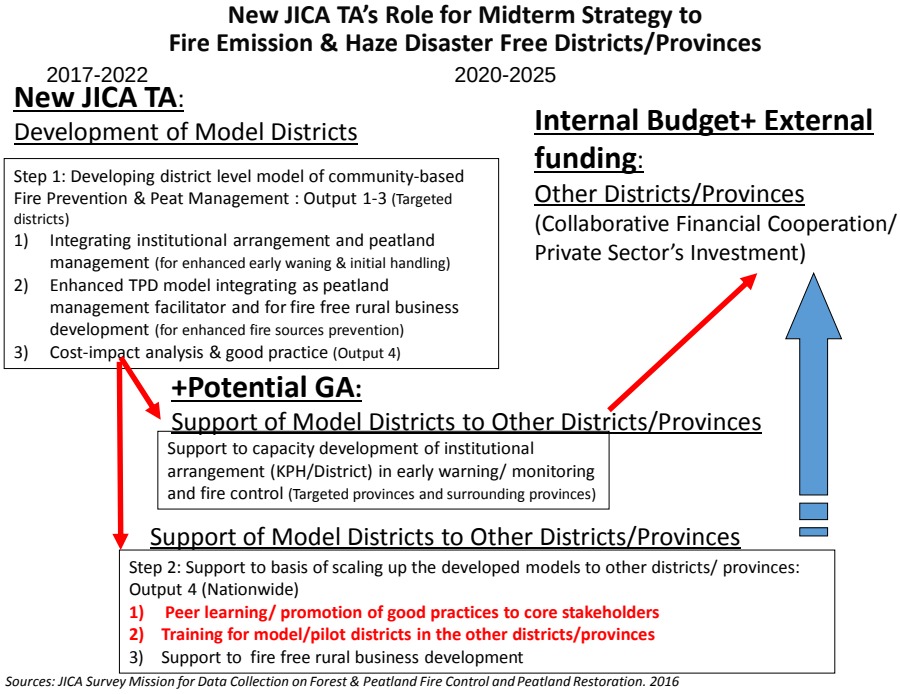
peatland management for early warning and reaction purpose

b) To improve TPD approach and to add TPD function as facilitate for peatland management as well as promoter of environmental friend rural business

c) To compile good practice models by verifying impact comparing cost[98]

d) To scale up to other districts/provinces based on the developed good practice model

In scaling-up, developing fire free rural business will be supported by not only collaborating with other cooperation as Grant Aid but also building partnership/ support to support to private sector investment[99].



Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration. 2016

Figure 5.2.1.1. Draft Exit Strategy of New Technical Cooperation for Forest and Peatland Fire Prevention

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

5.2.2 Proposed Draft Project Design Matrix/PDM

Several brainstorming were hold during Jun till Aug. 2016 by involving PKHL, PKG and Secretariat of DG PPI (in charge of international cooperation) to propose first draft PDM (version of Aug. 2016) and then to propose to MoEF by JICA Office Letter dated on 25 Aug. 2016 (see Proposed Draft PDMs in Annex Volume).

(1) Change of structure of components

As shown in figure below, comparing the draft PDM structure proposed by JICA mission in Jan. 2016, contents of outputs were changed even the numbers of components are same.

a) "Extending Community-based Forest and Peatland Fire Prevention" was divided into "Developing institutional arrangement for forest and land fire control by village level" and "Developing Community-based Forest and Peatland Fire Prevention".

[98] Utilzing the experices and lessons leanred in FCP socio-economic baseline surveys, involiving the Japanese researchers expertizing impact evalution, the researchers expertizing on analyzing causes of forest sector's issues who belongs to internation institution in Indoneisa as CIFOR, and the Indonesia reserchers from diversed expertize including socio-pyschorogy will be facilitated for collabollationn and partnership in such analysis.

[99] Building partnership/collaboration with international/ national NGOS etc. who are positive to Fairtrade and incubation of community business will also be examined in addition to involving the persons concerned with the Indonesian authorities and private sectors concerned.

b) "Enhancing Satellite System" was merged into "Developing Community-based Forest and Peatland Fire Prevention".

c) "Enhancing Peatland Monitoring System" was changed as "Developing community-based Peatland Management for community-based Peatland Fire Prevention"

d) "Capacity development and knowledge dissemination" was changed as "Strengthening Policy Execution Nationwide of Community-based Forest and Peatland Fire Prevention".

Table 5.2.2.1. Change of Way of Thinking on PDM Structure

Basic Way of Thinking to Draft PDM of Requested Next Technical Cooperation

Output No.	Proposal by JICA (Jan. 2016)	Improved proposal by PKHL-PKG (Aug. 2016)	Backgrounds of improvement
1	Extending **Community-based Forest and Peatland Fire Prevention**	Developing **institutional arrangement for forest and land fire control** by village level	a) Institutional matters are devised from community-based fire prevention b) Needed for KPH model development
2	Enhancing Satellite System	Developing **Community-based Forest and Peatland Fire Prevention**	a) Satellite matters should be by LAPAN b) EWS in field level can be integrated in community-based fire prevention c) Establishing model district before extending to all fire prone prov. (First: around 2 prov.; not all districts are prioritized in a prov.) d) Quantitative impact and cost analysis are needed for extending
3	Enhancing **Peatland Monitoring System**	Developing **Community-based Peatland Management** for Community-based Peatland Fire Prevention	a) No needs for peatland monitoring system development (entered into drafting regulation) b) Community-based peatland management is more prioritized in enhancing peatland monitoring and starting peatland restoration
4	Capacity Development & Knowledge dissemination	Strengthening policy execution nationwide of Community-based Forest and Peatland Fire Prevention	a) No focus on ASEAN due to sensitive situation in ASEAN b) To cope with central needs and/or other than targeted provinces include. to support extending to all fire prone prov. and/ other cooperation

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration. 2016

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

(2) Outline of component

The following figure shows the outline of Proposed Draft PDM (Version Aug. 2016).

a) The activities will be conducted in 2 provinces at first 3 years and 6 provinces at late 3 years. Therefore 8 prioritized provinces will have 1 model district each province.

b) Output 1 will focus on strengthening fire prevention WG by village level and KPH's fire brigade.

c) Output 2 and 3 will synchronize each other. TPD will function as facilitator for peatland management where is requested to be organized in Output 3 TPD will facilitate village community to prepare action plan not only for fire prevention by reducing land burning but also peatland monitoring and restoration.

d) Output 4 will cover the support to scaling up from the model districts to other districts and provinces.

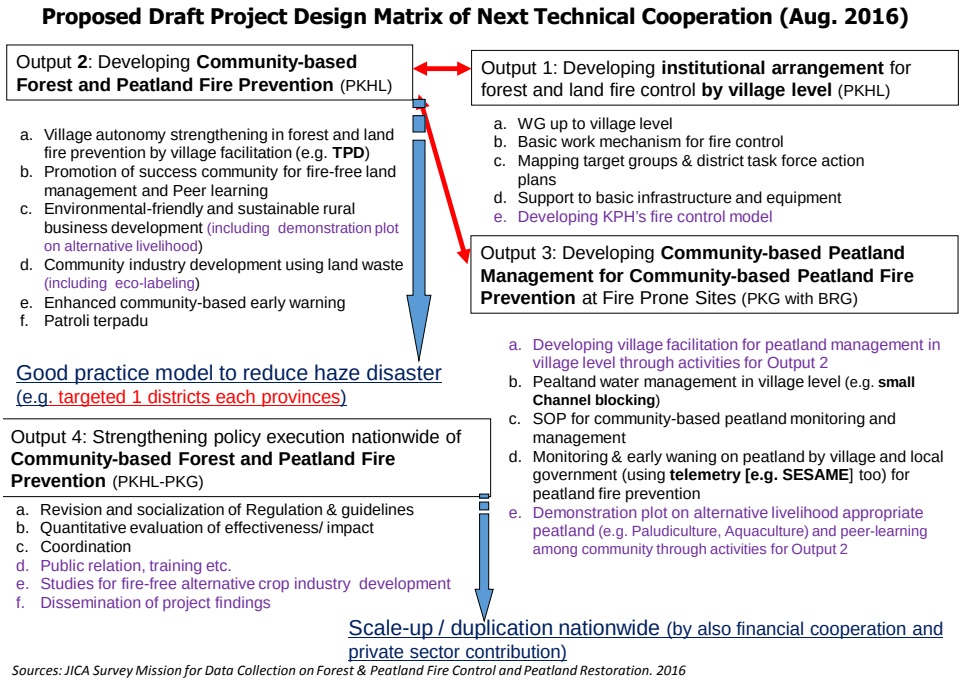


Figure 5.2.2.1. Outline of Proposed Draft PDM (Version Aug. 2016)

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

5.2.3 Proposed Draft Plan of Operation/PO

The outline of Proposed Draft PO based on the Proposed Draft PDM (Version Aug. 2016) above is as shown in the figure below.

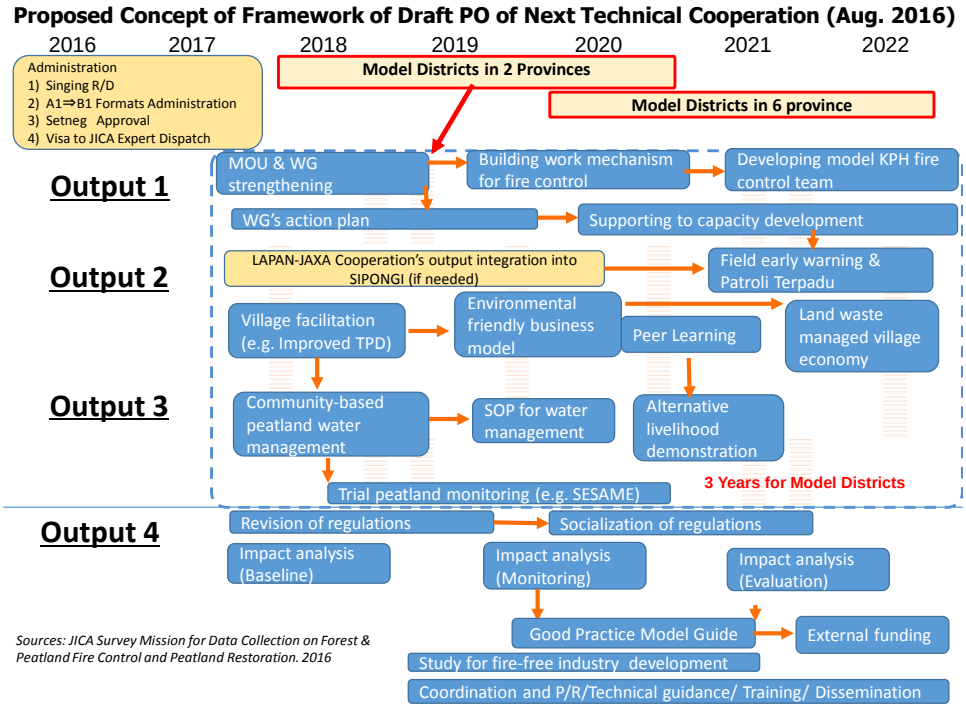


Figure 5.2.3.1. Outline of Proposed Draft PO based on Proposed PDM (version Aug. 2016)

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

5.2.4 Proposed Draft Implementation Structure

The proposed draft implementation structure based on the discussion on program model is shown in the figure below.

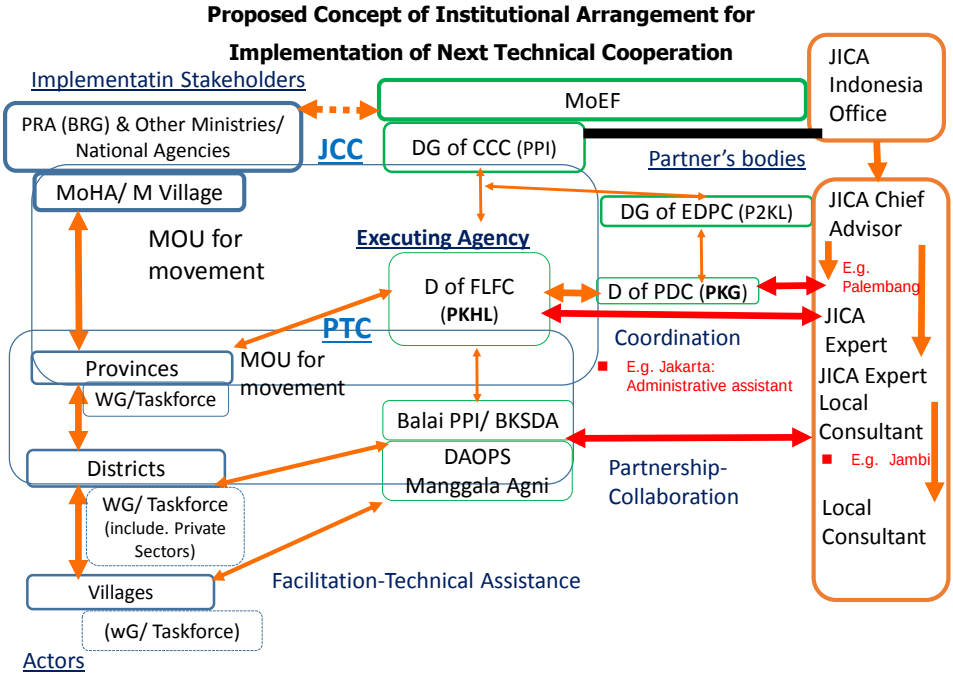
a) Executing Agency will be PKHL while PKG will be partner for Output 3.

b) Joint Coordination Committee (JCC) will be organized at central level by involving the authorities concerned as BRG. At provincial level, Provincial Technical Committee (PTC) will be organized by involving stakeholders of province and districts based on the concluded "MOU for fire prevention strengthening" .

c) Project office has representative staff in PKHL, MoEF while main office will be placed at provincial level each province and branch offices will be placed at district level each district.

d) Each office will contract with local university and/or consulting firms for project activity management and technical support consultancy service [100]including project staff and support services. Coordination with district and village level will be conducted through local consultant.

e) In addition to coordination with PKHL through representative staff, monthly coordination meeting with PKHL by involving PKG will be hold.



Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration. 2016

Figure 5.2.4.1. Outline of Draft Implementation Structure

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

5.3 Road Map and Options for Further Cooperation Formulation

5.3.1 Proposed Draft Midterm Road Maps for Further Cooperation Formulation

Based on the discussion above, draft road maps for further coopeartion formulation in forest and peatland fire prevention are proposed as follows.

[100] In order to sercure the appropriate service and human resources even each target province, human resources belonging to local universities, local authorities and local NGOs would be utilizied flexibily. For instance provincial TRGD functioning as the local support to BRG would be involved by assuming contracting to the local university who play the leader's role in the expert group of provincial TRGD.

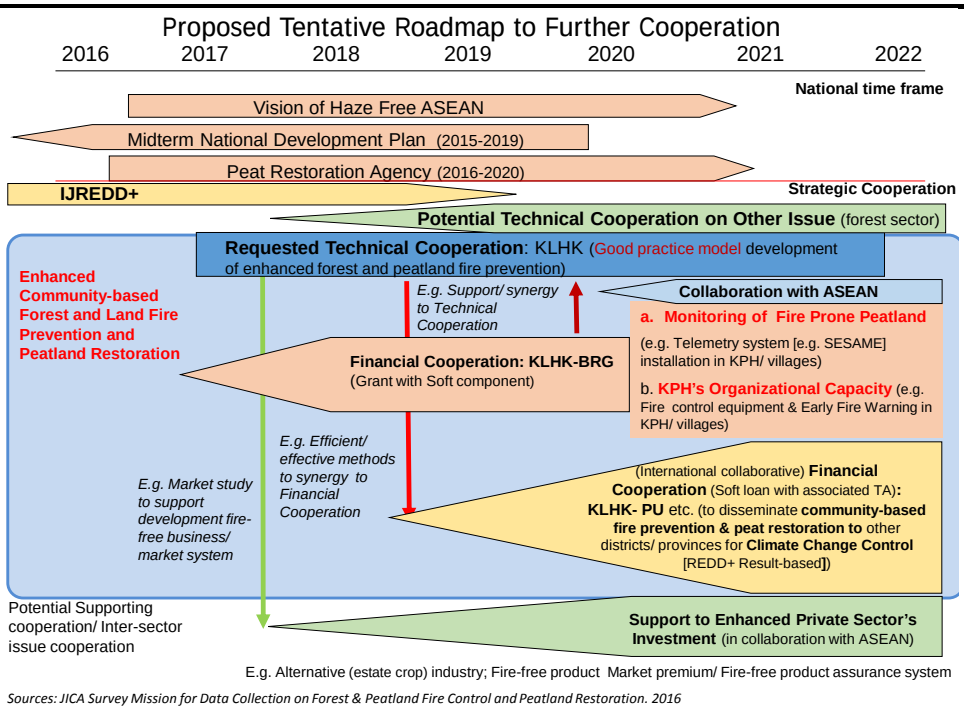


Figure 5.3.1.1. Draft Road Maps for Further Cooperation Formulation in Forest and Peatland Fire Control Cooperation

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016 (as of Aug. 2016)

5.3.2 Options for Coopertion Formulation

The following optional approaches are assumed to formulate further financial cooperation or support to private sector investment as proposed in the roadmap above

(1) Application for new cooperation

a) Proposed grant aid "(Tempoary title) Progect for Development of Early Warning and Response System for Peatland Fire Prevention and Restoration (Proposed draft framework of Euipment Grant Aid): PKG has started examined draft application but there was no information that PKG has the concreate draft application at the end of 2016.

b) Proposed soft loan aid" (Temporary title) Project for Peatland Watershed Management Enhancement for Peatland Fire Prevention and Restoration: here was no information that PU has started examined to utilize soft loan aid as the fund sources for peatland restoration infrasturece etc.

(2) Urgent survey

A supplemental survey (Preliminary feasibility study or Urgent survey) for peatland restoration in the most prioritized 4 districts (3 provinces) was proposed on 15 Sep. 2016 at the courtesy call of Detailed Planning Survey Team on BRG. Supplement collection and confirmation of the information will be conducted to confirm and examine possible cooperation for the preliminary F/S in line with cooperation formulation to support enhanced private sector investment.

5.4 Support to Prepare Implementation of New Cooperation

5.4.1 Preparation of Detailed Plan

Based on the Japanese official approval of the Indonesian Official Request and annoucment to the Indonesian Governemnt, JICA dispatched a HQ's Mission for Detailed Planning Survey Team of Requested New Technical Cooperation between 14-23 Sep. 2016. The following detailed plans on

cooperation contents in new cooperation was agreed through discussions by involving the representatives of JICA HQ's Mission and PKHL, PKG, and Secretariat of Directorate General of Climate Change (in charge of foreign cooperation), KLN. As a result, JICA Detailed Planning Survey Team submitted to MoEF sides Draft Minutes of Meetings with attached documents for signing by Chief Representative of JICA Indonesia Office and 2Directors Generals concerned[101] (see Final Draft PDM in the Annex Volume).

The basic way of thinking is based on the 5.2 above. The activities will be conducted in 2 provinces at first 3 years and 4 provinces at late 3 years. Therefore 6 prioritized provinces[102] will have 1 model district each province.

Table 5.4.1.1. Outline of Detailed Plan of New Technical Cooperation

Tentative Project Design of Community Movement Program on Forest and Land Fire Prevention	
Project title	The Project for Community Movement Program on Forest and Land Fire Prevention
Project period	Five years (2017- 2022) (expected to start from April, 2017)
Project Purpose	One model district, where hotspots and burnt area are decreased, is established in each targeted province
Major Component	1) Capacity Development for Forest and Land Fire Control 2) Development of 6 Model Districts (one district in each target province) 3) Development of Community-based Peatland Management 4) Policy Support on Community-based forest and land fire prevention
Target Area	**Six districts** in six provinces (Riau, West Kalimantan, Jambi, South Sumatra, Central Kalimantan and East Kalimantan provinces)
Target group	Stakeholders in relation to fire control in the target areas including communities, local governments and Forest Management Units (KPH)
Executing Agency	• Directorate of Forest and Land Fire Management, DG of Climate Change, Ministry of Environment and Forestry (MoEF)
Implementing Agency	• Directorate of Forest and Land Fire Management, DG of Climate Change in cooperation with Directorate of Peat Damage Control, DG of Pollution and Environmental Damage Control, MoEF • Provincial and District Governments
Collaborating Agency	Peatland Restoration Agency (BRG)
Project Cost Estimation	(JICA) ######### million Rp (≒######USD) (GoI) ######### million Rp (≒######USD)

Sources: Modified from JICA Detailed Planning Survey Team. Sep. 2016. Draft Minutes of Meetings

[101] (Draft Ver. 5) Minutes of Meetings between the Japanese Detaliled Planning Survey Team and the Authorities Concerned of the Government of Republic of Indonesia on the Japanese Technical Cooperation for Project for Community Movement Program of Fire and Land Prevention in Indonesai

[102] As the result of discussions with Director of PKHL on 19 Sep. 2016, (and involving 4 Sub-directors), South and North Kalimantan Provinces was judgeted lower priority in Kalimantan Island.

Figure 5.4.1.1. Structure of PDM of New Technical Cooperation

Sources: Modified from JICA Detailed Planning Survey Team. Sep. 2016. Draft Minutes of Meetings

5.4.2 Examination of Implementation Plan

Such plans for implementation as Draft PO, Draft project implementation structure, and Division of cost estimation of the project will be finalized through further discussions by both sides as the results of the discussions by the JICA Detailed Planning Survey Team. Based on the following final draft (see Final Draft PDM and PO etc. in Annex Volume), supplement collection and confirmation of the information will be conducted even from Oct. 2016 to follow-up the detailed planning.

A meeting to finalize minuts of meeting was hold on 17 Oct. 2016. Relating Drat PO and Draft Demarcation among Relevant Organizations for Peatland Monitoring, PKG side pointed out that supporting to prepare Peatland Protection and Management in district level is important in preparing fire prevention action plan in district level for Output 1 because of the basis of village-level peatland monitoring for Output 3.

Regarding the division of cost estimation, there is a view in MoEF sides that decreasing proportion of cost for project procured/employed personnel including the Indonesian Experts below 30% of the total project cost is important to maximize the activity cost. Meanwhile JICA Detailed Planning Survey Team pointed out that the implementation agency needs to confirm budget allocation for Allowance, Travel Expense for Counterpart personnel.

The signing procedures of Minutes of Meetings with attached documents reflected the enhancement mentioned above was completed in March 2017.

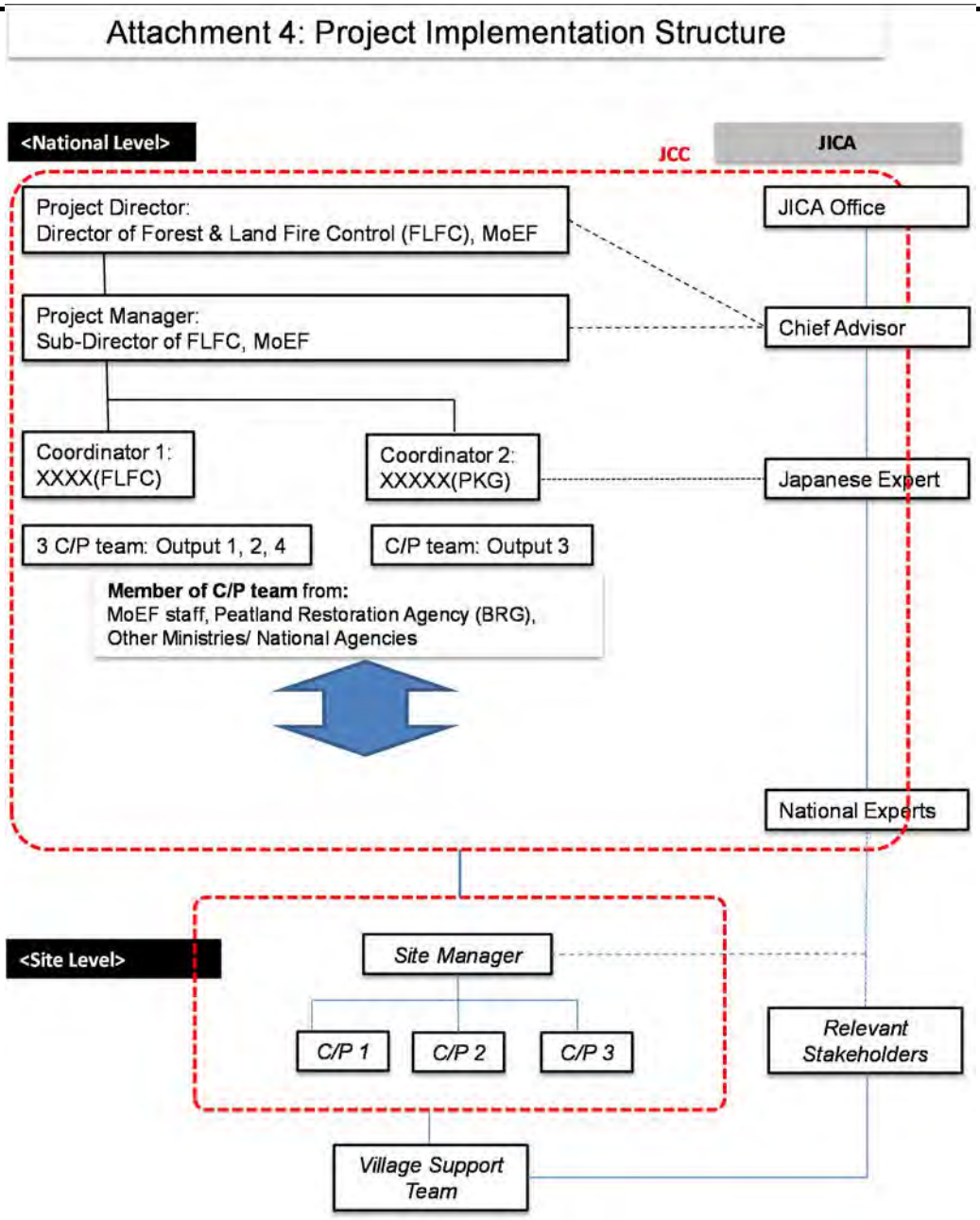


Figure 5.4.2.1. Example of Implementation Plan of New Technical Cooperation

Sources: JICA Detaiedl Planning Survey Team. Sep. 2016. Draft Minutes of Meetings

CHAPTER 6 SUPPORT TO SUPPLEMENTAL SURVEYS FOR PEATLAND RESTORATION AT THE MOST PRIORITIZED BY PEATLAND RESTORATION AGENCY

6.1 Examination of Contents of Support to Supplemental surveys for Peatland Restoration at the Most Prioritized 4 Districts in 3 Province

6.1.1 Examination of Contents of Support

JICA HQ dispatched Detailed Planning Survey Team on the requested next technical cooperation between the middle until the end of Sep. 2016. At the courtesy calls at BRG, the Head of BRG requested for supplemental surveys (hereafter referred to "Preliminary Feasibility Study" or "Urgent Survey"). To respond the request, the JICA Survey Mission conducted the additional surveys to define the survey needs for the urgent surveys, and then to collect additional information on role and cost sharing in component of the authorities relating to peatland monitoring.

Based on the examination with BRG and PKG of MoEF in Oct. 2016, the following issues in peatland monitoring were collected.

a) As the tale below, the matters of demarcation of the authorities concerned with peatland monitoring needs to continue to be examined in the following Supplemental Surveys due to the important matters according to the location (BRG targeted sites or others) and the period (before or after BRG breakup).

Table 6.1.1.1. Proposed Improvement on Role Sharing in Peatland Restoration Attached the Minutes of Meetings with the Detailed Planning Survey Team on the requested next cooperation.

Proposed Role Sharing in Peatland Hydrological Monitoring Outside of Conservation Forests (State Forest**) & Private Sector Managed Lands** (in/outside of State Forest)

No.	Role	BRG	PKG	Prov./TRGD (KPH P/L)	Kab./LH (KPH P/L)	Desa	Remarks
I	**BRG Restoration Sites until 2020**						
1	Planning	X					
2	Design & Management	X		X	X		Include. Installation location
3	Place arrangement			(X)		X	
4	Providing Equipment	(X)					Equipment received by BRG will be National Assets. And then the equipment will be handed over from BRG to local gov. as Local Gov. Assets.
5	Providing Training	X					
6	Maintenance of device and Payment for tele-communication (include. SIM - card and prepaid Pulsa)	(X)		X			BRG will allocate budget for maintenance and tele-communication for the first year. BRG will recommend the local government to allocate budget .
7	Security			X	(X)	X	
8	Reporting data to National Database (PKG)	X		(X)	(X)		
II	**Non BRG Restoration Sites and Whole KHG after 2020**						
1	Planning		X				Non BRG target
2	Design & Management		X	X	X		Include. Installation location
3	Place arrangement		(X)	(X)	(X)	X	
4	Providing Equipment		(X)				
5	Providing Training		(X)				
6	Maintenance of device and Payment for tele-communication		(X)	X			
7	Security			X	X	X	By organizing/ strengthening village facilitators (and/or TPD) for peat management
8	Reporting data to National Database			X	X		
9	National Database Management		**X**				

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration. 2016

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

b) According to PKG, the private sector's unions as APHI requests for the government to prohibit opening and leakage of data period[103]. That's why the government will take responsibility on

[103] This is said to relate the possibility that complaints can be filed against corporations and individuals where fire occurred

leakage and abuse of data on private sector. Such monitoring data should be transmitted to the national database in PKG to store it. Thus data stored in BRG-BPPT should not to be shared with PKG due to risk management of PKG.

c) Management of equipment in peatland should be referred to the laws and regulation on management of government's possessing assets[104].

6.1.2 Contents of Supplemental Surveys

As the results of examination above, BRG submitted the written proposal at the additional surveys in Oct. 2016[105]. The proposed contents of the supplemental surveys are as follows. And then in Nov. 2016 BRG and JICA concluded the Minutes of Meeting on Basic Information Surveys on Peatland Restoration[106].

Table 6.1.2.1. Planned Contents of Supplemental Surveys for Peatland Restoration in the BRG's Most Prioritized 4 Districts in 3 Provinces

Outline of Supplementary Surveys for Peatland Restoration in the BRG's Most Prioritized 4 Districts in 3 Province BRG

No.	Framework	Summary of Proposed Contents	Remarks
1	Title	Pre-feasibility Study for Peatland Restoration Investment in Four Most Prioritized Areas in Indonesia	
2.	Period	Dec. 2016-aournd Aug. 2017	
3.	Goals	To develop economic development models to contribute climate change mitigation by peatland restoration	
4.	Objective	To develop peatland restoration portfolio options in prioritized 4 districts	
5.	Major components	**1. Trial baseline measurement and monitoring of peatland hydrological conditions of the target area** 1.1. Piloting for harmonization in national monitoring system 1.2. Building consensus on detail monitoring plan 1.3. Training of Trainers (TOT) for stakeholders on peatland hydrological monitoring 1.4.Installing water logger real time to monitor peatland hydrological	a) Phase 1: 4 loggers in 1.4.in South Sumatera Prov. (MUBA District: 1KHG, OKI District: 2 KHG) b) Phase 2: Remain/Overall *Water loggers as survey equipment is temporally possessed by JICA Indonesia Office and then will be transferred to BRG at the end of survey period.
		2. Profiling surveys of the target area and quick preliminary feasibility study for facilitating peatland restoration by private business investment 2.1.Quick feasibility study on biophysical and economic on peatland restoration to develop peatland restoration portfolio 2.2. Conducting market research and cost benefit analysis on the proposed peatland-friendly species plantation development associated with potential business development 2.3.Identifying the location for implementing peatland restoration portfolio based on quick feasibility study 2.4. Designing and establishing demonstration plot for peat restoration 2.5.Monitoring and evaluation on demonstration plot	Phase 2
		3. Stakeholders' coordination meetings to promote private business investment on peatland restoration 3.1. Regular coordination meetings (3 times) 3.2. Support to BRG International Symposium (Dec. 2016) 3.3. . Open Seminar on Investment on Peatland Restoration at Tokyo (Apr. 2017) 3.4. Open Seminar on Investment on Peatland Restoration at Jakarta (around July 2017)	a) Phase 1: 1st in 3.1 and 3.2. b) Phase 2: Remain
6.	Target sites	1. Musi Banyuasin (MUBA) District focusing on 1KHG (KHGS. Air Hitam Laut-S.Buntu Kecil), South Sumatra Prov. 2. Ogan Kemering Ilir (OKI) District focusing on 3KHG(KHGS. Sugihan-S.Lumpur, S. Sibumbung-S. Batok, S.Sugihan-S. Saleh), South Sumatra Prov. 3. Pulang Pisau District focusing on 2KHG (KHG S. Kahayang- S. Sebangau, S. Kahayang-S. Kapuas/ S. Katingan-S. Sebangau) 4. Kepulauan Meranti District focusing on 1KHG (KHG Pulau Tebing Tinggi)	

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration. 2016

Sources: Prepared based on the Proposed Work Plan by BRG Letter dated on 28 Oct. 2016[107]
Notes

1) Phasing (Phase 1: around by Jan. 2017; Phase 2: around from Feb. 2017) was proposed by JICA HQ's internal consideration after signing the Minutes of Meetings.
2) As implicated in the BRG's written proposal, there is the information on the needs of the equipment procurement: the Presidential Office who will receive the report from BRG is implicated to direct "real-time monitoring" and then the Head of BRG is implicated to designate "SESAME brand" according to the experiences in peatland environment. And also the needs to build real-time monitoring/ early warning

at the source of haze estimated based on wind direction and speed when haze pollution has occurred in Singapore because of the Transboundary Haze Pollution Act No.18/2014 in August 2014.

[104] Based on Government Regulation No. 27/2014 (on Management of State/Local Government's Possessing Objects: PERATURAN PEMERINTAH REPUBLIK INDONESIA NOMOR 27 TAHUN 2014 TENTANG PENGELOLAAN BARANG MILIK NEGARA/DAERAH), the assets that transferred to BRG will transferred to the local government (like Provincial TRGD). BRG will support temporally the budget for management and maintenance for a while but the organization where the right of ownership will be transferred finally should prepare the budget for management and maintenance.

[105] BRG Letter No. S.167/BRG-KB/10/2016 Subject: Proposal of Urgent Cooperation Action 2016-2017 between BRG-JICA (28 Oct. 2016)

[106] Minutes of Meetings between Peatland Restoration Agency of the Government of Republic of Indonesia and Japan International Cooperation Agency for Basic Information Survey on Peatland Restoration in Indonesia (11 Nov. 2016)

[107] BRG (Deputy 4). 2016. BRG-JICA Urgent Cooperation Action Plan (2016-2017): Pre-feasibility Study for Peatland Restoration Investment in Four Most Prioritized Areas in Indonesia TOR

system at least at the target restoration sites (e.g. the damaged sites by the large scale of fires in 2015) by January 2017 due to the predication of the drier condition derived from ENSO again in 2017.

3) The targeted sites for the phase 1 was defined based on the BRG's proposal in Nov. 2016 that South Sumatra is more urgent than Central Kalimantan and Riau Provinces[108]. One of the background of the proposal is related to BPPT's donation of 8 equipment at the some peatland monitoring prioritized sites in Central Kalimantan and Riau Provinces.

6.2 Support to Prioritized Survey Activities

6.2.1 Piloting Implementation of Peataland Hydrological Monitoring at the Targeted 2 Districts in South Sumatra

The following supports were conducted in the Phase 1 to implement piloting peatland hydrological monitoring.

(1) Support to Detail Monitoring Planning

a) A national system to monitor peataland is based on the laws and ministerial decrees discussed above. The above-mentioned laws and regulation stipulate the contents of observation but don't stipulate the equipment. Meanwhile various stakeholders have started trial monitoring but the role sharing and collaboration among the authorities concerned has not established yet.

a. BRG is expected to want to build database in the server in BPPT based on the MOU for cooperation BRG-BPPT. The risk of leakage and misuse of data will dependent of BPPT's server security. It will become important to examine the measure to such risk as differentiate data to be sent to BPPT (open data) and other date (closed under national database management).

b. Basically examination how to prevent data leakage and how open data is important. BRG did not propose appropriate rule of the scope of open web site address as well as ID and password.

c. Any hydrological monitoring focusing on measuring on spot with real time transmission costs higher. There is a room for improvement to lower costing by integrating rough monitoring based on the estimation using remote sensing technology.

One of future issues is to harmonize the BRG's peatland hydrological data transmission procedures to MoEF's system as shown in the figure below.

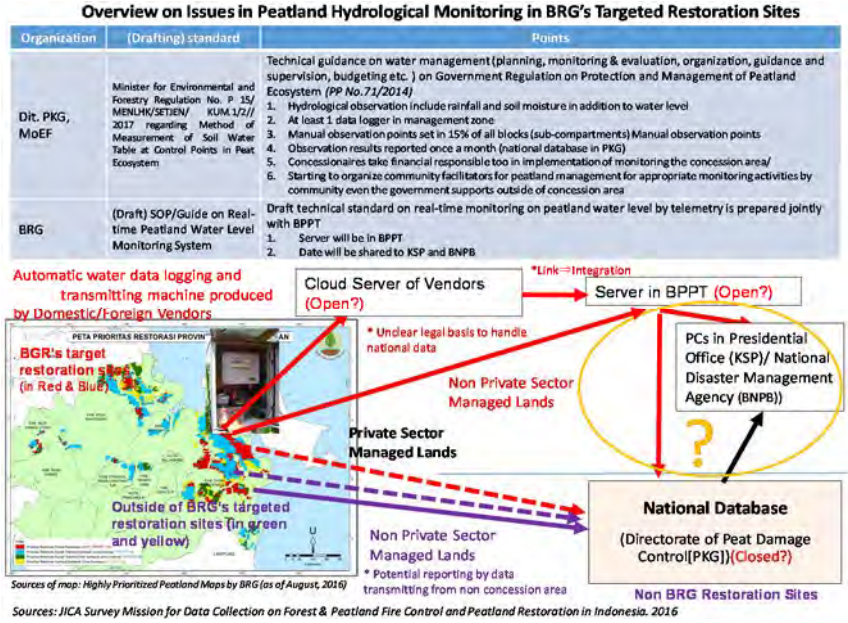


Figure 6.2.1.1 Overview of Issues in Peatland Hydrological Monitoring at the BRG's Targeted Sites

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2017 (as of Feb. 2017)

[108] BRG Letter No. S.011/BRG-4/11/2016 Subject: Proposed Priority Location for Peatland Monitoring (30 Nov. 2016)

b) Based on the results of coordination in each BRG and PKG of KLHK conducted in Oct. 2016, Deputy 4 (in charge of Research of Development) will start informal coordination with PKG jointly with Deputy 1 (in charge of Planning and Cooperation) of BRG who has collaborated with PKG.

c) As trial peatland monitoring has already started by each stakeholder, "Coordination Meeting on Peatland Monitoring System" as a peatland monitoring coordination meeting for detail monitoring planning for harmonization in future was hold on 3 Feb. 2017 at BRG (0.5 day).

a. Approximately 30 persons were joined. First the following information was shared.

i. "Peatland monitoring of measuring water table by telemetry system" by Deputy 4, BRG
ii. "Design of BRG information system" by Deputy 4, BRG
iii. "Development of early warning system on peatland" and "Peatland fire danger warning analysis from fire danger rating system (FDRS)" by BPPT
iv. "Direction to control water management in peatland ecosystem" by PKG, MoEF

b. Opinions were exchanged under the facilitation by Mr. Bambang Setiadi from National Research Council (DRN). He also emphasized the relationship between water table and annual oil palm production and HS.

c. The direction to opinions were summarized as below.

i. FDRS is the answer of BRG interests such as, emission calculations, location justification, EWS development, and also the prediction of ground water level for the next months ahead with the development of FDRS.
ii. Gadjah Mada University has developed EWS for fire vulnerability by social behavior, it is also possible to integrate with FDRS
iii. It would be better if there is a forum of how to input this information and compiling it into tools for the government as a result of system integration and synergy of all thoughts.
iv. Discussion result will be the tools for the data management development by BRG and will be included in main task POKJA data management.
v. Besides monitoring points, the use of satellite technology should be discussed in the future. We look forward to continuing discussions with LAPAN
vi. BMKG and KLHK is expected to synergize for EWS development with FDRS and other tools to update the existing EWS.
vii. Peatlands restoration activities is connected with the haze if the restoration is done perfectly there will be no haze.3R could be an assessment of the restoration target.

Presentation in Peatland Coordination Meeting for Detail Monitoring Planning (3 Feb. 2017)

Discussion in Peatland Coordination Meeting for Detail Monitoring Planning (3 Feb. 2017)

Figure 6.2.1.2. Overview of Coordination Meeting for Detail Monitoring Planning

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2017

d) In parallel with supporting to detail planning to national level monitoring, site specific detail p lanning on peatland monitoring at the monitoring equipment installed sites will also be facilitated to utilize the experiences and lessons learned to detail planning national level monitoring.

(2) Implementation of local training to the stakeholders

a) As a result, holding the first training for provincial peatland monitoring will be planned after installation of peatland monitoring as discussed in (3) below. Based on the progress and results of a above, the training to the personnel concerned with central level monitoring of the authorities concerned will be planned at the coming second phase.

b) "ToT on Peatland Water Management" as local training to the stakeholders for 4 peatland monitoring sites where peatland monitoring device was installed in Dec. 2017 was hold on 9-10 Feb. 2017 at Hotel 101 in Palembang City South Sumatra Province (1.5 days).

a. Approximately 85 persons were joined (50 persons from central & provincial level, 22 persons from MUBA and OKI Districts, and 14 persons [8 companies] in own company's expense[109]). First the following opening was conducted.

i. Report of secretariat by Mr. Haris Deputy 4, BRG
ii. Remarks by Mr. Najib, Leader of TRGD and Special Expert to Governor in Climate Change Field
iii. Opening by Mr. Nazir, Head of BRG

b. And then the following in-room trainings were conducted. "Guide on Peatland Water Table Monitoring by Telemetry System" was distributed as a textbook[110].

i. "Application of water table monitoring relating to peatland damage control" by PKG[111]
ii. "Bases of water table control" by TRGD Expert Group/UNSRI
iii. "Peatland water table real time monitoring system" by DRN
iv. "Methods of utilizing and maintenance of peatland water control monitoring device" by BPPT and ZMEI/Midori
v. "Feedback to training contents and methods" by Deputy 4, BRG[112]
vi. "Group Discussion [per private sector, provincial and district: Experiences and proposal relating fire control, monitoring and device" by Deputy 4, BRG

c) Taking into consideration needs and proposal from the participants, the next training (the 2nd training in South Sumatra around the middle/end of Mar. 2017) will be improved from the perspectives below.

a. Enhanced ToT will be conducted at central level to the trainees selected from the participants of local ToT conducted in each place.
b. Local ToT will focus on district level stakeholders.
c. Local ToT will provide time to study the whole textbook and field practice to install device.

[109] The participants were increased due to possibility of remarks by Governor.
[110] With logos of BRG-BPPT-JICA
[111] Examining data open on outside of private sector managed lands is started by PKG too.
[112] At first focus group discussions/FGD was planned to examine monitoring plan under facilitation by TRGD and UNSRI. But such FGD was cancelled because it became little apppriate as simulation to the whole participants due to mixture of participants from private sector.

Peatland Monitoring Training to Stakeholders in South Sumatra (Opening session on 9 Feb. 2017)

Peatland Monitoring Training to Stakeholders in South Sumatra (Session about method on 9 Feb. 2017)

Figure 6.2.1.3. Overview of Training to Stakeholders

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2017

(3) Installation and operation of peatland monitoring equipment

a) In order to complete installation of peatland monitoring to launching peatland monitoring at the international symposium on 15-16 Dec. 2016, installation was conducted immediately after building consensus among the field level stakeholders on site to support preparation of peatland monitoring (building consensus the location of installation and the agreement with land-right owner etc.). And then written agreement on installation place among the stakeholders will be facilitation by the provincial TRGD after installation. The leader of TRGD's Expert Group (University of Sriwijaya [UNSRI]) will be contracted to support TRGD as the representative of JICA Survey Mission.

b) The criteria used in selecting the location of peatland monitoring was follows.

Table 6.2.1.1. BRG's Selection Criteria on Location of Installation of Peatland Monitoring

No.	Criteria
1	Peatland (depth of peat is deeper than 50cm)
2	Non-concession areas, but public owned lands, such as the state forest, community forests, property of local governemnt building, and so on.
3	Available mobile netwoek
4	Areas suffered by the peatland fire in 2015. And the areas not suffered by the peatland fire in 2015 is also selected for comparison in the neighbouring areas.

Sources: Prepared based on the Interviews with BRG Personnel (Dec. 2016)

In accordance with the above-mentioned selection criteria, BRG instructed to the District Bappeda as the representative of the provincial TRGD for OKI District and to the provincial TRGD for MUBA District of South Sumatra to choose the candidate locations in each target KHG in each district.

c) The site confirmation surveys were conducted to check the temporarily selected locations, and re-selected the locations in case the temporal selected locations were not suit by the selection criteria. Some staff from the provincial TRGD, district officer and the persones related with village accpmpanied to the site surveys and define the concesus locations.

d) Transporatation and installation at the sites was conducted by the sole distributor of the selected device by the contract direclty JICA Indonesia Office. The JICA Survey Mission was entrusted as site inspector on instllation from JICA Indonesia Office. The outline of installation is as follows. .

Table 6.2.1.2. Outline of 4 Sites of Peatland Monitoring Equipment Installed in Dec. 2016

Code	Control	Location[1)] (GPS value at inspection)	Land ownership	Above land right ownership	Remarks
OKI-1	No burn in 2015 *Experimental tree planted sites of Jelutung (Thickness of peat: around 4m)	a. Kedaton Village, Kayu Agung Sub-district, OKI District b. S3.409062, E104.879212 (S3.42386, E104.87834) c. Site decision by District Bappeda (Mr. Jerry) * Installation was done as far as possible from the planned alignment of planned highway around 100 m to south from the installation.	District owned land outside of State Forest	Peatland Forest Genetic Conservation Farm of Branch of Research & Development Agency in MoEF (supported by ITTO)	a. Preliminary survey: 5 Dec. 2016 b. Installation: 8 Dec. c. Inspection:17 Dec.
OKI-2	Burned in 2015 *River flooding swamp grasslands of burned in 2015 and 1997(Thickness of peat: around 0.5m more)	a. Simpang Tiga Village, Sulang Selapang Sub-district, OKI District b. S3.332961, E105.459234 (S.3.33294, E105.45922) c. Site decision by District Bappeda (Mr. Jerry) (accompanied by Deputy village head and leader of Puskesmas)	Village owned land outside of State Forest	Around Community health center (Puskesmas)	a. Preliminary survey:6 Dec. 2016 b. Installation: 10 Dec. c. Inspection: 18 Dec. *Transmitting is succeeded more than once a day due to several times a day accessible to stable signal[113].
MUBA -1	No burn in 2015 *Remaining peatland forests at the alternative site outside of the BRG target peatland restoration sites in order to accessible site to the mobile phone signal	a. Bakung Village, Lalan Sub-district, MUBA District b. S2.066926, E104.064752[2)] (S2.04747, E104.05127) c. Site decision by Provincial Dishut (Mr. Adong) (accompanied by KPHP [Mr. Randi]	State Forest	KPHP Lalan Mengsang Mendis (Specific Use Zone)	a. Preliminary survey:13 Dec. 2016 * Re-survey because there is no mobile signal at the candidate sites at first preliminary survey on 9-10 b. Installation: 14 Dec. c. Insepction:20 Dec.
MUBA -2	Burn in 2015 *Grasslands (Thickness of peat around4.5m)	a. Kepahyang Village, Lalan Sub-district, MUBA District b. S2.085272, E104.267234 (S.2.08537, E104.26734) c. Site decision by Provincial Dishut (Mr. Adong) (accompanied by KPHP [Mr. Randi]	State Forest	KPHP Lalan Mengsang Mendis (Eco-service Zone)	a. Preliminary survey: 10 Dec. 2016 b. Installation: 13 Dec. c. Inspection: 19 Dec. * Transmitting was not succeeded due to no accessible to stable signal.

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

Note

1) PT. Zenbi Machinery and Electronics Indonesia (Diwakili oleh Tim Midori Engineering Laboratory Co., Ltd .2015. LAPORAN AKTIVITAS PEMASANGAN AWLRS SESAME OKI DAN MUBA (21 Dec. 2016)
2) Underlined sites are requested to re-confirmation and amendment of the related documents according the re-confirmation results at the second phase.

e) Among the 4 sites, installation of external antenna used procurable ones in local market was conducted at MUBA 2 because data trasmissin on peatland hydrological condition did not succeed more than 2 weeks that will be required in operation of the government regulation and

[113] Acccoriding to the site representative of distributer, accsssibility to stables mobile signal which can continue more than30 seconds so as to transmit the continuous data (10 minutes interval) by telemetry.

ministerial decree concerned due to inconinous stable signal more than 30 seconds[114].

Figure 6.2.1.4. Overview of 4 Sites of Peatland Monitoring Equipment Installed in December 2016

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

f) Village-level socialization of peatland monitoring equipment was conducted by TRGD in facilitation by UNSRI by the beginning of April 2017 (OKI-1 site: 1 Apr. 2017; OKI-2 site: 6 Mar. 2017; MUBA-1 site: 26 Mar. 2017; MUBA-2 site: 26 Mar. 2017). Written agreements on installation of peatland monitoring device at the sites by TRGD was also completed through such socialization activities.

g) It is difficult to support to social preparation and security assurance on monitoring by preparing monitoring plan through training to stakeholder because BRG and TRGD prioritize technical matters of monitoring. Thus through the activities for feasibility study, it will be also focused to examine facilitation methods for community-based sustainable peatland management and monitoring as well as field level training to community.

6.2.2 Support to Stakeholders Coordination Meetings

The following supports were conducted in the Phase 1 to hold stakeholders coordination meetings.

(1) Support to organize international symposium

a) BRG and MoEF held an international symposium at Hotel Borobudur on 15-16 Dec. 2016 as shown in figure below. To support to organize it, JICA Survey Mission supported to examine program and to select speakers as well as to coordinate and collaborate logistic matters to hold seminars with the secretariat of BRG-UNDP.

b) Outline of international symposium was opened at the secretariat web site (http://peatlandsymposium2016.info/). The detail will be referred to Proceeding to be prepared by the Secretariat.

c) The read conclusion as the international symposium is as follows.

a. Peat restoration implementation should be done through several strategies:

[114] Installed on 12 Feb. 2017 and succeeded in data transmission since 13 Feb. 2017.

incentive and disincentive, law enforcement, concession right improvement, and forest fire prevention.

b. Letter of assignment to the private sector to undertake peat restoration through hydrology management improvement in peatlands is needed.
c. Strengthen the support from the government and science is crucial in order to make the restoration effort undertaken by stakeholders (including private sector) is effective and efficient.
d. Policy should be transparent and law enforcement is important towards the success of peatland restoration.
e. Restoration effort should have a long term dimension, integrated across institutions and level of governments, and utilize various financing mechanism.
f. The help of foreign investors is needed to restore over 2 million ha of peatlands in Indonesia.
g. Technical work in peatland restoration using technology and building capacity will be useful for cooperation between local and donors.
h. Market strategy needs to be developed for peatland commodities.
i. Real time monitoring instrument is needed to be installed in 7 provinces target priority.
j. As Next Step
    i. BRG will develop more cooperation with key stakeholders to undertake peatland restoration action.
    ii. BRG will cooperate with foreign investors to support peatland restoration actions.
    iii. Full implementation of peat restoration will be undertaken in 2017 by various support from local governments, international partners and civil society group

Figure 6.2.2.1. Overview of International Symposium

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2016

(2) 1st Stakeholder Meeting for Facilitation of Private Sector Investment to Peatland Restoration

In order to implement this survey and facilitating private investment in future smoothly, "Focus Group Discussion for Private Sector Investment Engagement in Peatland Restoration" as the 1st stakeholder coordination meeting for investment facilitation was hold on 7 Feb. 2017 at Hotel Aone in Jakarta (0.5 day).

a) Approximately 45 persons were joined. First the following information was shared.

a. "Peatland restoration framework: Facilitating Private Sector Investment in Peatland Restoration" by Deputy 1, BRG
b. JICA Mission "Background of survey as well as potential of green investment by peatland restoration": See figure below
c. "Outline of results of preliminary F/S" by UNSRI
d. "Policy support in development and investment to commodity friendly to peatland" by Coordinating Ministry of Economic Affairs

b) Secondly the following information was shared for discussion.
   a. "Potential of Sago Palm and Rotan as green product" by South Kalimantan Province[115]
   b. "Support to private for peatland restoration" by South Sumatra Province.

c) Opinions were exchanged under the facilitation by Ms. Hanni, Special Staff for Minister of Environment and Forestry. But time for discussion is not enough in half day.

d) Based on the positive reaction from the participants to this coordination meeting, the next meeting (after visit activities in Japan) will be improved from the perspectives below.
   a. One day meeting for enough time for information sharing from various ministries and agencies
   b. Discussion by two focus group discussion: One on technical matters such as commodity crops and business models; Another on fund procurement matters such as tax reduction and bond raising
   c. Starting to plan basic model and action plans

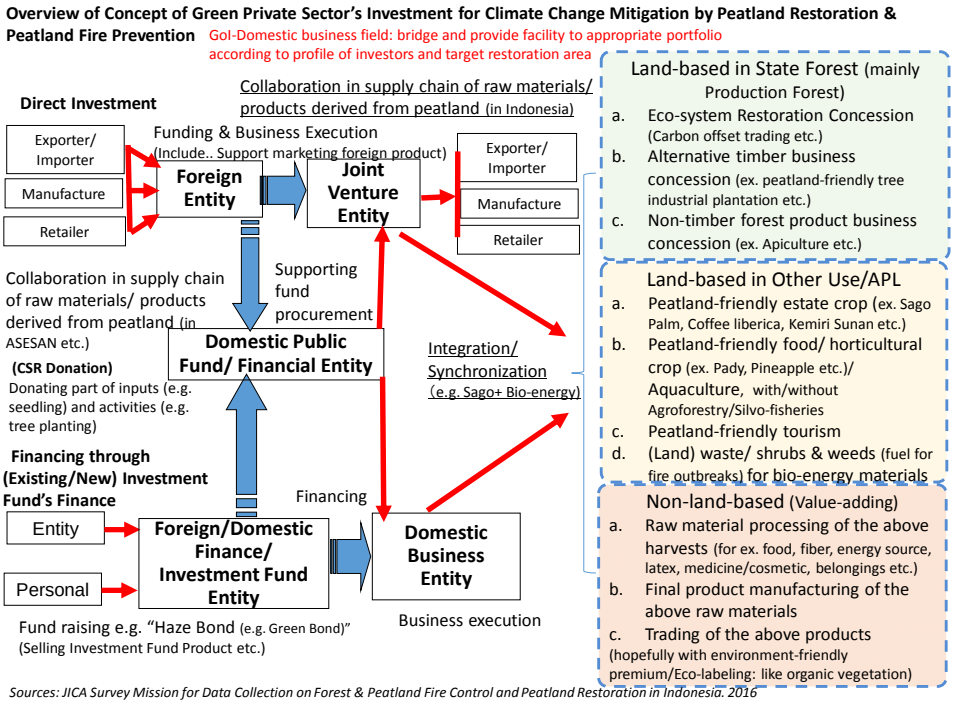


Figure 6.2.2.2. Proposed Concept of Private Sector Investment to Peatland Restoration

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2017 (as of Feb. 2017)

[115] Purification technology of starch, recycling starch from waste and waste water is highly needed.

Presentationn in 1st Coordination Meeting for Investment Engagaement (7 Feb. 2017)

Discussion in 1st Coordination Meeting for Investment Engagaement (7 Feb. 2017)

Figure 6.2.2.3. Overview of 1st Coordination Meeting for Investment Engagement

Sources: JICA Survey Mission for Data Collection on Forest & Peatland Fire Control and Peatland Restoration in Indonesia. 2017

Data Collection Survey on Forest & Peatland Fire Control and Peatland Restoration in Indonesia

Final Report
<Annex>

May 2017

Japan International Cooperation Agency (JICA)

Japan Forest Technology Association
Nippon Koei Co. Ltd.

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Final Report <Annex>

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1. Outline of Meeting

1.1 Survey Mission

1.1.1 Kickoff Meeting

Subject：	Kickoff meeting on Forest and Peat Land Fire Control for new cooperation between the government of Indonesia and the government of Japan
Date：	May 31st, 2016　08:30-10:00
Place：	Meeting room, 6th floor, MoEF
Participants from Indonesia side	Sri Murniningtyas (KLN), Agus Haryante (PKHK), Rektarim(PPI), Julita Endah Medyasari (PPI), Indah Prasasti (LAPAN), Parwati (LAPAN), Indra K. M.(PKHL), M. Askary (PKG), Viki F (GAKUM)、Adelin Indah M (Dit Astipas-Kemlu),
Japanese side	JICA : Mr. Shishido (JICA HQ), Mr Nagumo (JICA HQ), Ms. Suzuki (JICA Indonesia), Nindita P. (JICA Indonesia) JICA survey team： Mr. Kuno, Mr Sakurai, Mr. Hashiguchi
	After the holistic explanation about the purpose of the data collection survey on forest and peat land fire control by Mr Kuno (Team leader of the survey team), discussion was done as follows;
	[Ms Murniningtyas: KLN] ・ This meeting is held for new Indonesia-JICA cooperation. Thus, it is nessesary to cooperate and work together. ・ There is a possibility to hold a meeting with other donners after Ramadan.
	[Mr. Nagumo: JICA] ・ Due to the Summit in Japan, the progress of approval for the new cooperation was delayed. It would be accelerated after the summit. Official announcement of approval will be delivered to the Government of Indonesia through the Embassy of Japan.
	[Mr. Shishido: JICA] ・ We had two meetings. One of them was with World Bank (WB). ・ For the consideration of long term cooperation, aid coordination between JICA and WB is also one of the options since the budget of JICA is limited, and WB also have the idea/plan of fire prevention project. ・ Discussions between JICA and WB will be continued to decide which fields would be covered by which organization. ・ JICA, for example, will support a pilot project and capacity building from the beginning of the new cooperation project. Also, JICA has considered to scale up the project for following up the outputs of the project. ・ JICA requests the survey team to follow up these above points mentioned.
	[Mr. Kuno: JICA survey team] ・ The team has considered both long and short term strategies. Cooperation with WB is one of the options in long term strategy. ・ This survey has just started. Thus, whenever there are possibilities, we will consider about them.
	[Mr Agus: PKHL] ・ We have cooperated with JICA for approximately 20 years. ・ We would like to focus on district and/or village levels in the new cooperation. ・ It is important that there are no fire prone villages as a result of the cooperation. ・ District/Village level activities are very important because the access to information is limited at district and/or village levels.

	・ Income generation activities are necessary because the cause of fires also derives from human economic activities. ・ The new project should be operated based on outputs from previous projects (JICA's assets), should not start with zero base. ・ I wish everyone to be ready for the new project and to start it in 2017. ・ In the project, district level should be a project target area although there are seven target provinces in this survey. For instance, it will be implemented at a district in Jambi province. ・ It would be better if we focus on not too many activities in order to avoid obtaining nothing at the end of the project.
	[Ms. Parwati: LAPAN] ・ Agree with the opinion of Mr Agus. ・ LAPAN has provided HS data using satellite images. We will also try to address distributing district level data. ・ LAPAN already has technologies and instruments
	[Mr. Kuno: JICA survey team] ・ The target provinces of this survey are seven provinces. There are deficiencies of data in some provinces so that the team needs to visit each provinces for searching the current conditions in terms of, especially, forest and peat land fire and peat land restoration. ・ The team has also discussed about national movement of fire prevention with the University of Indonesia.
	[Mr. Agus: PKHL] ・ Site selection is very important. ・ Working with a local government is essential, and having good relationship with them is crucial. ・ It is suggested that, firstly, five provinces out of seven provinces will be chosen. Secondly, a project target province will be selected. Lastly, target districts will be decided. ・ Data which cannot be collected in Jakarta should be clarified before conducting field surveys.
	[Ms Murniningtyas: KLN] ・ Local government will make the acceptance of the project clear. (If they would be welcome or not). ・ Project design should be prepared by the JICA survey team. (till June 6, 2016) ・ In terms of Papua province, implementation of the field survey should be re-considered.
	[Mr. Askry: Head of Peat damage control under the MoEF (Peatland ecosystem restoration division)] ・ Agree with the new cooperation with JICA ・ Our division is in charge of preparing maps including peat land maps. ・ We cooperate with Ministry of Agriculture and deal with concession in peal land. ・ Peat restoration is effective for raising water level. Main point is how we make water level higher while the government of Indonesia has tried to rise its level around 0.4m for contributing to the reduction of carbon emission from peat land. Cannel blockings are one of the options, and it is important to inform communities regarding these information.
	[Mr. Shishido: JICA] ・ In terms of peat restoration, we discussed with Mr Nasir of BRG. ・ BRG agreed with cooperating with MoEF, especially peat land monitoring and mapping. ・ JICA cannot support two organizations over the same issue. It is necessary to

	discuss with BRG about the ways to cooperate between MoEF and BRG for the new cooperation
	[Ms. Murniningtyas: KLN] ・ It is the challenge to work together between two big organization. ・ Further discussion is needed if the new cooperation should be 1 project or divide into 2 cooperation.
	[Mr Shishido: JICA] ・ JICA has a scheme to provide machines as grant aid. ・ SESAME introduced by SATREPS is also effective to monitor water level. ・ There is limitations regarding the budget of technical cooperation so that other scheme should also be considered.
	[Mr Agus: PKHL] ・ It is needed to consider what milestones are for the new project. ・ Fire prevention is the main purpose of the new cooperation.
	[Mr. Nagumo: JICA] ・ JAXA will launch GCOM-C (climate change monitoring satellite), new satellite, at the end of this year. ・ JAXA and LAPAN have started discussions for a new collaboration, and outcomes might be provided. ・ Please consider how to utilize the outcomes of JAXA-LAPAN cooperation.
	[Mr. Shishido: JICA] ・ There is a possibility to utilize outputs from JAXA-LAPAN cooperation for Early Warning System. ・ JICA acknowledged that delivering information of Early Warning System to commune level is one of the issues.
	[Ms. Murniningtyas: KLN] ・ The main body of the project is MoEF although there are spaces to consider of cooperation with other organizations/institutions.
	[Ms. Parwati: LAPAN] ・ One of the issues in terms of Early Warning System is to make accuracy higher, and it is important.
	[Mr. Agus: PKHL] ・ In order to improve early warning system, building tower and setting CCTV is one of the options. ・ Verification of fires is also important. ・ Current system (Sipongi) should be utilized for the new project, should not establish new system to avoid the confusion of users.
	[Mr. Sakurai: JICA survey team] ・ Cooperation with PU for peat restoration including cannel blocking should be considered.
	[Ms. Murniningtyas :KLN] ・ In sum, organizations to cooperate for the new project are LAPAN, PU, UI, Local Government, BRG.
	[Mr. Viki, Gakum] ・ Site selection is very important. ・ Target areas of the new project include not only communities but also concessions. Forest planning division should be included. ・ Each organization put importance in each area so that Bappenas should be taken part in. ・ In terms of fire occurrence, its cause is human activities. Livelihood activities are crucial. We had income generation activities in Riau province, but it was failure because methodology was not suitable for the area. ・ Therefore, it is critical to consider the difference of features in each area.

	[Ms Murniningtyas: KLN] To sum up with the discussion; ・ Potential target areas a) Forest fire control: Riau and Jambi b) Central Kalimantan: IJ-REDD has implemented c) Central Kalimantan: Many donners and academic studies are there. b) Other possibilities: South Sumatra, South Kalimantan, and East Kalimantan ・ There is higher possibility in East Kalimantan ・ Papua province has less possibility.
	[Mr Kuno: JICA survey team] ・ Coordination meeting with other donners will be held in order to avoid overlapping of project activities. ・ KLN and JICA will coordinate the meeting. ・ The meeting will be held after Ramadan.
	[Mr. Nagumo: JICA] ・ JICA has still considered to organize a joint seminar. ・ Potential schedule will be after Ramadan, and its organizer will be PKHL and JICA.
	[Ms. Murniningtyas: KLN] ・ Need preparation for draft project design before going to field surveys. ・ After Ramadan, there will be follow up meeting, and further details are discussed. END

1.2 Detail Planning Survey Team

1.1.2 September 15, 2016 (BRG)

Time : 09.25 AM – 10.15 AM
Venue : Badan Restorasi Gambut (BRG) Office, Jakarta

Officials of Japan International Cooperation Agency (JICA) visit Peatland Restoration Agency of Indonesia, known as Badan Restorasi Gambut (BRG). After welcoming remarks from the Head of BRG, the JICA officials open up discussion on proposed roadmap for forest and peatland fire prevention or peatland restoration.
Dicussion :

- Mr. Shishido Kenichi from JICA give brief explanation about the tentative roadmap for forest and peatland fire prevention or peatland restoration designed by JICA.
- Mr. Nazier Foead as the head of BRG give the latest development and progress after the presidential's cabinet meeting that was held few weeks ago regarding peatland restoration programs.
  - Focus on rewetting and monitoring.
  - Priority on 4 districts : South Sumatera, Riau,Central Kalimantan
  - Target to have 400 units in 4 districts. If possible with the help from JICA.
  - BRG's on going progress : still calculating how many hectares covered by one unit.
- Pilot activities of the restoration by BRG is to map the remaining peatland. For example degraded peatland.
  - Degraded peatland around 600,000 ha under government control
  - 70,000 ha protected areas & community lands.
  - 2,100,000 under the concessions.
  - Thousands more hectares was burnt on 2015.
- Government of Indonesia is keen to invite more investors to apply for concessions for restoration, for there is 3.9 milion hectares that is unkown in terms of its ownership. Although there is still works need to be done in order to improve Indonesia's licensing policy.
  - BRG is currently make efforts to simplify the licensing process.
  - Indonesian's government is offering other organisations to do the restorations so the government can deal more on regulations while supervising and monitoring the restoration process.
  - Investments on peatland restoration is highly prioritized by indonesian's government compared to restoration on mineral soils.
- Mr.Nazier urge JICA officials to reconsider and redirect the proposed program to focus on the restorations on the 4 districts prioritized by the government instead of peatland fire prevention. And Mr. Shishido has agreed to reconsider and request for another meeting sometime next week.
- Mr. Budi Satria Wardhana, as one of the Deputies at BRG questioned about the criteria of technical assistance as well as grant assistance proposed by JICA.
- At 10.15 Mr. Nazier ask permission to leave the meeting and hope to reach agreement soon with JICA.
- BRG and JICA officials agreed to have another meeting on Wednesday, 21 September at 4 pm, same venue.

1.1.3 September 15, 2015 (PKHL, KLHK)

Time : 11.10 AM – 12.35 PM
Venue : KLHK (Manggala)

Welcoming speech by KLHK official, and continued by Mr. Nagumo who give brief introduction about JICA and stated JICA's purpose of visit which is to share JICA's tentative roadmap/programs and hope to have feedback and discussions with KLHK officials regarding the proposed program

before finalizing the design.
Dsicussion :

- First discussion is on who is going to sign the PDM from KLHK side
- Mr. Nagumo start to give brief explanation on the PDM and ask for comments and feedbacks if any, and exchanging opinions.
- Designed based on information by Mr. Kuno, tentatively prioritized 8 provinces : South Sumatera, Jambi, Riau, South Kalimantan, East and West Kalimantan.
- KLHK asked if priority based on JICA point of view from KLHK point of view. Because KLHK have 5 priority in which Riau is not open for another project because of its already densed activities. So its better for JICA to prioritize South Sumatera and Jambi.
- JICA asks how many districts will be covered since this tima JICA hope to design not only technical cooperation but also other cooperations.
- KLHK official explained the amount of districts that will be covered is depending on how much the budget is. It is already mentioned since the very first meeting. However the government already assigned 5 provinces to be the priority, they are : Riau, Jambi, South Sumatera, West & Central Kalimantan. And if there is a surplus of budget then it can be developed into 10 provinces.
- Among those 5 priorities, the highest priority is Sumatera since it has direct border with Malaysia and Singapore. But since Riau already busy with too many projects, KLHK decided to move to Jambi and South Sumatera for JICA project.
- In this new concept, KLHK want to focus more on the real result of having fire free districts rather than output in the form of numbers of activities that have been done in one district. It is all about how many districts that are free from fire.
- Under the directorat of land & forest fire prevention, the budget of the program is never below 100 Billion Rupiahs. And this year alone, the directorat already spent 350 billion rupiahs.
- Mr. Nagumo continue the discussion by explaining more on the proposed design.
- KLHK officials responded by commenting that the Scalling up Cooperation Asset program is outside of their territoty, it is a highly sensitive issue hence need higher level of officials for discussion and authorization.
- Mr. Shishido asked regarding future expansion on the mission, what kind of design that KLHK think is the most suitable design for the future extension of the project.
- KLHK officials explained that future expansion is depending on how successful the former project is. They have to have a success story in order to make a duplication. If the design is not succeed then it is unlikely to be extended.
- And in order to evaluate, KLHK need to see the impacts of the project for the whole year because of dry and wet seasons happen every 6 months. It is necessary to have broader overview of the results.
- As for the indicators of the evaluation is not being mentioned clearly because it depends on the evaluation process. Annual evaluation is different from monthly evaluation.
- Mr. Nagumo continue to explain about the proposed design.
- KLHK official explains that this project involves 2 institutions which are forest fire and peatland. And in Indonesia, it is quite a challenge considering the number of cases of miscoordination on the field is often happened.
- Even in the KLHK alone, we have 2 authorities. One from forestry and another one from environment division.
- KLHK official asks whether JICA is more focus on forest fire or peats. If the proposed design is mainly about forest fire then JICA has come to the right place. However if its mainly about peats, our directorat is only a support unit.
- So first option is to make the design mainly about fire in which one of the aspects covered is peats, or second option is to make it mainly about peats and our directorat will only help in regards to the fire issue.
- It is because its very hard to have 2 institutions with the same level of power to collaborate. It will be a lot easier if the project have 1 institution as the main partner, but also have another institutions as a supporting unit.

- It will also make the accountability process easier, because only 1 institution will have to take into account of all of the responsibilities in regards to the project.
- Mr. Shishido explained that on JICA side, it is hard to divide a project per partner. We often collaborate with 2 or more institutions under one project as long as the activities of the project have the same purpose.
- KLHK official explained that if collaborating with other organizations at the implementation level is not a problem. It will be a problem if both organizations with the same level of high power are included in the main structure organizations of the project.
- Mr.Shishido emphasized on the importance of having a meeting with general secretary (sekjen) in order to have a general view on what should be achieved.
- KLHK official agreed upon the importance to have a meeting with the higher level officials because ultimately it is them who have the capacity for project's approval.
- The KLHK officials have agreed to help JICA's representatives to meet higher level officials even though it would be quite challenging considering the schedule of high level officials.

1.1.4 September 15, 2016 (AFD)

Time : 15.00 to 15.30
Venue : AFD Office, The Plaza Tower.

A Senior Investment Officer from AFD, Mr. Jean-Hugues de Font-Reaulx, greets JICA's representatives and gives JICA's representatives time to introduce themselves and start the discussion session.
Discussion :

- Mr. Shisido gives a brief introduction about JICA and its activities on forest fire prevention and forest fire extinction, as well as on the on going cooperation with indonesian's government.
- Purpose of visit : to look for more partner in regards to forest fire prevention and forest fire extinction activities.
- Main component will be community-based fire activity, which JICA have been working on the 4 prioritized districts. But open for a combination of other partners activity or other related activity.
- In addition to the technical cooperation JICA already have a discussion on providing equipment for firefighters, fire extinguish's equipments and monitoring on peatland area.
- Mr. Jean gives a brief introduction about AFD and its activities.
    - AFD has been running for 10 years.
    - Special mandate in Indonesia is very much related to climate change issues, and green energy. But still open to investigate on other sectors.
    - In regards to forestry, only few small scale projects have been done.
    - Since Indonesia is an emerging country, the grant received by AFD Indonesia is not the same as other countries like Africa, etc. In Indonesia is mostly loans; loans to government, to state-owned enterprises, etc.
    - Forestry sector is not easy to intervene because AFD see no potential or short term activity to work with them.
    - Current activity : investigating one investment with private company for rubber plantation in Sumatera and Kalimantan.
    - AFD have in mind in regards to the fire issue but have a very specific area on the project, and on how do they take this issue into account. It is not on peatland but on mineral soil. And it's still on its early stage, no commitment made just yet.
    - However AFD is very keen to work on forestry sector because of the climate change mandate. But if it is on its own, it's rather difficult considering the lack of tools, and the fact that funding sector is difficult for AFD to intervene.
    - AFD also very open to have discussions and sharing ideas, and if possible to have a feasible collaboration.

- Mr. Shishido explained that JICA have worked in Sumatera and Kalimantan, and hope to expand its' models for fire prevention and fire extinction to other provinces as well as other districts with the help of other partners.
- Mr. Jean further explained that he heard from EU experts few months ago that there was a mission in regards to fire control, to diagnose and to see the strengths & weaknesses, as well as to make recommendations.
- However until now AFD do not see how they can help and accept the investment program.
- In regards to the grant, AFD can only manage grant from others but not from its own, because they simply don't have French grant for Indonesia in general. Most of french grants are to sub-saharan africa.
- Mr. Shishido asked whether AFD involves in activities related to REDD+ and Mr. Jean explained that most proposals on REDD+ are not bankable so AFD is more focus on other kinds of opportunities.
- Mr.Shishido further asked whether there are french or other european private sectors who are interested in common credit on the voluntary market. Mr. Jean said there are some but usually small scale, at least smaller than what AFD usually does.
    - Usually AFD loan is minimun 50 million USD, but never financed 100% of the project. As for forestry, could actually go under that limit.
    - AFD itself never do common credit because AFD dont have the mechanism for it.
- JICA shared its plan for the upcoming year to develop a framework on technical cooperation, and will probably held a workshop and seminar regarding the matter, and invited AFD to join because it is important to establish a good network among the stakeholders.
- Mr. Kubo from JICA asked whether AFD has any current work related to bio mass, and Mr. Jean replied that AFD does not have a direct involvement in such project at the moment but might have indirect project coming up.
- Mr. Jean further assures JICA to have no hesitation if there is a financing needs because AFD have a lot of tools for investments. However AFD's counterpart must be Indonesian company. Japanese shareholder is not a problem as long as it is an Indonesian company.
- As for collaboration with International organizations for investment programs, AFD regularly team up with IDB and world bank, and mostly related to fiscal policy and reform.

1.1.5 September 15, 2015 (FAO)

Time : 17.00 to 17.40
Venue : FAO Office, Menara Thamrin

JICA representatives received a very warm welcome from FAO representative, Mr. Mark Smulders and also FAO Associate Professional Officer, Mrs. Jiwon Rhee. Both parties formally introduces each other berore starting the discussion session.
Discussion :

- Mr. Shishido opened the discussion session by stating the purpose of JICA's visit : to conclude their project design on forest fire prevention.
    - Also shares some of the results from JICA's discussions with BRG and KLHK representatives in regards to their design of forest fire prevention as well as on peatland monitoring & restoration.
    - JICA's target is to cover 56 districts and estimated budget for the project is around 200 million USD. JICA is currently looking for more partners, especially funding partners to collaborate with in this project.
    - JICA has tried to approach Indonesian's government but the govenrment is hesitant to give the loan.
- Mr. Mark acknowledges Japan as a major investor in Indonesia whereas FAO has invested only in a small way in regards to firefighting issue in developing countries.

- However in the past FAO has a success story of forest fire prevention training in Central Kalimantan on 2013, and train the local people how to make a good use of the land without burning.
    - When last year's tragic fires happened, the village that FAO has trained is among the few who survived from the massive fire, whereas its' neighboring villages were infected by the fire.
    - Credit to the local farmers group leader for they have managed to continue the good practice that FAO has trained since 2013.
    - At that time FAO worked with 3 communities on how to build a small water canal to re-wetting the area. After it dries the people can plant their crops.
    - The 3 communities were close to each other and the total area altogether is around 200 ha, with more of a landscape approach.
    - The idea was not just to restore for conservation purposes but to restore for sustainable management.
- FAO has two publications on 2012 and 2014 that are about peatland management and climate change conservation & rehabilitation that will be shared to JICA.
- As for the funding aspect, the World Bank just introduces One Map Policy. President Jokowi declared for land management improvement and want to have clear demarkation and ownership of the land.
- But the One Map proven to be quite a challenge, they work on 200 milion USD loan from the World Bank up to 7 years.
    - It is a big challenge because too many contradictory maps, even between the ministry of forestry there are many contradictory maps in terms of land use, ownership, etc.
    - President Jokowi has discouraged the government to go on big loans. Yet on the other hand, peatland restoration is a big priority.
    - The government is very keen to find solution in private sector investment as a formula, working with private sector such as Sinarmas, ABP, because they have 18.000 ha of land that they want to rehabilitate.
- FAO just had a meeting in Brazil about how best to manage forest concessions.
    - Its' interest is for private sector to get more deeply engaged in this issue.
    - Despite the pros and cons of having private company's engagement, considering the fact that private sectors tend to have their own interests involved.
    - Regardless, it is agreed that private sectors are potential allies.
- Mr. Mark pointed that there are some frustration in the ministry in regards to its management upon many different requests.
    - The government have limited capacity to process all of the requests to work on the agreement to work with NGOs, with local communities or with private sectors. And FAO were asked to propose a solution to that matter.
    - FAO could work as an umbrella for the NGOs. Rather than having fragmanted approach, having too many actors helping the government.
- FAO is a small donor, but given the big mandates they have to seek money to pilot a project every now and then. Whenever FAO needs major intervention, usually they will go to the Green Climate Fund.
- Mr. Mark Further addresses another issue on conflicting claims of land ownership.
    - The solution is to start mapping from the village level, using bottom up approach.
    - The reconciliation process needs to start from the ground level, to see the actual use of the conflicting land and eventually corrects the maps at the national level.
    - It is an important issue if JICA is going to have a large loan on forest and peatland rehabilitation.
- The one map policy is at its' early stage in Indonesia, as early as the formulation stage, with BAPPENAS as the leading agency. Although KLHK is one important stakeholder in this matter.
    - Current problem : many claim to have the idea of mapping but very view who really have the ability to do the mapping process.

- Mr. Mark then concluded the discussion with an offer that whenever JICA want to work on the practical side, in terms of how peatland restoration could work, how to be done, including the benefit of local livelihoods, productive but sustainable use of peatland, forest management units on production as well as conservation areas, or simply looking for partner as a coordination function, FAO is ready to engage.
- Mrs. Jiwon also offers to send all of related documents mentioned during the meeting to JICA representatives.

1.1.6 September 16, 2016 (PKG)

Day 2. Friday, 16 September 2016.

Time : 9.50 – 11.15 AM
Veune : KLHK Office, Kebon Nanas

Welcoming speech by KLHK officials, and continued by Mr. Shishido who gives a brief introduction about JICA and stated JICA's purpose of visit which is to conclude JICA's design on fire prevention on peatland, and hope to have feedback as well as discussions with KLHK officials regarding the proposed project before finalizing the design.
Dsicussion :

- Mr. Shisido begin with the explanation on the planning of the project design
  - Starting with the tentative idea about having 2 districts as the pilot projects.
  - The 2 districts are yet to be determined.
- JICA is proposing a Forest Fire Prevention Project, in which JICA have years of experience, since 1998.
  - Target Project in Indonesia is having 8 provinces as a fire free model, with 1 district in each province.
  - The project includes : Capacity building training for forest management, Peatland Monitoring, and Peatland Restoration through re-wetting programs.
- For JICA, the point of having this collaboration is to look for partners to implement the project, and also if possible to have government's financial support (loan) for the project.
- Another proposal made by JICA related to the forest fire prevention project is providing equipments for fire control.
- JICA also offers climate change mitigation project for forest and land sector, which includes :
  - Policy support for climate change
  - Peatland restoration / green economy development model project
  - Supporting REDD+ implementation in West Kalimantan.
- In terms of collaboration with The Directorate of Peatland Damage Control (PKG), the most important thing is the monitoring process.
  - JICA does not have the men power to do the technical operation for monitoring, but will only provide the equipments.
- There is a need to discuss which location that will be selected for this project.
  - JICA offers South Sumatera and Jambi as the top priority.
  - And have another 6 provinces as the other prioritized locations, they are : Riau, Central Kalimantan, South Kalimantan, West Kalimantan, East Kalimantan, and North Kalimantan.
- JICA's total target until 2023 are :
  - 56 Fire Prone Districts
  - 80 Fire Prone KPH (in fire prone districts)
  - Fire Prone Peat Dome Community Lands 48,000 ha
- JICA representative also explain about the Project Design Matrix (PDM) on community-based peatland management, and hope that together with JICA, PKG will collaborate with Peatland Restoration Agency (BRG) on :
  - Facilitating and implementing peatland restoration

- Monitoring and strenghtening fire early warning & initial reponse
- Designing SOP for technical operations

- JICA asked for feedbacks, comments and opinions on the proposed project to KLHK officials.
- Ibu Ning as the director of PKG explains the current focus in her directorate :
  - To strengthen peatland protection and peatland management on fire prevention.
  - Since it is harder to make peatland wet compared to other kinds of land, water management on peatland is highy important, both in concession area as well as community area.
  - To involved local communities in the project in order to strengthen the capacity.
- Mr. Sigit as the secretary of the Directorate General of Pollution Control & Environmental Damage further explains that his directorate might have different view with BRG.
  - According to him BRG is more pragmatic because they usually have only 3 years to finish a project while KLHK is more focus on long term projects to make peatland sustainable.
  - His directorate has some cooperation with other donors for rehabilitation, and is currently more focus on community rehabilitation.
  - JICA is expected to have a common goal for district area rather than focusing on villages area.
  - Some districts have peatland as a whole area and there is a need to create industries around it to provide more source of living for the local communities. And that's what we are lacking of currently.
  - Community rehabilitation will complement the national purpose.
  - If JICA only make pilot project per villages, each village might have different needs and purposes. It is better to have a common goal that could be implemented by all.
- Ibu Ning further explains that they need one big strategy above all projects. The big strategy involves how to control, how to mitigate, and how to maintain peatland activities.
  - Only if JICA agreed upon this matter then PKG is willing to talk about the project per villages more in detail.
- Mr. Shishido ask about current monitoring system and Mr. Sigit responded by explaining that every concession must have equipments for monitoring and mechanism of reporting.
  - As for the source of the equipments, it has yet to be discussed whether it is from PKG or BRG or JICA or others.
  - PKG will have to have more coordination, because so far they only had discussed the aspects on technical level but not on decision maker level.
- Mr. Nagumo from JICA asked about monitoring water level, and what are the items that are being monitored in each level.
  - Ibu Ning explains that peatland in Indonesia are divided into two groups, protection area as well as development area.
  - Each area have different criteria. Some of the criteria are: water level, land cover, moisture of soils, etc.
  - Unfortunately the document version for these criteria is not finished yet.
- Ibu Ning explains that they don't usually involve in monitoring projects because their main role is mostly developing ministrial decree. And currently they are proposing water level because it is a big issue for everyone.
- Mr. Shishido further asked about open land, and under whose authorities are they. But Ibu Ning said that she has to check on the monitoring level first because she is not really convinced.
- Ibu Ning also emphasizes that her institution does not touch the 4 districts that are specifically mandated to BRG's authority in order to avoid duplication. PKG also have no issue to collaborate with other directorate.

1.1.7 September 19, 2016 (PKHL, KLHK)

TIME : 08.30-09.30, 19 September 2016
VENUE : DIREKTORAT PKHL MEETING ROOM

PARTICIPANTS :

Directorate of Land and Forest Fire Control

1. Mr. Raffles, Director of Land and Forest Fire Control
2. Mr. Untung, Sub-Directorate of Forest and Land Fire Control (Penanggulangan Kebakaran Hutan dan Lahan)
3. Mr. Afrizal, Sub-Directorate of Partnership and Fire Care Community (Kemitraan dan Masyarakat Peduli Api)
4. Mr. Agus, Sub-Directorate of Manpower and Facilities Infrastructure (Subdit Tenaga dan Sarpras)
5. Mr. Ferdi, Sub-Directorate of Technical Prevention (Teknis Pencegahan)

JICA Mission Team:

1. Mr. Shishido
2. Mr. Nagumo
3. Ms. Suzuki
4. Mr. Kuno
5. Mr. Kubo

Mr. Raffles as the Director of PKHL warmly greeted JICA representatives.

Discussion points:

- The meeting aimed to discuss important points for the design of the new collaboration with JICA.
- Mr. Raffles shared that in this collaboration:
  - The Secretariat General's role is to carry out coordination from central government to avoid overlapping tasks, area, involved organizations, and funding.
  - JICA is suggested to focus on increasing capacity of community, village, Forest Management Units (KPH), etc.
  - This new project is to be planned in detail.
- Achieving 2022 targets of 56 districts and 731 villages are the Government of Indonesia (GoI)'s responsibility, with support from various partners. JICA will take part in helping GoI to achieve the target.
- GoI will make sure that pilot projects in Riau and West Kalimantan are scaled up. Although GoI is capable of doing so, there are several shortcomings:
  - Limited budget and other priorities make the targets take longer time to achieve.
  - GoI's programs are usually unsustainable once funding is stopped. Therefore, continuous funding is required for sustainable program.
  - GoI's programs highly depend on government regulation, making community awareness at site level a challenge.
  - JICA's project can help to overcome the shortcomings.
- Mr. Agus shared that scaling up for capacity building should be done by assessing the performance of a pilot project in a certain district and then implement the project in another district. Program intervention allows evaluation can be carried out in only 1 year after its implementation. For instance, Indonesia this year experience declining danger rating for forest and land fire compared to last year, all due to integrated patrol intervention.
- For 2017-2021 collaboration project, fund from JICA is grant aid and approximately 6 million USD is already approved by JICA. The fund allocation is already planned out but it still needs to be aligned with inputs from GoI to avoid overlapping with other programs.
- Mr. Shishido from JICA stated that scaling up to other districts requires other partners as well because funds from JICA is not sufficient to cover everything. JICA offers loan aid from Japan Government for the scale up. However, GoI avoids loan but instead will accept grant aid.
- Therefore, the dotted square with "Other partner's fund for scaling up" in Tentative Midterm Strategic Program is to be changed into "the Government of Indonesia's fund for scaling up".
- Riau and West Kalimantan as two provinces engaged in JICA's FCP and IJ-REDD programa are suggested to be engaged again in this new project but with slightly different activities than the others, e.g. monitoring, enhancing the existing project, etc.
- Priority provinces follow GoI's regulations. The suggested priority provinces for this project are Riau, West Kalimantan, South Sumatera, Jambi, Central Kalimantan, and East Kalimantan, and. The number of districts originally allocated for South and North Kalimantan will be Riau and

West Kalimantan. Therefore, this project's priority areas are 2 districts in West Kalimantan, 2 in Riau, 1 in South Sumatera, 1 in Jambi, 1 in Central Kalimantan, and 1 in East Kalimantan.

- Point number three for Scope of JICA TA, i.e. "Community-based peatland Management (trial restoration & monitoring)", requires collaboration and information sharing with the Directorate of Peatland Damage Control (Dir. PKG) and Peat Restoration Agency (BRG). As other peat areas outside of BRG's 2 million hectares mandate also experience fire, this project is suggested not to limit the BRG-JICA collaboration scope only in the 2 million hectares peat. The Ministry of Environment and Forestry (MoEF) will engage BRG and determine which area/district to work on for BRG-JICA collaboration. Trial restoration can be carried out, but the main focus of this project is still on prevention of forest and land fire.
- Mr. Raffles added that President Jokowi has stipulated Toba Lake in North Sumatera as a priority for tourism. However, forest and land fire still occurs in its surrounding districts where 5 out of 7 districts are priorities for forest and land fire. The President has instructed the Ministry to control the fire around the lake. The head of the district or Bupati has also sent letter requesting equipment to fight the fire. This project is suggested to also help provide the equipment and trainings required to fight control in the 5 districts. JICA needs time to obtain relevant information regarding this matter.
- Mr. Shishido stated that:
  - JICA agreed upon suggestion to focus more on the community. Therefore, further discussion is required to determine the methodology, number of trainings, scaling upmethods, scope, etc. for this new project.
  - There will be further discussion on PKG engagement.
  - It is yet to be determined whether monitoring points will placed inside or outside BRG's 2 million hectares mandate.
  - Peatland monitoring requires large funding. Further discussion is required to determine who will provide the funds, the task division, location determination, etc. through stakeholder meeting to be able to develop the project design.
- Mr. Raffles stated that the planning and implementation stages will involve central to village levels. Therefore, further discussion is required related with setting up the program.
- Mr. Shishido and Mr. Raffles agreed to the following tentative schedules.
  - To hold further discussion with Bureau of International Cooperation (KLN) in MoEF.
  - To hold kick-off meeting on Wednesday, 21 September 2016.
  - Inputs from kick-off meeting will be compiled and used to revise the program design.
  - Minutes of Meeting will be signed by relevant parties on Friday, 23 September 2016.

1.1.8 September 20, 216 –Draft PDM- (PKHL, KLHK)

TIME : [09.30-13.00] Tuesday, 20 September 2016
VENUE : [DIREKTORAT PKHL MEETING ROOM]

Mr. Sumantri from PKHL on behalf of Mr. Raffles opened the discussion and Mr. Shishido from JICA elaborated the team's schedule, introduced the team members and shared expectation to achieve in meetings. The discussion focused on revising PDM prepared by JICA team as well as determined on who will sign the Minute of Meeting and Record of Discussion (RoD) and when they will be signed.

Discussion:

- Minute of meeting which comprises PDM, notes on RoD, and further cooperation between MoEF and JICA will be signed on Friday, 23 September 2016 by JICA along with the Secretary General or the Director Generals of Climate Change (PPI) and Pollution and Environmental Damage Control (PPKL).
- Discussion regarding Record of discussion (RoD) will start following formal response from DG PPI and PPKL. RoD is expected to be signed by the Secretary General at the end of 2016 or early 2017 after detailed review by the Secretary General and KLN.
- Mr. Nagumo from JICA led the discussion on PDM revision. PDM draft version 1.6 was revised in this meeting to produce PDM draft version 1.7.

- Further discussion on project scope and overall goals will continue on Wednesday, 21 September 2016 09.00 a.m.
- The discussion was attended by:

No.	NAME	AGENCY
1	Nagumo Takao	Jica mission
2	Afrizal	Dit PKHL
3	Agus Haryanto	Dit PKHL
4	Wahyu Utami T	Dit PKG
5	Indra K H	Dit PKHL
6	Ima Y R	PI-KLN
7	Susi S	KLN
8	Julius Rafles	KST PPI
9	Untung Suryanto	Dit PKHL, PPI
10	Hedeyaki Kubo	JICA mission
11	Yenny Chusna	Note taker
12	Shishido K	JICA mission
13	Dian A	Dit PKHL
14	Jaya D. Cipta	Dit PKHL
15	Inggar Ulhasanah	Owlingua (interpreter)
16	Kuno Hiromitsu	JICA mission
17	Sumantri	PKHL
18	Rektarini	Sekditjen PPI

1.1.9 September 21, 2016 -Draft PDM 2- (PKHL, KLHK)

TIME : (09.30-14.00) Wednesday, 21 September 2016
VENUE : DIREKTORAT PKHL MEETING ROOM
Mr. Sumantri from PKHL opened the meeting and Mr. Nagumo from JICA mission elaborated that the meeting would:

- continue the discussion on Project Purpose and Overall Goal in draft PDM
- followed by discussion on draft Minutes of Meeting (MoM) along with its 8 attachments

Mr. Nagumo also asked the participants to:

- send comment on draft minutes of meeting, if any, through email today and the latest version of the draft will be sent to participants through email on Thursday morning;
- help send the latest version of the Draft Minutes of Meeting to Sekjen or Dirjen prior to signing on Friday. Wrap up meeting is expected to be held at Friday morning, 23 September 2016; and
- help set up appointment for the JICA team to meet Sekjen and Dirjen.

Discussion:

- Mr. Kubo from JICA mission gave brief summary on the updated version of PDM revised on yesterday meeting and led the discussion to continue with PDM revision. PDM draft version 2.1, as one of the attachments of Draft Version 1 Minutes of Meeting, was revised in the meeting.
- Mr. Nagumo led the discussion on revision of Draft Version 1 minutes of meeting prepared by JICA to produce Draft Version 2 Minutes of Meeting. Several points to note are:
  - the agreed project name is Community Movement Program on Fire and Land Prevention in Indonesia;

- Plan of Operation of the Project finalization needs: 1) comments and inputs from KLHK that will be sent through email to JICA within 1 month, or 2) by inviting JICA Indonesia's representative to come to KLHK to discuss the PO, and 3) email on serious comment, if any, will be sent from KLHK to JICA on Thursday, 22 September 2016;
- attachment 6 needs approval from PKG regarding the continuation of basic study;
- attachment 7 on Draft RoD will be discussed separately. KLHK will provide comment after obtaining formal response from DGs of PPI and PPKL. Part of RoD related to the project was discussed in the meeting and more general part of RoD would be discussed by JICA representative with KLN; and
- it is suggested that a narrative explanation for Attachment 8 is added to avoid varying interpretations.

- The produced Minutes of Meeting and draft RoD revised in this meeting will be shared with Dirjen.
- Draft version 1 was revised on 21 September 2016 meeting and resulted in Draft Version 2. Comments provided on version 2 were integrated into the document, producing Draft Version 3 on 22 September 2016. Draft version 3 is expected to be shared with Dirjen.
- There will be a formal exchange notes between KLHK and JICA regarding Minutes of Meeting. JICA expected that Minutes of Meeting will be signed by Sekjen or by DGs of PPI and PPKL.

- The discussion was attended by:

No.	NAME	AGENCY
1	Nagumo Takao	JICA mission
2	Afrizal	Dit PKHL
3	Agus Haryanto	Dit PKHL
4	Ima Y R	PI-KLN
5	Julius Rafles	KST PPI
6	Untung Suryanto	Dit PKHL, PPI
7	Hedeyaki Kubo	JICA mission
8	Yenny Chusna	Note taker
9	Shishido K	JICA mission
10	Jaya D. Cipta	Dit PKHL
11	Inggar Ulhasanah	Owlingua (interpreter)
12	Kuno Hiromitsu	JICA mission
13	Sumantri	PKHL
14	Rektarini	KST PPI

1.1.10 September 21, 2016 (BRG)

TIME : (16.15-17.45) Wednesday, 21 September 2016
VENUE : BRG Office

Mr. Haris from BRG greeted JICA team warmly and shared brief summary on BRG activity this year along with expectations to meet from BRG and JICA collaboration. This discussion focused on proposal explanation by BRG in hope that JICA will be able to support BRG this year, while JICA team shared the team schedule and the result of discussion with MoEF.
Discussion:

- Mrs. Eli updated the meeting participants regarding BRG's meeting plan with investors. High level meeting (and open seminar for investors) is expected to be held on the 3rd week of November 2016 in Japan with Mr. Nazir as the BRG representative.

- Water logger is urgent for BRG. As per President Instruction no. 1 Year 2016, 400 water loggers will be installed in 4 degraded districts in 3 provinces this year and the location of which will be discussed in early October with JSS and JAXA. Scientific info regarding the monitoring points is expected to be shared soon. Water logger is managed by Regional Peat Restoration Team (*Tim Restorasi Gambut Daerah* or TRGD) and the budget of which is borne by BRG.
- Coordinating with TRGD, capacity development will be held to empower community on water logger, data, how to maintain the equipment, etc.
- BRG in collaboration with BPPT is currently developing SOP on guideline, how to use, legality of the water logger, etc. which will be ready in two weeks.
- BRG hopes JICA can help on Feasibility Study on re-vegetation, rewetting, and community empowerment. The Feasibility Study will also be supported by several universities in Kyoto, Japan and expected to be carried for 1 or 2 months.
- BRG's priority is to provide site locations for BRG-JICA collaboration along with why the sites are selected. The site selection is expected to be ready in few weeks.
- Demonstration plot (demplot) is expected to be established in 4 districts next year and portfolio regarding the demplot will be shared with investors.
- Mr. Shishido elaborated JICA Program's tentative roadmap. Since Mr. Nazir and Mr. Shishido both will be attending the CoP22 in Marrakech, it will be a good opportunity to shine the spotlight on Indonesia-Japan cooperation by having an agreement signed or creating press release during the CoP. The GoI is expected to use its government slot to create a side event for this purpose. BRG with Mr. Kuno from JICA will discuss on the ToR preparation.
- In addition, JICA team hopes for BRG's help on LULUCF project plan.
- An agreement to handover the responsibility on water logger equipment from BRG to MoEF is required to anticipate when BRG is no longer in place, thus JICA's next project needs to be in cooperation with BRG and MoEF.
- It is suggested that during Mr. Nazir's visit to Japan next November, technical cooperation between JICA and BRG regarding fund, etc. will be discussed further in JICA Japan headquarter. Universities in Hokkaido and Kyoto can help BRG to arrange meetings with investors in Japan.
- Continuation of Basic Study in Draft Version 2 Minutes of Meeting was revised during the discussion.
- Meeting summary will be shared with Mr. Nazir from BRG. After signing, Minutes of Meeting will also be shared with BRG.

- The discussion was attended by:

No.	NAME	AGENCY
1	Nagumo Takao	JICA mission
2	Hedeyaki Kubo	JICA mission
3	Kuno Hiromitsu	JICA mission
4	Shishido K	JICA mission
5	Haris Gunawan	BRG
6	Eli Nur Nirmala Sari	BRG
7	Inggar Ulhasanah	Owlingua (interpreter)
8	Yenny Chusna	Note taker

1.1.11 September 22, 2016 (KLN)

TIME : (15.40-16.06), Thursday, 22 September 2016
VENUE : KLN meeting room
Mrs. Sri Murniningtyas from KLN opened the discussion and warmly greeted the participants. Mr. Shishido from JICA introduced the team members and gave brief summary on JICA project and expectations. The meeting aimed to share brief summary on JICA's project to KLN and to determine

who and when to sign the Minutes of Meeting (MoM) and Record of Discussion (RoD).
Discussion:

- Mr. Shishido shared the tentative roadmap of the project that:
  - The Ministry of Foreign Affair (MoFA) Japan already approved the project.
  - The project design is already 90% finalized.
  - Once the current project receives consensus, JICA's other project ideas (e.g. LULUCF, equipment and monitoring, etc.) will be formulated.
  - Further communication is required to discuss: 1) How JICA's limited budget can help contribute in scale up process to achieve 56 districts as the ultimate goal of GoI; 2) how much is needed to scale up; and 3) how many provinces will be involved in the capacity building.
- KLN is currently waiting for the Project Design Matrix formal acceptance letter from Directorate General Control of Pollution and Environmental Damage (Dirjen PPKL) and Directorate General Climate Change (Dirjen PPI) before starting discussions on RoD.
- PDM shown in the meeting is still flexible. MoM still can be adjusted based on inputs from both DGs to prepare RoD which will be discussed separately. RoD is expected to be signed by Sekjen at the end of the year or early next year.
- Considering that the MoM does not only contain technical design of the upcoming project but also a bigger picture of the future cooperation. Even if the MoM will not be signed by Sekjen, JICA mission – through JICA Indonesia – hopes to meet with Sekjen or both DGs this year. KLN will help deliver this request to Sekjen.
- KLN suggested the MoM will be signed by JICA, Director of PKG (Mdm. Wahyu Indraningsih), and Director of PKHL (Mr. Raffles). However, JICA suggested the MoM will be signed by DG PPI and DG PPKL because the project collaborates with both DGs.
- KLN will help communicate JICA's suggestion regarding the MoM signatory to Sekjen and JICA mission will negotiate to JICA Japan if Sekjen agrees to sign the MoM provided that the other signatory is JICA Japan.
- JICA mission also suggested that if both DGs are unable to sign the MoM, the option is the MoM is signed by JICA, Director of PKG and Director of PKHL, and witnessed by both DGs.
- The project is expected to be carried out April of next year.
- The discussion was attended by:

No.	NAME	AGENCY
1	Nagumo Takao	JICA mission
2	Hedeyaki Kubo	JICA mission
3	Suzuki Sachiko	JICA mission
4	Shishido Kenichi	JICA mission
5	Saito Mikiya	JICA mission
6	Ima Y R	KLN
7	Sri Murniningtyas	KLN
8	Ning Ngudi	KLN
9	Kadim	KLN
10	Susi	KLN
11	Inggar Ulhasanah	Owlingua (interpreter)
12	Yenny Chusna	Note taker

2. Translation of New Ministor Decree on Fire Control (PermenLHK No. 32/2016)

MINISTER OF ENVIRONMENT AND FORESTRY
OF THE REPUBLIC OF INDONESIA

REGULATION OF MINISTER OF ENVIRONMENT AND FORESTRY
OF THE REPUBLIC OF INDONESIA
NO. P.32/MenLHK/Setjen/Kum.1/3/2016
ON
FOREST AND LAND FIRE CONTROL

BY THE GRACE OF THE GOD ALMIGHTY
MINISTER OF ENVIRONMENT AND FORESTRY
OF THE REPUBLIC OF INDONESIA

Considering:

a. WHEREAS, based on §18.2 of Government Regulation No. 4/2001 on Environmental Degradation and/or Pollution Control Relating to Forest and Land Fires, it is necessary to govern a general guideline to countermeasure forest and land fires under Decree of Minister responsible for forestry affairs upon coordination with other relevant Ministers and State Agencies;
b. WHEREAS, based on §22, 23 and 25 of Government Regulation No. 45/2004 on Forest Protection as amended by Government Regulation No. 60/2009, Minister of Forestry Regulation No. P.12/Menhut-II/2009 on Forest Fire Control has been issued;
c. WHEREAS, in order to implement the regulation under point a and b above hereof as well as to adjust to the dynamics of forest and land fire occurrences, it is imperative to govern the control of forest and land fires;
d. WHEREAS, based on point a to c above hereof, it is necessary to issue a Regulation of Minister of Environment and Forestry on Forest and Land Fire Control.

In view of:

1. Law 5 of 1990 on Conservation of Living Resources and Their Ecosystems (State Gazette of the Republic of Indonesia Year 1990 No. 49, Supplement of State Gazette of the Republic of Indonesia No. 3419);
2. Law 41 of 1999 on Forestry (State Gazette of the Republic of Indonesia Year 1999 No. 167, Supplement of State Gazette of the Republic of Indonesia No. 3888) as amended by Law 19 of 2004 on Enactment of Government Regulation in Lieu of Law No. 1 of 2004 on Amendment to Law 41 of 1999 on Forestry (State Gazette of the Republic of Indonesia Year 2004 No. 86, Supplement of State Gazette of the Republic of Indonesia No. 4412);
3. Law 26 of 2007 on Spatial Planning (State Gazette of the Republic of Indonesia Year 2007 No. 68, Supplement of State Gazette of the Republic of Indonesia No. 4725);
4. Law 32 of 2009 on Environmental Protection and Management (State Gazette of the Republic of Indonesia Year 2009 No. 140, Supplement of State Gazette of the Republic of Indonesia No. 5059);
5. Law 18 of 2013 on Prevention against and Eradication of Forest Destruction (State Gazette of the Republic of Indonesia Year 2013 No. 130, Supplement of State Gazette of the Republic of Indonesia No. 5432);
6. Law 23 of 2014 on Local Governments (State Gazette of the Republic of Indonesia Year 2014 No. 244, Supplement of State Gazette of the Republic of Indonesia No. 5887) as amended multiple times, lastly with Law 9 of 2015 on the Second Amendment of Law 23 of 2014 on Local Governments (State

Gazette of the Republic of Indonesia Year 2015 No. 58, Supplement of State Gazette of the Republic of Indonesia No. 5679);

7. Law 39 of 2014 on Plantation (State Gazette of the Republic of Indonesia Year 2014 No. 308, Supplement of State Gazette of the Republic of Indonesia No. 5613);
8. Government Regulation No. 4/2001 on Environmental Degradation and/or Pollution Control Relating to Forest and Land Fires (State Gazette of the Republic of Indonesia Year 2001 No. 10, Supplement of State Gazette of the Republic of Indonesia No. 4076);
9. Government Regulation No. 45/2004 on Forest Protection (State Gazette of the Republic of Indonesia Year 2004 No. 147, Supplement of State Gazette of the Republic of Indonesia No. 4453) as amended with Government Regulation No. 60/2009 (State Gazette of the Republic of Indonesia Year 2009 No. 137, Supplement of State Gazette of the Republic of Indonesia No. 5056);
10. Government Regulation No. 6/2007 on Forest Arrangement, Management Planning and Use (State Gazette of the Republic of Indonesia Year 2007 No. 22, Supplement of State Gazette of the Republic of Indonesia No. 4696), as amended with Government Regulation No. 3/2008 (State Gazette of the Republic of Indonesia Year 2008 No. 16, Supplement of State Gazette of the Republic of Indonesia No. 4814);
11. Government Regulation No. 71/2014 on Peat Ecosystem Protection and Management (State Gazette of the Republic of Indonesia Year 2014 No. 209, Supplement of State Gazette of the Republic of Indonesia No. 5580);
12. Presidential Regulation No. 7/2015 on State Ministry Organisation (State Gazette of the Republic of Indonesia Year 2015 No. 8);
13. Presidential Regulation No. 16/2015 on Ministry of Environmental and Forestry (State Gazette of the Republic of Indonesia Year 2015 No. 17);
14. Presidential Decree No. 121/P/2014 on Establishment of Ministries and Appointment of Ministers of Kerja Cabinet 2014-2019 as amended with Presidential Decree No. 80/P/2015;
15. Regulation of Minister of Environment and Forestry No. P.18/MenLHK-II/2015 on Organisation and Administration of Ministry of Forestry (State Gazette of the Republic of Indonesia Year 2015 No. 713);
16. Regulation of Ministry of Environment and Forestry No. P.77/MenLHK-II/2015 on Procedure for Overcoming Burnt Areas under Business Concession to Utilise Forest Products in Production Forest (State Gazette of the Republic of Indonesia Year 2016 No. 86).

DECIDE TO:

Stipulate : REGULATION OF MINISTER OF ENVIRONMENT AND FORESTRY ON CONTROL OF FOREST AND LAND FIRES

SECTION I
GENERAL PROVISION

Part One
Definition

Article 1

The following definition shall apply hereto.

1. Forest shall mean unit of ecosystem in the form of lands comprising biological resources dominated by trees in their natural forms and environment, which cannot be separated from each other.

2. Land shall mean terrestrial ecosystem outside forest area, allocated for community business, farmland cultivation, and plantation activities.
3. Forest Area shall mean particular area which is stipulated by the government to be retained as permanent forest.
4. State Forest shall mean forest located on lands bearing no ownership rights.
5. Private Forest shall mean forest located on lands encumbered with land rights.
6. Customary Forest shall mean state forest situated within customary law community territory.
7. Conservation Forest shall mean state forest area of specific characteristics, with the main function of protecting life-supporting system, preserving plant and animal diversity and its ecosystem, and sustainable use of living resources to ensure its sustainable use for community prosperity as well as to improve human life quality.
8. Nature Reserve Area, hereinafter referred to as KSA, shall mean conservation area of specific characteristics, both terrestrial and aquatic, with the main function of preserving the diversity of plant and wildlife species and their ecosystem, as well as the place for life-supporting system.
9. Nature Conservation Area (KPA) shall mean area of specific characteristics, both terrestrial and aquatic, with the main function of protecting life-supporting system, preserving the diversity of plant and animal species, and sustainable use of living resources and their ecosystem.
10. Nature Reserve (CA) shall mean KSA area characterised with plants, wildlife and ecosystems, which needs to be protected and allowed to develop naturally.
11. Wildlife Sanctuary (SM) shall mean KSA with specific characteristics in the form of animal species diversity and/or uniqueness, in which habitat management may be conducted in order to ensure their survival.
12. National Park (TN) shall mean nature conservation area of native ecosystems, managed with zoning system, and used for research, scientific, educational, breeding enhancement, tourism and recreational purposes.
13. Nature Recreation Park (TWA) shall mean nature conservation area mainly used for recreational and tourism purposes.
14. Grand Forest Park (TAHURA) shall mean nature conservation area used to collect both natural and non-natural, native and/or introduced plants and animal species for research, scientific, educational, breeding enhancement, cultural, tourism and recreational purposes.
15. Game Park (TB) shall mean forest area gazetted as park area for hunting.
16. Protection Forest shall mean forest area having the main function of protecting life-supporting systems for hydrological management, preventing against flood, controlling erosion, preventing against sea water intrusion and maintaining soil fertility.
17. Production Forest shall mean forest area of the main function to produce forest products.
18. Industrial Plantation Forest (HTI) shall mean plantation forest established in production forest by forest industry group to enhance the potential and quality of production forest by implementing silviculture practices in order to meet forest product industry raw material requirements.
19. Community Plantation Forest (HTR) shall mean plantation forest established by community group to improve potential and quality of production forest by implementing silviculture practices in order to ensure forest resources sustainability.
20. Rehabilitated Plantation Forest (HTHR) shall mean plantation forest established in production forest through land and forest rehabilitation activities in production forest area to restore, maintain and improve the forest and land functions in order to maintain its carrying capacity, productivity and role as life-supporting system.
21. Particular Area shall mean area within production, protection, and/or conservation forest areas that may be gazetted as Community Forest or Forest Area with Special Purpose (KHDTK) to make its existence integral with sustainable forest management.
22. Village Forest shall mean State forest yet to be encumbered with concessions/rights and managed by village for village community prosperity.
23. Community Forest shall mean State forest with the main function to empower community.
24. Management Unit shall mean the smallest unit of forest and/or land management in accordance with its principal function and purpose for efficient and sustainable management.
25. Plantation shall mean all activities to cultivate particular crops in soil and/or other growing media in suitable ecosystem, as well as those that process and market goods and services produced from

the crops with support from science and technology, capital funding and management to achieve prosperity for both plantation business actors and communities.

26. Concession Holder shall mean agency or individual granted with concession in forest and land area by relevant authority in accordance with the applicable law and regulations.
27. Forest Management Unit (KPH) shall mean forest management area in accordance with its principal function and purpose that may be efficiently and sustainably managed, including production, protection, and conservation forests.
28. Holder of Forest Utilisation Concession shall include Business Concession for Utilising Timber Forest Product (IUPHHK), Business Concession for Utilising Non-Timber Forest Product (IUPHHBK) and IUPHHK for Restoration of Ecosystem in Natural Forest situated in Production Forest; and the holder of IUPHHK and IUPHHBK in Industrial Plantation Forest (HTI) and Rehabilitated Plantation Forest (HTHR) for individual, cooperative, Private-Owned Enterprise or State-Owned Enterprise, granted by relevant authorities and comprises business concession for utilising forest area, business concession for utilising environmental service, business concession for utilising timber and/or non-timber forest product and concession for extracting timber and/or non-timber forest product in the allocated area.
29. Business Concession for Utilising Forest Area (IUPK) shall mean business concession granted to use area inside protection forest and/or production forest.
30. Business Concession for Utilising Timber Forest Product (IUPHHK) and/or Business Concession for Utilising Non-Timber Forest Product (IUPHHBK) shall mean business concession granted to use timber and/or non-timber forest product in natural forest area situated in production forest through harvesting, enrichment, maintenance and marketing activities.
31. Business Concession for Utilising Environmental Service (IUPJL) shall mean business concession granted to use environmental services of protection forest and/or conservation forest.
32. Concession for Extracting Timber Forest Product (IPHHK) shall mean concession to extract timber products from production forest through harvesting, transporting and marketing activities for certain time period and volume.
33. Concession for Extracting Non-Timber Forest Product (IPHHBK) shall mean concession to extract non-timber product from protection forest and/or production forest, including rattan, honey, fruits, gums and medicinal plants for certain time period and volume.
34. Concession for Borrowing and Using Forest Area (IPPKH) shall mean concession granted to use forest area for non-forestry development purposes, without changing the function and purpose of the forest area.
35. IUPHHK for Ecosystem Restoration shall mean business concession granted to develop area within natural forest area situated in production forest with important ecosystem for maintaining its function and representation through maintenance, protection and restoration of forest ecosystem including planting, enrichment, thinning, wildlife breeding, plant and animal release to restore biological (plant and wildlife) and non-biological elements (soil, climate and topography) in an area back to its initial condition in order to reach biological and ecosystem balance.
36. IUPHHK and/or IUPHHBK in Plantation Forest shall mean business concession granted to utilise timber and/or non-timber product in plantation forest situated within production forest through land preparation, nursery, planting, maintenance, harvesting and marketing activities.
37. Plantation Business Actor shall mean Grower and Plantation Company that manage plantation business.
38. Forest and Land Fire shall mean incident of forest and/or land fire due to both natural causes and human activities that leads to environmental degradation and ecological, as well as economic, socio-cultural and political losses.
39. Forest and/or Land Fire Prevention shall mean all efforts, actions or activities undertaken to prevent or reduce the possibility of forest and/or land fire.
40. Forest and/or Land Fire Extinguishing shall mean all efforts, actions or activities undertaken to suppress or extinguish fire that consumes forest and/or land.
41. Post-Forest and/or Land Fire Management shall mean all efforts, actions or activities including inventory, monitoring and coordination carried out to manage forest and/or land after a fire event.

42. Evacuation and Rescue Support shall mean support for any effort to take and rescue people, plants, animals and retrieve public assets prior to or during the event of forest and/or land fires.
43. Management Support shall mean all administrative, financial, and other activities to support forest and land fire control.
44. Forest and/or Land Fire-Related Environmental Damages shall mean the effects of environmental changes in the form of environmental damages and/or pollution related to forest and/or land fire caused by a business and/or activity.
45. Environmental Destruction shall mean human activities that lead to direct or indirect changes to the environment's physical, chemical and/or biological conditions beyond the environmental damage criteria standards.
46. Environmental Damage shall mean direct and/or indirect changes to the environment's physical, chemical and/or biological conditions beyond environmental degradation criteria standards.
47. Environmental Impact shall mean effects of environmental changes caused by a business and/or activity.
48. Land Clearing shall mean all efforts undertaken to prepare and clear land for cultivation and non-cultivation activities.
49. Zero Burning Land Clearing (ZBLC) shall mean a method of agricultural land clearing involving fire.
50. Fire Danger Rating System (PBK) shall mean rating system used to determine risk level of forest and land fire hazard in an area by taking into account the weather conditions or fuels as well as other natural conditions that affect fire behaviour.
51. Hotspot shall mean a pixel of satellite imagery having temperatures above certain threshold as the result of the image interpretation and can be used as to indicate forest and land fire.
52. Community shall mean social unit that comprises citizens of the Republic of Indonesia who live and stay inside and/or around operational area of forest use and plantation businesses, and has social community of the same livelihoods depending on potentials and activities that may affect the sustainability of forest use and plantation businesses.
53. Manggala Agni shall mean a forest and land fire control organisation at Central Government level, whose duty and function include prevention, firefighting and post-fire management, evacuation and rescue supports, and management support formed by and becoming the responsibility of Minister.
54. Operation Control Centre (*Pusdalops*) shall mean Manggala Agni central organisation led by a Director accountable to Director General.
55. Operational Area (*Daops*) Office shall mean organization that implements Manggala Agni technical duty at ground level led by a Head of *Daops* Office accountable to Director General.
56. Forest and Land Fire Control Brigade (*Brigdalkarhutla*) shall mean a working unit whose duty and responsibility include prevention and firefighting, post-fire management, and evacuation and rescue support in controlling forest and land fire.
57. Forest Fire Control Core Team shall mean team specifically controlling forest fire in their working area.
58. Forest Fire Control Supporting Team shall mean team that supports the core team, whose members are concession holder employees.
59. Forest Fire Control Auxiliary Team shall mean team that supports the core team, whose members are communities from local partner village.
60. Manggala Agni Team shall mean technical implementing group of Manggala Agni Brigdalkarhutla provided with forest and land fire control equipment, facilities and infrastructures on the ground and led by Team Leader accountable to Head of *Daops* Office.
61. Fire Control Team shall mean technical implementing group of Management Unit Brigdalkar provided with forest and land fire control equipment, facilities and infrastructures on the ground and led by Team Leader accountable to the Head of Management Unit.
62. Anti-Fire Community Group (MPA) shall mean civil society group that voluntarily cares about forest and fire control for which they have been trained, briefed and empowered to help control forest and land fires.
63. Village Facilitation Team (TPD) shall mean community group comprising various elements, i.e. extension officer, Manggala Agni, MPA, village office apparatus and other village facilitators

who live, stay or are on duty in the village area and have been trained to facilitate the communities in planning and implementing forest and land fire prevention at village level.

64. Facility and Infrastructure shall mean equipment and facility used to support forest and land fire control.
65. Other Facilities and Infrastructures shall mean facilities and infrastructures used to support forest and land fire prevention and firefighting activities.
66. Patrol shall mean surveillance activity undertaken by Manggala Agni and all stakeholders to prevent and suppress and extinguish forest and land fires.
67. Mobilisation shall mean mobilisation of resources owned by all stakeholders to suppress and extinguish forest and land fires.
68. Work Coordination shall mean a set of work procedure and system that rule work relationship, main duty and function between Working Units to achieve coordination, synchronisation and synergy in implementing forest and land fire control.
69. Minister shall mean the minister who administers governmental affairs in the field of environment and forestry.
70. Director General shall mean director general whose duty and responsibility is in the field of climate change control.
71. Director shall mean director authorised to perform duty in and be responsible for forest and land fire control.

Part Two
General Matters
Article 2

Forest and Land Fire Control (Dalkarhutla) shall include measures/activities/actions to organise and manage human resources, facilities and infrastructures, as well as to run operation to prevent and suppress and extinguish, and manage post-fire, evacuation and rescue support, and forest and/or land fire control management support.

Article 3

The aims hereof shall be to serve as norms, standards, criteria and guideline to planning, organising, operational implementation, monitoring and evaluation in the implementation of Dalkarhutla effort/activity/action for relevant parties to guarantee effectiveness and efficiency in the scope of Dalkarhutla.

Article 4

The scope hereof shall include the following.

a. Dalkarhutla Organisation.
b. Dalkarhutla Human Resources.
c. Dalkarhutla Facilities and Infrastructures.
d. Dalkarhutla Operations.
e. Dalkarhutla Innovation Development.
f. Community Empowerment and Partnership Cooperation.
g. Reporting, Monitoring and Evaluation.
h. Reward and Sanction.
i. Funding.

SECTION II
DALKARHUTLA ORGANISATION
Part One
General Matters
Article 5

(1) Dalkarhutla Organisation under §4.a hereof shall constitute organisation to implement forest and land fire control.
(2) Dalkarhutla Organisation under §5.1 hereof shall be established based on:
    a. the Governmental Hierarchy;

b. the Management Level.

Article 6

(1) Dalkarhutla Organisation within the Governmental Hierarchy under §5.2.a hereof shall comprise the following.
   a. Central Government.
   b. Provincial Government.
   c. District/Municipal Government.
(2) The Central Government Dalkarhutla Organisation under §6.1.a hereof shall be responsible for Dalkarhutla's measures at national level.
(3) The Provincial Government Dalkarhutla Organisation under §6.1.b hereof shall be responsible for Dalkarhutla's measures at provincial level.
(4) The District/Municipal Government Dalkarhutla Organisation under §6.1.c hereof shall be responsible for Dalkarhutla's measures at district/municipal level.

Part Two

Central Government Dalkarhutla Organisation

Article 7

The Central Government Dalkarhutla Organisation under §6.1.a hereof shall consist of:
a. coordinating Dalkarhutla organisation; and
b. operational Dalkarhutla organisation.

Article 8

(1) The Central Government Dalkarhutla Organisation that runs coordinating functions under §7.a hereof shall be ad-hoc and take form of a Taskforce, known as *Satgas Pengendali Nasional Penanganan Kebakaran Hutan dan Lahan* (National Taskforce for Forest and Land Fire Management).
(2) The National Taskforce for Forest and Land Fire Management under §8.1 hereof shall be authorised by Minister.
(3) The National Taskforce for Forest and Land Fire Management under §8.2 hereof shall be headed by Minister and composed of at least Head of National Agency for Disaster Relief (BNPB), Minister of Agrarian Affairs and Spatial Planning/National Land Agency (BPN), Commander of the National Armed Forces of the Republic of Indonesia (TNI), Head of National Police of the Republic of Indonesia, Head of Meteorology, Climatology and Geophysics Agency, Head of Geospatial Information Agency, Head of National Institute of Aeronautics and Space and/or other Dalkarhutla-related Ministries/State Agencies relevant to their authorities.
(4) The National Taskforce for Forest and Land Fire Management under §8.3 hereof shall be placed under the Ministry of Environment and Forestry and function to coordinate planning, organising, operational, monitoring and evaluation activities in any Dalkarhutla measures.
(5) When running its coordinating functions, the National Taskforce for Forest and Land Fire Management may establish secretariat, known as *Posko Krisis Kebakaran Hutan dan Lahan Nasional* (National Coordinating Office for Forest and Land Fire Crisis).

Article 9

(1) The Central Government Operational Dalkarhutla Organisation under §7.b hereof shall be run by the Central Government's Brigdalkarhutla known as Manggala Agni.
(2) *Manggala Agni* under §9.1 hereof shall consists of:
   a. Manggala Agni Central Office at national level;
   b. Manggala Agni Regional Office at regional level; and
   c. Manggala Agni *Daops* Office at operational area unit (*daops*) level.

Article 10

(1) Manggala Agni Central Office under §9.2.a hereof shall be placed under the Ministry of Environment and Forestry.

(2) Manggala Agni Central Office under §10.1 hereof shall be headed by Director and accountable to Director General.

Article 11

Manggala Agni Regional Office under §9.2.b hereof shall be led by Head of Central Technical Implementing Unit (UPT) Brigdalkarhutla and accountable to Director General.

Article 12

(1) Manggala Agni *Daops* Office under §9.2.c hereof as Dalkarhutla operation implementing organisation shall be led by Heads of *Daops* Office under the technical supervisor of Manggala Agni Regional Office and accountable to Manggala Agni Central Office.
(2) Manggala Agni *Daops* Office operational area may include more than one District/Municipality.
(3) The operational area of Manggala Agni *Daops* Office under §12.2 hereof shall be established in consideration of the scope of forest and land fire control service.
(4) By the scope of its operational area, Manggala Agni *Daops* Office may develop more than one Work Post or Field Coordinating Office *(Posko)* to facilitate its operations on the ground.
(5) The organisation of Manggala Agni *Daops* Office under §12.1 hereof shall comprise two or more Manggala Agni Teams headed by Team Leader that shall be accountable to Head of Manggala Agni *Daops* Office.
(6) Further provision on Manggala Agni *Daops* Office organisation and operational area under §12.5 hereof shall be governed by Director General Regulation.

Part Three

Provincial Government Dalkarhutla Organisation

Article 13

(1) Organisation of the Provincial Government Dalkarhutla under §6.1.b may be established or refer to organisation responsible for Dalkarhutla at provincial level.
(2) The Provincial Government Dalkarhutla Organisation under §13.1 shall consist of:
    a. coordinating Dalkarhutla Organisation; and
    b. operational Dalkarhutla Organisation.

Article 14

(1) The coordinating Provincial Government Dalkarhutla Organisation under §13.2.a hereof shall be ad-hoc, known as *Satgas Pengendali Provinsi Penanganan Kebakaran Hutan dan Lahan* (Provincial Taskforce for Forest and Land Fire Management).
(2) The Provincial Taskforce for Forest and Land Fire Management under §14.1 hereof shall be authorised by Governor.
(3) The Provincial Taskforce for Forest and Land Fire Management under §14.2 hereof shall be headed by Governor and composed of at least Provincial Secretary, Provincial Development Planning Agency (BAPPEDA), Provincial Agency for Disaster Relief, Provincial Environmental Agency (BLHD), Technical Office on Forestry, Plantation and Agricultural Affairs and/or other relevant Technical Office, Manggala Agni, the subordinated District/Municipal Governments, the neighbouring Provincial Governments, Provincial Police, local authorities of the National Armed Forces of the Republic of Indonesia (TNI) and/or other Dalkarhutla-related institutions relevant to their authorities.
(4) The Provincial Taskforce for Forest and Land Fire Management under §14.3 hereof shall be domiciled at the Provincial Government Office, and function to coordinate planning, organising, operational, monitoring and evaluation activities in any Dalkarhutla efforts.
(5) The Provincial Taskforce for Forest and Land Fire Management under §14.4 hereof shall, any time, actively coordinate with the National Taskforce for Forest and Land Fire Management.
(6) Provincial Taskforce for Forest and Land Fire Management shall establish secretariat, known as *Posko Krisis Kebakaran Hutan dan Lahan Provinsi* (Provincial Coordinating Office for Forest and Land Fire Crisis).

Article 15

(1) The operational Provincial Government Dalkarhutla Organisation under §13.2.b shall be run by Dalkarhutla Taskforce, led by Head of Dalkarhutla Work Unit, and accountable to Governor.
(2) The Dalkarhutla Work Unit under §15.1 shall be authorised by Governor.
(3) The Dalkarhutla Work Unit under §15.2 shall carry out planning, organising, operation, monitoring and evaluation in any Dalkarhutla efforts.

Part Four
Dalkarhutla Organisation
District/Municipal Government
Article 16

(1) District/Municipal Government Dalkarhutla Organisation under Article 6.1.c hereof shall be ad-hoc, known as Satgas *Pengendali Kabupaten/Kota Penanganan Kebakaran Hutan dan Lahan* (District/Municipal Taskforce for Forest and Land Fire Management).
(2) The District/Municipal Taskforce for Forest and Land Fire Management under §16.1 hereof shall be authorised by District Head/Mayor.
(3) The District/Municipal Taskforce for Forest and Land Fire Management under §16.2 hereof shall be headed by District Head/Mayor and composed of at least District/Municipal Secretary, District/Municipal Development Planning Agency (BAPPEDA), District/Municipal Agency for Disaster Relief, District/Municipal Environmental Agency (BLHD), Technical Office on Forestry, Plantation and Agricultural Affairs and/or other relevant Technical Office, local Anti-Fire Community Group (MPA, subordinated District/Municipal Governments, the neighbouring District-Municipal Governments, District-Municipal Police, local authorities of the National Armed Forces of the Republic of Indonesia (TNI) and/or other Dalkarhutla-related institutions relevant to their authorities.
(4) The District/Municipal Taskforce for Forest and Land Fire Management under §16.3 hereof shall be domiciled at the District/Municipal Government Office, and function to coordinate planning, organising, operational, monitoring and evaluation activities of any Dalkarhutla efforts in its territory.
(5) The District/Municipal Taskforce for Forest and Land Fire Management under §16.4 hereof shall actively coordinate with the Provincial Taskforce for Forest and Land Fire Management.
(6) District/Municipal Taskforce for Forest and Land Fire Management shall establish secretariat, known as *Posko Krisis Kebakaran Hutan dan Lahan Kabupaten/Kota* (District/Municipal Coordinating Office for Forest and Land Fire Crisis).

Article 17

District/Municipal Government shall assign each Forest Management Unit, Perum Perhutani Forest Stewardship Unit (Perum Perhutani FSU), Perum Perhutani, Forest Use Concession Holder, Concession for Borrowing and Using Forest Area (IPPKH) Holder, Private Forest Concession Holder and Village Forest Concession Holder to implement operational matters.

Part Five
Management-Level Dalkarhutla Organisation
Article 18

(1) Every Dalkarhutla Local Technical Implementing Unit (UPTD), Grand Forest Park UPTD, Production Forest Management Unit (KPHP), Protected Forest Management Unit (KPHL), Conservation Forest Management Unit (KPHK), Perum Perhutani Forest Stewardship Unit (Perum Perhutani FSU), Perum Perhutani and Holder of Business Concession to Utilise Forest Products shall form Brigdalkarhutla Organisation.
(2) Structure of the Forest Management Unit (KPH) Brigdalkarhutla Organisation under §18.1 hereof shall be subject to the Schedule hereof.

Article 19

The Brigdalkarhutla Organisation under §18.1 hereof shall be:
a. Brigdalkar of Dalkarhutla UPTD;

b. Brigdalkar of Grand Forest Park UPTD;
c. Brigdalkar of KPHP, KPHL, KPHK or Perum Perhutani FSU;
d. Brigdalkar of holders of Business Concession to Utilise Timber Forest Products (IUPHHK) Holder, Business Concession to Utilise Non-Timber Forest Products (IUPHHBK), or Business Concession to Utilise Timber Forest Products for Ecosystem Restoration (IUPHHK-RE) in natural forest on production forest.
e. Brigdalkar of IUPHHK or IUPHHBK in Industrial Plantation Forest (HTI) and Rehabilitated Product Plantation Forest (HTHR); and
f. Brigdalkar of IPPKH in protected forest and production forest for mining activities.

Article 20

Every Brigdalkarhutla under §19 shall have organisational structures and main tasks that include:
a. Head of Brigade whose position, in implementation, may also be held by the Management Unit Head at field level or any appointed official and shall be accountable to the Head at management level, run planning, organising, operational, monitoring and evaluation tasks in any Dalkarhutla efforts within his/her operational area;
b. Brigade Secretary that shall be accountable to the Head of Brigade and run management support tasks;
c. Coordinator of Forest and Land Fire Prevention that shall be accountable to the Head of Brigade, run planning, organising, operational, monitoring and evaluation tasks in community empowerment, awareness raising, risk reduction, institutional capacity building, patrol activities and early warning;
d. Coordinator of Firefighting and Post-Fire Management that shall be accountable to the Head of Brigade, run planning, organising, operational, monitoring and evaluation tasks in early detection, groundchecking, initial and advanced firefighting, inventorying and monitoring of the previously burnt areas, post-fire management coordination, and evacuation and rescue support; and
e. Team Leader that shall be accountable to the Head of Brigade, and run Dalkarhutla operational tasks on the ground.

Article 21

Each Brigdalkarhutla may be provided with organisation identity taking forms of, among others, name, flag, banner or mascot, that shall be determined by each management unit.

Article 22

(1) Every:
    a. holder of Special Mining Business Concession (IUPK), Environmental Service Utilisation Business Concession (IUPJL), or Concession to Utilise Non-Timber Forest Products (IPHHBK) in Protected and Production Forests; and holder of Concession to Utilise Timber Forest Products (IPHHK) in production and Community Plantation Forest (HTR);
    b. holder of IPPKH for non-mining activities;
    c. manager of Community Forests (HKm);
    d. manager of Village Forest;
    e. individual responsible for Customary Forest;
    f. owner of Private Forest;
    g. holder of Special Purpose Forest Area (KHDTK); and
    h. farmer group around forest, conservation village, climate village or forest ecosystem-based tourism village;

    shall facilitate MPA groups.
(2) Each MPA organisation shall consist of two (2) teams, each of which shall be composed of fifteen (15) local community members from one (1) village.
(3) The MPA under §22.1 hereof shall be established involving the nearest KPH and/or Manggala Agni.

Article 23

(1) Each MPA group shall have at least the organisational structures and tasks as follow:

a. Head of MPA that shall carry out planning, organising, operational, monitoring and evaluation tasks in any Dalkarhutla efforts in his/her village;
b. Secretary (also holding Treasurer position), that shall carry out finance administration and secretariat tasks; and
c. Team Leader that shall carry out Dalkarhutla operational tasks.

(2) Further provision on procedure of establishment and development of MPA under §23.1 shall be governed with Director General Regulation.

Article 24

Every holder of non-forestry concession outside forest areas such as for plantation and mining shall form organisation for land fire control according to the applicable laws and regulations.

Article 25

Every natural lover individual and/or club, conservation cadre, tourism guiding service group in National Park, environmental watcher, environmental representative and other works or professions may develop MPA group relevant to their needs.

SECTION III
HUMAN RESOURCES OF DALKARHUTLA
Part One
General
Article 26

Improvement of the quality of Dalkarhutla under §4.b hereof shall be supported by Dalkarhutla resources that include:
a. fulfilment of the needs for Dalkarhutla human resources; and
b. capacity building for Dalkarhutla human resources.

Article 27

The fulfilment of the needs for Dalkarhutla human resources under §26.a hereof shall aim to:
a. improve Dalkarhutla scope to the field level; and
b. meet citizen duly obligations.

Article 28

The capacity building for Dalkarhutla human resources under §26.b shall aim to:
a. improve Dalkarhutla efficiency and effectiveness; and
b. achieve national, regional and international commitment targets in Dalkarhutla matter.

Part Two
Standards and Criteria
Paragraph 1
Dalkarhutla Human Resources
at Central, Provincial and District/Municipal Levels
Article 29

(1) All institutions within the following authorities:
a. Central Government;
b. Provincial Government; and
c. District/Municipal Government that handle Dalkarhutla;
shall have quality and professional Dalkarhutla human resources according to the laws and regulations.

(2) Human resources for every Dalkarhutla Taskforce and Coordinating Office for Forest and Land Fire Crisis established at each Central, Provincial and District/Municipal Government institution shall be provided by means of decree of the supreme leadership in the institution.

Article 30

The Government may, in order to improve the performance of Dalkarhutla Control Taskforce and

Coordinating Office for Forest and Land Fire Crisis, carry out development in hierarchical manner.

Paragraph 2
Dalkarhutla Human Resources in KPHP, KPHL, KPHK and Perum Perhutani KPH
Article 31

(1) Every KPHP, KPHL, KPHK, or Perum Perhutani KPH shall make available of Dalkarhutla human resources in Brigdalkarhutla.
(2) The Dalkarhutla human resources under §31.1 hereof shall be made available to fill positions of:
    a. the Brigdalkarhutla organisation under §20 hereof; and
    b. Dalkarhutla Team.
(3) The Dalkarhutla Team under §31.2.b hereof shall comprise:
    a. Forest Fire Control Core Team; and
    b. Forest Fire Control Auxiliary team.

Article 32

(1) The KPH Forest Fire Control Core Team under §31.3.a hereof shall be composed of at least one (1) team leader and fourteen (14) team members.
(2) The team leader and members under §32.1 hereof shall have competence in the field of Dalkarhutla as demonstrated with certificates issued by relevant authorities.
(3) KPHP, KPHL and KPHK shall have at least one (1) Dalkarhutla core team.
(4) Perum Perhutani KPH shall have at least one (1) core team under each Forest Stewardship Sub-Unit (BKPH).

Article 33

(1) The KPH Forest Fire Control Auxiliary team under §31.3.b shall be composed of community members from the partner villages.
(2) Determination of auxiliary team number, as well as tasks and functions in Dalkarhutla shall be governed further by means of KPHP, KPHL, KPHK or Perum Perhutani KPH.

Paragraph 3
Dalkarhutla Human Resources in Concession of IUPHHK, IUPHHBK or IUPHHK-Ecosystem Restoration in Natural Forest on Production Forest; Concession of IUPHHK or IUPHHBK in HTI or HTHR; and Holder of Concession of IPPKH in Protected Forest and Production Forests for Mining Activities

Article 34

(1) Every:
    a. holder of IUPHHK, IUPHHBK or IUPHHK-Ecosystem Restoration in Natural Forest on Production Forest;
    b. holder of IUPHHK or IUPHHBK in HTI or HTHR;
    c. holder of IPPKH in Protected Forest and Production Forests for Mining Activities;
    shall make available of Dalkarhutla human resources in Brigdalkarhutla.
(2) The Dalkarhutla human resources under §34.1 hereof shall be made available to fill positions of:
    a. the Brigdalkarhutla organisation under §20 hereof; and
    b. Dalkarhutla Team.
(3) The Dalkarhutla Team under §34.2.b hereof shall comprise:
    a. Forest Fire Control Core Team;
    b. Forest Fire Control Supporting Team; and
    c. Forest Fire Control Auxiliary team.

Article 35

(1) The Forest Fire Control Team under §34.3.a hereof shall be composed of at least one (1) team leader and fourteen (14) team members.

(2) The team leader and members under §35.1 hereof shall particularly recruited out of community elements for further becoming employees and/or directly recruited out of licence-holding employees.
(3) The team leader and members under §35.2 hereof shall have competence in the field of Dalkarhutla as demonstrated with legitimate certificates.

Article 36

Every management unit, district or sector in:
a. holder of IUPHHK, IUPHHBK or IUPHHK-Ecosystem Restoration in Natural Forest on Production Forest;
b. holder of IPPKH in Protected Forest and Production Forests for Mining Activities;
c. holder of IUPHHK or IUPHHBK in HTI or HTHR;
shall have at least one (1) Forest Fire Control Core Team.

Article 37

(1) The provision under §36 hereof shall apply to all holders of IUPHHK, IUPHHBK or IUPHHK-Ecosystem Restoration in Natural Forest on Production Forest in Natural Forest on production forest and IPPKH in Protected Forest and Production Forest for mining activities with area of no more than fifty thousand hectares (50,000 ha).
(2) In case the management unit, district or sector area comprises more than fifty thousand hectares (50,000 ha) up to one hundred thousand hectares (100,000 ha), it shall have at least two (2) Forest Fire Control Core Teams.
(3) In case the management unit, district or sector area is more than one hundred thousand hectares (100,000 ha), it shall have at least three (3) Forest Fire Control Core Teams.

Article 38

(1) The provision under §36 hereof shall apply to all holders of concession of IUPHHK or IUPHHBK in HTI or HTHR with area no more than twenty thousand hectares (20,000 ha).
(2) In the case where each management unit, district or sector is more than twenty thousand hectares (20,000 ha) up to forty thousand hectares (40,000 ha), at least two (2) Forest Fire Control Core Teams shall be present.
(3) In the case where each management unit, district or sector is more than forty thousand hectares (40,000 ha) up to sixty thousand hectares (60,000 ha), at least three (3) Forest Fire Control Core Teams shall be present.
(4) In the case where each management unit, district or sector is more than sixty thousand hectares (60,000 ha) up to eighty thousand hectares (80,000 ha), at least four (4) Forest Fire Control Core Teams shall be present.
(5) In the case where each management unit, district or sector is more than eighty thousand hectares (80,000 ha) up to one hundred thousand hectares (100,000 ha), at least five (5) Forest Fire Control Core Teams shall be present.
(6) In the case where each management unit, district or sector is more than one hundred thousand hectares (100,000 ha), at least three (6) Forest Fire Control Core Teams shall be present.

Article 39

All employees of:
a. holder of IUPHHK, IUPHHBK or IUPHHK-Ecosystem Restoration in Natural Forest on Production Forest;
b. holder of IUPHHK or IUPHHBK in HTI or HTHR;
c. holder of IPPKH in Protected Forest and Production Forests for Mining Activities;
shall be recruited as members of the Forest Fire Control Supporting Team under §34.3.b hereof.

Article 40

All members of partner communities developed by:
a. holder of IUPHHK, IUPHHBK or IUPHHK-Ecosystem Restoration in natural forest on production forest;

b. holder of IUPHHK or IUPHHBK in HTI or HTHR;
c. holder of IPPKH in Protected Forest and Production Forests for Mining Activities;
shall be recruited as members of the Forest Fire Control Supporting Team under §34.3.c hereof.

Article 41

Further provision on determination of number of Forest Fire Control Supporting Team and Forest Fire Control Auxiliary team and their main tasks and functions in Dalkarhutla shall be governed by decree of the Concession Holder Head/Chief.

Paragraph 4
Dalkarhutla Human Resources in Holder of Concession of IUPK, IUPJL or IUPHHBK in Protected or Production Forest;
Holder of Concession of IPHHK in Natural Forest on Production Forest or HTR;
Holder of Concession of IPPKH in Protected or Production Forest for Non-Mining Activities;
Manager of Community Forest Concession;
Manager of Village Forest Concession;
Individual Responsible for Customary Forest Area; Private Forest Owner;
Special-Purpose Forest Area (KHDTK);
Plantation Business Actor or Village Unit Group

Article 42

(1) Every:
   a. holder of IUPK, (IUPJL), or IPHHBK in protected and production forests;
   b. holder of IPHHK in natural forest on production forest or HTR;
   c. holder of IPPKH in Protected and Production Forests for non-mining activities;
   d. manager of HKm;
   e. manager of Village Forest;
   f. individual responsible for Customary Forest;
   g. owner of Private Forest; and
   h. manager of KHDTK;
   shall make available of Dalkarhutla human resources in the form of MPA organisations.
(2) Further provision on determination of number of MPA and their main tasks and functions in Dalkarhutla shall be governed by decree of the concession holder head/chief, manager, or responsible individual.

Article 43

Plantation business actor or village unit group shall make available of reliable and professional Dalkarhutla human resources in the form organisations that shall be established based on applicable laws and regulation.

Section Three
Capacity Building for Dalkarhutla Human Resources

Article 44

(1) The capacity building for Dalkarhutla human resources under §26.b hereof shall be provided to each Dalkarhutla technical implementing actor, particularly Manggala Agni Brigdalkarhutla members, Provincial/District/Municipal Dalkarhutla Work Unit, Management Unit Brigdalkar, and communities.
(2) The capacity building for Dalkarhutla human resources under §44.1 hereof shall be delivered through:
   a. education and training;
   b. job provisioning (in-house training and on-the-job training);
   c. technical assistance;
   d. other forms of development.

Article 45

(1) The education and training under §44.2.a hereof shall include the following fields:
    a. community empowerment;
    b. awareness raising or prevention campaign;
    c. forest and land fire prevention techniques;
    d. firefighting in the event of forest and land fires;
    e. post-fire management;
    f. evacuation and rescue support;
    g. management support; and
    h. Dalkarhutla management.
(2) The education and training under §45.1 hereof shall refer to the applicable laws and regulations.
(3) The provisioning under §44.2.b hereof shall take form of short training on Dalkarhutla skills.
(4) The technical assistance under §44.2.c hereof shall take form of skill improvement by means of assistance.
(5) The other forms of development under §44.2.d hereof shall take form of delivery of special materials such as norms, standards, procedure and criteria (NSPK), fixed procedure (Protap), work ethic, corps spirit, and other Dalkarhutla techniques.
(6) Further provisions on provisioning, technical assistance and other assistance, under §45.3 to §45.5 shall be governed by Director General Regulation.

SECTION IV
DALKARHUTLA FACILITIES AND INFRASTRUCTURE
Part One
General
Article 46

In order to improve Dalkarhutla quality under §4.c hereof, the following facilities and infrastructure shall be made available.
a. Establishing Dalkarhutla facilities and infrastructures.
b. Improvement of Dalkarhutla facility and infrastructure capacity.

Article 47

The establishment of Dalkarhutla facilities and infrastructure under §46.a hereof shall aim to:
a. expand Dalkarhutla scope to the field level;
b. meet citizen duly obligations.

Article 48

The improvement of Dalkarhutla facility and infrastructure capacity under §46.b shall aim to:
a. improve Dalkarhutla efficiency and effectiveness; and
b. achieve national, regional and international commitment targets in Dalkarhutla matters.

Part Two
Standards and Criteria
Paragraph 1
Dalkarhutla Facilities and Infrastructures at Central, Provincial and District Government Levels
Article 49

Each of the following:
a. Central Government;
b. provincial government; and
c. district/municipal government;
shall make available of Dalkarhutla facilities and infrastructures to support Taskforces for Forest and Land Fire Management and Coordinating Office for Forest and Land Fire Crisis.

Article 50

(1) The facilities and infrastructures for Dalkarhutla Taskforce under §49 may use those adherent to the existing organisational structures.

(2) The facilities and infrastructures for Coordinating Office for Forest and Land Fire Crisis under §49 shall consist of at least the following.
   a. Rooms specially made available for the coordinating office, provided with chairs and tables.
   b. Laptop, desktop computer, printer, LCD projector, display monitor, and screen.
   c. Facsimile machine.
   d. Internet network.
   e. Communication tools.
   f. Whiteboard, other office stationeries.
   g. Coordinating office operational vehicles.
   h. Work shift log book, forms.
   i. Coordinating office operational SOP.

Paragraph 2
Dalkarhutla Facilities and Infrastructures in KPHP, KPHL, KPHK, Perum Perhutani KPH, IUPHHK or UPHHBK or IUPHHK-Ecosystem Restoration in Natural Forest on Production Forest, IUPHHK or IUPHHBK in HTI or HTHR, IPPKH in Protected and Production Forests for Mining Activities
Article 51

(1) Every:
   a. KPHP;
   b. KPHL;
   c. KPHK;
   d. Perum Perhutani KPH;
   e. IUPHHK or UPHHBK or IUPHHK-Ecosystem Restoration in Natural Forest on Production Forest;
   f. IUPHHK or UPHHBK in HTI or HTHR;
   g. IPPKH in Protected and Production Forests for Mining Activities.

   shall make available of facilities and infrastructures to support Brigdalkarhutla activities.
(2) The Brigdalkarhutla facilities and infrastructures under §51.1 hereof consist of at least the following:
   a. facilities and infrastructures for forest fire prevention;
   b. facilities and infrastructures for forest firefighting; and
   c. other facilities and infrastructures.

Article 52

(1) The facilities and infrastructures for forest fire prevention under §51.2.a hereof shall include:
   a. awareness raising or prevention campaign;
   b. prevention techniques;
   c. canal management facilities on peatlands;
   d. coordinating office for handling forest and land fire crisis;
   e. early warning of forest and land fires; and
   f. early detection of forest fires.
(2) Facilities and infrastructures for awareness raising or prevention campaign under §52.1.a hereof shall comprise awareness raising or campaign props and other facilities and infrastructures such as computer, television, video player, screen, LCD projector, clipboard, poster, leaflet and booklet.
(3) Facilities for prevention techniques under §52.3.b hereof shall consist of manmade firebreak, greenbelt, ponds/water point or water bag.
(4) Facilities for canal management on peatlands under §52.1.c hereof shall consist of simple hydrological tools, canal blocking and water gate.
(5) Facilities for coordinating office for handling forest and land fire crisis under §52.1.d hereof shall at least the same as provided for the coordinating office for handling forest and land fire crisis under §50.2 hereof.
(6) Facilities for forest and land fire early warning under §52.1.e hereof shall comprise fire prone area map or similar maps, work map, fire control resources database, supporting tool for

identifying fire hazard risks, signage on prohibition to start fire, information board on Fire Danger Rating System (PBK), PBK flag, village PBK supporting tool, and portable or fixed weather measuring instrument, and system capable of supporting dissemination of information on forest and land fire proneness.

(7) Facilities for early detection of forest and land fire under §52.1.f shall include watchtower, CCTV, or other similar heat detectors, as well as supporting instruments for processing data and information on hotspot, Global Positioning System, drone, ultra-light trike, or other similar aerial vehicles, and tools and devices for disseminating information on early detection result.

Article 53

Forest firefighting facilities and infrastructures of the forest management unit under §51.2.b hereof shall include:

a. personal supply;
b. team supply;
c. team equipment;
d. special 4-wheel vehicles for forest fire control;
e. data-processing and communication facilities; and
f. transportation facilities.

Article 54

The personal supply under §53.a hereof shall at least consist of: safety helmet, head lamp, safety glasses, mask and neck cover, gloves, belt, canteen, whistle, rucksack, firefighting shoes, firefighting suit, shirt, sleeping bag, and standard rucksack, comprising fifteen sets (15) each.

Article 55

(1) The team supply under §53.b hereof shall consist of two (2) units of tent, one (1) set of standard tools, two (2) units of standard first aid kit, and one (1) lighting device, one (1) unit of cooking equipment, and one (1) unit of standard, basic evacuation and rescue equipment.

(2) Specification of the team supply under §55.1 hereof shall be subject to general specification that applicable to activities exposed with high risk of occupational accidents.

Article 56

(1) The team equipment under §53.c hereof shall be composed of the following:
   a. manual equipment; and
   b. mechanical equipment.

(2) The manual equipment under §56.1.a shall have at least the following functions:
   a. cutting, such as single bit axe, double bit axe, bi-functional axe, machete, and Pulaski;
   b. digging, such as hoe, shovel, and pitchfork;
   c. harrowing, such as regular rake, sharp-end rake, and pitchfork;
   d. pounding, such as *gepyok* (broomstick-like tool), rubber flapper;
   e. spraying, such as backpack water pump, *pacitan*;
   f. burning, such as drip torch, fuse.

(3) Each team shall have at least the following manual equipment by type and number:
   a. four (4) units of bi-functional axe;
   b. eight (8) units of *gepyok*;
   c. six (6) units of sharp-end rake;
   d. three (3) units of pitchfork;
   e. six (6) units of shovel;
   f. ten (10) units of backpack water pump;
   g. one (1) unit of drip torch;
   h. two (2) units of file;
   i. ten (10) units of machete.

(4) All manual equipment used shall be standardised according to the applicable laws and regulations.

Article 57

(1) Each team shall have at least the following mechanical equipment under §56.1.b hereof:
   a. high-pressure pump along with its accessories including hose, nozzle, peat nozzle, foldable water tank; and
   b. chainsaw.
(2) Each team shall have at least the following high-pressure pump by type and number:
   a. one (1) unit of main pump;
   b. three (3) units of portable pump; and
   c. two (2) units of floating pump.
(3) Pump accessories shall include at least the following by type and number:
   a. five (5) units of nozzle;
   b. five (5) units of peat injector;
   c. five (5) units of foldable water tank;
   d. fifty (50) units of hose;
   e. other relevant equipment.
(4) Each team shall have at least one (1) unit of chainsaw.

Article 58

(1) Each team shall have special 4-wheel vehicles for forest and land firefighting under §53.d in the form of at least one (1) unit of fire engine and one (1) unit of tanker vehicle.
(2) Fire engine and tanker vehicle for forest and land firefighting shall be standardised according to the applicable laws and regulations.

Article 59

Each team shall have at least the following data processing and communication facilities under §53.e hereof:
a. one (1) unit of GPS;
b. four (4) units of walkie-talkie;
c. one (1) unit of megaphone;
d. traditional communication tools such as flags and *kentongan* (bamboo alarm) as many as necessary.

Article 60

Each team shall have the transportation facilities under §53.f hereof that consist of at least:
a. two (2) units of 2-wheel field vehicle;
b. two (2) units of 4 wheel field vehicle that include bi-functional logistic car and equipment-carrying car; and/or one (1) unit of speedboat, *klotok* boat or other types of boat; and
c. other transportation facilities relevant to the operational area.

Article 61

(1) Each forest management unit may provide forest and land fire firefighting facilities and infrastructures to Forest Fire Control Supporting Team and/or Forest Fire Control Auxiliary team.
(2) Number and type of forest and land firefighting facilities and infrastructures provided to Forest Fire Control Supporting Team and/or Forest Fire Control Auxiliary team may be governed further with Regulation of Head or Official of each management unit.

Article 62

(1) Other facilities and infrastructures under Article 51.2.c hereof for each:
   a. KPHP;
   b. KPHL;
   c. KPHK;
   d. Perum Perhutani KPH;
   e. IUPHHK, UPHHBK, or IUPHHK-Ecosystem Restoration in Natural Forest in Production Forest;

f. IUPHHK or IUPHHBK in HTI or HTHR;
g. IPPKH in Protected and Production Forest for Mining Activities;

shall consist of internal operational procedure document, work space, equipment storage, shop and its equipment, garage, fuel storage, and equipment washing facility, personnel barrack, kitchen, mess hall, and training field.

(2) For the sake of asset protection and fulfilling responsibilities, provision of other facilities and infrastructures such as helicopter or other heavy machinery shall be taken into account by each management unit individually or together in a group.

Paragraph 3

Forest Fire Control Facilities and Infrastructures in Holder of IUPK, IUPJL or IPHHBK in Protected and Production Forests; Holder of IPHHK in Natural Forest in Production Forest or HTR, Holder of IPPKH in Protected and Production Forests for Non-Mining Activities, Manager of Community Forest and Village Forest, Owner of Private Forest and Plantation Business Actor

Article 63

(1) Every:
a. holder of IUPK, IUPJL, or IPHHBK in Protected or Production Forests
b. holder of IPHHK in natural forest in production or HTR forest;
c. holder of IPPKH in protected and production forests for non-mining activities;
d. manager of HKm;
e. manager of Village Forest;
f. owner of Private Forest;

shall provide forest and land fire control facilities and infrastructures to MPA group organisation.

(2) Further provision on determination of number and types of Dalkarhutla facilities and infrastructures shall be governed with decree of head or leadership of each concession holder, manager or responsible individuals.

Article 64

All plantation business actors shall provide facilities and infrastructures for the implementation of other main tasks and functions of plantation and land fire control according to the applicable laws and regulations.

SECTION V

DALKARHUTLA ACTIVITIES

Part One

General

Article 65

Dalkarhutla activities shall consist of at least the following:
a. planning;
b. prevention implementation;
c. countermeasure implementation;
d. implementation of post-fire management measures;
e. work coordination;
f. alert status.

Article 66

Every institution and/or forest and land management unit under the following:
a. Central Government;
b. provincial government;
c. district/municipal government;
d. KPHP;
e. KPHL;
f. KPHK;
g. Perum Perhutani KPH;

h. holder of IUPHHK, UPHHBK or IUPHHK-Ecosystem Restoration in natural forest in production forest;
i. holder of IUPHHK, IUPHHBK in HTI or HTHR;
j. holder of IPPH in Protected and Production Forests for Mining Activities;
k. holder of IUPK, IUPJL, IPHHBK in protected and production forests; and holder of IPHHK in natural forest in production forest and HTR;
l. holder of IPPKH for non-mining activities;
m. manager of Community Forest;
n. manager of Village Forest;
o. individual responsible for customary forest;
p. private forest owner;
q. KHDTK manager;
r. plantation manager; and
s. farmer group around forest, conservation village, climate village or forest ecosystem-based tourism village;

shall plan and implement prevention, fire suppression and extinguishing, and post-forest and land fire management.

Part Two
Planning
Article 67

The planning of Dalkarhutla under §65.a hereof shall include:
a. awareness raising on Dalkarhutla prevention;
b. fire prevention and management techniques for canal in peatlands;
c. improvement of partnership system and MPA;
d. development of Dalkarhutla facilities and infrastructures;
e. early warning;
f. patrol;
g. planning of Dalkarhutla strategy and administration;
h. monitoring and evaluation of forest and land fire prevention operation;
i. alertness;
j. early detection;
k. firefighting and post-forest and land fire management;
l. monitoring and evaluation of firefighting and post-forest and land fire management operations;
m. training/provisioning/in-house training/refreshing/technical assistance on Dalkarhutla;
n. monitoring and evaluation of human resources capacity building; and
o. establishment and development of Brigdalkarhutla.

Article 68

(1) The Dalkarhutla planning under point a to o of §67 hereof shall be made basis of Dalkarhutla planning document preparation by forest and/or land management institution and unit.
(2) The Dalkarhutla planning document under §68.1 hereof shall include:
    a. Annual Work Plan (RKT) or Operational Work Plan (RKO);
    b. Standard of Activity and Cost (SKB) and/or Standard of Expenditure Cost (SBK);
    c. Work and Budget Plan or other similar plans;
    d. Contingency Plan;
    e. other relevant planning document.
(3) Further provision on determination of Dalkarhutla activity and cost standards shall be governed with Director General Regulation.
(4) Every forest and land management institution and unit leadership shall issue Dalkarhutla planning document under point a to e of §68.2 hereof.

Part Three
Implementation of Prevention
Article 69

(1) Implementation of forest and land fire prevention shall include community empowerment, awareness raising, forest and land fire risk reduction, alertness, early warning implementation and prevention patrol.
(2) The forest and land fire prevention activities under §69.1 hereof shall include:
    a. application agroforestry, agro-silvo-pastura, silvo-pastura, and other similar activities;
    b. dissemination of information and/or extension on forest and land fire prevention through a wide range of methods;
    c. campaign on forest and land fire prevention for raising awareness on forest and land fire prevention;
    d. making of campaign materials and/or props for forest and land fire prevention;
    e. forest and land fire prevention movement;
    f. assistance to MPA;
    g. practice of zero burning land clearing;
    h. making and/or management of firebreaks;
    i. making compost from plant waste;
    j. fuel management;
    k. construction of canal breaks, water point and water bag;
    l. consolidation of organisation and its procedures;
    m. simulation of multilayer mobilisation;
    n. improvement of coordination through work meeting, coordination meeting, work visit, etc.;
    o. early warning and application of fire danger rating system or other similar systems;
    p. making and installing signage and signboards on forest and land fire prevention warning and dissemination of information on them;
    q. making, presenting and disseminating information on forest and land fire proneness through maps or other similar forms;
    r. making, presenting and disseminating information on national, provincial, district/municipal, sub-district and village Dalkarhutla resources; and
    s. Dalkarhutla prevention patrol.
(3) Further provision on forest and land fire prevention activities under §69.2 hereof shall be governed with Director General Regulation.

Article 70

Implementation of the forest and land fire prevention under §69 hereof shall aim to:
a. improve community empowerment in forest and land management;
b. mitigate factors that cause fire, particularly from the source of fire and fuel;
c. raise awareness of public and/or corporate's behaviour;
d. restrict people and/or corporate's chances or intentions to set fire on vegetation;
e. provide information as early as possible of potential forest and land fires.

Part Four
Implementation of Countermeasure
Article 71

(1) Implementation of forest and land fire countermeasure shall include:
    a. early detection;
    b. initial fire suppression;
    c. firefighting coordination;
    d. firefighting mobilisation;
    e. advanced firefighting;
    f. firefighting demobilisation;
    g. evacuation and rescue.
(2) Forest and land fire countermeasure activities shall include:

a. application of early detection through various observation methods such as detection through watchtower, application of various types of camera/CCTV, remote sensing (aerial photograph or satellite imagery);
b. hotspot data and information processing;
c. dissemination of hotspot data and information;
d. determination of alertness level;
e. determination of Dalkarhutla coordinating offices;
f. implementation of fire size-up;
g. establishment of field coordinating office;
h. direct firefighting;
i. construction of firebreak land strips around land clearing area to control the fire spread (*ilaran api*);
j. indirect firefighting;
k. aerial firefighting support;
l. mopping up remaining embers;
m. personnel safety measures.

(3) The evacuation and rescue under §71.1.g hereof shall take form of evacuation and rescue support carried out for:
a. human victims from local communities around the fire location or Dalkarhutla personnel;
b. rare plant and wildlife species (TSL) that can possibly be evacuated;
c. public assets in the form of vital public assets that are located around the disaster area.

(4) Further provision on forest and land fire countermeasure activities under §71.2 shall be governed with Director General Regulation.

Article 72

Implementation of forest and land countermeasures shall aim to:
a. improve accuracy of analysis of data and information relating to forest and land fire countermeasure and service for all stakeholders;
b. improve cooperation in forest and land fire countermeasure;
c. implementation of initial firefighting for all stakeholders;
d. quick firefighting mobilisation; and
e. evacuation and rescue service.

Part Five
Implementation of Post-Forest and Land Fire Management
Article 73

(1) Implementation of post-forest and land fire management shall include:
a. monitoring of previously burnt areas;
b. inventory of area of forest and land fire;
c. loss estimate; and
d. coordination of post-forest and land fire management.

(2) Activities of the post-forest and land fire management under §73.1 hereof shall include:
a. area estimate;
b. analysis of previously burnt vegetation;
c. loss estimate;
d. recommendation on rehabilitation of previously burnt areas;
e. investigation of causes of fire;
f. marking with police line and/or line of Investigator from Civil State Employee (PPNS) under environmental and forestry authority;
g. deployment of officers in the area after forest and land fire;
h. investigation; and
i. monitoring and proceeding all matters relating to the implementation of forest and land fire law enforcement.

(3) Further provision on the post-forest and land fire management activities under §73.2 hereof shall be governed with Director General Regulation.

Article 74

Implementation of post-forest and land fire management shall aim to:

a. obtain data and information on size of burnt area and vegetation, forest fire causes, functions of the burnt forest or land, and other relevant types of data or information;
b. monitor the previously burnt area;
c. bring about deterrent effect to all people and/or corporations that have deliberately committed to or failed in the event of a forest and land fire.

Part Six

Work Coordination

Paragraph 1

General

Article 75

Every forest and land management institution and/or unit under:

a. the Central Government;
b. provincial government;
c. district/municipal government;
d. KPHP;
e. KPHL;
f. KPHK;
g. Perum Perhutani KPH;
h. holder of IUPHHK, UPHHBK, or IUPHHK-Ecosystem Restoration in Natural Forest in Production Forest;
i. holder of IUPPHK or IUPHHBK in HTI or HTHR;
j. holder of IPPKH in Protected and Production Forests for Mining Activities;
k. holder of IUPK, IUPJL, IPHHBK in protected and production forests; and holder of IPHHK in natural forest in production forest and HTR;
l. holder of IPPKH for non-mining activities;
m. manager of Community Forest;
n. manager of Village Forest;
o. individual responsible for customary forest;
p. Private Forest owner;
q. manager of KHDTK;
r. plantation management;
s. farmer group around forest, conservation village, climate village or forest ecosystem-based tourism village;

shall coordinate works in planning, preventing, firefighting and post-forest and land fire management.

Article 76

Work coordination shall aim to:

a. harmonise, synergise, synchronise and integrate all action plans in implementation of prevention, firefighting and post-forest and land fire management;
b. facilitate and encourage mutual cooperation in implementation, prevention, firefighting and post-forest and land fire management.

Paragraph 2

Implementation of Work Coordination

Article 77

Work coordination shall be carried out through work management mechanism between:

a. National, Provincial and District/Municipal Taskforce for Forest and Land Fire Management;
b. National, Provincial and District/Municipal Coordinating Office for Forest and Land Fire Crisis; and/or
c. Dalkarhutla organisation for each forest and/or land management unit.

Article 78

(1) At national level, work coordination improvement in implementing prevention, countermeasure and post-fire management shall operate National Taskforce for Forest and Land Fire Management.
(2) At provincial level, work coordination improvement in implementing prevention, countermeasure and post-fire management shall operate Provincial Taskforce for Forest and Land Fire Management.
(3) At district/municipal level, work coordination improvement in implementing prevention, countermeasure and post-fire management shall operate District/Municipal Taskforce for Forest and Land Fire Management.
(4) At management unit level, work coordination improvement in implementing prevention, countermeasure and post-fire management shall operate Brigdalkarhutla Organisation under each management unit.

Article 79

(1) In the event of forest and land fire crisis at district/municipal level, frequency of coordination activities shall be intensified through District/Municipal Coordinating Office for Forest and Land Fire Crisis.
(2) In the event of forest and land fire crisis at provincial level, frequency of coordination activities shall be intensified through Provincial Coordinating Office for Forest and Land Fire Crisis.
(3) In the event of forest and land fire crisis at national level, frequency of coordination activities shall be intensified through National Coordinating Office for Forest and Land Fire Crisis.
(4) Minister shall determine the condition of forest and land fire crisis at district, provincial or national level.

Article 80

(1) Management of work relationship at coordinating office level shall be carried out by secretariat of each coordinating office.
(2) Further provision on the management of work relationship at coordinating office level under §80.1 shall be governed with Director General Regulation.

Article 81

(1) Where an emergency response has been announced by relevant authority, work of Coordinating Office for Forest and Land Fire shall automatically be integrated into the Emergency Response Coordinating Office that shall be established during the period of emergency response.
(2) The coordinating office hierarchy may automatically revert back to the initial state once the emergency response period is declared to have ended.

Part Seven
Alertness Status
Article 82

Alertness and emergency status shall include:
a. Alert 3 or normal;
b. Alert 2;
c. Alert 1; and
d. district/municipal, provincial or national Emergency Response.

Article 83

(1) Recommendation on alertness status at national level shall be made through a mechanism of National Dalkarhutla Taskforce coordinating meeting.
(2) Recommendation on alertness status at provincial level shall be made through a mechanism of Provincial Dalkarhutla Taskforce coordinating meeting.
(3) Recommendation on alertness status at district/municipal level shall be made through a mechanism of District/Municipal Dalkarhutla Taskforce coordinating meeting.

(4) Recommendation on alertness status at Forest and Plantation Management Unit level shall be made through a mechanism of coordinating meeting of Dalkarhutla Taskforce at the Management Unit Brigdalkar level.

Article 84

(1) National Alertness Status shall be set by Minister upon the recommendation under §83.1.
(2) Provincial Alertness Status shall be set by Governor upon the recommendation under §83.2.
(3) District/Municipal Alertness Status shall be set by District Head/Mayor upon the recommendation under §83.3.
(4) Alertness Status at Management Unit level shall be set by Head of the Management Unit upon the recommendation under §83.4.

Article 85

Further provision on technical criteria of the alertness and emergency statuses under §82 shall be governed with Minister Regulation.

Article 86

(1) In the case where forest and land fire condition has wide impacts on social, cultural and economic matters, the alertness status may change to emergency response.
(2) Setting of emergency response status shall follow the existing mechanisms based on the applicable laws and regulations.

Part Eight
Responsibility for Prevention, Countermeasure
and Post-Forest and Land Fire Management

Article 87

Minister, Governor, District Head/Mayor and Head/Leader of Management Unit shall be responsible for the implementation of prevention, countermeasure and post-forest and land fire management according to the applicable laws and regulations.

Article 88

In the case of forest and land fire:
a. that takes place in a management unit, Management Unit Head shall be responsible for the countermeasure implementation in his/her territory;
b. that takes place in at least two (2) sub-districts, District Head shall be responsible for the countermeasure implementation in his/her territory;
c. that takes place in at least two (2) districts/municipalities, Governor shall be responsible for the countermeasure implementation in his/her territory;
d. that takes place in at least two (2) sub-districts, Minister shall be responsible for the countermeasure implementation in his/her territory and coordinate forest and land fire countermeasure at the national level.

Article 89

In the event of emergency status and/or upon Governor request, institutions granted with the legal authority to may provide countermeasure assistance by deploying the Armed Forces of the Republic of Indonesia (TNI), the National Police (POLRI) and cloud seeding or aerial firefighting.

Part Nine
Management Support

Article 90

(1) Implementation of Dalkarhutla activities shall be supported by a management system capable of assuring order and continuity of Dalkarhutla efforts in effective and efficient manner according to the applicable laws and regulations.

(2) Management support under §90.1 shall include at least the following:
   a. accountability report;
   b. annual report;
   c. management of State Property (BMN) and/or management unit property;
   d. financial administration; and
   e. planning and budgeting.

SECTION VI
DEVELOPMENT OF DALKARHUTLA INNOVATION

Article 91

Dalkarhutla innovation shall be developed through study, research, development and assistance on Dalkarhutla applicable science and technology that includes the following fields:
a. forest and land fire prevention;
b. forest and land fire countermeasure;
c. post-fire management;
d. evacuation and rescue support; and
e. Dalkarhutla management support.

Article 92

(1) Innovation in the field of forest and land fire prevention under §91.a hereof shall be, among others:
   a. zero burning land clearing;
   b. construction of canal breaks on peatlands;
   c. national movement for prevention;
   d. mapping of fire prone areas;
   e. early warning system;
   f. early detection system;
   g. forest and land fire hazard risk reduction; and
   h. fuel management.
(2) Innovation in the field of forest and land fire countermeasure under §91.b hereof shall be, among others:
   a. fire behaviour;
   b. burning material characteristics;
   c. early detection system;
   d. peatland firefighting techniques;
   e. integrated land and aerial firefighting;
   f. weather modification technology.
(3) Innovation in the field of post-forest and land fire management under §91.c hereof shall be, among others:
   a. techniques to measure size of the burning area;
   b. techniques to analyse fire impact;
   c. techniques to rehabilitate the previously burnt area;
   d. techniques to identify and investigate fire event.
(4) Innovation in the field of evacuation and rescue support under §91.d hereof shall be, among others:
   a. techniques to evacuate and rescue human victims;
   b. techniques to evacuate and rescue plant and wildlife; or
   c. techniques to evacuate and retrieve public assets and vital national assets.
(5) Innovation in the field of Dalkarhutla management support under §91.e hereof shall be, among others:
   a. IT-based Dalkarhutla management information system;
   b. Dalkarhutla monitoring and evaluation system; or
   c. Dalkarhutla education and training method.

Article 93

Innovation may be developed on independent basis by Dalkarhutla implementing organisation, community and Dalkarhutla research and development institution under the Ministry of Environment and Forestry and/or other research institutions.

SECTION VII
COMMUNITY EMPOWERMENT
AND PARTNERSHIP COOPERATION
Part One
Community Empowerment

Article 94

To optimise Dalkarhutla activities, the Central, provincial and district/municipal governments, as well as management unit shall carry out empowerment and develop community participation in planning, countermeasure and/or post-fire management activities in every Dalkarhutla operational area.

Article 95

Community empowerment and participation development under §94 hereof shall be carried out subject to the following principles:

a. strengthen capacity and independency in forest fire control activities;
b. create climate that enable growing community potential and capacity;
c. strengthen community potential and capacity;
d. protect public interests through alignment towards community to prevent against unfair competition;
e. constitute activities of awareness raising, capacity building and access granting to resources; and
f. support Dalkarhutla efforts.

Article 96

(1) Community empowerment and participation development under §95 hereof may be carried out by means of the following activities.
    a. training;
    b. institutional strengthening;
    c. facilitation; and
    d. extension.
(2) The training under §96.1.a hereof shall be delivered through the following activities:
    a. basic training on Dalkarhutla;
    b. training on forest and land fire disaster risk reduction; or
    c. training relating to climate village stabilisation.
(3) The institutional strengthening under §96.1.b hereof may be carried out at village level that includes the following phases:
    a. passing village regulations on forest fire control according to the local conditions;
    b. establishment of MPA that starts from planning, requirement, provisioning to authorisation;
    c. organising communities through farmer groups;
    d. facility and infrastructure support that includes Dalkarhutla administrative and technical supply and equipment;
    e. establishment of climate village.
(4) Establishment of MPA under §96.3 hereof shall refer to Director General Regulation.
(5) The facilitation under §96.1.c hereof shall be carried out through the following activities:
    a. assistance;
    b. technical assistance; or
    c. development.
(6) The extension under §96.1.d hereof shall be carried out through the following activities:
    a. campaign of forest and land fire prevention, both directly and through printed and electronic media; or

b. direct meeting and visit.

Part Two
Partnership Cooperation

Article 97

To optimise Dalkarhutla activities, the Central, provincial and district/municipal governments as well as management unit may conduct partnership cooperation with all stakeholders relevant/concerning about Dalkarhutla.

Article 98

(1) The partnership cooperation under §97 hereof shall be made between Dalkarhutla implementing organisations, as well as with governmental institutions, private sector, non-governmental organisation, donor institution and/or community through agreement.
(2) The partnership cooperation agreement under §98.1 hereof shall take form of:
    a. Dalkarhutla human resources capacity building;
    b. Dalkarhutla innovation development;
    c. Dalkarhutla facility and infrastructure development;
    d. community empowerment; or
    e. development of other management supports.

SECTION VIII
REPORTING AND MONITORING

Article 99

(1) In order to maintain order and compliance in Dalkarhutla implementation, every level of Dalkarhutla organisation shall report and monitor Dalkarhutla activity implementation hierarchically according to the level of their authority.
(2) Reporting and monitoring under §99.1 hereof shall include:
    a. organisational matters;
    b. human resources;
    c. facility and infrastructure; or
    d. operational matters.

Part One
Reporting

Article 100

(1) Reporting shall include:
    a. incidental report; and
    b. regular report.
(2) The incidental report under §100.1.a hereof shall take form of report on forest fire event that contains at least general data and information about the fire event and the countermeasure efforts made.
(3) Regular report under §100.1.b hereof shall take form of monthly and annual reports on Dalkarhutla that contain at least data and information on institutional aspects, human resources, facility and infrastructure, prevention countermeasure and post-forest and land fire management, and management support.
(4) The report under §100.2 and §100.3 hereof shall be prepared and submitted by every Dalkarhutla implementing organisation on hierarchical basis.
(5) Report type and format as well as procedure of Dalkarhutla reporting, monitoring and evaluation shall refer to Director General Regulation on Guideline to Dalkarhutla Reporting.

Article 101

(1) In order to improve Dalkarhutla performance, performance evaluation activities may be performed.
(2) Further provision on implementation of performance evaluation under §101.1 hereof shall be governed with Director General Regulation.

Part Two
Monitoring

Article 102

Monitoring shall include:
a. regular monitoring;
b. occasional monitoring.

Article 103

(1) The regular monitoring under §102.a hereof shall be conducted by official at Echelon I level to improve regional development of coordination, integration, synergism, and activity synchronisation aspects in particular region in order to ensure successful performance target achievement.
(2) Further provision as to the responsibility of the developing official and region under §103.1 shall be governed with Minister Decree.

Article 104

(1) The occasional monitoring under §102.b hereof shall be carried out by Integrated Team to monitor particular areas that, according to Minister, need to have special monitoring.
(2) The Integrated Team under §104.1 hereof shall be established later on by means of Assignment Letter issued by official at Echelon I level.
(3) Further provision on technical guideline to the monitoring under §104.1 shall be governed with Director General Regulation.

Article 105

(1) For particular reason, Director General may instruct relevant authority to audit Dalkarhutla compliance.
(2) The compliance scoring shall be subject to the following category:
    a. good compliance (scoring from 85 to 100);
    b. moderate compliance (scoring from 65 to less than 85);
    c. poor compliance (scoring from 50 to less than 65);
    d. incompliance (scoring to less than 50).
(3) Further provision on instrument of the compliance audit under §105.1 hereof shall be governed with Director General Regulation.
(4) Result of the audit scoring under §105.2 hereof shall be taken into account in developing, rewarding and sanctioning by the developing institution.

Article 106

(1) Monitoring of Manggala Agni Central Office and Manggala Agni *Daops* Office shall be performed by Director General.
(2) Provincial Forest Fire Control Work Unit shall be monitored by Governor or Echelon I official responsible for provincial Dalkarhutla.
(3) District/Municipal Forest Fire Control Work Unit shall be monitored by District/Mayor or Echelon I official responsible for district/municipal Dalkarhutla.
(4) Management Unit Fire Control Work Unit shall be monitored by:
    a. governor and Echelon I official responsible for the KPH, over Dalkarhutla implementation in KPH or UPT;
    b. governor and Echelon I official responsible for sustainable production forest, over Dalkarhutla implementation in Forest Use Concessions;

c. governor and Echelon I official responsible for Forest Planning and Environmental Management, over Dalkarhutla implementation in IPPKH Concessions;
d. governor and Echelon I official of relevant responsibility, over Dalkarhutla implementation in Community Forest Concession; Village Forest Concession, Customary Forest, Private Forest and KHDTK Concession;
e. district head/mayor, as well as Echelon I official responsible for social forestry and Echelon I official responsible for agriculture, plantation and community socio-economic aspect, over Dalkarhutla implementation in community agricultural business lands.

(5) Monitoring over Non-Forestry Business Concession Management Unit fire control taskforce shall be carried out according to the applicable laws and regulations.

SECTION IX
REWARD AND SANCTION
Part One
Reward

Article 107

(1) Reward shall be given to every Dalkarhutla Implementing Organisation at governmental administrative and management unit levels that performs obligations of preparing Dalkarhutla organisation, human resources, facility and infrastructure, and operation in its operational area.
(2) Further provision on procedure of rewarding as provided under §107.1 hereof shall be governed with Minister Regulation.

Part Two
Sanction

Article 108

(1) Sanction shall apply to every Dalkarhutla Implementing Organisation at governmental administrative and management unit levels that fails to perform obligations of preparing Dalkarhutla organisation, human resources, facility and infrastructure, and operation in its operational area.
(2) The sanction under §108.1 hereof shall apply according to the applicable laws and regulation on environmental protection and management, forest destruction prevention and eradication, forest use concession, IPKHH, and/or other relevant laws and regulations.
(3) Further provision on procedure of sanctioning under §108.1 hereof shall be governed with Minister Regulation.

SECTION X
FUNDING

Article 109

(1) Expenses from Dalkarhutla activities shall be borne by State Annual Budget (APBN), Local Government Annual Budget (APBD) and other non-binding sources of funding according to the applicable laws and regulations.
(2) The Dalkarhutla expenses under §109.1 hereof may take form of on-call budget, multi-year budget and/or social aid fund.
(3) Ministry of Environment and Forestry shall allocate funds from APBN and other sources of fund according to laws and regulations to Dalkarhutla activities carried out by Manggala Agni.
(4) Provincial and district/municipal governments whose administrative territories are prone to forest and land fires shall allocate funds from their APBDs and other sources of fund according to laws and regulations to Dalkarhutla activities carried out by Local Government Dalkarhutla Work Unit, relevant stakeholders and local communities in their territories.
(5) Management Unit, save for community agricultures, shall allocate annual operational fund to forest and/or land fire control activities conducted by its Fire Control Work Unit, relevant stakeholder and local communities in their operational areas.

(6) Dalkarhutla expenses and funding shall be governed by the responsible individual of respective Dalkarhutla implementing organisation according to the applicable laws and regulations.

SECTION XI
CLOSING PROVISIONS

Article 110

By the time this Minister Regulation starts taking effect, Minister of Forestry Regulation No. P.12/Menhut-II/2009 on Forest Fire Control shall be revoked and declared to be no longer valid.

Article 111

This Minister Regulation shall become effective on the date of its promulgation.

For public cognisance, this Minister Regulation shall be announced by publishing it in the State Gazette of the Republic of Indonesia.

Stipulated in Jakarta on the date of [*]

MINISTER OF ENVIRONMENT AND FORESTRY
OF THE REPUBLIC OF INDONESIA
SITI NURBAYA

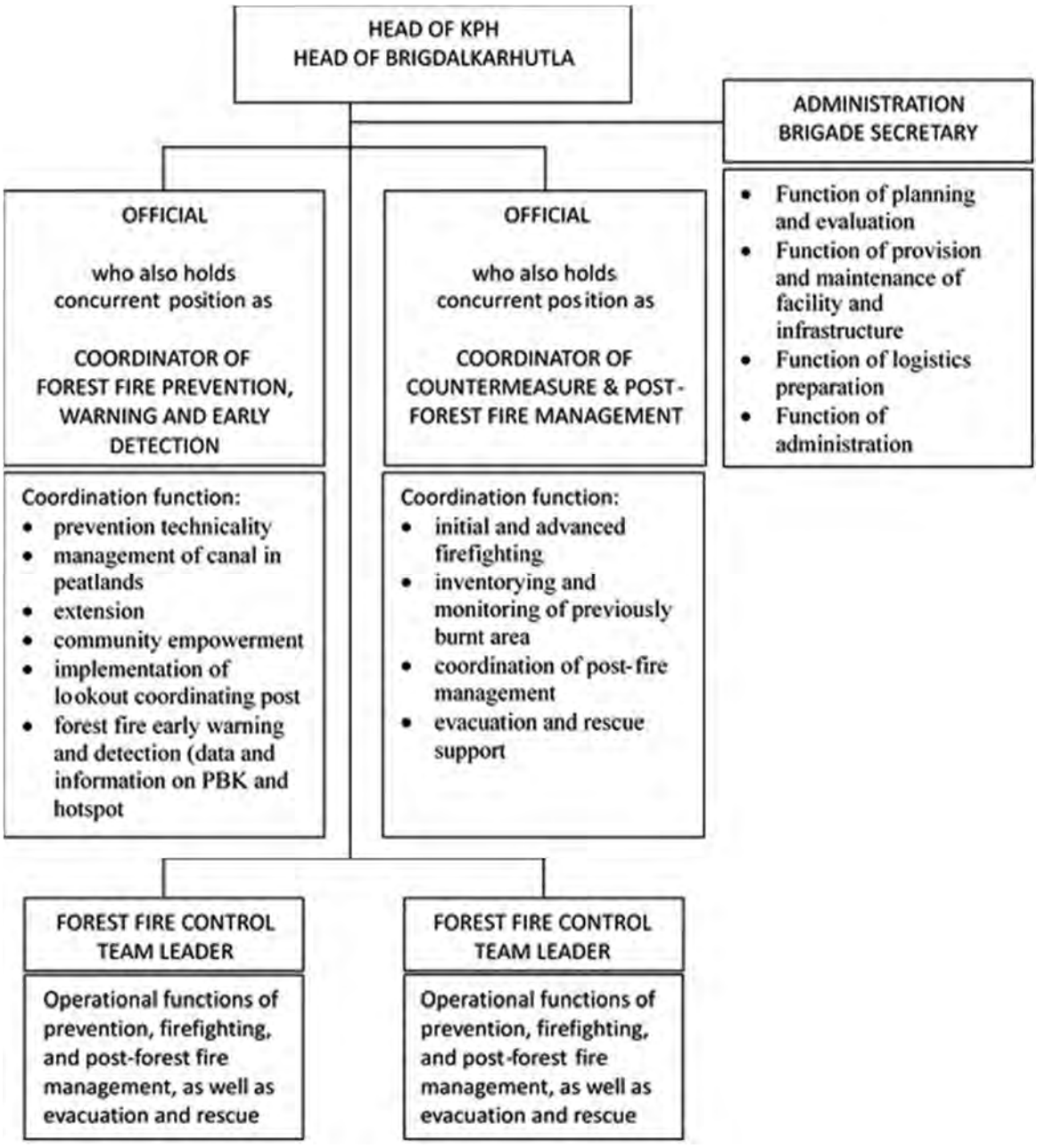
Promulgated in Jakarta
on the date of 18 April 2016
DIRECTOR GENERAL
OF LAWS AND REGULATIONS
MINISTRY OF LAW AND HUMAN RIGHTS
OF THE REPUBLIC OF INDONESIA

WIDODO EKATJAJANA

STATE GAZETTE OF THE REPUBLIC OF INDONESIA YEAR 2016 NO. 583
Certified as the true copy
HEAD OF LEGAL BUREAU
KRISNA RYA

SCHEDULE OF : REGULATION OF MINISTER OF ENVIRONMENT AND FORESTRY
NO. :
DATE :
ON : FOREST AND LAND FIRE CONTROL

STRUCTURE OF KPH FOREST FIRE CONTROL BRIGADE ORGANISATION



MINISTER OF ENVIRONMENT AND FORESTRY
OF THE REPUBLIC OF INDONESIA

SITI NURBAYA

Certified as the true copy
HEAD OF LEGAL BUREAU
KRISNA RYA

3. Draft PDM, PO

3.1 Proposed Draft PDM (Version Aug. 2016 before Detailed Planning Survey Team)

Draft Project Design Matrix (PDM)

Ver. Draft for discussion dated on 24 Aug.2016

- Project title: Forest and Peatland Fire Prevention Project (FPFP)
- Project period: Five years (2017- 2022)
- Executing Agency: Directorate of Forest and Land Control, DG of Climate Change Control, Ministry of Environment and Forestry (MoEF)
- Implementation Body: Directorate of Forest and Land Control, DG of Climate Change Control in cooperation with Directorate of Peat Damage Control, DG of Environmental Damage and Pollution Control, MoEF and the Provincial and District Government
- Target Area: First priority: 2 Forest Management Unit(KPH) and surround district(s), South Sumatra Province and 1 KPH and surrounding district(s) in Jambi Province in Sumatra; Second Priority [2019-]: more than 1 KPH and surrounding district(s), 1 Province in Sumatra and/or Kalimantan
- Target group: Stakeholders related with fire prone sites of the target areas

Narrative Summary	Verifiable indicators	Means of Verification	Important Assumption
Overall goal To support MoEF in achieving Performance Indicators of forest and land fire control in national	(Evaluation period is approximately 5 years after the Project ends) 1) Percentage of decrease of numbers of hotspots in non-conservation forests and land in Sumatra, Kalimantan and Sulawesi Islands is 10% and maximum numbers of hotspot decreases to 19,631 spots at 2019. 2) Percentage of decrease of burned area in non-conservation forests and land in Sumatra, Kalimantan and Sulawesi Islands is 10% and maximum numbers of hotspot decreases to 448,863 ha at 2019.	1) Data of LAPAN 2) Data of MoEF	
Project Purpose			

Narrative Summary	Verifiable indicators	Means of Verification	Important Assumption
To reduce numbers of hotspot and burned area in the targeted KPH/district(s)	1) Percentage of decrease of numbers of hotspots in non-conservation forests and land in the targeted district(s) is 10% and maximum numbers of hotspot decreases to *** spots at 2019. 2) Percentage of decrease of burned area in non-conservation forests and land in the targeted district(s) is 10% and maximum numbers of hotspot decreases to ***ha at 2019.	1) Data of LAPAN 2) Data of MoEF	There are no serious changes in governmental policy of forest and land fire control.
<u>Outputs</u> Output 1: Institutional arrangements for forest and land fire control is developed in the targeted area.	(<u>Outcome from activities</u>) 1) Institutional arrangement for forest and land fire control is developed from district up to village. 2) Infrastructure and equipment is prepared from district up to village.	1) Documents of local governments 2) Data of local governments	There are no serious changes in governmental policy of forest and land fire control.
Output 2: Community-based forest and land fire prevention is developed.	1) Numbers of villages that uses early warning system increase by 10% per year. 2) Numbers of fire users in land management decreases.	1) Results of socio-economic survey 2) Results of socio-economic survey	There are no serious changes in governmental policy of empowerment of community and villages.
Output 3: Community-based sustainable peatland management for community-based peatland fire prevention to the fire prone sites is developed in the targeted area.	1) The average water level at fire prone peatland increases in the target villages. 2) Numbers of peat water control sites (e.g. channel blocking) increases.	1) Data from peatland monitoring equipment 2) Report of PKHL, Branch offices of MoEF, Local government, private sector and village taskforce	There are no serious changes in governmental policy of peat land management.
Output 4: Policy on Community-based forest and land fire prevention is strengthened nationwide.	1) Implementation of national policy regarding to forest and land fire control to stakeholders increase by 10% per year	1) Result of survey and visit report	There are no serious changes in governmental diplomatic and administrative policy.
	Input	Input	Preconditions:

Narrative Summary	Verifiable indicators	Means of Verification	Important Assumption
	Japanese side: 1) Long Term Experts (Chief advisor/ **, ** (based in targeted province), Coordinator/ **) 2) Short Term Experts (when needed, ex. Real time peat monitoring, **,**) 3) Employment of Local (Indonesian) Consultants and administrative assistants 4) Training in Japan and/or the Third Country 5) Necessary machinery, equipment and materials delivered to project sites 6) Running expenses for the implementation of the Project activities	Indonesian side: 1) Counterpart personnel a) Project Director b) Project Manager(s) c) ** 2) Travel expenses and allowances of counterpart personnel 3) Suitable office space (in MoEF, targeted provinces and districts) 4) Available data and information related to the Project 5) Running expenses for the implementation of the Project under MoEF	Local government and local leaders' policy prioritize forest and land fire prevention as well as peatland restoration.
Activities	(Example results of activities)		
Output 1 (PKHL; Target Districts and KPH) 1) Organize/strengthen forest and peatland fire control Working Group (Pokja/ WG)/ task forces (Satgas) up to village level 2) Build basic work mechanism forest and land fire control in local level 3) Do mapping the resources for forest and land fire control, and identify fire prone sites, as well as design action plans in KPH/ district level 4) Support to basic equipment and infrastructure for forest and land fire control 5) Develop KPH's model of forest and land fire control	1) Decision letter on organizing Pokja/ Satgas 2) Governor decree on organization and work rule of forest and land fire brigade regarding targeted KPH 3) a) Data and information on resources for forest and land fire control b) Larger scale maps on forest and land fire prone site c) KPH's forest and land fire control action plan 4) Basic equipment and infrastructure for forest and land fire control	1) Data form local government/ Forest Office (Dishut) 2) Data from local government 3) Data from local government and others 4) Data from local government and others 5) Data from local government and others	

Narrative Summary	Verifiable indicators	Means of Verification	Important Assumption
	5) HR for competent KPH's forest and land fire control team		
Output 2 (PKHL; focus on fire prone villages surrounding target KPH) 1) Strengthen village autonomy in forest and land fire prevention through facilitation approach (e.g. TPD) 2) Develop environment-friendly and sustainable rural business model of agriculture (including Paludiculture)/ agroforestry/ silvo-fisheries/ silvo-pasture/ apiculture 3) Do publication and promotion of success community of Land Management without Burning/ PLTB as well as facilitate Peer Learning 4) Support to manage land waste/ combustible matters to enhance community economy (including eco-labeling with verification) 5) Enhance community-based early warning system in targeted KPH/district(s), by utilizing/ applying more accurate/ confident satellite-based (fire outbreak/ fire risk) early warning system in cooperation with LAPAN, BMKG and other relevant agencies, as well as other supporting application 6) Implement Integrated Patrol (Patroli Terpadu) with community	1) a) Decision by head of Dishut on TPD b) Village regulation and/or group/ local wisdom rules c) Forest and land fire prevention plan by village/ group 2) Community-based agriculture/ agroforestry/ silvo-fisheries/ silvo-pasture/ apiculture 3) Publication/promotion in printing/e-media and others 4) Organic waste processing business 5) Implementation of utilization of SIPONGI and other application 6) Patrol implementation	1) Data form village 2) Field visit and interviews 3) Project report 4) Results from socio-economic surveys 5) Field visit and interviews 6) Project report as well as Field visit and interviews	
Output 3 (PKG in cooperation with BRG; fire prone peatland around targeted KPH) 1) Strengthen and build capacity of community facilitators and community group for peatland management and restoration in	1) Decision of village peatland management facilitator, Decision of village peatland management & restoration community team	1) Project report 2) Field visit and interviews 3) Field visit and interviews 4) Project report	

Narrative Summary	Verifiable indicators	Means of Verification	Important Assumption
village level through the activities for Output 2 2) Facilitate to design and conduct peatland water management and restoration (e.g. channel blocking) in village level 3) Facilitate implementation of peatland monitoring and early warning (using telemetry [e.g. SESAME] too) by village and district/provincial government for peatland fire prevention 4) Facilitate for village community to prepare SOP for utilization of peatland monitoring/water management 5) Facilitate design and build, demonstration plot of alternative livelihood options for sustainable peatland management in village level as well as support peer leaning among community through the activities for Output 2	2) a) Document on Condition Analysis & Problem Identification with village sketching by village community (e.g. peatland, social) b) Village action plan for peatland water management and restoration c) Canal blocking and Report by village 3) Peatland monitoring equipment operated by village and district/provincial government 4) Decision by Head of KPH on Water level monitoring SOP 5) Demonstration plot developed and Report by village	5) Field visit and interviews as well as Results of socio-economic surveys	
Output 4 (PKHL-PKG and the relevant ministries/agencies; Whole country) 1) Study and conduct socialization of laws and regulation 2) Implement impact evaluation study 3) Implement coordination with stakeholders from central upto local level 4) Implement other public relations as well as technical guidance/ trainings on forest and land fire control and peatland restoration to the stakeholders 5) Support study on Fire Free Alternative Crop Industry Development (e.g. Sago)	1) a) Review on Government Regulation No. 45/2004 and No. 4/ 2001 b) Implementation of socialization of laws and regulations 2) Survey reports and Guide of Effective Good Practices 3) Coordination implementation in local, regional and national 4) Report of public relations, technical guidance/trainings 5) Report of Masterplan/ Feasibility	1) a) Academic papers on Government Regulations b) Report of socialization 2) Project report 3) Project report 4) Project report 5) Project report 6) Project report	

Narrative Summary	Verifiable indicators	Means of Verification	Important Assumption
6) Disseminate project findings and outcomes to relevant stakeholders at national as well as at international level.	Study on Fire Free Alternative Crop Industry Development 6) Dissemination material (e.g. scientific journal, symposium proceedings)		

3.2 Agreed Draft PDM (Version Oct. 2016 revised version Sep. 2016 after Detailed Planning Survey Team)

Project Design Matrix (PDM)

Ver.6 dated 17 October 2016

Project title: Project for Community Movement Program on Forest and Land Fire Prevention
Project period: Five years (2017- 2022)
Executing Agency: Directorate of Forest and Land Fire Management, DG of Climate Change, Ministry of Environment and Forestry (MoEF)
Implementing Agency: Directorate of Forest and Land Fire Management, DG of Climate Change in cooperation with Directorate of Peat Damage Control, DG of Pollution and Environmental Damage Control, MoEF and the Provincial and District Government
Collaborating Agency: Peatland Restoration Agency (BRG)
Target Area: Six districts in six provinces (One district each for Riau, West Kalimantan, Jambi, South Sumatra, Central Kalimantan and East Kalimantan provinces)
Target group: Stakeholders in relation to fire control in the target areas including communities, local governments (Districts, Sub-Districts, and Villages) and Forest Management Units (KPH)

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal: New model district(s), where hotspots and burnt area are decreased, is established in the target and/or other provinces.	1. The decreasing trend of hotspots is observed at the target provinces over the period of 2022-2027. 2. The decreasing trend of burnt areas is observed at the target provinces over the period of 2022-2027.	1. Data of LAPAN 2. Data of MoEF	
Project Purpose: One model district, where hotspots and burnt area are decreased, is established in each of the target provinces.	1. The decreasing trend of hotspots is observed at the target districts over the period of 2017-2022. (The baseline should be in line with Key Performance Indicator of PKHL for the year 2012)	1. Data of LAPAN 2. Data of MoEF 3. Reports of the	[El Nino events at their extreme level do not occur.] The government makes financial

	2. The decreasing trend of burnt areas is observed at the target districts over the period of 2017-2022. 3. Institutional arrangement for forest and land fire control is operationalized (i.e. activities are conducted by Pokja/ Satgas/ KPH) in the target districts. 4. Community-based forest and land fire prevention model is adopted (i.e. prevention actions are taken by the villages) at the district level. 5. Community-based sustainable peatland management model is developed at fire prone villages. 6. Policies and experiences on Community-based forest and land fire prevention are shared at the national level.	concerned offices 4. Interviews at concerned offices 5. Report of the model 6. Reports of sharing events	commitment for the scaling up of the "haze free district". The government executes the rewetting program under the Presidential Decree No.1 Year 2016 [so that the water table is maintained at the 40cm level].
Output 1: Institutional arrangement for forest and land fire control is operationalized in the six target districts.	1-1 Regular reports on fire control are produced by all the district working groups and KPHs and by more than [##%] of sub-district and village working groups. (Content of the reports should also include fire-prone area map and status of institutional development.) 1-2 Regular maintenance of fire control equipment is made by the target villages and KPHs.	Documents of local governments and KPHs Record of or interview at the target village and KPHs	
Output 2:	2-1 The number of fire users in land	Results of socio-	

Community-based forest and land fire prevention model is adopted at the district level.	management is decreased by less than half at more than [##%] of the target villages. (The data collection survey is to be done through the sampling method.) 2-2 Early warning system is used at more than [##%] of the target villages. 2-3 Reports on rural business models are produced.	economic survey Reports on rural business models.	
Output 3: Community-based sustainable peatland management model is developed at fire prone villages.	3-1 The water table at fire prone peatlands is less than 40cm during the dry season at all the pilot villages. 3-2 Peatland monitoring reports are produced by the pilot villages and district governments. 3-3 Reports on alternative livelihood are produced. 3-4 Collaborative water management is operationalized between concession holders and communities.	Data from peatland monitoring equipment Monitoring reports by villages and district governments Reports on alternative livelihood Interview to concession holders and community leaders	
Output 4: Policies and experiences on Community-based forest and land fire prevention are shared at the national level.	4-1 National policies on fire control and peatland management are shared with local stakeholders. 4-2 Project findings are shared with concerned stakeholders.	Project reports	

Activities	Inputs		
	Japanese side	Indonesian side	
For Output 1 (PKHL; Target Districts and KPH) 1.1 Organize/strengthen forest and peatland fire control working groups (Pokja/Satgas) at the district, sub-district and village levels. 1.2 Facilitate the development of a basic working mechanism on forest and land fire control at the target KPH. 1.3 Support a planning process of district working groups and KPH including mapping of fire prone sites and action planning. 1.4 Provide basic equipment on forest and land fire control for the target villages. 1.5 Provide trainings on forest and land fire control for the target KPH and other stakeholders. For Output 2 (PKHL; focus on fire prone villages surrounding the target KPH) 2.1 Strengthen the village capacity in forest and land fire prevention through the facilitation approach (e.g. TPD) 2.2 Strengthen community-based early warning system by using SIPONGI and other satellite-based applications. 2.3 Implement Integrated Patrol (Patroli Terpadu) with communities. 2.4 Identify pilot communities for the development and implementation of rural business models such as agroforestry, silvo-fishery, processing of organic waste (from land clearing) and others. 2.5 Support the empowerment of the pilot communities for developing and implementing the rural business models. 2.6 Facilitate peer learning on PLTB (land management without burning) and the rural business models. For Output 3 (PKG in cooperation with BRG; fire prone peatland around targeted KPH) 3.1 Identify one pilot village for each target district.	・ Long Term Experts (ex. Chief advisor/ Community-based Fire Prevention and Coordinator/ Local Administration) ・ Short Term Experts (when needed, ex. Real time peat monitoring, etc.) ・ Employment of Local (Indonesian) Consultants and administrative assistants ・ Training in Japan and/or the Third Country ・ Necessary machinery, equipment and materials delivered to project sites ・ Running expenses for the implementation of the Project activities	・ Counterpart personnel a) Project Director b) Project Manager ・ Travel expenses and allowances of counterpart personnel ・ Suitable office space (in MoEF, targeted provinces and districts) ・ Available data and information related to the Project ・ Running expenses for the implementation of the Project under MoEF	

3.2 Strengthen village capacity for peatland management and restoration (the same process as Activity 1) of Output 2). 3.3 Facilitate the planning and implementation of peatland water management and restoration (e.g. canal blocking) at the pilot villages. 3.4 Facilitate the planning and experimentation of alternative livelihood options for sustainable peatland management at the pilot villages. 3.5 Facilitate peer learning on alternative livelihood experimentations (the same process as Activity 6) of Output 2). 3.6 Support the development and implementation of a partnership program between concession holders and communities including water management and livelihood activities. 3.7 Facilitate the implementation of peatland monitoring and early warning at the pilot villages and at district/provincial governments for peatland fire prevention. 3.8 Facilitate the SOP preparation at the pilot villages for peatland ecosystem protection and management. Output 4 (PKHL-PKG and the relevant ministries/agencies) 4.1 Review and disseminate national policies on forest and land fire control and peatland management. 4.2 Conduct an impact evaluation study of project activities. 4.3 Coordinate with concerned stakeholders including governments, private sectors, NGOs and donors on fire control and peatland management affairs. 4.4 Support study on Fire Free Alternative Crop Industry Development (e.g. Sago). 4.5 Organize events and trainings to disseminate project findings and outcomes to relevant stakeholders at the local, national and international levels.			

3.3 Draft PO (Version Sep. 2016 after Detailed Planning Survey Team)

Appendix I. Annex 2. TENTATIVE PLAN OF OPERATION (PO) with tentative translation *(Lampiran IX, Rencana Pelaksanaan (versi terjemahan tentatif)*

Draft-0 (Sep 2016)

	Main responsibility (Implementor) *Penanggungjawab (Pelaksana)*	Activities *(Kegiatan)*	Project Period *(Periode Proyek)*
			1st year *(tahun ke-1)*: 1 2 3 4 5 6 7 8 9 10 11 12 (2017 / 2018)
		If Project starts by Chief Advisor assigned from Apr. 2017	4 5 6 7 8 9 10 11 12 1 2 3
	JCC *(Komisi Koordinasi Gabungan)* & Provincial Technical Committee *(Komisi Teknis Propinsi)*.		JCC PTC PTC PTC
	Joint Monitoring Sheet *(Lembaran Monitoring Bersama)* : M		M M
	Training in Japan/ Third Countries *(Pelatihan Jepang/ Negara Lain)*		
		Leader level (e.g. prov/district governor, prov./district councilers/leaders of political parties): L	L
		Technical level (e.g. taskforce): T	T
	Jambi and S. Sumatra Prov. *(Provinsi Jambi dan Sumsel)*		
	Riau, W. Kalimantan, C. Kalimantan and E. Kalimantan *(Provinsi Kalbar, Kalteng dan Kaltim)*		
	Output 1.Institutional arrangement for forest and land fire control is operationalized in the Six target districts. ***(Dioperasikannya kelembagaan dalkarhutla di 6 kabupaten sasaran.)***		
1-1	PKHL-Prov.-Kab.	Organize/strengthen forest and peatland fire control working groups (Pokja/Satgas) at the district, sub-district and village levels. *(Membentuk/ menguatkan Pokja/ Satgas Pengendalian Kebakaran Hutan dan Lahan Gambut di tingkat kabupaten, kecamatan dan desa).*	Audience; MOU; SK
1-2	Kab.(District Taskforce)-KPH	Facilitate the development of a basic working mechanism on forest and land fire control at the target KPH. *(Memfasilitasi pengembangan mekanisme kerja dalkarhutla di KPH sasaran.)* .	Pergub
1-3	Kab.(District Taskforce)-KPH	Support a planning process of district working groups and KPH including mapping of fire prone sites and action planning. *(Mendukung proses pokja kabupaten dan KPH termasuk pemetaan lokasi rawan kebakaran dan merancang rencana aksi)* .	Mapping & identification; Action planning
1-4	PKHL-Prov.	Provide basic equipment on forest and land fire control for the target villages. *(Memberi peralatan dasar untuk darkarhulta di tingkat desaa)* .	
1-5	PKHL-Prov.	Provide trainings on forest and land fire control for the target KPH.*(Memberi pelatihan darkarhutla kepada KPH sasaran)* .	
	Output 2. Community-based forest and land fire prevention model is adopted at the district level. *(Diterapkannya pencegahan kebakaran hutan dan lahan berbasis masyarakat di tingkat kabupaten)*		
2-1	PKHL-Prov.-Kab.-KPH	Strengthen the village capacity in forest and land fire prevention through the facilitation approach (e.g. TPD) *(Menguatkan kapasitas desa dalam pencegahan karhutla melalui pendekatan pendampingan (misal Tim Pendamping Desa/TPD)* .	(WK); (Target prov.); (1st villages); (Target prov.); (1st villages/Subdistrict); Team building training *(Pembekalan)*; Village activities *(Aktifitas desa)*; (Jambi/S.Sumatra); (1st villages/Subdistrict)
2-2	PKHL-Prov.-KPH	Strengthen community-based early warning system by using SIPONGI and other satellite-based applications .(Menguatkan sistim peringatan dini berbasis masyarakat *melalui mengunakan SOPONGI dan aplikasi berbasis satelite lain)* .	*LAPAN-JAXA Cooperation for New Satellite Utilzation Development (planned from Nov. 2016 during 2 years)*
2-3	KPH-Village	Implement Integrated Patrol (Patroli Terpadu) with communities *(Melaksanakan Patroli Terpadu bersama masyarakat)*	
2-4	Prov.-KPH	Identify pilot communities for the development and implementation of rural business models such as agroforestry, silvo-fishery, processing of organic waste (from land clearing) and others. (Mengidentifikasi masyarakat pilot untuk mengembangkan dan melaksanakan model usaha pedesaan misal agroforestry, silvofishery, pengolahan limbah organik (dari pembukaan lahan) dan lain.	
2-5	Prov.-KPH	Support the empowerment of the pilot communities for developing and implementing the rural business models. (Mendukung untuk memperdaykan masyakarat pilot untuk mengembangkan dan melaksanakan model usaha pedesaan).	
2-6	Prov.-Kab.(District Taskforce)	Facilitate peer learning on PLTB (land management without burning) and the rural business models. *(Menfasilitasi peer leaning tentang PLTB (pengelolaan lahan tanpa bakar) dan model usaha pedesaan)*	Video producing & dissemination (e.g. TV & Social media) *(Pembuatan video & diseminasi (misal. TV & medial sosial)*; Peer learning; Registraion of fire-free innovator community/ business *(Registrasi pengusaha/masyarakat inovator bebas api)*

Output 3. Community-based sustainable peatland management model is developed at fire prone villages. *(Dikembangkannya kelola gambut lestari berbasis masayarakat di desa rawan kebakaran.)* .			
3-1	PKG-Prov.-Kab.	Identify one pilot village for each target district. *(Mengidentifikasi satu desa pilot tiap kabupaten).*	
3-2	PKG/BRG-Prov.(Prov. Taskforce)-Village	Strengthen village capacity for peatland management and restoration (the same process as Activity 1) of Output 2). (Menguatkan kapasitas desa untuk kelola dan restorasi gambut (proses ssama dengan Kegiatan 1) di Keluaran 2).	(WK) (Target prov.) (Target prov.) (1st villages) (Target prov.) (Target prov.) (Target prov.) (Target prov.) (1st villages/Subdistrict) (1st villages/Subdistrict) (1st villages/Subdistrict) (1st villages/Subdistrict) Team building training *(Pembekalan)* Village activities *(Aktifitas desa)* (Jambi/S.Sumatra)
3-3	Village	Facilitate the planning and implementation of peatland water management and restoration (e.g. canal blocking) at the pilot villages. *(Menfasilitasi kelola tata air dan restorasi gambut [misal sekat kanal] di desa pilot .*	
3-4	Village	Facilitate the planning and experimentation of alternative livelihood options for sustainable peatland management at the pilot villages. *(Menfasilitasi merancang dan uji coba opsi mata pencaharian alternatif guna kelola gambut lestari di desa pilot)*	
3-5	Prov.-Kab.(District Taskforce)	Facilitate peer learning on alternative livelihood experimentations (the same process as Activity 6) of Output 2). (Menfasilitasi peer learning tentang uji coba mata pencaharian alternatif(proses sama dengan Kegiatan 6) di Keluaran 2)	Video producing & dissemination (e.g. TV & Social media) *(Pembuatan video & diseminasi (misal. TV & medial sosial)* Peer learning Registraion of fire-free innovator community/ business *(Registrasi pengusaha/masyarakat inovator bebas api)*
3-6	Kab.(District Taskforce)-KPH	Support the development and implementation of a partnership program between concession holders and communities including water management and livelihood activities. *(Mendukung pengembangan dan pelaksanaan kemitraan antara pemegang konsesi dan masyarakat termasuk kelola tata air dan kegiatan mata pencahariaan)* .	
3-7	Village	Facilitate the implementation of peatland monitoring and early warning at the pilot villages and at district/provincial governments for peatland fire prevention. *(Menfasilitasi pelaksanaan monitoring dan peringkatan dini gambut di desa pilot dan pemda kab./prov. guna pencegahan karhutla)* .	
3-8	Village	Facilitate the SOP preparation at the pilot villages for peatland monitoring/water management.*(Menfailitasi penyusunan SOP monitoring/kelola tata air)* .	
Output 4. Policies and experiences on Community-based forest and land fire prevention are shared at the national level. *(Diberbaginya kebijakan dan pengalaman tentang pencegahan karhutla berbasis masyarakat di tingkat nasional)* .			
4-1	PKHL-PKG/BRG	Review and disseminate national policies on forest and land fire control and peatland management. *(Mereviw dan mendiseminasi kebijakan nasional tentang darkarhutla dan kelola gambut)* .	
4-2	PKHL-PKG/BRG (Joint Univ./research instituion in Indonesia- Japan- Intertnational [e.g. CIFOR])	2) Conduct an impact evaluation study of project activities. *(Melaksanakan studi evaluasi dampak tentang kegiatan proyek)*	Baseline Monitoring/ Interim Guide of Effective Good Practices of (Community-based) Forest and Land Fire Prevention and Peatland Restoration that is proposed/submitted to international forum (e.g. WG of ASEAN etc.) Evaluation/ Final
4-3	PKHL-PKG/BRG	Coordinate with concerned stakeholders including governments, private sectors, NGOs and donors on fire control and peatland management affairs. *(Melakusanakan koordinasi dengan para pihak termasuk pemerintah, sektor swasta, LSM, donor dalam hal darkarhutla dan kelola gambut)* .	
4-4	PKHL-PKG/BRG (Joint Univ./research instituion in Indonesia- Japan- Intertnational [e.g. CIFOR])	Support study on Fire Free Alternative Crop Industry Development (e.g. Sago). *(Mendukung studi Pengembangan Industri Komoditas Alternatif Bebas Api [misal Sago])* .	Strategic planning F/S
4-5	PKHL-PKG/BRG	Disseminate project findings and outcomes to relevant stakeholders at the local, national and international levels. *(Mendiseminasikan temuan dan dampak proyek kepada para pihak terkait di tingkat lokal, nasional dan internasional)* .	

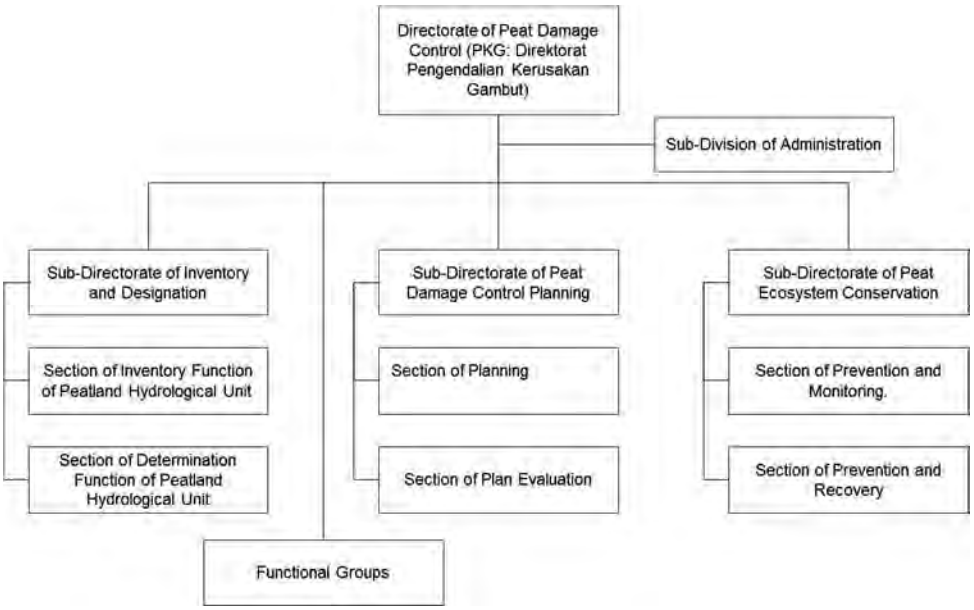
: Preparation/ Continued (repeating) activties

: Main implementation of concentrated acitvities

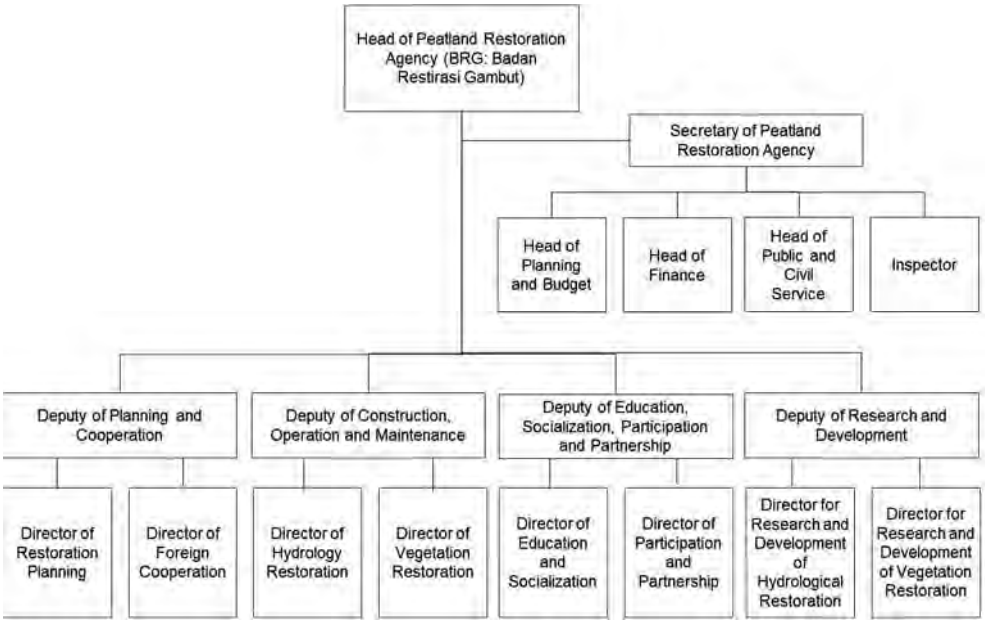
4. Organization Structures of Relevant Organization

4.1 KLHK / Ministory of Environment and Forestry

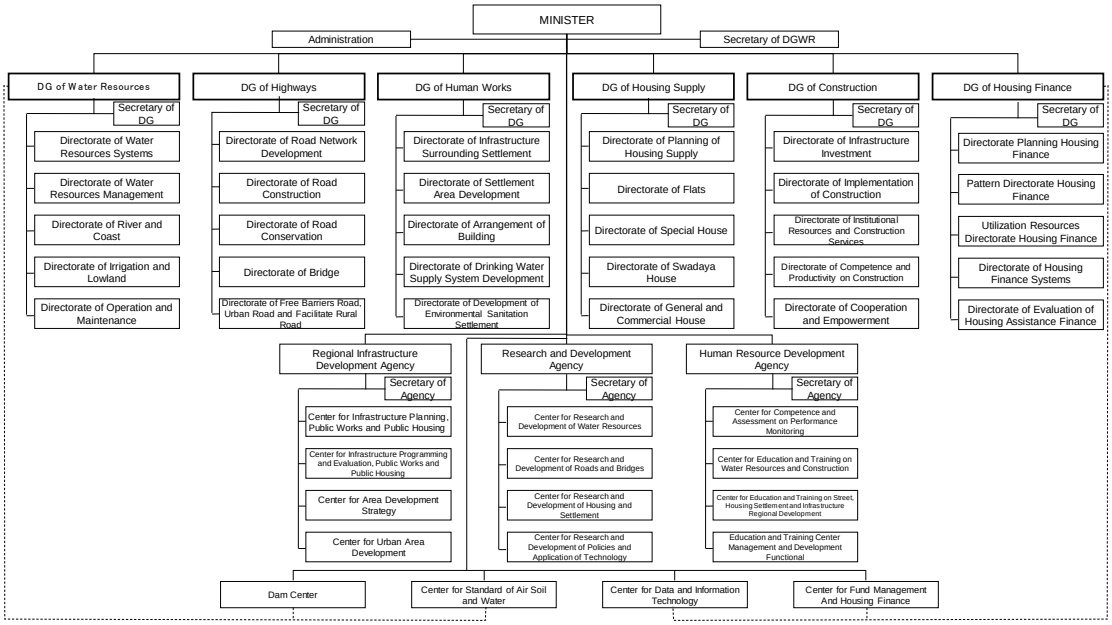
4.1.1. Directorate of Peat Damage Control



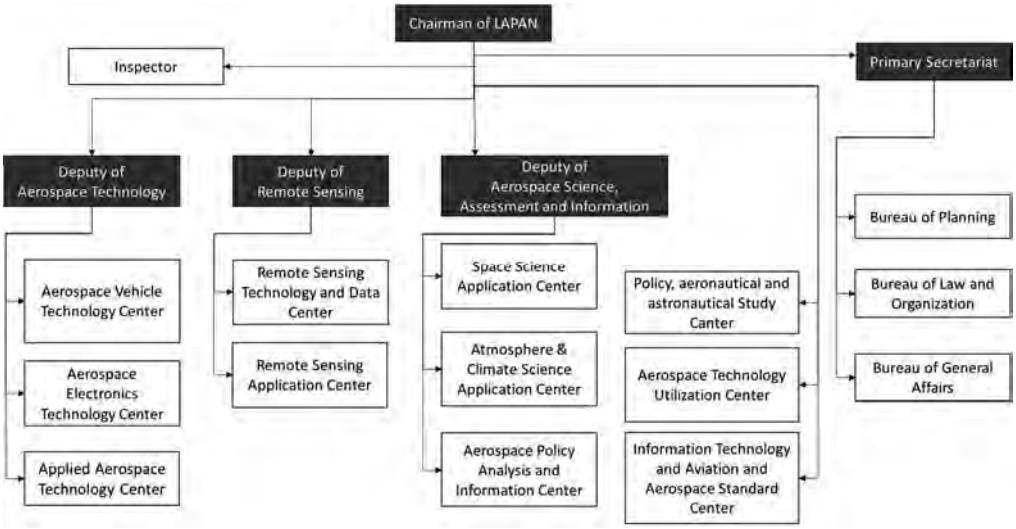
4.2 BRG/Peat Restoration Agency



4.3 PU-PR/Ministry of Public Works and People's Housing

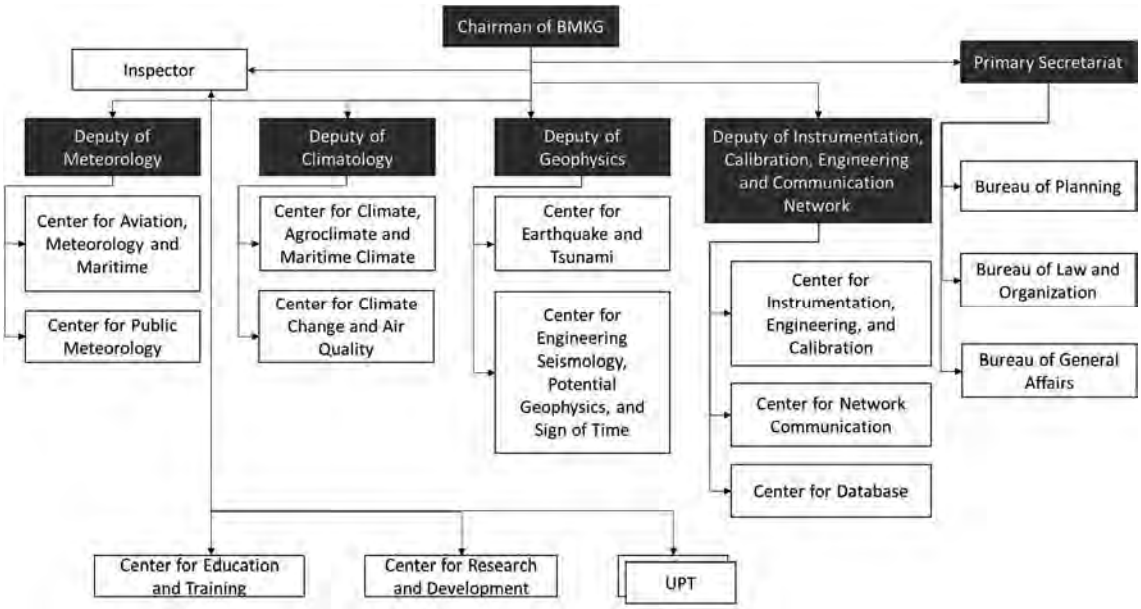


4.4 LAPAN/ National Institute of Aeronautics and Space



(Source: Website of LAPAN, http://www.lapan.go.id/)
It is translated into English from Indonesian

4.5 BMKG/ Meteorological, Climatological, and Geophysical Agency



(Source: Website of BMKG, http://www.bmkg.go.id/BMKG_Pusat/)
*It is translated into English from Indonesian

5. Estimated Breakdown of Target Peatland Restoration

5.1 Target areas of peatland restoration for BRG (as of the end of August 2016)

Restoration Priority	Area (ha)	Protected Area	Cultivated Area	Peat water body
Restoration Priority Post-Burn Incident in 2015	875,701	226,335	650,921	345
Restoration Priority of Peat Dome with Canals (Protected Areas)	2,791,070	201,457	2,604,216	12
Restoration Priority of Intact Peat Dome without Canals (Protected Areas)	6,174,492	2,175,048	3,985,515	16,111
Restoration Priority of Shallow Peat (non-dome) with Canals (Cultivation Area)	3,091,226	264,592	2,813,926	22,046
Total (ha)	12,932,489	2,867,432	10,054,578	38,514

Restoration Priority		Protected Area			Cultivated Area			Peat Water Body		
	Area (ha)	Forest	Crop	Open	Forest	Crop	Open	Forest	Crop	Open
Restoration Priority Post-Burn Incident in 2015	875,701	0	118,911	107,424	0	315,330	335,591	0	70	275
Restoration Priority of Peat Dome with Canals (Protected Areas)	2,791,070	26,966	128,199	46,293	129,846	2,142,530	331,840	0	0	12
Restoration Priority of Intact Peat Dome without Canals (Protected Areas)	6,174,492	1,993,110	141,428	40,510	2,990,498	752,215	242,802	1,892	81	14,137
Restoration Priority of Shallow Peat (non-dome) with Canals (Cultivation Area)	3,091,226	11,686	169,966	82,939	167,190	2,330,997	315,739	47	487	21,512
Total (ha)	12,932,489	2,031,762	558,504	277,166	3,287,534	5,541,072	1,225,972	1,939	639	35,936
		2,867,432			10,054,578			38,514		

Land Cover Category
Forest include primary mangrove forest , lowland forest , highlands forest , mangrove forest / mangrove , swamp forest and primary swamp forests
Crops include Mixed Dryland Agriculture, Dryland Agriculture , Unproductive Dryland , Industrial Plant Forest, shrubs, reeds, Plantation, Grass, Paddy
Open areas include lake/ river, settlements, swamps, open land, mining

Restoration Priority	Protected Area						Cultivated Area						Peat Water Body					
	Licensed			Not Licensed			Licensed			Not Licensed			Licensed			Not Licensed		
	Forest	Crop	Open	Forest	Crop	Open	Forest	Crop	Open	Forest	Crop	Open	Forest	Crop	Open	Forest	Crop	Open
Restoration Priority Post-Burn Incident in 2015	0	85	368	0	118,826	107,056	0	72,496	181,480	0	242,834	154,111	0	0	0	0	70	275
Restoration Priority of Peat Dome with Canals (Protected Areas)	1,910	3,774	34	25,056	124,425	46,259	65,327	876,183	215,458	64,519	1,266,347	116,382	0	0	0	0	0	12
Restoration Priority of Intact Peat Dome without Canals (Protected Areas)	13,046	2,583	28	1,980,064	138,845	40,482	852,532	169,309	56,702	2,137,966	582,906	186,100	906	1	1,231	806	93	12,906
Restoration Priority of Shallow Peat (non-dome) with Canals (Cultivation Area)	212	926	161	11,474	169,040	82,778	78,609	556,029	114,657	88,581	1,774,969	201,082	11	1	571	3	486	20,940
Total (ha)	15,168	7,369	591	2,016,595	551,135	276,574	996,469	1,674,016	568,296	2,291,066	3,867,055	657,676	1,040	2	1,903	900	637	34,034
	23,128			2,844,304			3,238,781			6,815,797			2,944			35,570		
	2,867,432						10,054,578						38,514					

Restoration Priority	Protected Area								
	HPH			HTI			HGU		
	Forest	Crop	Open	Forest	Crop	Open	Forest	Crop	Open
Restoration Priority Post-Burn Incident in 2015	0	6	0	0	79	368	0	0	0
Restoration Priority of Peat Dome with Canals (Protected Areas)	7	0	0	1,902	121	34	0	3,653	0
Restoration Priority of Intact Peat Dome without Canals (Protected Areas)	2,672	6	0	10,374	2,578	28	0	0	0
Restoration Priority of Shallow Peat (non-dome) with Canals (Cultivation Area)	1	136	5	210	790	151	2	0	6
Total (ha)	2,680	148	5	12,486	3,567	580	2	3,653	6
	2,833			16,634			3,661		
	23,128								

Restoration Priority	Cultivated Area									Peat Water Body								
	HPH			HTI			HGU			HPH			HTI			HGU		
	Forest	Crop	Open	Forest	Crop	Open	Forest	Crop	Open	Forest	Crop	Open	Forest	Crop	Open	Forest	Crop	Open
Restoration Priority Post-Burn Incident in 2015	0	7,739	7,596	0	51,440	164,154	0	13,317	9,730	0	0	0	0	0	0	0	0	0
Restoration Priority of Peat Dome with Canals (Protected Areas)	6,549	14,106	305	57,005	559,169	204,365	1,773	302,907	10,787	0	0	0	0	0	0	0	0	0
Restoration Priority of Intact Peat Dome without Canals (Protected Areas)	399,845	44,403	20,108	439,547	118,904	35,317	13,140	6,002	1,278	971	1	1,169	26	0	162	0	0	0
Restoration Priority of Shallow Peat (non-dome) with Canals (Cultivation Area)	14,714	41,938	13,402	60,353	352,423	90,155	3,541	161,668	11,100	0	0	242	44	1	243	0	0	57
Total (ha)	421,109	108,186	41,411	556,905	1,081,936	493,991	18,455	483,894	32,894	971	1	1,441	69	1	405	0	0	57
	570,706			2,132,832			535,243			2,412			475			57		
	2,703,538												2,887					

Restoration Target 1

Restoration Target:	2,103,327 (a.+b.+c.)

Protected Areas

Restoration Priority	Licensed Areas (overlapped)		
	HPH	HTI	HGU
Restoration Priority Post-Burn Incident in 2015	6	447	0
Restoration Priority of Peat Dome with Canals (Protected Areas)	7	2,057	3,653
Restoration Priority of Shallow Peat (non-dome) with Canals (Cultivation Area)	141	1,151	8
Total (ha)	155	3,654	3,661
a.	7,471		

Encroachment
225,881
195,740
263,292
b. 684,913

Cultivated Areas

Restoration Priority	Cultivated Area		
	Licensed Areas		
	HPH	HTI	HGU
Restoration Priority Post-Burn Incident in 2015	15,335	215,594	23,047
Restoration Priority of Peat Dome with Canals (Protected Areas)	20,961	820,540	315,467
Total (ha)	36,296	1,036,134	338,514
c.	1,410,943		

Restoration Target 2

Support Activity of restoration	4,752,795

Restoration Priority	Protected Area			Cultivated Area with no canal			Peat Water Body			Cultivated
	HPH	HTI	HGU	HPH	HTI	HGU	HPH	HTI	HGU	Un-lisenced
Restoration Priority of Intact Peat Dome without Canals (Protected Areas)	2,678	12,979	0	464,356	593,767	20,420	2,140	188	0	2,906,972
Total (ha)	15,657			1,078,543			2,328			2,906,972
	4,003,500									

Restoration Priority	Cultivated Area		
	Lisenced		
	HPH	HTI	HGU
Restoration Priority of Shallow Peat (non-dome) with Canals (Cultivation	70,054	502,931	176,309
Total (ha)	749,294		

Restoration Target 3

De-concentration (Local Government)	3,908,825

Restoration Priority	Cultivated Area			Remarks
	Non-Lisenced			
	Hutan	Tanaman	Terbuka	
Restoration Priority Post-Burn Incident in 2015	0	242,834	154,111	
Restoration Priority of Peat Dome with Canals (Protected Areas)	64,519	1,266,347	116,382	convert to Protected Area after restoration
Restoration Priority of Shallow Peat (non-dome) with Canals (Cultivation	88,581	1,774,969	201,082	Cultivation Area
Total (ha)	153,100	3,284,150	471,576	
	3,908,825			

5.2 Target areas of peatland restoration for PKG (as of September 2016)

Regarding the selection of target areas for new cooperation with PKG on peatland restoration, including monitoring system, the following criterion are discussed among the persons concerned in PKG and BRG, together with the JICA expert, and tentatively used to select the target aeras.

Table 1 Temporal criteria to select the target areas for peatland restoration under the Possible future cooperation for peatland restoration

Criteria	Contents
Criteria 1	Peat Dome
Criteria 2	APL areas
Criteria 3	Burnt areas in 2015
Criteria 4	Non-concession areas
Criteria 5	Larger than 50 ha
Criteria 6	Community facilitator

Source: JICA Survey team (2016) based on the discussions with PKG and BRG

Now, as PKG is conducting the trainings on community facilitators to the concerned provinces, it is difficult to use this criteria (criteria 6) at this moment to select out the villages. By using the above-mentioned criterion, excluding Criteria 6, the target areas and target numbers of villages are estimated as the following table.

Table 2 Tentative areas and numbers of vilalges, estimated based on the criteria under the Possible future cooperation for peatland restoration

Criteria 1	Peat Dome					
Criteria 2	APL areas					
Criteria 3:	Burnt areas in 2015					
Criteria 4:	Non-concession areas					
	Total Area	No. Of Kabupaten	No. Of Village	Criteria 5: Larger than 50 ha		
				Area	No. Kab	No. Village
Jambi	3,822	5	34	3,695	5	17
South Sumatra	31,287	5	76	30,854	5	55
Riau	0	0	0	0	0	0
Total Sumatra	35,109	10	110	34,549	10	72
West Kalimantan	6,451	5	37	6,193	4	22
Central Kalimantan	143	2	2	113	1	1
South Kalimantan	6,475	6	29	6,319	5	14
East kalimantan	1,051	4	5	983	2	3
North kalimantan	0	0	0	0	0	0
Total Kalimantan	14,121	17	73	13,608	12	40
Total	49,230	27	183	48,157	22	112

Source: JICA Survey team (2016) based on the database of peatland of PKG

6. Case study of telemetory technology for peatland restoration

1. Objective

Directorate of Peat Damage Control (PKG) has responsibilities to manage the ground water level on the peatland in Indonesia, according to the Government Regulation No. 71/2014 regarding Protection and Management of the Peat Ecosystems (PP71/2014) and the being-drafted Ministerial Decree on Water Management for Peat ecosystem. For the concession areas, the concession holders need to install the measurement equipment by their own responsibilities, whilst, for the community areas, PKG need to support to the communities to install the measurement equipment and measure the field data, in collaboration with the local governments.

In order for effective and efficient data collection on the field data on the peatland, the telemetry system to transmit the field data automatically is suitable for the data collection.

2. Necessary data in the field and image of data collection and data transmission, through mobile digital telecommunication network

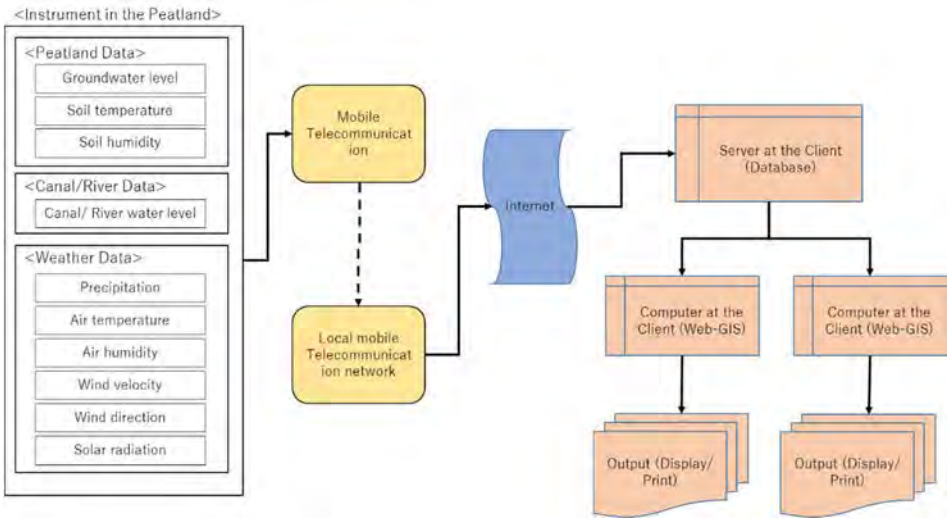
Based on the above-mentioned government regulations, those kinds of data should be collected from the community areas and concession areas.

Table 1: Necessary data to be collected from the peatland

Category	Data	Remarks
Peatland data	Ground water level	
	Soil temperature	
	Soil humidity	
Canal/ River data	Canal/ River water level	
Weather data	Precipitation	
	Air temperature	
	Air humidity	Recommended
	Wind velocity	Recommended
	Wind direction	Recommended
	Solar radiation	Recommended

Source: PKG (2016)

The image of data collection and data transmission is show in the following figure.



Source: JICA Survey Team and PKG (2016)

Figure 1: Image of data collection and data transmission, through mobile digital telecommunication network

3. Recommended systems on data collection and data transmission
At this moment, the following two (2) companies are listed as the prospective suppliers of the telemetry data collection system.

Table 2: List of suppliers/ manufacturers of telemetry system in Indonesia

No.	Manufacturer/ Supplier	System Name	Accomplishment in Indonesia
1	Midori Engineering Laboratory Co., Ltd.,	SESAME	More than 20 sets of SESAME have been installed in Indonesia. Also about 40 sets are installed to Citarung river watershed in West Java in 2016.
2	Sartika Mitrasejati	Dam Center Monitoring Application (Aplikasi Monitoring Balai Bendungan)	One (1) unit as a server and nine (9) unit as client at the dam water management center

Source: JICA Survey team (2016)

(1) SESAME system
SESAME systems have been developed by Midori Engineering Laboratory CO., Ltd., and a part of development of this system was performed as activity of the project "Wild fire and carbon management in peat/forest in Indonesia" of JST-JICA joint program "Science and Technology Research Partnership for Sustainable Development, SATREPS during 2008 and 2014.
As of August 2016, the following systems have been installed in Indonesia and in Japan.

Table 3: List of SESAME installed and being operated

Item	Content	Location	Remarks
Installed by SATREPS			
Groundwater level in peatlands			
	Daily Groundwater level in open area	Taruna, Central Kalimantan	First SESAME, in operation. New system (version 3) has been installed in Mar 2016 at the same location.
	Daily Groundwater level in young forest	Taruna, Central Kalimantan	In operation
	Daily Groundwater level in Forest	Sebangau, Central Kalimantan	Stolen, quit to operate.
	Daily Groundwater level in Forest	Sebangau, Central Kalimantan	Removed
	Daily Groundwater level at Camp	Sebangau, Central Kalimantan	In operation.
Groundwater level in Oil Palm Plantations			
	Daily Groundwater level in Oil Palm	Kapuas, Central Kalimantan	removed
	Daily Groundwater level in Oil Palm	Pontianak, West Kalimantan	Now in repairmen
Water level of rivers and dam lakes in catchments			
	Hourly River water level	Palangka Raya, Water company	In operation
	Hourly River water level	Tumbang Miri, Central Kalimantan	Stolen, quit to operate.
	Hourly Lake water level	Jatiluhur Dam	In operation
Soil moisture			
	Daily Soil moisture in	Banjarubaru, South	Plan to repair

	farmland	Kalimantan	
	Daily moisture	Jember East Jawa	Paused to measure
Carbon sink			
	Daily Tree growth test run	Japan	In operation
Ground surface level			
	Daily change of Ground surface level		In operation
Peatland management in Sebangau Catchment by IJ-REDD+			
	Daily Groundwater level in Forest	Tumban Nusa (in the Litbang of BFRI)	In operation
	Daily Groundwater level in Forest	Sebangau National Park	In operation
	Peat fire and flood warning systems	Installed by BPPT and Midori through JICA scheme on Verification Survey with the Private Sector for Disseminating Japanese Technologies	
	Total Weather	Serpong, Jakarta	In operation
	Water level in peatland	Riau	In operation
	Water level in peatland	Jambi	In operation
	Water level in peatland	West Kalimantan	In operation
	Water level in peatland	Central Kalimantan	In operation
	Water level in paddy rice field	Central Java	In operation
	Water level at Katulampa Weir	Katulampa Weir	In operation

Source: Midori Engineering Laboratory Co., Ltd., (2016)

The collected filed data can be checked at the website "Telemetric real-time data transfer system, SEAME for Management of Water, Carbon and Bio-production in Indonesia" now (http://space.geocities.jp/hkdkalimantan/fire2015/fire2015home.html).

(2) Dam Center Monitoring Application (Aplikasi Monitoring Balai Bendungan)
This system has been developed by Sartika Mitrasejati, one of the suppliers in Indonesia. As of August 2016, this system has been installed and utilized in Indonesia as following table.

Table 4: List of Aplikasi Monitoring Balai Bendungan installed

No.	Location	Status
1	Gedung Balai Bendungan, Jakarta	Server
2	Bendungan Jatiluhur, Jawa Barat	Client
3	Bendungan Sempor, Jawa Tengah	Client
4	Bendungan Sermo DI Yogyakarta	Client
5	Bendungan Kedung Ombo, Jawa Tengah	Client
6	Bendungan Batutegi, Lampung	Client
7	Bendungan Bili-bili, Sulawesi Selatan	Client
8	Bendungan Selorejo, Jawa Timur	Client
9	Bendungan Wonogiri, Jawa Tengah	Client
10	Bendungan Situ Gintung, Banten	Client

Source: Sartika Mitrasejati (2016)

4. Issues and recommendation
For SESAME system, the data usually are sent to the server in Japan and in Indonesia through the commercial cloud server. However, as PKG, a prospective main user for the future project, prefers to receive the data directly to their own server, not through the commercial cloud server, because the field data would be confidential and will be utilized for sanction. Also the concession holders are worrying about the data leakage risks in case of using the commercial could server, the data should be confidential, so that it should be considered the data transmission route would be discussed more among the stakeholders in case of installation of such equipment.

5. Sample specification of the equipment
   Sample specification of each equipment, necessary for the peatland monitoring, is attached hereunder.

Table 5 Sample Specification of Equipment

Purpose of Usage To measure ground water level, etc. at the peatland, and transfer the measured data to the remote servers through telemetry system, including the database and web application to compile and manage the data.			
Component : 1. Data recorder and data transfer system : 2. Water level gauge : 3. Rain gauge : 4. Soil moisture : 5. Protection fence : 6. Data Server : 7. Web application :	 1 set 1 set 1 set 1 set 1 set 1 set 1 set		
Specification : 1. Data recorder and data transfer system (1) Model (2) Media (3) Communication method (4) Measuring items (5) Antenna (6) Operating temperature (7) Electricity (8) Specification of electricity	 Data logger Memory card and internal memory USSD, GSM/GPRS, 3G network Ground water level x 1, temperature x 2, pulse for rain gauge x 1 Internal antenna, external antenna (optional) -20 ~ 50℃ AA size batteries, solar battery, external power (DC12V) − Standard: AA size batteries − External power: DC9 ~ 12V − Solar battery: 3W solar panel, Ni-MH battery cells		
2. Water level gauge (1) Model (2) Range (3) Accuracy (4) Operating temperature (5) Cable length (6) Others	Pressure type Semiconductor Pressure Gauge Type 0~3m, 0~10m, 0~20m 0.1％ FS -5 ~ 50℃ As required	Optical type Optical type 0~3m, 0~20m ±0.3% F.S. -5 ~ 50℃ As required Optical fiber	Ultrasonic Ultrasonic
3. Rain gauge (1) Model (2) Power (3) Power consumption (4) Output connection (5) Resolution (6) Accuracy (7) Operating temperature (8) Collecting area	 Tipping bucket rain gauge DC12V or DC24V±10％ 35W NC 0.1, 0.2, 0.5mm pulse ±2％ +4℃ ~ +60℃ >400cm2		
4. Soil moisture (1) Model (2) Temperature range (3) Accuracy (4) Moisture range (5) Humidity measurement precision (6) Power supply voltage	 +4℃ ~ +60℃ ±0.5℃ 0~100% ±2~4% 3~5.5V		

5. Protection fence, setting post/ pole	− Protection fence: BRC fence or equivalent, W200cm, D200cm, H200cm as maximum. One sheet of fence should be smaller than 100cm in width for easy transportation. − Post/ pole to set the equipment: more than 200cm above ground; i.e. 6m iron pipe − Post/ pole to install ground water gauge: more than 100cm above ground. i.e. 4m-long PVC pipe, with small holes at the underground portion
6. Server computer	− Server computer: Intel-Xeron processor, Hard disk: >1TB, 21" display or equivalent − OS: MS-Server 2012 − UPS: 3000VA Smart type
7. Web application	− Telemetry control system − Database − The obtained data will be transferred from the data logger and data transfer system through i) directly transfer to the above mentioned server through mobile network, ii) transfer data to the server via cloud server though mobile network, iii) transfer data through other methods
8. Remarks	

7. Outline of Fire Danger Rating System

1. Fire Danger Rating System in Indonesia

Fire Danger Rating System (FDRS) employed by BMKG is developed from Canadian Forest Fire Danger Rating System (CFFDRS) including Canadian Forest Fire Weather Index System and Canadian Forest Fire Behavior Prediction Systm[1]. Valuables to calucurate FDRS in Indonesia is calibrated for adapting the Indonesia environmental Condition. Below figure shows the basic structure of the FDRS.

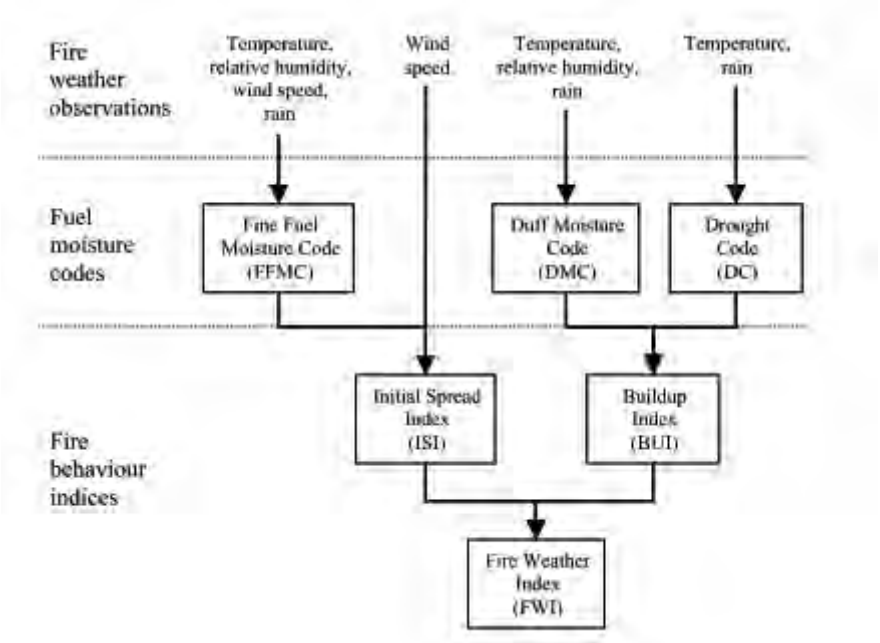


Figure 7.1.1. Basic structure of the Canadian Forest Fire Danger System

The structure is composed of 3 layers and six components. Top layer named 'fire weather observations'. It includes individual four weather parameters, which is temperature, relative humidity, wind speed and rain. 2nd layer of 'Fuel moisture codes' and 3rd layer of 'Fire behavior indices' are composed of "Fine Fuel Moisture Code (FFMC), a numerical rating of the moisture content of surface litter and other cured fine fuels on the forest floor; the Duff Moisture Code (DMC), a numerical rating of the average moisture content of loosely compacted organic layers of moderate depth in the forest floor; the Drought Code (DC), a numerical rating of the average moisture content of deep, compact organic layers in the forest floor; the Initial Spread Index (ISI), a numerical rating of the expected rate of fire spread; the Buildup Index (BUI), a numerical rating of the total amount, of fuel available for combustion; and the Fire Weather Index (FWI), a numerical rating of fire intensity that is used as a general indicator of fire danger[1]".

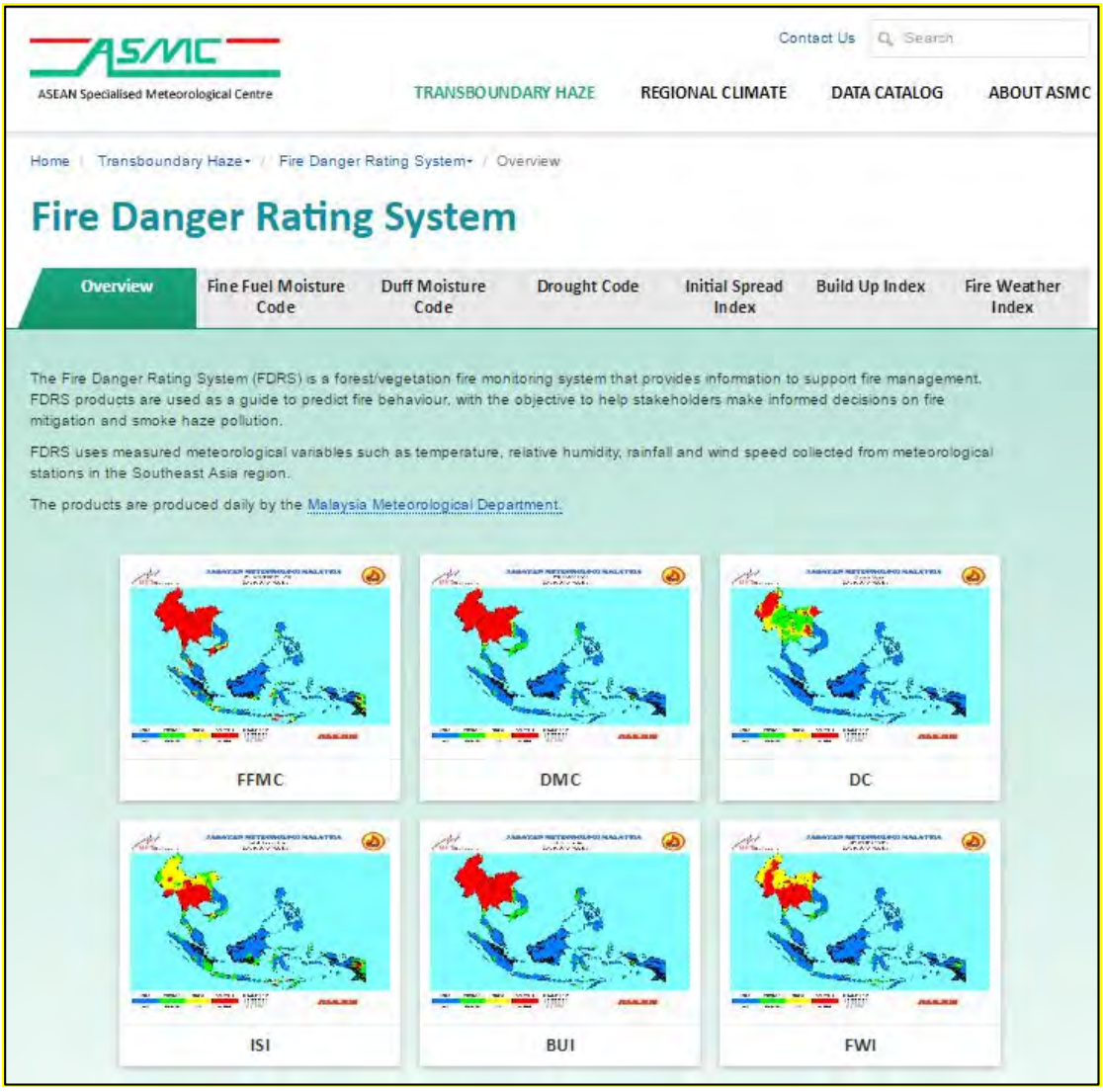
In order to adjust CFDRS to Indonesian environmental condition, the number of daylight hours (the amount of daily fuel dryng time) to 'a constant value of 9.0 dring hours per fay for DMC, caluculations and a constant day length factor (L*f*) of 1.39 for DC calucurations[1]'. FFMC, DMC, and ISI were also additionally calibrated[1]. Each codes and indexes are caluculated by the combination of formulars written in "*Equations and FORTRAN Program for the Canadian Forest Fire Weather Index System*[2]" (Van Wagner and Pickett, 1895).

[1] J. de Groot W. et al(2005) Development of the Indonesian and Malaysian Fire Danger Rating System, Mitig Adapt Strat Glob Change, 12:165-180

[2] Van Wagner and Pickett (1985) Equations and FORTRAN Program for the Canadian Forest Fire Weather Index

2. Fire Danger Rating System by Asian Specialized Meteorological Center

Additionally, below figure shows the FDRS published by Asian Specialized Meteorological Center (ASMC). Valuables for FDRS are obtained by the Global Telecommunication System (GTS) trhough World Metelorogical Organization. Formulations for FDRS. It is provided by Maleysian Meteorological Center.



System, Canadian Forest Service

8. List of Collected References

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
General（GE)									
1	Statistics, Ministory of Environment and Forestry 2014	Ministory of Envitronment and Forestry (MoEF)	Digital	1				JR・CR （ ）	
2	Methodology Development for Estimating Green House Gasses Emission from Peat Fires	Institut Pertanian Bogor (IPB), Indonesia Climate Change Center (ICCC)	Digital	1				JR・CR （ ）	
3	Law No. 41 year 1999 regarding Forestry Affairs, dated on September 30, 1999, as amended by Government Regulation in Lieu of Law No. 1 year 2014 regarding the Amendment of Law No. 41 year 1999, dated March 11, 2004 (UU No.41/1999)	Governemnt of Indonesia	Digital	1				JR・CR （ ）	
4	Presidential Decree No. 121 / P 2014 regarding Establishment of the Ministry and the Appointment of the Minister of the Cabinet of Work Year 2014-2019	President	Digital	1				JR・CR （ ）	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
5	Presidential Regulation No. 16 of year 2015 regarding Ministry of Environment and Forestry	President	Digital	1				JR・CR ( )	
6	Minister of Environment and Forestry DecreeNo. P.18 / MENLHK-II / 2015 regarding Organization and Working Procedures Ministry of Environment and Forestry	Ministory of Envitronment and Forestry (MoEF)	Digital	1				JR・CR ( )	
7	Attachment of Minister of Environment and Forestry Decree No. 18/ MENLHK-II/2015 regarding organization Structure of MoEF	Ministory of Envitronment and Forestry (MoEF)	Digital	1				JR・CR ( )	
8	Presidential Regulation No. 15 of year 2015 regarding Ministry of Public Works and Public Housing	President	Digital	1				JR・CR ( )	
Forest and Peatland Fire（FP)									
1	Equations and FORTRAN Program for the Canadian Forest Fire Weather Index System	Government of Canada	Digital	1				JR・CR ( )	
2	Typology Analysis of Land and Forest Fire in Riau Province, Indonesia	Israr Albar	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
3	Regulation Of Minister Of Environment And Forestry Of The Republic Of Indonesia No. P.32/Menlhk/Setjen/Kum.1/3/2016 on Forest And Land Fire Control	Ministory of Envitronment and Forestry (MoEF)	Digital	1				JR・CR ( )	
4	Development of the Indonesia and Malasian Fiire Danger Rating Systems	J. G. Willoam et al	Digital	1				JR・CR ( )	
Peatland Restoration（PR)									
1	Presidential Instruction No. 02 year 2007, dated March 16, 2007, regarding Acceleration of Rehabilitation and Revitalization for Peatland Areas in Central Kalimantan Province (Inpres No. 02/2007)	Governemnt of Indonesia	Digital	1				JR・CR ( )	
2	Government Regulation No. 76 year 2008, dated December 16, 2008 regarding Forest Rehabilitation and Reclamation (PP No. 76/2008)	Governemnt of Indonesia	Digital	1				JR・CR ( )	
3	Minister for Forestry Regulation No. 39/MENHUT-II/2010 year 2010, dated August 11, 2010 regarding General Pattern, Criteria, and Standard for Forests Rehabilitation and Reclamation (PerMenHut No.76/2008)	Ministory of Forestry (MoF)	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
4	Government Regulation No. 37 year 2012, dated March 1, 2012, regarding Watershed Management (PP No. 37/2012)	Ministory of Forestry (MoF)	Digital	1				JR・CR ( )	
5	Presidential Instruction No. 10 year 2011, dated May 20, 2011, on Moratorium on the Granting of New Permit and the Improvement of Primary Natural Forest and Peatland Management (Inpres No. 10/2011)	Governemnt of Indonesia	Digital	1				JR・CR ( )	
6	Presidential Instruction No. 06 year 2013, dated February 13, 2013, regarding Moratorium on the Granting of New Permit and the Improvement of Primary Natural Forest and Peatland Management (Inpres No. 06/2013)	Governemnt of Indonesia	Digital	1				JR・CR ( )	
7	Presidential Instruction No. 08 of 2015, dated May 13, 2015, regarding Postponement of Moratorium on the Granting of New Permit and the Improvement of Primary Natural Forest and Peatland Management -Extension of Presidential Instruction No. 10 of 2011 and No. 6 of 2013 (Inpres 08/2015)	Governemnt of Indonesia	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
8	Minister for Forestry Regulation No. P.12/Menhut-II/2012, dated on March 12, 2012, regarding Second Amendment on Minister for Forestry Decree No. P.32/MENHUT-II/2009 concerning Procedure for Technical Planning Formulation of Forest and Watershed Area Rehabilitation (RTk RHL-DAS)	Ministory of Forestry (MoF)	Digital	1				JR・CR ( )	
9	Minister for Forestry Regulation No. P.09/Menhut-II/2013, dated on January 28, 2013, regarding Procedure for the Implementation of Supporting Activities and Incentive Provision for Forest and Land Rehabilitation (Permenhut No. P.09/Menhut-II/ 2013)	Ministory of Forestry (MoF)	Digital	1				JR・CR ( )	
10	Director General for Management of Watershed Area and Social Forestry Regulation No. P.01/V-Set/2013, dated May 5, 2013, regarding Technical Guidelines for Forest and Land Rehabilitation (Perdirjen PDASPS P.01/V-Set/2013)	Ministory of Forestry (MoF)	Digital	1				JR・CR ( )	
11	Government Regulation No. 150 year 2000, dated December 23, 2000, regarding Control on Soil Degradation for Biomass Production (PP No.150/2000)	Ministry of Environment (MoE)	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
12	Law No. 32 year 2009, dated on October 03, 2009, regarding Environmental Protection and Management (UU No.32/2009)	Ministry of Environment (MoE)	Digital	1				JR・CR ( )	
13	Government Regulation No. 71 year 2014, dated on September 12, 2014, regarding Protection and Management of the Peat Ecosystems (PP No.71/2014)	Ministory of Envitronment and Forestry (MoEF)	Digital	1				JR・CR ( )	
14	Presidential Regulation No. 1 year 2016, dated on January 6, 2016, regarding Peatland Restoration Agency (PP No.01/2016)	Governemnt of Indonesia	Digital	1				JR・CR ( )	
15	Minister for Public Works and Settlement Regulation No. 29/PRT/M/2015 regarding Swamp (PermenPUPr No. 29/2015)	Pekerjaan Umum dan Perumahan Rakyat (PUPR)	Digital	1				JR・CR ( )	
16	Minister for Public Works and Settlement Regulation No. 11/PRT/M/2015, dated on April 6, 2015, regarding Exploitation and Maintenance of Reclamation Network on Tidal Swamp (PermenPUPr No.11/2015)	Pekerjaan Umum dan Perumahan Rakyat (PUPR)	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
17	Minister for Public Works and Settlement Regulation No. 16/PRT/M/2015, dated on April 21, 2015, regarding Exploitation and Maintenance of Irrigation Network on Lowland Swamp (Permen PUPr No. 16/2015)	Pekerjaan Umum dan Perumahan Rakyat (PUPR)	Digital	1				JR・CR ( )	
18	Minister for Public Works and Settlement Regulation No. 15/PRT/M/2015, dated on April 21, 2015, regarding Organization and Working Procedure of Ministry for Public Works and Settlement (PermenPUPr No. 15/2015) (DRAFT)	Pekerjaan Umum dan Perumahan Rakyat (PUPR)	Digital	1				JR・CR ( )	
19	Minister for Environmental and Forestry Regulation No. P …/MENLHK/2016 regarding Procedure for Inventory and Stipulation of Peat Ecosystem Function (Draft)	Ministory of Envitronment and Forestry (MoEF)	Digital	1				JR・CR ( )	
20	Strategic Plan year 2015-2019 of Directorate General of Pollution and Environmental Damage Control	Directorate General of Pollution and Environmental Damage Control	Digital	1				JR・CR ( )	
21	Performance Reports 2015 Achievements and Deliverables and the Work Plan 2016; Sub-Directorate of Peat Degradation Control	Sub-Directorate of Peat Degradation Control	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
22	Strategic Plan year 2015-2019 of Directorate of Peat Degradation Control	Sub-Directorate of Peat Degradation Control	Digital	1				JR・CR ( )	
23	Strategic Plan of Peatland Degradation Agency (Draft)	Badan Restorasi Gambut (BRG)	Digital	1				JR・CR ( )	
24	Strategic Plan 2015-2019 of Director General of Water Resources	Director General of Water Resources, PUPR	Digital	1				JR・CR ( )	
25	National Peat Hydrology Unit(KHG) Indicative Maps	KLHK-BIG	Digital	1				JR・CR ( )	
26	Album of Peat Map Hydrological Unit (KHG) per- rovince	KLHK-BIG	Digital	1				JR・CR ( )	
27	Map of Restoration Priority Province	Badan Restorasi Gambut (BRG)	Digital	1				JR・CR ( )	
28	Plan of Operation of Peatland Protection Agency 2016	Governemnt of Indonesia and Government of Norway	Digital	1				JR・CR ( )	
29	Final Report for ASEAN Peatland Forest Project (APFP): Rehabilitation and Sustainable Use of Peatland in Southeast Asia	Ministry of Environment	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
30	ASEAN Peatland Forests Project Case Sudies, Specific Achievements and Lessons Learned in Indoensia: Terminal Evaluation Workshop	Ministry of Environment	Digital	1				JR・CR ( )	
31	Project on Sustainable Management of Peatland Ecosystems in Indonesia (SMPEI)) (2016 -2019)	MoEF, GEF, IFAD	Digital	1				JR・CR ( )	
32	Restoration of Damaged Peatland: by constructing bulkhead-type canal blocking (Pemulihan Lahan Gambut Terdegradasi: Pembuatan Sekat Kanal)	PKG-PKHL	Digital	1				JR・CR ( )	
33	Mechanism and Criteria of PROPER project (Performance Rating Program in Environmental Management)	Secretariate of PROPER project	Digital	1				JR・CR ( )	
34	Criteria of PROPER Project	PKG	Digital	1				JR・CR ( )	
35	Matrix of Infrastructure Activity for Prevention KARLAHUT KLHK-UNDP-REDD+ by Small Grant to Local NGO	United Nations of Decelopment Programme (UNDP)	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
36	Summary of the 2016-2019 IFAD Country Strategy Validation Workshop	International Fund for Agricultural Development (IFAD)	Digital	1				JR・CR ( )	
37	Master Plan for the Rehabilitation and Revitalisation of the Ex-Mega Rice Project Area in Central Kalimantan	Euroconsult Mott MacDonald and Deltares | Delft Hydraulics in association with DHV, Wageningen UR, Witteveen+Bos, PT MLD and PT INDEC	Digital	1				JR・CR ( )	
38	Annual Progress Reports for Wild Fire and Carbon Management in Peat-forest in Indonesia for FY2009 to FY2012 under Science and Technology Research Partnership for Sustainable Development (SATREPS)	SATREPS Team (Represented by Dr. Mitsuru Osaki)	Digital	1				JR・CR ( )	
39	Terminal Evaluation Report for Wild Fire and Carbon Management in Peat-forest in Indonesia under Science and Technology Research Partnership for Sustainable Development (SATREPS)	Japan International Cooperation Agency (JICA)	Digital	1				JR・CR ( )	
40	Guidelines For Design and Construction Of Check Dams For Prevention and Control Of Peatland Fire	Department of Irrigation and Drainage, Malaysia	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
41	Peatland mapping in scale of 1: 50,000 based remote sensing image	Badan Standardisasi Nasional (BSN)	Digital	1				JR・CR ( )	
42	Minister of Environment and Forestry Decree No: P. / Menlhk-Secretariat / 2016 regarding Water Management of Water on Peatland Ecosystem (Draft)	Ministory of Envitronment and Forestry (MoEF)	Digital	1				JR・CR ( )	
43	Government Regulation No.57/2016 on Revision of the Government Regulation on Protection and Management of Peatland	Ministry of Environment (MoE)	Digital	1				JR・CR ( )	
44	RECAP Table of Number and Size Analysis of KHG in Indoensia (June 2016)	PKG, PKHL	Digital	1				JR・CR ( )	
45	Criteria of Peatland Restoration Indicative Map (July 26, 2016)	PKG, PKHL	Digital	1				JR・CR ( )	
46	Data and Information Peatland Restoration (BRG Media Briefing Material, 9 June 2016)	Badan Restorasi Gambut (BRG)	Digital	1				JR・CR ( )	
47	Work Plan and the Indicative Map of Priority Restoration in South Sumatra (Palembang, August 9, 2016)	Badan Restorasi Gambut (BRG)	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
48	Peatland, drainage, subsidence and canal blocking for Berbak Green prosperity Partnership Steering Committee Meeting April 26, 2016, Kota Jambi	Deltares	Digital	1				JR・CR ( )	
49	Establishment of Dams in the ex of MRP's Canal to Accelerate the Restoration Process of Damaged Peatland (Presentation for International Symposium and Workshop on Tropical Peatland, Luching, 19-22 August 2008)	Suwido H. Lamin, rt al., CIMTROP, UNPAR	Digital			1		JR・CR ( )	
50	Canal blocking strategies for hydrological restoration of degraded tropical peatlands in Central Kalimantan, Indonesia	Henk Ritzema, et al.	Digital	1				JR・CR ( )	
51	Ecology of Shorea Balangeran (Kahui)	Sampang Gaman, Yuda Prawira and Hideyuki Saito	Digital	1				JR・CR ( )	
52	Proceedings for the Research "30 Years of Forestry Development Institution of Banjarbaru"	Kementerian Kehutanan Badan Penelitian Dan Pengembangan Kehutanan Pusat Litbang Peningkatan Produktivitas Hutan	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
53	Paludiculture	Dr. Haris Gunawan Deputy 4: Research and Development, BRG	Digital	1				JR・CR ( )	
54	Field data transmission system, SESAME-SATREPS, by using cell-phones digital telecommunications network	Shigenaga, Y, at al.	Digital	1				JR・CR ( )	
55	"Overview of SESAME System: Technology and System on Peat Monitoring (Forum on Group Discussion for SESAME Application in the Development of Early Warning System for Land and Forest Fire) "	Dr.Ir. Bambang Setiadi	Digital	1				JR・CR ( )	
56	Session 1-2: Overview on Protection Policy and Peatland Ecosystem Management	Kesatuan Hidrologi Gambut/ Peatland Hydrological Unit	Digital	1				JR・CR ( )	
57	Session 2-1: Environmental and socio-economic impacts of peatlands drainage and peatland fires	Food and Agriculture Organization (FAO)	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
58	Session 2-2: Map of National Peatland Hydrological Units (Scale 1: 250 000) in the island of Sumatra, Kalimantan, Sulawesi, and Papua	PKG, Directorate General of Pollution and Environmental Degradation Control	Digital	1				JR・CR ( )	
59	Table for Analysis of Land Use in Peatland Hydrological Unit	PKG, Directorate General of Pollution and Environmental Degradation Control	Digital	1				JR・CR ( )	
60	Session 2-3: GHG reduction by rehabilitation of degraded peatlands: Opportunities and Challenges in winning paludiculture	Indonesian Soil Research Institute, Ministry of Agriculture	Digital	1				JR・CR ( )	
61	Session 3-1: Paludiculture: challenges for technology and policy	Hans Joosten Joosten@uni-greifswald.de	Digital	1				JR・CR ( )	
62	Session 3-2: Peatland rewetting from the perspective of inland fishery and paludiculture developments	Wetlands International	Digital	1				JR・CR ( )	
63	Session 3-3: Sustainable Land Use in Degenerate Peat Land: Nipa and Sago cultivation – Possible Combinations with Rice	Dr Ir Taco Bottema, Senior Advisor PASPI, Bogor, Indonesia	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
64	Session 4-1: Water management approaches in peatlands based on comprehensive field data in West Kalimantan	PT. Wana Subur Lestari PT. Mayangkara Tanaman Industri	Digital	1				JR・CR ( )	
65	Session 4-2: Effective Canal Blocking Technology and Practices in South Kalimantan	Balai Rawa Banjarmasin Puslitbang Sda – Balitbang PUPR	Digital	1				JR・CR ( )	
66	Session 5-3: Thoughts on peatland canal blocking that can be implemented fast, cost-effective and permanently, based on practical project experience	Deltares	Digital	1				JR・CR ( )	
67	Joint Symposium for Peat Restoration and Fire Prevention} Jakarta & Pekanbaru; 30 May - 1 June 2016	BRG, PKHL, JICA, Hokakido Univ., Kyoto Univ., RIHN, NIHU	Digital	1				JR・CR ( )	
68	Panel 1-1: Sustainable Peat Swamp Management	Dr. Ir. Henri Bastaman, Kepala Pusat Litbang Hutan	Digital	1				JR・CR ( )	
69	Panel 1-2: Kyoto University's Commitment to Peatland Restoration in Indonesia -Looking for Solutions with People for People-	Kosuke Mizuno (Center for Southeast Asian Studies, Kyoto University)	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
70	Panel 1-3: Fire Prevention Strategy and Developing Sustainable Livelihood "Sago Palm" in Riau Peatland	Arsyadjuliandi Rachman Governor of Riau	Digital	1				JR・CR ( )	
71	Panel 1-4: Peatland Ecosystem Resource Management	Prof. Dr.Ir. H. Fachrurrozie Sjarkowi, M.Sc., Universitas Sriwijaya	Digital	1				JR・CR ( )	
72	Panel 2-1: Peatland MRV by Bio-eco-environmental Geo Informatics System (Bee-GIS)	Prof. Mitsuru Osaki: Research Faculty of Agriculture, Hokkaido University	Digital	1				JR・CR ( )	
73	Panel 2-2: A Collaborative Restoration Planning for Controlling Peat Fires and Degradation	Prof. Dr. Gusti Z. Anshari Universitas Tanjungpura	Digital	1				JR・CR ( )	
74	Panel 2-3: How to prevent wild fire? Rewetting & Reforestation	Osamu Kozan Center for Southeast Asian Studies, Kyoto University	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
75	Panel 2-4: Experience on Restoration and Peat Fire Prevention	Aswin Usup, Ph.D Pusat Pengendalian Kebakaran dan Rehabilitasi Hutan, LPKM-Universitas Palangka Raya	Digital	1				JR・CR ( )	
76	Panel 2-5: Peat Fire Prevention through Socio-anthropological approach	Ashaluddin Jalil, Universitas Riau	Digital	1				JR・CR ( )	
77	Panel 3-1: Economic Incentives and Program KKN Peat Desa Sejahtera	Prof. Azwar Maas, Universitas Gadjah Mada	Digital	1				JR・CR ( )	
78	Panel 3-2: CCN Peat Desa Sejahtera	Dr. Haris Gunawan, Deputi Litbang BRG	Digital	1				JR・CR ( )	
79	Panel 3-4: Program on Management Plan to Support Independent Community for Peatland Ecosystem Restoration	Ir. Wahyu Indraninsih, PKG	Digital	1				JR・CR ( )	
80	Panel 4-1: Carbon Emission Estimation from Groundwater Level Distribution in Tropical Peatland Area, Central Kalimantan	Dr. Yohei Hamada & Dr. Nobuyuki Tsuji, Japan International Cooperation Agency (JICA)	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
		(Former Hokkaido University Task Force of IJ-REDD+ Project)							
81	Panel 4-2: Peat Fire and Severe Air Pollution Due To During 2015 Super El Niño In Palangka Raya, Indonesia - Human-caused Natural Disaster	Hiroshi Hayasaka, NPO Hokkaido Institute of Hydro-climate (Former Researcher in Hokkaido University)	Digital	1				JR・CR ( )	
82	Presented at the Meeting of the Implementation and Coordination for Peat Restoration at Hotel Sari Pan Pacific, Jakarta June 22, 2016	Governemnt of Indonesia	Digital	1				JR・CR ( )	
83	Preparation of Budget Plan for Ministry / Agency (RKA-K / L) FY 2017	Kementerian Keuangan Republik Indonesia Direktorat Jenderal Anggaran	Digital	1				JR・CR ( )	
84	Policy and Budget for Implementation Peat Restoration in Indonesia	Nur Hygiawati Rahayu Direktorat Kehutanan dan Konservasi Sumber Daya Air Badan Perencanaan Pembangunan Nasional (Bappenas)	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
85	Exploiting Peatland for Oil Palm Cultivation	Direktur Perlindungan Perkebunan pada acara Rapat Koordinasi Restorasi Gambut	Digital	1				JR・CR ( )	
86	Climate Change Control Policy And Space Synergies With Implementation of Peat Restoration	Direktor Jenderal Pengendalian Perubahan Iklim Kementerian Lingkungan Hidup dan Kehutanan	Digital	1				JR・CR ( )	
87	Maps of Peatland Hydrology Unit (KHG), Indicative Function of Protected Peat and Peat Ecosystem Restoration area of Sumatra, Kalimantan and Papua	Direktur Jenderal Pengendalian Pencemaran Dan Kerusakan Lingkungan Kementerian Lingkungan Hidup Dan Kehutanan	Digital	1				JR・CR ( )	
88	Peat Restoration At Different Types and Functions of Land (Especially IUPHHK-HTI)	Ibrahim (Direktorat Usaha Hutan Produksi), Direktorat Jenderal Pengelolaan Hutan Produksi Lestari, Klhk	Digital	1				JR・CR ( )	
89	Cooperation on Work Programme Planning and Restoration of Peat	Deputi Bidang Perencanaan dan Kerjasama Badan Restorasi Gambut	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
90	Rehabilitation of Forest and Peatland	Direktorat Jenderal Pengelolaan DAS dan Hutan Lindung, KLHK	Digital	1				JR・CR ( )	
91	Policy and Implementation Strategy for Restoration of Peat in Indonesia	Direktorat Jenderal Sumber Daya Air Kementerian Pekerjaan Umum Dan Perumahan Rakyat	Digital	1				JR・CR ( )	
92	Deputy 4 Brg Work Programme 2016-2020: Peat Swampy -Rakyat-State Sejahtera Jaya	Badan Restorasi Gambut (BRG)	Digital	1				JR・CR ( )	
93	Education and Participation in the Protection and Management of Peatland	Paparan Deputi Edukasi, Sosialisasi, Partisipasi dam Kemitraan BRG	Digital	1				JR・CR ( )	
94	Draft Implementation Peatland Restoration in 7 priority provinces	Sekretariat Badan Restorasi Gambut	Digital	1				JR・CR ( )	
95	Construction, Operation & Maintenance: Strategies, Approaches & Peat Restoration Program	Deputi Konstruksi, Operasi Dan Pemeliharaan Badan Restorasi Gambut	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
Satellite Data utilization（SD）									
1	Effective use of space-base information to monitor disaster and its impacts. Lessons Learnt from Forest and Land Fires in Indonesia	LAPAN/ UN-SPIDER	Digital	1				JR・CR ( )	
2	Toward a Fire and Haze Early Warning System for Southeast Asia	Asia-Pacific Network	Digital	1				JR・CR ( )	
3	Satellite Remote Sensing-Based Fire Danger Rating System to Support Forest /Land Fire Management In Indonesia	Lembaga Penerbangan dan Antarisksa Nasional (LAPAN)	Digital	1				JR・CR ( )	
4	Operational Weather System for National Fire Danger Rating	Guswanto, Eko Heriyanto	Digital	1				JR・CR ( )	
5	Operational Fire Danger Rating System in Indonesia	Israr Albar et al	Digital	1				JR・CR ( )	
6	LAPAN's Activities on Remote Sensing Application	Rokhis Khomarudin (LAPAN)	Digital	1				JR・CR ( )	
7	Annual Report Of Lapan Remote Sensing Center 2013	Lembaga Penerbangan dan Antarisksa Nasional (LAPAN)	Digital	1				JR・CR ( )	

No.	The Name of Collected References	Publisher	Form	Type				Classification: JR:Public CR () : Private with a limited time	Note by JICA library
				Collected documents	Expert-making documents	JICA's documents	Others		
8	Drought And Fine Fuel Moisture Code Evaluation: An Early Warning System For Forest/Land Fire Using Remote Sensing Approach	Yenni Vetrita et al	Digital	1				JR・CR ( )	
9	An Enhanced Contextual Fire Detection Algorithm for MODIS	Giglio Louis et al	Digital	1				JR・CR ( )	
10	LAPAN-JAXA seminar PPT	LAPAN, PKHL, BMKG	Digital	1				JR・CR ( )	
Others（OT)									
1	Insight Robotics Brochure for fire detection by using CCTV	Insight Robotics Ltd.	Digital	1				JR・CR ( )	

9. List of Interviewees

No	Name	Organization	Position	Topics
1	Sri Murniningtyas	International Cooperation, Ministory of Environment and Forestry (MoEF)	Head of Bureau for International Cooperation	New JICA cooperation
2	Agus Haryanta	Ministory of Environment and Forestry (MoEF), Land and Forest Fire Control (PKHL)	Sub-directorate of infrastructure and equipment	New JICA cooperation
3	Sumantri	Land and Forest Fire Control (PKHL), Ministory of Environment and Forestry (MoEF)	Sub-directorate of Program and Evaluation	New JICA cooperation
4	Ferdian Krisnanto	Land and Forest Fire Control (PKHL), Ministory of Environment and Forestry (MoEF)	Technical Staff	New JICA cooperation
5	Deny Haryanto	Land and Forest Fire Control (PKHL), Ministory of Environment and Forestry (MoEF)	Early Warning System Analyst	Sipongi and Early Warning System
6	Eva	Land and Forest Fire Control (PKHL), Ministory of Environment and Forestry (MoEF)	Early Warning System Analyst	Sipongi and Early Warning System
7	Dr. Lawin Bastian	Land and Forest Fire Control (PKHL), Ministory of Environment and Forestry (MoEF)	Head of Divisio, Legal and Technical Cooperation, Directorate General of Climate Change	Sipongi and Early Warning System
8	Wahyu Indraningsih	Directorate of Peatland Damage Control (PKG), MOEF	Directorate of PKG	Peatland restoration
9	Muhammad Askary	Directorate of Peatland Damage Control (PKG), MOEF	Head of d. Sub-Directorate of Peat Ecosystem Conservation, PKG	Peatland restoration
10	Wahyu T. Utami	Directorate of Peatland Damage Control (PKG), MOEF	Head Section of Prevention and Monitoring, PKG	Peatland restoration
11	Aep Purnama	Directorate of Peatland Damage Control (PKG), MOEF	Head of Sub-Directorate of Inventory and Designation	Peatland restoration
12	Waluyo Yogo Utomo	Directorate of Peatland Damage Control (PKG), MOEF	Staff of Sub-Directorate of Inventory and Designation	Peatland restoration
13	Nazir Foead	Peatland Restoration Agency (BRG)	Head of BRG	Peatland restoration
14	Hartono	Peatland Restoration Agency (BRG)	Secretary of BRG	Peatland restoration
15	Budi S. Wardhana	Peatland Restoration Agency (BRG)	Deputy of Planning and Cooperation, BRG	Peatland restoration

No	Name	Organization	Position	Topics
16	Alue Dohong	Peatland Restoration Agency (BRG)	Deputy of Construction, Operation and Maintenance, BRG	Peatland restoration
17	Myrna A. Safitri	Peatland Restoration Agency (BRG)	Deputy of Educaiton, Socilization, Participation and Partnership, BRG	Peatland restoration
18	Haris Gunawan	Peatland Restoration Agency (BRG)	Deputy of Research and Development, BRG	Peatland restoration
19	Ilarius Wibisono	Peatland Restoration Agency (BRG)	Staff to head of BRG (in charge of GIS)	Peatland restoration
20	Ms. Eli	Peatland Restoration Agency (BRG)		Peatland management/ restoration
21	Dr. Ir. Bambang Setiadi	Agency for the Assessment and Application of Technology (BPPT)	Coordinator of Indonesia SESAME Project	Peatland monitoring system
22	Dr. Ir. Sidik Mulyono, M. Eng.	Agency for the Assessment and Application of Technology (BPPT)	Center of Technology for Regional Resources Development	Peatland monitoring system
23	Dr. Ir. A. Sulaiman, M. Sc	Agency for the Assessment and Application of Technology (BPPT)	Center of Technology for Regional Resources Development	Peatland monitoring system
24	Mr. Awaluddin S. Pi, M.Si	Agency for the Assessment and Application of Technology (BPPT)	Center of Technology for Regional Resources Development	Peatland monitoring system
25	Dr. Rokhis Khomarudin	Indonesian National Institute of Aeronautics and Space (LAPAN)	Director	Early Warning System , HS detection, satellite data utilization
26	Parwati Sofan	Indonesian National Institute of Aeronautics and Space (LAPAN)	Head of Dissemination	Early Warning System , HS detection, satellite data utilization
27	Syarif Budhiman	Indonesian National Institute of Aeronautics and Space (LAPAN)	Head of Program and Facilities	Early Warning System , HS detection, satellite data utilization
28	Riris Adriyanto	Meteorological, Climatological, and Geophysical Agency (BMKG)	Head of Remote Sensing Imaginary Management Division	FDRS and satellite data utilization
29	Ano Okravia	Meteorological, Climatological, and Geophysical Agency (BMKG)	Technical staff	FDRS and satellite data utilization
30	Andersen L.P.	Meteorological, Climatological, and Geophysical Agency (BMKG)	Technical staff	FDRS and satellite data utilization
31	Kukuh R.	Meteorological, Climatological, and Geophysical Agency (BMKG)	Head of FDRS division	FDRS and satellite data utilization
32	Nasrullah	Meteorological, Climatological, and Geophysical Agency (BMKG)	Deputy director	BMKG' activities and Haze Monitoring

No	Name	Organization	Position	Topics
33	Ania Supeni	Meteorological, Climatological, and Geophysical Agency (BMKG)	Director's Assistant	BMKG' activities and Haze Monitoring
34	M. Addip, Mangasa Naibaho	Meteorological, Climatological, and Geophysical Agency (BMKG)	Chief of Air Quality Information	BMKG' activities and Haze Monitoring
35	B. Andri Yani	Meteorological, Climatological, and Geophysical Agency (BMKG)	Technical staff	BMKG' activities and Haze Monitoring
36	Sumaryo	Meteorological, Climatological, and Geophysical Agency (BMKG)	Technical staff	BMKG' activities and Haze Monitoring
37	Dwi Atmoko	Meteorological, Climatological, and Geophysical Agency (BMKG)	Technical staff	BMKG' activities and Haze Monitoring
38	Kariono	Kepala Kapuas, PU	System Technicial Staff	Peatland restoration
39	Andri Jansicau	Kepala Kapuas, PU	Technical Staff	Peatland restoration
40	Lailan Syaufina	Bogor Agriculture University (IPB)	Vice Dean of Faculty of Forestry	IPB's projects and current studies, Early Warning System
41	Ati Dwi Nurhayati	Bogor Agriculture University (IPB)	Lecturaer, Faculty of Forestry	IPB's projects and current studies, Early Warning System
42	Yanni Vetrita	South Dakota University		Sauthdakota Univ. and IPB's project for haze monitoring
43	Adi Jaya	University of Palangka Raya (UNPAR)		Peatland restoration
44	Linda Wulandari	University of Palangka Raya (UNPAR)	Benthos Ecologist, Staff of International Office	Peatland restoration
45	Kitso Kusin	Center for International Cooperation in Sustainable Management of Tropical Peatland (CIMTROP), University of Palangka Raya (UNPAR)	Staff of CIMTROP	Peatland restoration
46	Kevin Chan	Insight Robotics Ltd.	CEO	Fire Detection System by using CCTV
47	Ahmad Rifki	Insight Robotics Ltd.	Managing Director	Fire Detection System by using CCTV
48	Jean-Pierre Wack	Insight Robotics Ltd.	Regional Director of Business Development, Indonesia	Fire Detection System by using CCTV

No	Name	Organization	Position	Topics
49	Chew Tech Wee	Insight Robotics Ltd.	Managing Director, Southeast Asia	Fire Detection System by using CCTV
50	Frida Koerdiati	Sub-Directorate of Lowland, DG of Water resources, PUPR	Deputy Director for Lowland	Peatland restoration
51	Rendhy	Sub-Directorate of Lowland, DG of Water resources, PUPR	Technical Staff	Peatland restoration
52	Andi Sudirman	Sub-Directorate of Technical Guidance, DG of Water resources, PUPR	Deputy Director for Technical Guidance	Peatland restoration
53	Abdul Muis	Sub-Directorate of Planning, DG of Water resources, PUPR	Deputy Director for Planning	Peatland restoration
54	Sunae Kim	International Fund for Agricultural Development (IFAD)	Environment and Climate Change Portfolio Officer, Environment and Climate Division/ Asia and the Pacific Division	Peatland restoration
55	Roland Hartman	International Fund for Agricultural Development (IFAD)	Country Director, Asia and the Pacific Division	Peatland restoration
56	Tjuk Sasmito Hadi	Banjarbaru Environment & Forestry Research Development Institute	Director	Peatland restoration
57	Tri Wira Yuwati	Banjarbaru Environment & Forestry Research Development Institute	Researcher	Peatland restoration
58	H.M. Farid Soufian	Environmental Agency, Banjar Regency, South Kalimantan	head of Environmental Agency	Peatland restoration
59	Rini Astuti	Forest Governance, Environment Unit, UNDP	Technical Adviser	Peatland restoration
60	Dr. Abdul Wahib Situmorang	Forest Governance, Environment Unit, UNDP	Technical Adviser	Peatland restoration
61	Dr. Aljosja Hooijer	Deltares in Indonesia		Peatland restoration
62	Dr. Mitsuru Osaki	Graduate School of Agriculture, Hokkaido University	Special Appointed Professor	Peatland restoration
63	Dr. Kosuke Mizuno	Center for Southeast Asian Studies Kyoto bUniversity	Professor	Peatland restoration
64	Dr. Daisuke Naito	Center for Southeast Asian Studies Kyoto University		Peatland restoration
65	Dr. Osamu Kozan	Center for Southeast Asian Studies Kyoto University	Associate Professor	Peatland restoration
66	Dr. Kazuya Uezu	Department of Life and Environment Engineering, Faculty of Environmental Engineering, The University of Kutakyushu	Professor	Peatland restoration
67	Yoshihisa Shigenaga	Midori Engineering Laboratory	CEO	Peatland monitoring system

No	Name	Organization	Position	Topics
68	Dr. Youhei Hamada	Midori Engineering Laboratory		Peatland monitoring system
69	Hideki Takahashi	Midori Engineering Laboratory		Peatland monitoring system
70	Hiroyuki Ishihara	Nihon Musen Jakarta Office	Director	Peatland monitoring system
71	Yoshihisa Takakawa	Nihon Musen Jakarta Office		Peatland monitoring system
72	Shinichi Sobue	Japan Aerospace Exploration Agency (JAXA)	Senior Engineer	Potential utilization of JAXA satellites
73	Koji Nakau	Japan Aerospace Exploration Agency (JAXA)	Associate Senior Researcher	Potential utilization of JAXA satellites
74	Juniardi Arijanto	PT. Sartika Mitrasejati		Peatland monitoring system
75	Hiroshi Kobayashi	IJ-REDD+ Project / JICA	Project Coordinator / Biodiversity Conservation	Peatland management/ restoration
76	Hideyuki Kubo	IJ-REDD+ Project / JICA		Peatland management/ restoration
77	Hiroshi Kusakabe	IJ-REDD+ Project / JICA	Forestry Agency International Forestry Cooperation Office	Peatland management/ restoration
78	Dr. Gun Gun Hidayat	IJ-REDD+ Project / JICA	National Coordinator	Peatland management/ restoration
79	Mr. Jerry Hansen	BAPPEDA, OKI, South Sumatra		Peatland management/ restoration
80	Mr. Syawal Harahap			Peatland management/ restoration
81	Ms. Verta Sari	TRGD South Sumatra	Secretary	Peatland management/ restoration
82	Mr. Adong Tarigan	UPTD PKHL, Dep Environment, South Sumatra		Peatland management/ restoration
83	Mr. Sulmin	Kepayang vilalge, MUBA, South Sumatra	Village head	Peatland management/ restoration
84	Riska Efriyanti	UNOPS	Operation Officer GAMBUT project	Early Warning System , HS detection
85	Akira Moretto	UNOPS	Research Coordinator GAMBUT project	Early Warning System , HS detection
86	Dr. Pipin Permadi	GIZ	Senior Adviser Forest Policy and Strategic Planning	Forest and Peatland Fire Prevention