



THE MINISTRY OF ENVIRONMENT
AND FORESTRY REPUBLIC OF INDONESIA



CORRECTIVE ACTION

ON PEATLAND MANAGEMENT
IN INDONESIA

Toward Sustainable Peatland Ecosystem

2018

CORRECTIVE ACTION ON PEATLAND MANAGEMENT IN INDONESIA

Toward Sustainable Peatland Ecosystem

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Published by:
Ministry of Environment and Forestry Republic of Indonesia
Directorate General for Environmental Pollution and Degradation Control
Directorate of Peat Degradation Control



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Preface



In the last ten years, there are some occurrences that massive forest and peatland fire cannot be avoided, this cause air pollution and land damage with huge economic, social, and environmental impact. It is still in our memory, the forest and peat fire in 2015, in land area of 2.6 million hectares and loss estimated at around 2,220 billion rupiah. In response to such situation, the Government of Indonesia under the leadership of President Joko Widodo declare to combat and avoid forest and peatland fire in Indonesia. The Government of Indonesia has prioritized a strategy to achieve the goal, emphasizing on the protection and restoration of degraded peatland, and strict law enforcement to individual or corporate responsible for forest fire through administrative and criminal sanctions.

The Ministry of Environment and Forestry has carried out several efforts, i.e. implementation of peatland ecosystem function inventory, determination of peat land protection and management plan, restoration of peatland ecosystem function either in concession or community area, development database and publication of GIS portal web based information. Those efforts have been implemented with involvement of all stakeholders, for instance local government, community, university, and private sectors. Benefits of those efforts are reduction in the number of potential fire hotspot and greenhouse gas emissions, and contribution to the achievement of SDG's Goal 1 (no poverty), Goal 2 (zero hunger), Goal 13 (climate action), and Goal 15 (life on land).

This book entitled "Corrective Action on Peatland Management in Indonesia: toward Sustainable Peatland Management" is to showcase the progress of peatland ecosystem management that has been carried out by the Government of Indonesia under the leadership of President Joko Widodo and Vice President Jusuf Kalla in time period of 2015 to 2018.

Jakarta, Januari 2019



Dr. Ir. Siti Nurbaya Bakar, M.Sc.
Minister of Environment and Forestry
Republic of Indonesia

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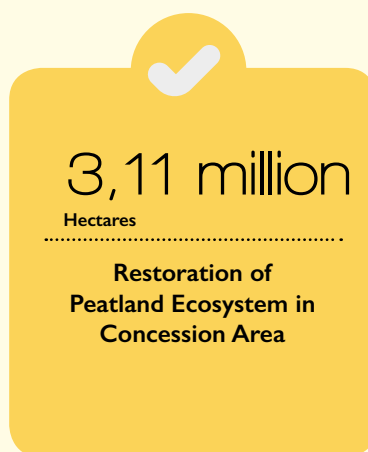
 President Joko Widodo instructed corrective action on peatland management comprehensively



 Secondary Forest
in Peatland Ecosystem

CORRECTIVE ACTION
ON PEATLAND MANAGEMENT
IN INDONESIA

Toward Sustainable Peatland Ecosystem



Introduction

Referring to the Ministerial Decree Number SK.129/MENLHK/SETJEN/ PKL.0/2/2017 regarding to the Determination of National Peat Hydrological Unit, Indonesia has 865 Peat Hydrological Units with total area 24,667,804 hectares scattered in the Sumatera, Kalimantan, Sulawesi, and Papua Island. From those area, 14.9 million hectares are peatland (Source: BBSDLP, 2013). This peatland is the world largest tropical peatland, followed by the Democratic Republic of Congo with area about 9 million hectares, and the Republic of Congo with area about 5.5 million hectares (Miles et al., 2017)

Peatland ecosystem has unique characteristic. It is a part of wetland and terrestrial space ecosystem, and important part of Indonesia natural resources. Thus, peatland ecosystem has various function for livelihood in Indonesia, among others as natural resources, genetic resources and wood, natural habitat of endemic fish, and carbon storage for climate stability.

With such unique characteristics, peatland ecosystem is vulnerable to damage if not properly managed. Development of drainage (canal) in the past in order to prepare agriculture land caused peatland dried and increased potential fires. The occurrence of peatland fires would cause natural disasters with negative impact at local, national, and global level. Indonesia has suffered from forest and peatland fires in 2015 with area on 2.6 million hectares. In response to this disaster, the President of Republic of Indonesia, Joko Widodo, gave very clear instruction to implement corrective action on peatland management. Following the instruction, the Government of Indonesia promote prevention and management on peatland ecosystem.

With those background, the Ministry of Environment and Forestry implements intensive efforts for Protection and Management on Peatland Ecosystem as mandated by the Government Regulation Number 71 Year 2014 as revised by the Government Regulation Number 57 Year 2016 regarding on Protection and Management on Peatland Ecosystem.



**The Ministry of Environment
and Forestry Decree**

**Number: SK 129/MENLHK/STJEN/
PKL.0/2/2017**

hectares
14,9 million

Peatland
(BBSDLP, 2013)

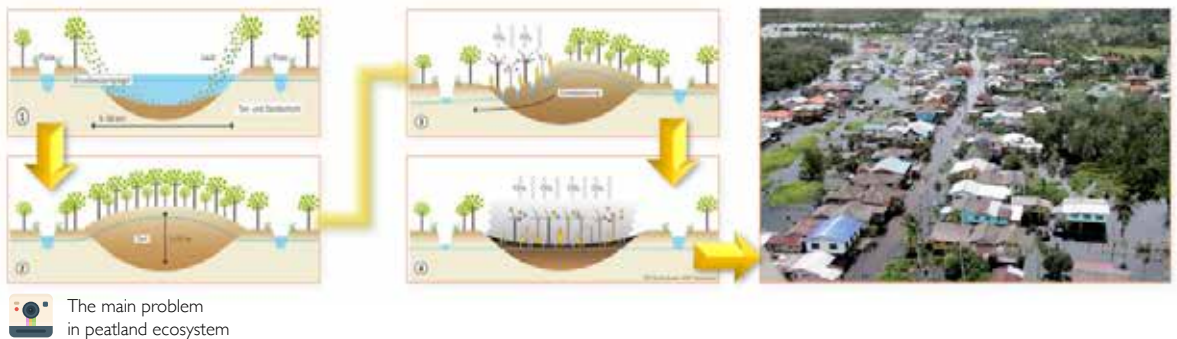
Policy Strategy on Peatland Ecosystem Protection and Management

Policy strategy on Peatland Protection and Management refers to the Law Number 32 year 2009 regarding on Environmental Protection and Management and the Government Regulation Number 71 Year 2014 as revised by the Government Regulation Number 57 Year 2016 regarding on Protection and Management of Peatland Ecosystem.

The concept of those Government Regulations describe the corrective action on peatland management. Fundamental revision of Government Regulation No. 71 year 2014 to Government Regulation No. 57 year 2016 regarding to Protection and Management on Peatland Ecosystem is improvement of peatland ecosystem management with more detail regulation on prevention and restoration.



Peatland ecosystem protection and management based on its characteristics

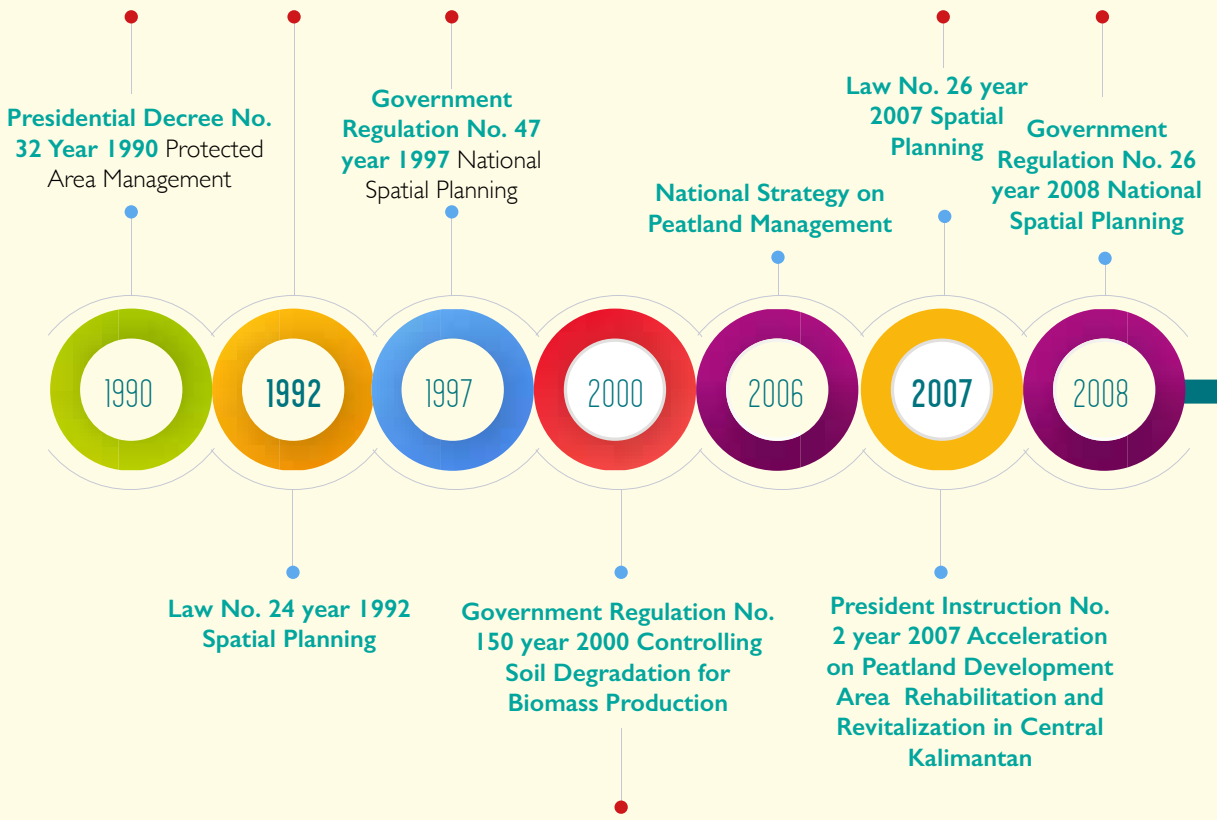


After the enactment of those regulations on protection and management of peatland ecosystem in December 2nd, 2016, the Ministry of Environment and Forestry immediately follows up with stipulating Ministerial Regulations to

accelerate operationalization of the government regulations in the field. Detail policy milestone on peatland ecosystem protection and management is presented in Figure 1.

Detailed milestone on peatland ecosystem protection and management provided in Figure I

Peatland Protection Function: thickness > 3 metres in upstream of rivers and swamps



Peatland Degradation Criteria : ground water level > 25 centimetres

Ministerial Regulation No. 14 year 2017 Procedures on Peatland Ecosystem Function Inventory and Determination

Ministerial Regulation No. 15 year 2017 Procedures on Water Level Measurement in Compliment Point

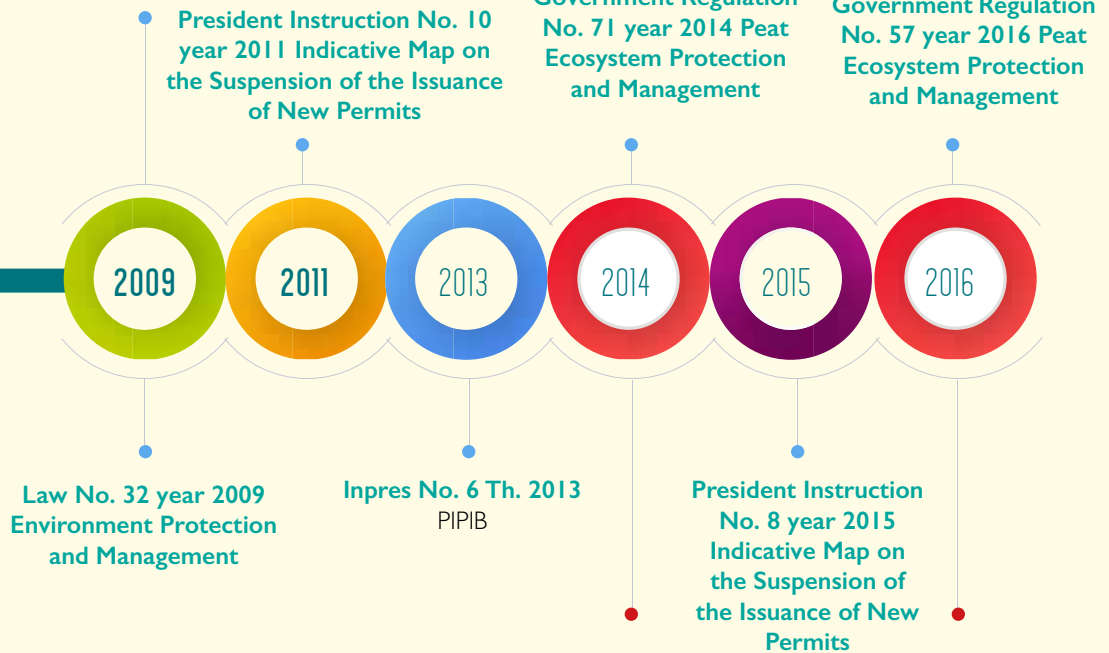
Ministerial Regulation No. 16 year 2017 Technical Procedures on Peatland Ecosystem Function Restoration

Figure I. Policy development on peatland ecosystem protection and management

Milestone


Protected Peatland Ecosystem Function: minimum 30% from KHG areas + thickness > 3 metres, etc

Ministerial Regulation of Agriculture No. 14 year 2009 Procedures on Peatland Ecosystem Use Peatland for Oil Palm Cultivation



Peatland Cultivation Function Degradation Criteria : ground water level > 0,4 metres

 **Ministerial Regulation No. 17 year 2017**
Plantation Forest Development

 **Decree of Minister of Environmental and Forestry Number SK.129/2017**
Determination of National Peat Hydrological Unit Map


 **Decree of Minister of Environmental and Forestry Number SK.130/2017**
Determination of Peat Ecosystem Function Map

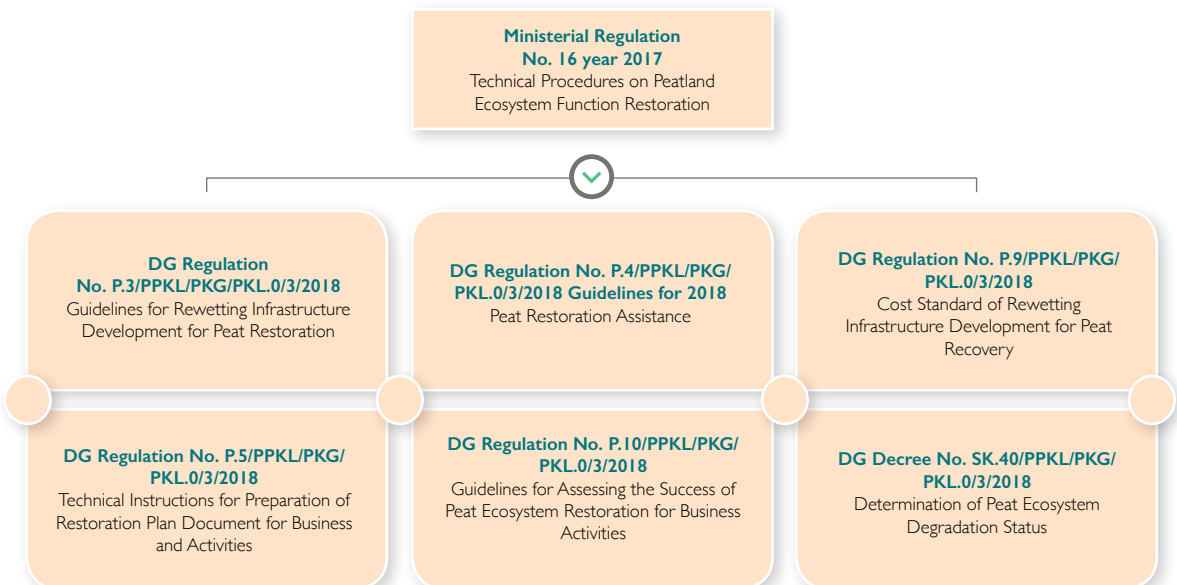
Figure 1 demonstrates that the Government of Indonesia has highly committed to protection and management of peatland ecosystem. Enactment of the Government Regulation No. 71 of 2014 junto the Government Regulation No. 57 Year of 2016 on Protection and Management of Peatland Ecosystem give more authority and power on protection and management of peatland ecosystem focusing on governance, characteristic and criteria, and peatland management based on peat hydrological unit. It is a corrective action from the previous governance started from the

enactment of Presidential Decree No. 32 Year 1990 regarding Management of Protected Area to enactment of Government Regulation No. 26 Year 2008 regarding national spatial and zoning plan as describe on Picture 1 with priority on zonation and utilization.

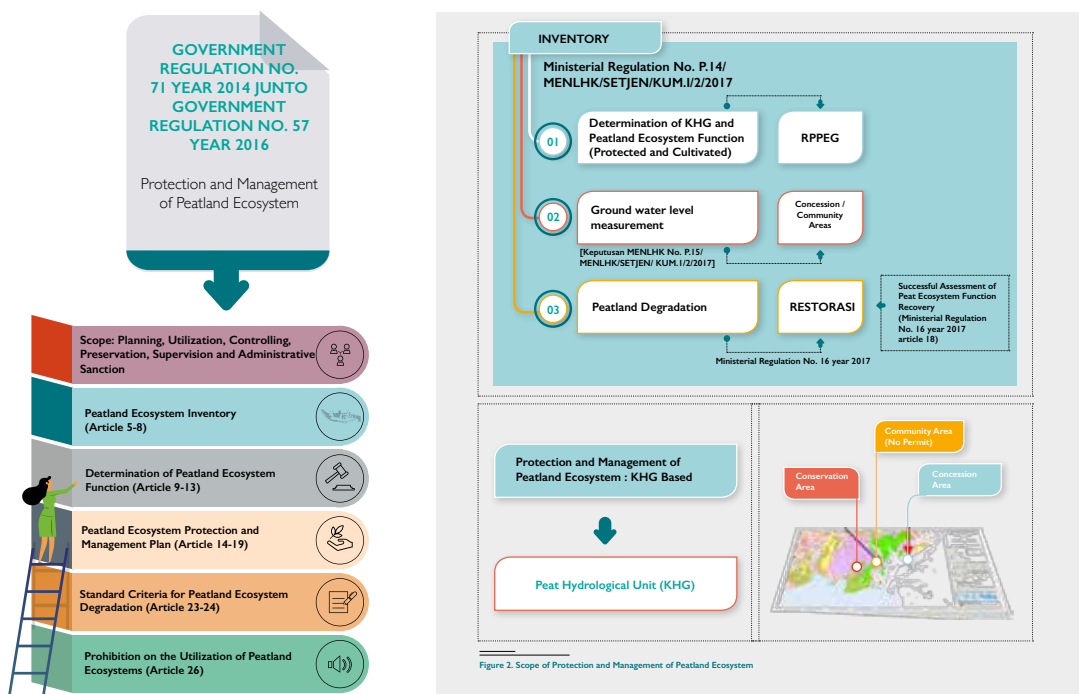
The Ministerial Regulations and Ministerial Decrees as reference for the operational implementation of the Government Regulation on protection and management of peatland ecosystem in the field are describe as follow.



Several Director General for Pollution and Environmental Degradation Control Decree has also been implemented, as follow:



In the implementation of policy strategy on peatland protection and management, the Ministry of Environment and Forestry refers to Article 3 the Government Regulation Number 71 year 2014 juncto The Government Regulation Number 57 year 2016 covering planning, utilization, control, maintenance, and administration sanction to parties having committed violation.



Protection and Management of peatland ecosystem is also implemented referring to standard criteria of degraded peatland in Article 23 Government Regulation on Peatland Protection and Management and indicator of successful peatland ecosystem recovery based on Article 18 Ministry of Environment and Forest Decree Number P.16/MENLHK/SETJEN/KUM.1/2/2017 regarding Technical Guidance for Restoration Peatland Ecosystem Function.

Priority Program and Activities on Peatland ecosystem protection and management are determined based on based on Degraded Peatland Ecosystem status according to The Director General for Pollution and Environmental Deterioration Control Decree Number SK.40/PPKL/PKG/PKL.0/3/2018 on Determination of Degraded Peatland Ecosystem Status. The Director General Decree divide degraded peatland ecosystem status into 5 categories, i.e. Very

Heavily Degraded, Heavily Degraded, Moderately Degraded, Lightly Degraded and Not Degraded. The Directorate Decree also set priorities on each degradation category, first priority (Priority I) for Very Heavily Degraded, Priority II for Heavily Degraded, Priority III for Moderately Degraded, and Priority IV for Lightly Degraded.

On the institutional capacity in peatland ecosystem protection and management in Indonesia, the Ministry of Environment and Forestry has established Directorate for Peatland Degradation Control under Directorate General for Pollution and Environmental Degradation Control. Government of Indonesia also established Peatland Restoration Agency (BRG) under the Presidential Regulation Number 1 Year 2016. The Agency has duty to coordinate and facilitate in restoring degraded peatland in 7 provinces suffering from severe forest fire in 2015 in Riau, Jambi, South Sumatera, West Kalimantan, Center Kalimantan, South Kalimantan and Papua Provinces.

Map of Degraded Peatland Ecosystem Status



REVISI RETA
Peta Indikator Fungsi Hidrologis Gambut Nasional ini merupakan hasil integrasi data tahun gambut, data jangkar sungai, data sistem lahan, data rona dan data hasil analisis lapangan.
Peta Indikator Fungsi Ekosistem Gambut Nasional ini adalah hasil pemetaan hasil integrasi data hasil gambut rona, data kawasan lindung (Peta Kawasan Lindung) dan data kawasan lindung (Peta NTRM Proklamasi).

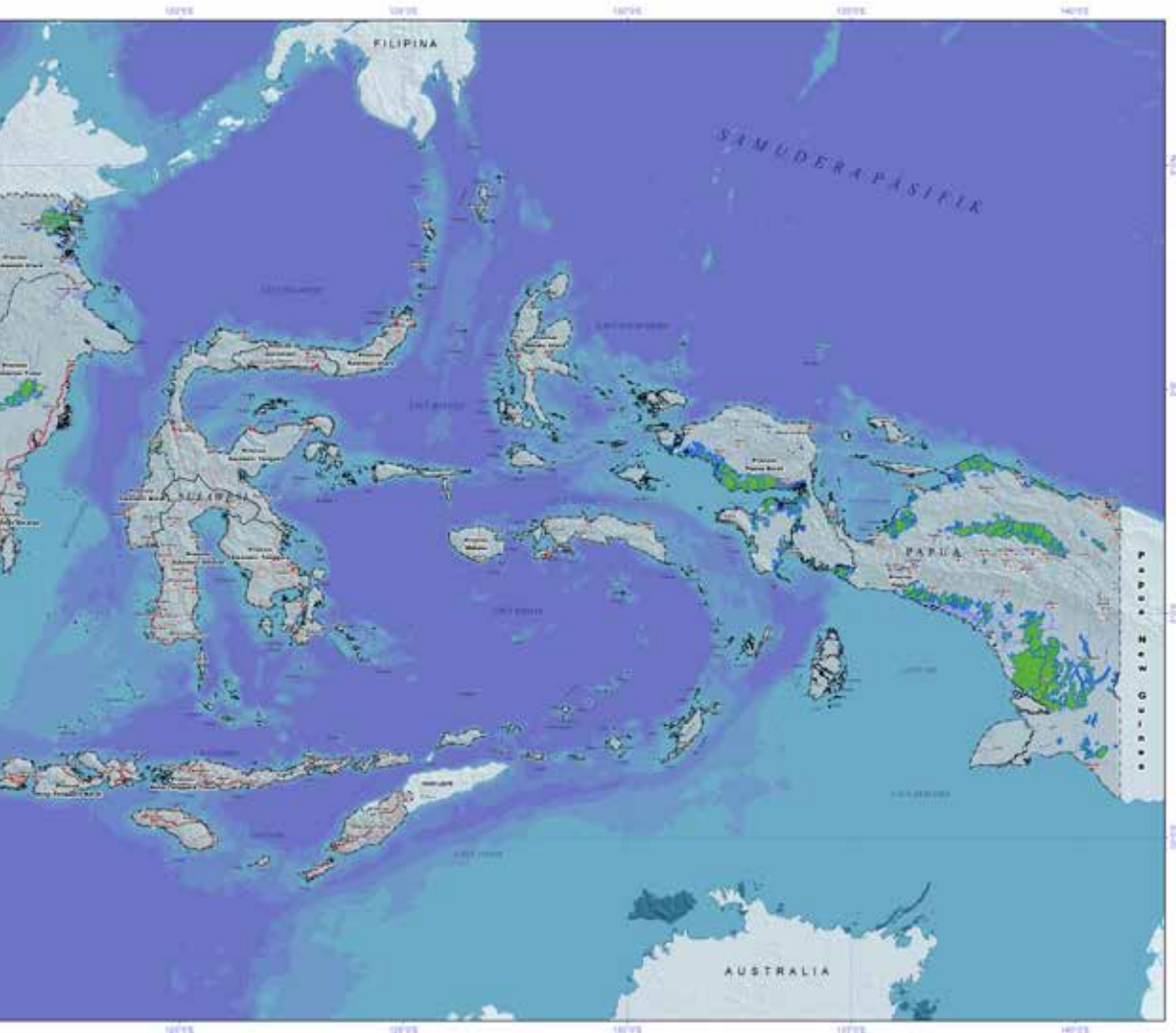


**KEMENTERIAN LINGKUNGAN HIDUP DAN KEHUTANAN
REPUBLIK INDONESIA
2018**

KETERANGAN:
Jika terdapat perubahan status akibat perubahan mata air sungai pada tahun analisis yang dilakukan oleh Kementerian Dalam Negeri dan Badan Informasi Geospasial.
CATATAN:
Jika terdapat kesalahan dalam peta ini, mohon disampaikan kepada Kementerian Lingkungan Hidup dan Kehutanan Direktorat Pengendalian Kawasan Gambut Direktorat Jenderal Pengendalian Perencanaan dan Kemitraan Lingkungan A.2.1. Peta ini terbit pada 20 Oktober 2018. Jakarta. Telp. (021) 8000110

- Sumber Data:**
1. Peta Rupa Bumi Indonesia Badan Informasi Geospasial (Skala 1:50.000), Tahun 2017.
 2. Peta Lahan Gambut Indonesia Kementerian Perencanaan Pembangunan Nasional (Skala 1:250.000), Tahun 2018.
 3. Data rona (ERTM) dan 'Terrestrial' dengan resolusi ketelitian (30 meter dan 10 meter).
 4. Peta Rencana Tata Ruang Wilayah Provinsi (RTWRP) (Selangun Peta Rencana Baku) dan Kementerian ATR dan BPN, 2016.
 5. Peta Kanal Drainase di Sistem Gambut, Tahun 2016-2017, Ditjen PPHL - KLHK.
 6. Peta Indikator Area Tersebar Tahun 2016-2017, Ditjen PPHL - KLHK.
 7. Peta Pengukuran Lahan Tahun 2016-2016, Ditjen PPHL - KLHK.
 8. Peta Analisa Kawasan Pelebaran (SURVIVATINA), Tahun 2017, Ditjen PPHL - KLHK.
 9. Peta Analisa Kawasan Pelebaran (INDUPERKAWAN), Kementerian ATR/BPN.
 10. Peta Kawasan Hidrologis Gambut, Tahun 2017, Ditjen PPHL - KLHK.
 11. Peta Fungsi Ekosistem Gambut Nasional, Tahun 2017, Ditjen PPHL - KLHK.

Lampiran Ke-
dan Kerangka
Nomor: SA
Tanggal: 12



Direktur Jenderal Pengendalian Pencemaran dan Kerusakan Lingkungan
K. 40/PP/KL/SK/PP/KL.0/3/2018
Maret 2018

Mengesahkan,
Direktur Jenderal Pengendalian Pencemaran dan Kerusakan Lingkungan

Drs. M.H. Kartihsyah, MS
NIP. 19610329 199203 1 001

STATUS KERUSAKAN EKOSISTEM GAMBUT

- Tidak Rusak (Nilai < 0,00)
- Rusak Ringan (Nilai < 2,00 - 13,00)
- Rusak Sedang (Nilai 13,01 - 34,00)
- Rusak Berat (Nilai 34,01 - 48,00)
- Rusak Sangat Berat (Nilai > 48,01 - 48,00)

KETERANGAN

- BUNDAH ADMINISTRASI**
 - Bndkda Provinsi
 - Bndkda Kabupaten
- JALINAN JALAN**
 - Jalan Arteri
 - Jalan Kolektor
- BATAS ADMINISTRASI**
 - Batas Negara
 - Batas Provinsi
 - Batas Kabupaten
 - Batas Kabupaten Melintang Sumatera (KMS)
 - Batas 282 dan Lintasan Nasional Indonesia (282 dan LNI)
- PERAKARAN**
 - Pantai
 - Demak/Reklamasi
 - Sungai

Provinsi	STATUS KERUSAKAN EKOSISTEM GAMBUT					Luas Total (Ha)
	Tidak Rusak	Rusak Ringan	Rusak Sedang	Rusak Berat	Rusak Sangat Berat	
Pulau Sumatera	34.261	6.917.767	1.617.599	574.762	16.124	9.166.114
Aceh	2.501	261.192	40.521	11.692	143	336.049
Bengkulu	46	14.257	38	0	0	14.339
Jambi	1.459	635.745	151.899	79.344	3.554	871.292
Kep. Bangka Belitung	399	93.021	5.673	943	1	98.036
Kep. Riau	55	15.963	326	0	0	16.344
Lampung	252	48.922	31.327	56.369	303	97.173
Riau	24.262	4.136.290	635.916	166.042	3.866	4.868.174
Sumatera Barat	494	96.444	82.480	32.817	217	152.430
Sumatera Selatan	3.224	1.290.009	560.281	214.222	7.943	2.093.779
Sumatera Utara	1.260	295.926	151.451	72.733	99	521.476
Pulau Kalimantan	52.803	7.402.969	762.219	165.449	7.411	8.390.930
Kalimantan Barat	17.250	2.305.438	375.248	93.969	626	2.792.633
Kalimantan Selatan	640	154.031	55.640	16.967	743	227.027
Kalimantan Tengah	17.639	4.324.118	289.493	46.505	5.701	4.692.026
Kalimantan Timur	14.409	294.028	30.214	2.554	261	341.467
Kalimantan Utara	3.438	325.353	12.795	5.365	0	366.951
Pulau Sulawesi	268	62.431	14.960	2.573	0	86.161
Sulawesi Barat	46	20.140	9.684	1.375	0	31.233
Sulawesi Tengah	220	22.263	5.224	1.198	0	29.905
Pulau Papua	93.730	6.495.642	23.274	2.939	80	6.525.665
Papua	57.997	4.077.067	17.045	1.826	0	5.054.936
Papua Barat	35.733	1.427.455	6.229	1.113	0	1.470.529

Inventory and Determination of Peatland Ecosystem Function

Peatland Ecosystem Inventory is activities to identify and obtain data and information on peatland ecosystem characteristic including identification of peatland area, delineation of peat hydrological unit, field survey, and determination of final peatland hydrological unit map.



Inventory of Peat Ecosystems Characteristics is carried out as a materials for determining the Map of Peat Ecosystems Functions

In implementing Article 10 of the Government Regulation Number 57 y Year 2016 regarding peatland protection and management for peatland ecosystem function determination, the Ministry of Environment and Forestry has conducted inventory of peatland ecosystem function with scale 1:50K. Detail information on the achievement of peatland ecosystem characteristic inventory until the end of 2018 is presented in Table 1.

Table 1. Achievement on Inventory and Determination of Peatland Ecosystem Function

No	Description	Number of Peat Hydrological Unit (PHU)				Note
		Year 2015	Year 2016	Year 2017	Year 2018	
1	Inventory Peatland Ecosystem Characteristics					
	a. Scale 1:250.000		865			
	b. Scale 1:50.000	5 (complete 5)	8 (complete 8)	4 (complete 4)	12 (complete 4, less complete 8)	Total of Inventory 29 PHU
2	Determination of Peatland Ecosystem Function					
	a. Scale 1:250.000			865		
	b. Scale 1:50.000			5	16	5 PHU have been set, 16 PHU have been completed (propose for determination), 8 PHU should be completed with inventory data in concession area.

Peat Hydrological Unit and Peat Ecosystem Function are established under the Ministry of Environment and Forestry Decree Number: SK.129/MENLHK/SETJEN/PKL.0/2/2017 on the Determination of National Peat Hydrological Unit and the Ministry of Environment and Forestry Number: SK.130/MENLHK/SETJEN/PKL.0/2/2017 regarding the Determination of National Peatland Ecosystem Function.

Peatland Ecosystem Inventory has been implemented since 2015 with a total 29 peat hydrological unit (PHU) characteristic inventoried in scale 1:50K. 5 (five) PHU has been established under the Ministry of Environment and Forestry Decree in 2017. In 2018, Ministry of Environment and Forestry process to determine 16 PHU in scale 1:50K. 8 of 29 PHU inventoried is still to be completed with data from the peatland characteristic inventory in concession holders. Detail name of 5 determined PHU and 24 inventoried PHU in 2016 – 2018 provided in Table 2.



Table 2. Achievement on Inventory of Peatland Ecosystem Function with Scale 1:50K in 2015 - 2018

2015

- KHG Sungai Kampar – Sungai Gaung :
Regency of Pelalawan, Indragiri Hulu dan Indragiri Hilir, Province of Riau
- KHG Sungai Gaung – Sungai Batang Tuaka:
Regency of Indragiri Hulu dan Indragiri Hilir, Province of Riau
- KHG Pulau Tebing Tinggi:
Regency of Kepulauan Meranti, Province of Riau;
- KHG Pulau Bengkalis:
Regency of Bengkalis, Province of Riau;
- KHG Sungai Kapuas – Sungai Terentang:
Regency of Kubu Raya, Province of Kalimantan Barat

2016

- KHG Krueng Surin – Krueng Muling,
Regency of Nagan Raya, Province of Aceh;
- KHG Krueng Tripa – Krueng Seuneuam,
Regency of Nagan Raya, Province of Aceh;
- KHG Sungai Kanopan – Sungai Kuala,
Regency of Labuhan Batu Utara, Province of Sumatera Utara;
- KHG Sungai Kuala – Sungai Kuo,
Regency of Labuhan Batu Utara, Province of Sumatera Utara;
- KHG Aek Lunang – Aek Sidang,
Regency of Pesisir Selatan, Province of Sumatera Barat;
- KHG Aek Ubar – Aek Lunang,
Regency of Pesisir Selatan, Province of Sumatera Barat;
- KHG Sungai Kelinjau – Sungai Kedangyantau,
Regency of Kutai Kartanegara dan Kutai Timur, Province of Kalimantan Timur;
- KHG Sungai Kedangyantau – Sungai Sabintulung,
Regency of Kutai Kartanegara, Province of Kalimantan Timur.

2017

- KHG Krueng Matee – Krueng Tumiyee,
Regency of Nagan Raya, Province of Aceh;
- KHG Batang Toru – Aek Maraitgadang,
Regency of Mandailing Natal, Province of Sumatera Utara;
- KHG Aek Maraitgadang – Aek Sikapas,
Regency of Mandailing Natal, Province of Sumatera Utara; serta
- KHG Batang Ampu – Bah Mandiangin,
Regency of Pasaman Barat, Province of Sumatera Barat.

2018

- KHG Krueng Wonki - Krueng Gubon,
Regency of Aceh Barat, Province of Aceh
- KHG Krueng Meureubo - Krueng Matee,
Regency of Aceh Barat, Regency of Naganraya, Province of Aceh
- KHG Aek Na Birong - Aek Batang Toru,
Regency of Tapanuli Selatan, Province of Sumatera Utara
- KHG Sungai Kualuh Bilah - Sungai Barumun, Regency of Labuhan Batu, Labuhan Batu Selatan, Province of Sumatera Utara
- KHG Pulau Mendol, Regency of Pelalawan, Province of Riau
- KHG Sungai Indragiri - Sungai Belilas,
Regency of Indragiri Hulu, Province of Riau
- KHG Sungai Tabat - Batang Masangkiri,
Regency of Agam, Province of Sumatera Barat
- KHG Aek Musi - Sungai Upang,
Regency of Banyuasin, Province of Sumatera Selatan
- KHG Sungai Bila - Sungai Rasau, Regency of Kotawaringin Barat, Regency of Sukamara Province of Kalimantan Tengah
- KHG Sungai Dadau - Sungai Sikan,
Regency of Sambas Province of Kalimantan Barat
- KHG Sungai Sambih - Sungai Landak,
Regency of Kuburaya, Regency of Landak Province of Kalimantan Barat
- KHG Sungai Kapuas - Sungai Mendawak,
Regency of Sanggau, Province of Kalimantan Barat

Planning of Peatland Degradation Control

Peatland Ecosystem Protection and Management Plan (PEPMP – RPPEG) is established based on government authority level as mandated on the Article 15 of the Government Regulation Number 57 Year 2016 regarding Protection and Management of Peatland Ecosystem. The PEPMP – RPPEG National is established by the Minister of Environment and Forestry, PEPMP – RPPEG Province is established by Governor, and PEPMP – RPPEG district/city is established by Head of District/Mayor. Authority Classification on PEPMP – RPPEG development

is established based on administrative area and consider to the location of peatland hydrological unit.

PEPMP – RPPEG Development is hierarchical process. With this regard, the lower level should refer to the upper level of PEPMP – RPPEG Document. Changing and adjustment of RPPEG developed based on the upper level of PEPMP – RPPEG Document. Staging of the PEPMP – RPPEG development is implemented through data and information collection, data analysis, plan development. Plan Development

should start with identification of opportunities, problems, strategic issues, policy directions, and formulation of strategy, programs, and activities.

Substance and content of PEPMP – RPPEG covers utilization of peatland ecosystem, peatland ecosystem management, and adaptation and mitigation of climate change. The Scheme of PEPMP – RPPEG establishment as mandated on the government regulation is provided in Figure 3.



Government Regulation No. 57 year 2016 regarding Peatland Ecosystem Protection and Management, Article 16.

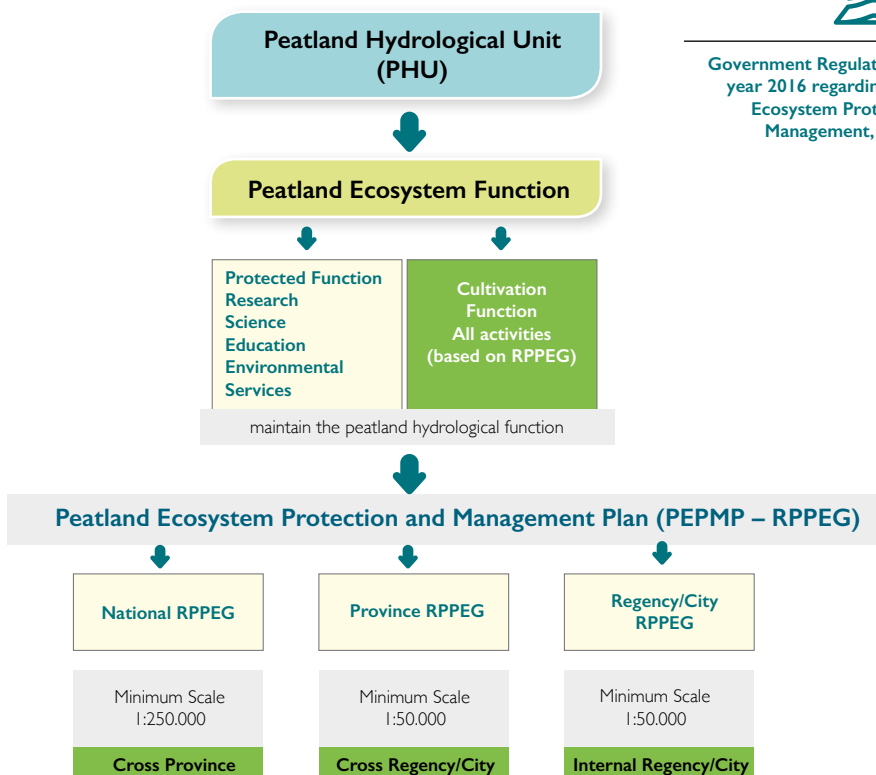


Figure 3. Scheme for Preparing Protection and Management Peatland Ecosystem Plan



 Ground water level measurement in field

PEPMP – RPPEG is component of Environmental Protection and Management Plan (RPPLH) and should be a reference to other development plan, while taking into account other relevant development plan document, i.e. National Medium Term Development Plan (RMTDP)/Regional Medium Term Development Plan, Spatial Plans, National Forestry Plan, and other strategic plans.

Until 2018, the Ministry of Environment and Forestry is establishing National Peatland Ecosystem Protection and Management Plan that will be determined in the Ministerial Decree. In providing guideline for province and district level to develop Regional Peatland Ecosystem Protection and Management Plan, the Ministry of Environment and Forestry is preparing a Guideline on Procedure of Formulation, Stipulation, and Amendment of Peatland Ecosystem Protection and Management Plan under the Ministerial Regulation. In parallel, the Ministry of Environment and Forestry has also implemented Pilot Project on establishment of Peatland Ecosystem Protection and Management Plan in:



KHG Sungai Kapuas – Sungai Terentang, Kubu Raya Regency



Administrative area in Tana Tidung Regency (9 KHG), and/or Nunukan Regency (5 KHG), North Kalimantan Province



One administrative area at North Kalimantan Province which has 13 KHG

In implementing those Pilot Projects, the Ministry of Environment and Forestry engage various stakeholders, among other local governments, university, concession holders, and community.

Restoration of Peatland Ecosystem Function

A. Peatland Restoration in Concession Area



 Water management (hydrology) in restoring peatland ecosystem function

Peatland Ecosystem degradation control consist of prevention, mitigation, and restoration. Those activities are implemented by involving active role of community and encourage concession holders to restore in their concession areas. Restoration of Peatland Ecosystem in concession areas are implemented by developing Restoration Plan Document. Meanwhile peatland ecosystem restoration in non-concession area are under supervision of the Ministry of Environment and Forestry, Province Government, and District/City Government depending on its authority level. The non concession areas consist of conservation area, conservation forest, production forest, forest parks that are not allocated with business and/or activities license, as well as other used areas including land managed by local communities and/or customary law communities.

Restoration of Peatland Ecosystem in concession areas, either in industrial forest (HTI) or in Plantation/palm Oil Estate, are implemented by concession holders referring to the restoration direction from the Director General for Pollution and Environmental Degradation Control, the Ministry of Environment and Forestry. Restoration is carried out with hydrological and vegetation restoration. Peat hydrological restoration is implemented through development of canal blocking (with or without spillway), rain fall monitoring station, water level monitoring well, either in manual way or using data logger. Restoration of vegetation is implemented with revegetation, rehabilitation and natural succession.

Based on the Director General Decree on Peatland Ecosystem Restoration Plan Document in concession areas, corporates are mandated to report its restoration implementation regularly, submit water level monitoring data as compliance points, either in manual way or using data logger, and rain fall monitoring data. Progress data on restoration of peatland ecosystem is provided in the following description. .

➔ Recapitulation of Peatland Ecosystem Restoration in Industrial Plantation Forest

Total of Company

68

▶ Area of Peatland Ecosystem Restoration 2.226.780,8 hektar	▶ TMAT's number 5.669 unit	▶ Number of Rainfall Monitoring Station 263 unit
▶ Number of Canal Blocking 8.012 unit	▶ Extent of Revegetation 4.438,70 hektar	▶ Extent of Natural Suceccion 306.112 hektar

➔ Recapitulation of Peatland Ecosystem Restoration in Oil Palm Plantation

Total of Company

127

▶ Area of Peatland Ecosystem Restoration 884.580,92 hektar	▶ TMAT's number 3.934 unit	▶ Number of Rainfall Monitoring Station 337 unit
▶ Number of Canal Blocking 9.460 unit	▶ Extent of Revegetation -	▶ Extent of Natural Suceccion -

➔ Total of Peatland Ecosystem Restoration in Concession Areas

Total of Company

194

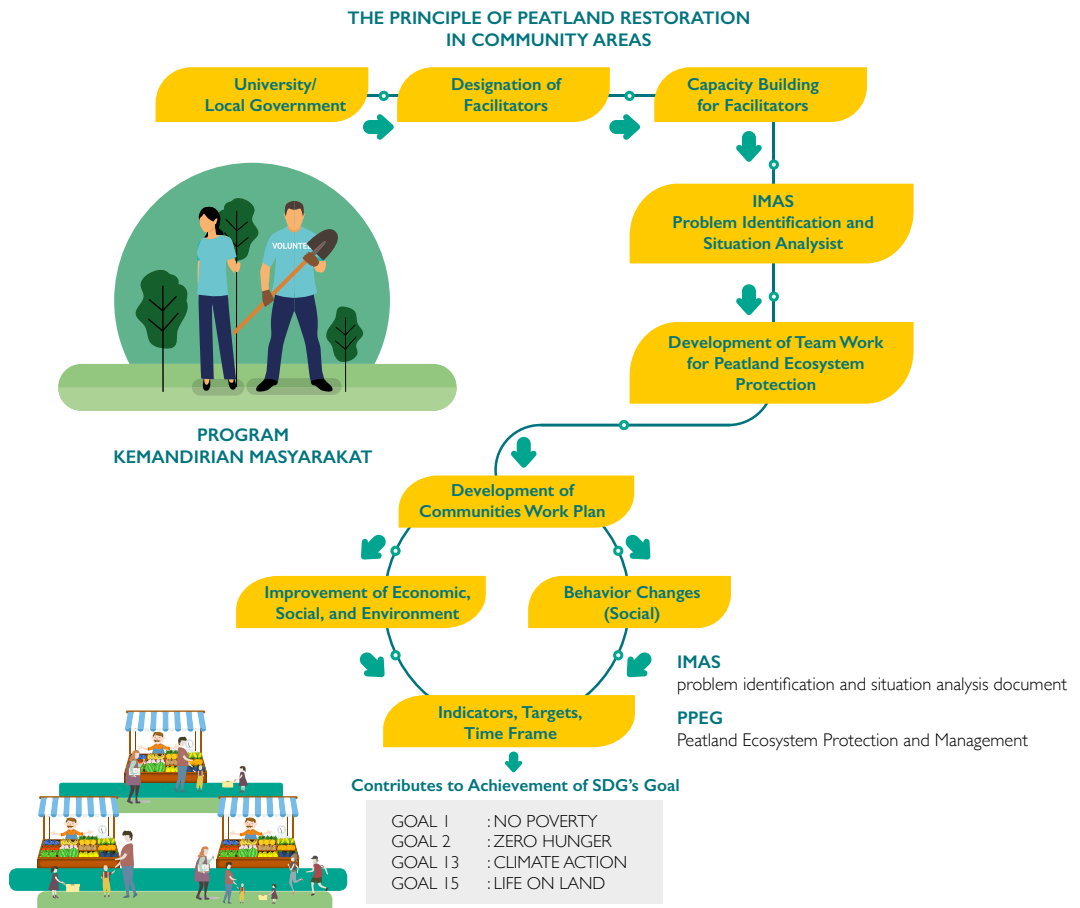
▶ Area of Peatland Ecosystem Restoration 3.111.360,89 hektar	▶ TMAT's number 9.603 unit	▶ Number of Rainfall Monitoring Station 600 unit
▶ Number of Canal Blocking 17.292 unit	▶ Extent of Revegetation 4.438,70 hektar	▶ Extent of Natural Suceccion 306.112 hektar

B. Community Based in Peatland Ecosystem Restoration

Peatland Ecosystem restoration in community area is also implemented through Community Self-sustaining Program. This program is aimed at promoting self-sustaining community in peatland ecosystem. This activities consist of restoration on peat hydrological function and community livelihood improvement. Implementation of this program involves facilitators' assistance from local communities with qualification in education at undergraduate level. In general, the principle of community based peatland ecosystem restoration is provided in Picture 4.



Implementing Community Development Based Restoration Program



Peatland ecosystem restoration illustration and concept in community land

Initial step implemented in Community Self-sustaining Program is The Ministry of Environment and Forestry develop collaborative work with University and Local Government, and designate facilitators in village level. Facilitators are trained on protection and management of peatland ecosystem. Facilitators assist local community to develop problem identification and situation analysis document (IMAS) related to community needs in supporting peatland ecosystem protection and management in their area. In the next step, facilitators with community develop Peatland Protection and Management Working Group in village level. Facilitators with the Working Group establish Community Work Plan (RKM) as work plans prepared by the communities

(bottom-up planning) on peatland ecosystem restoration.

The established Community Work Plan (RKM) covers peatland ecosystem protection and management following three criteria, among others bring back the water and ecosystem, bring back the ecosystem, and improve community livelihood.

Those activities are implemented through constructing canal blocking, rehabilitation/ of vegetation, and improvement of community livelihood. Activities of Community Livelihood improvement are implemented including through development of Pilot Project on rehabilitation of vegetation with cultivation of indemic plants with high

economic value, i.e. pineapple, liberica/excelsa coffee, jernang (*Daemonorops* sp.), red ginger, pinang (*Areca catechu*), as well as fish farming and honey bees, etc. Community Development Plan completed with determination of performance indicators, target, time frame, and connection with contribution to the achievement of sustainable development goals (SDGs), in particularly SDGs Goal 1 (no poverty), Goal 2 (no hunger), Goal 13 (Climate Action), Goal 15 (life on land).

The result of implementation on community based peatland ecosystem restoration are presented in the following table.

Table 4. Recapitulation of Community Based in Peatland Ecosystem Restoration

Output	Year 2015	Year 2016	Year 2017	Year 2018	Total
Document of IMAS (Problem Identification and Situation Analyst) for Facilitators	-	17	12	24	53
Designation Document of Team Work for Peatland Protection and Management signed by the Head of Villages	-	17	12	24	53
Community Work Plan	-	54	40	66	160
Number of Canal Blocking have been developed (Unit)	12 model (Riau, Kalbar, Kalteng)	205 (Aceh, Riau, Jambi, Kalbar, Kaltim)	130 (Aceh, Sumut, Kaltim)	196 (Aceh, Sumut, Sumbar, Kaltim)	543 (Aceh, Sumut, Sumbar, Riau, Jambi, Kalbar, Kalteng, Kaltim)
Area of Rewetting Peatland through development of canal blocking	173 ha	2.870 ha	2,139 ha	3.200 ha	8.382 ha

Source: Directorate for Peatland Degradation Control, (December, 2018)

C. Partnership on Community Base Peatland Ecosystem Protection and Management.

Protection and management of peatland ecosystem is the obligation of all stakeholders, including state government, local government, responsible businesses or activities either as concession holders or communities, university, etc. Therefore, partnership among stakeholders is one strategy that must be taken in supporting the success of peatland ecosystem protection and management. As one example of the success of partnership is a community development initiated by Pertamina RU Sungai Pakning implementing community development in peatland ecosystem area in Sungai Pakning, Bengkalis, Riau.

Motivated by the problem in peatland area which is vulnerable to fire, Pertamina RU II Sungai Pakning implements community development program to solve the peatland problem in the area. Community development is established through Self-sustaining Peatland Village (Kampung Berdikari Program) and Golden Generation. Self-sustaining Peatland Village is implemented through community empowerment on fire preparedness (Community Fire Preparedness Team = Masyarakat Peduli Api), integrated pineapple cultivation, and peatland arboretum. While the Golden Generation Program is implemented through Peatland Awareness Raising and Education (Sekolah Peduli Gambut), SEHATI Children Health Services (Posyandu SEHATI), and marketing of Small and Medium Scale enterprises.



Partnership Model on Self-Sustaining Peatland Village Program and Gold Generation. Source: Pertamina RU II Pakning Sungai Pakning (2018)

In 2018, Pertamina RU II Sungai Pakning achieved Gold PROPER from the Ministry of Environment and Forestry for the excellence on community development program, particularly in communities building on prevention and protection of peatland ecosystem, as well as improving the economy by cultivating pineapple on peatland, so that the communities have economic self-suficiency to maintain a sustainable peatland ecosystem.

The partnership activity model will continue to be developed and replicated elsewhere with other partners considering the vast of peatland in the community area at about 9,607 million hectares in conservation function and 9,6 million in cultivation function or about 75 percent of the total peat hydrological units (PHU).



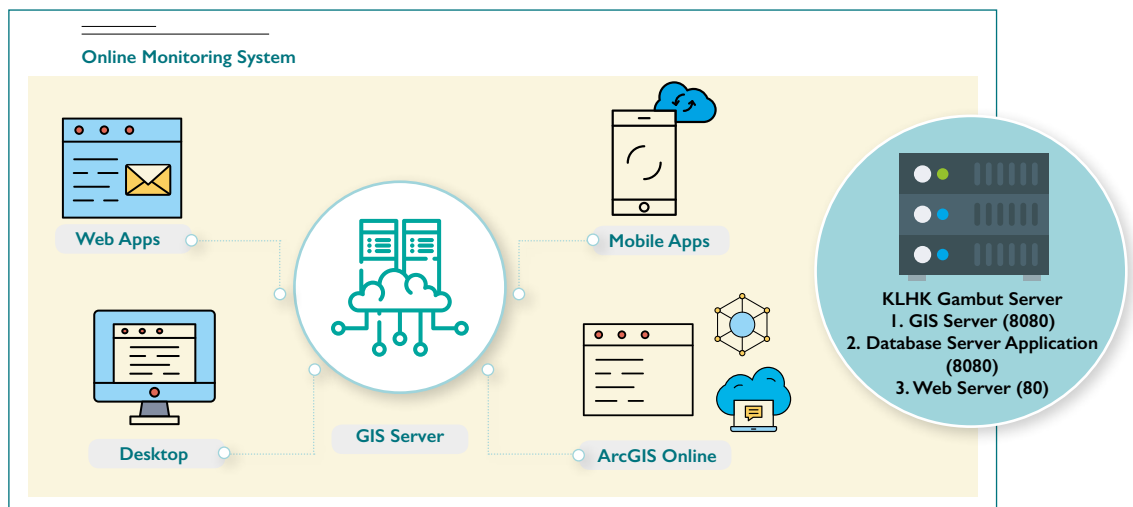
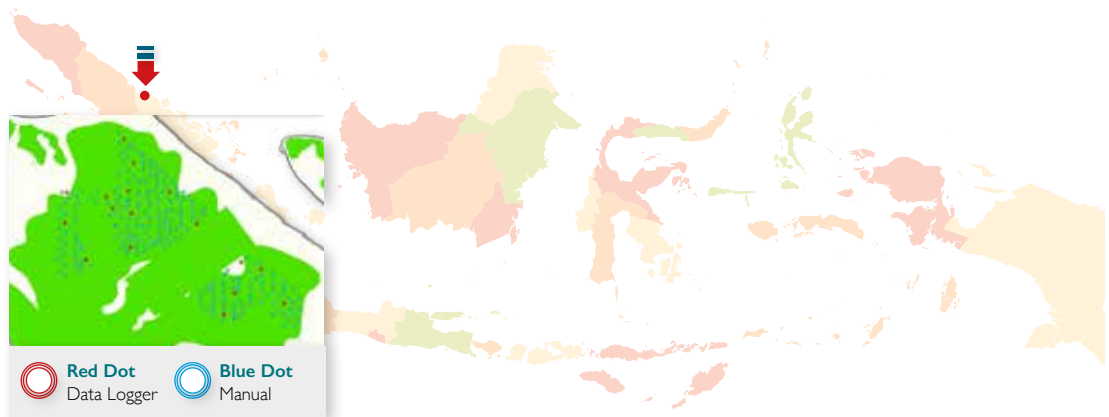
CSR PROGRAM TO SUPPORT PEATLAND ECOSYSTEM PROTECTION AND MANAGEMENT
SOURCE: Pertamina RU II Pakning Sungai Pakning (2018)

Development of Database

The Ministry and Environment and Forestry has developed water level and rainfall monitoring database (TMAT) either from concession area or from community area, especially in the location of pilot project for community based peatland restoration. The Database manages monitoring data from 8,514 compliance point for water level monitoring spread in all area in Indonesia and real time updated through mobile application based.

The database is also connected with other related database, among other SIPONGI (Forest and Land Fire Database), Database of Meteorology, Climatology, and Geophysics Agency (BMKG), database of National Agency for Disaster Management (BNPB), in supporting the calculation of peatland ecosystem restoration achievement in quantitative measures, evaluation and improvement the policy on protection and management of peatland ecosystem in the future. Description of the database for water level monitoring (TMAT) and rainfall is provided in the Picture 5.

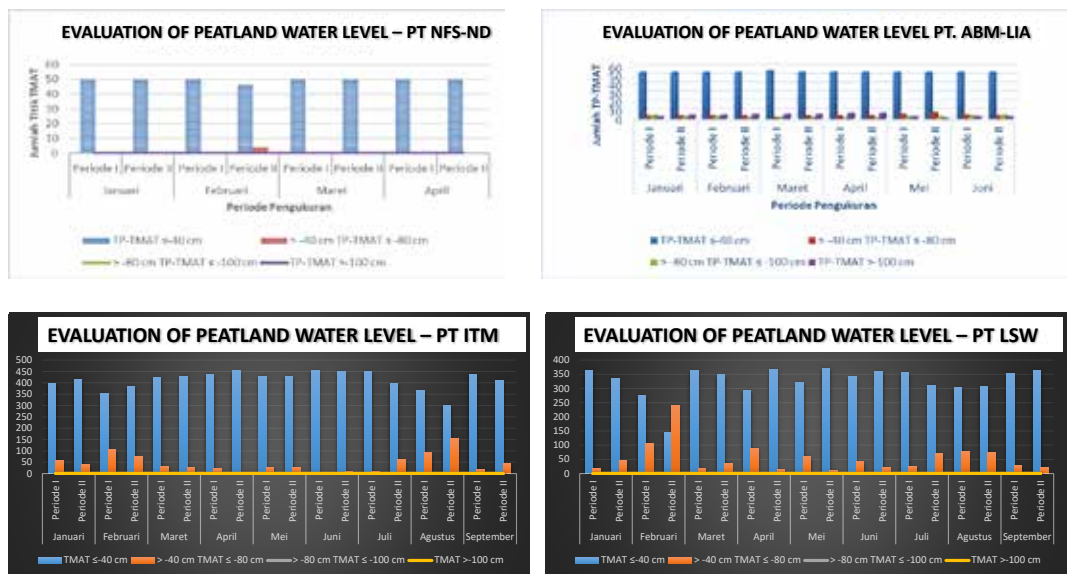
Illustration for the distribution of Compliance Point for Ground water level monitoring (TMAT)



Picture 5. Data base System Ground water level monitoring

The database can be used to determine the compliance of concession holders in implementing the requirement of water management with indicator on water level monitoring data (TMAT). As example, the compliance on water level requirement in industrial forest and palm oil plantation is describe in Picture 6 below. Picture 6 shows that either most industrial forest or palm oil concession holders are able to comply with water level requirement at less than 0.4 meter below land surface and the cultivated plants are still productive.

PEATLAND WATER LEVEL (TMAT) MONITORING DATA
AT THE PALM OIL PLANTATION AND INDUSTRIAL FOREST (2018)
SURVIVAL RATE 100%, AND WATER LEVEL <0,4 M CAN BE ACHIEVED

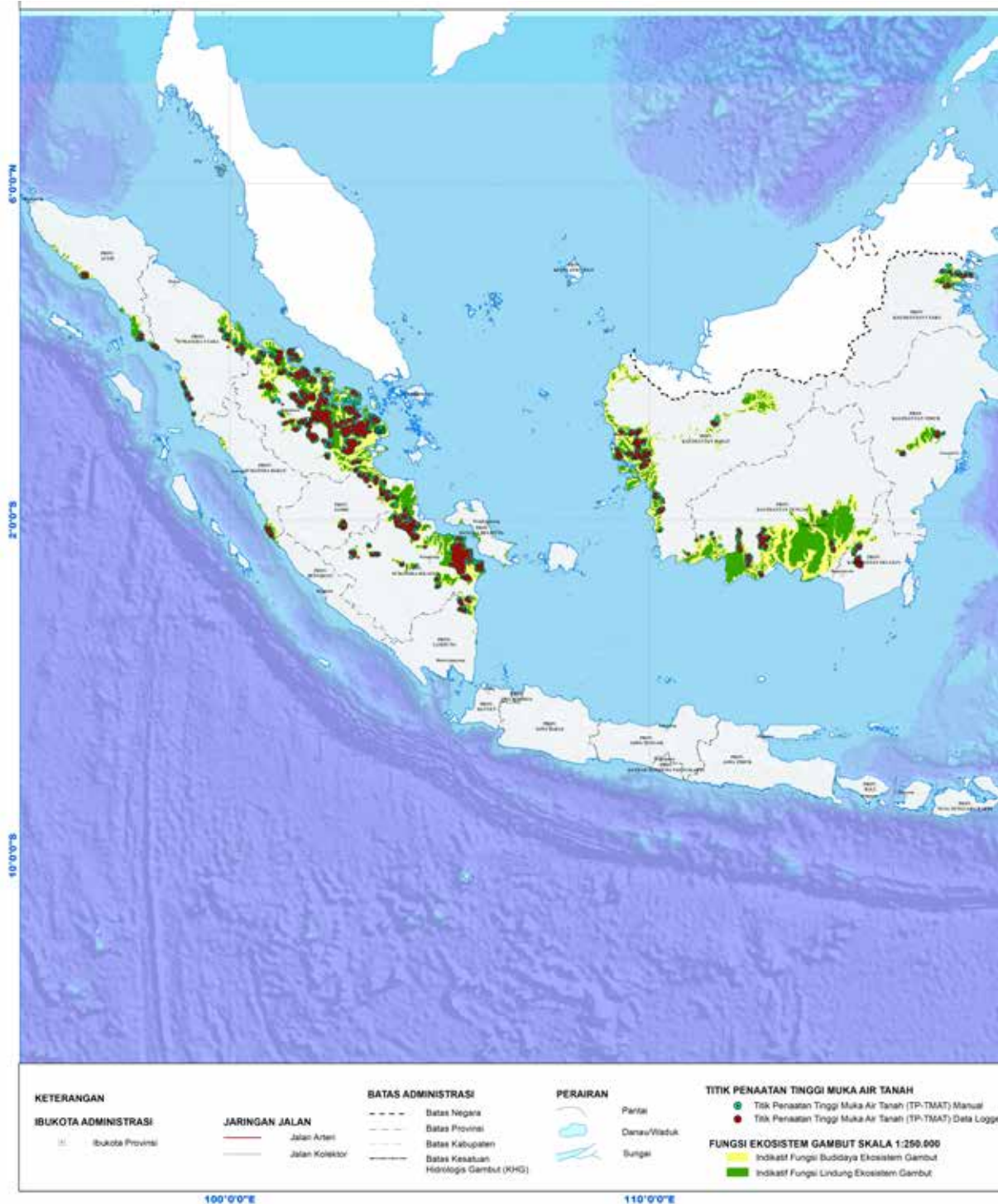


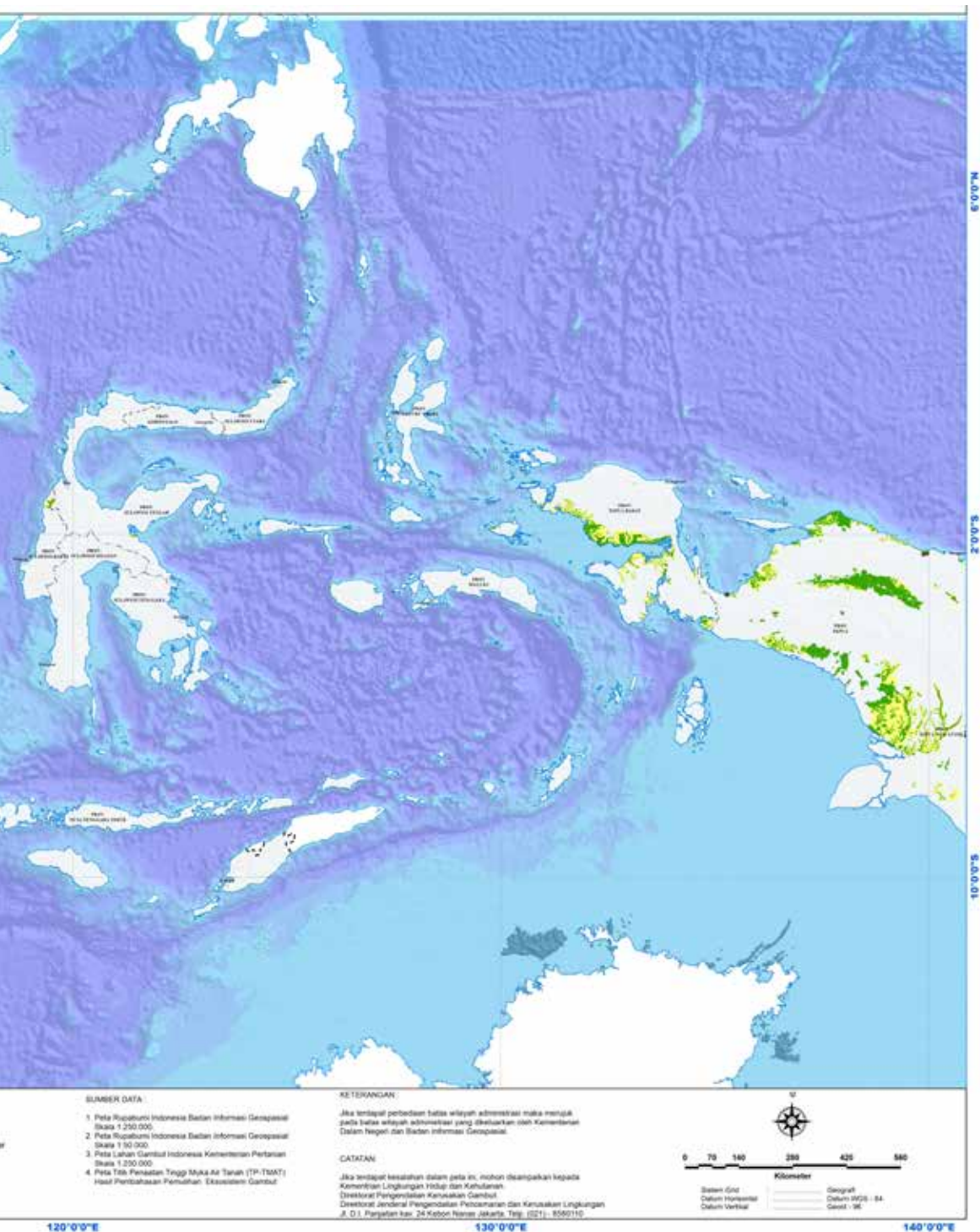
Picture 6. Monitoring Data on Ground Water Level (TMAT) in Industrial Forest and Palm Oil Plantation



Ground Water Level (TMAT) Monitoring using data logger

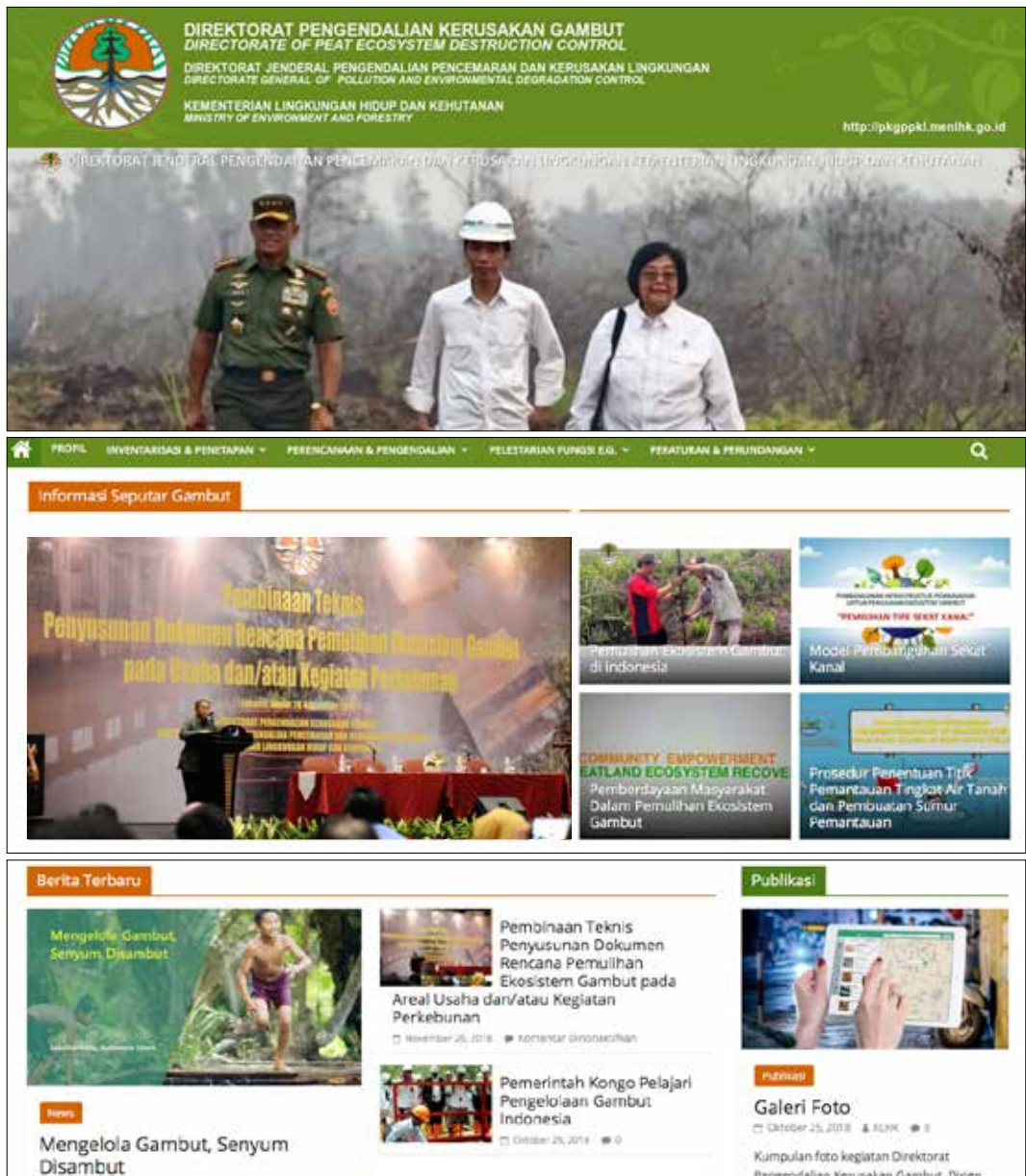
Map of Peatland Surface Water Level Compliment Point in Concession Area



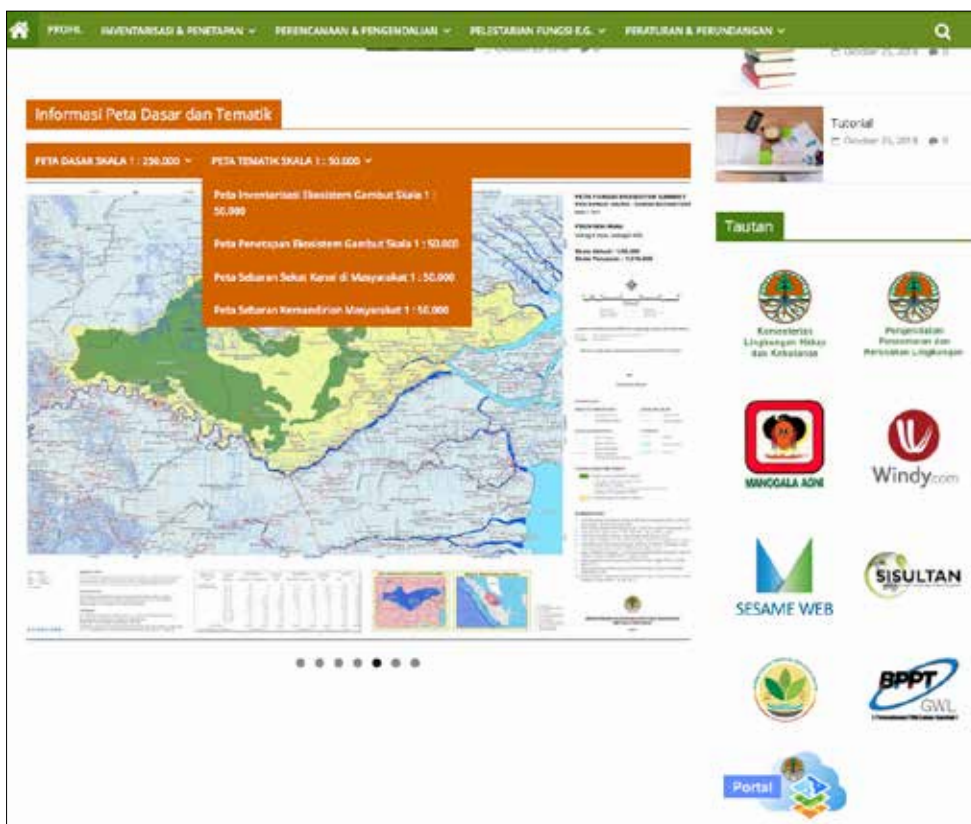


Development of Portal Geographic Information System (GIS) Website

In October 2018, the Ministry of Environment and Forestry has launched a portal Geographic Information System (GIS) Websites for sustainable management of peatland ecosystem and reduction of potential forest fire on peatland. The information in the website can be accessed at URL address pkgppkl.menlhk.go.id as described in Picture 7.



The objective of the website development is to provide knowledge, lesson learn, and information to encourage active participation of various stakeholders on peatland protection and management. The information provided in the website includes the effort and achievement on peatland protection and management, regulations, tutorials on peatland restoration, Peat Hydrological Maps with scale 1:250K and 1:50K, and Peatland Degradation Map under the Directorate General of Pollution and Environmental Degradation Control Regulation Number 41 year 2018. Peat Hydrological units (PHUs) Maps can be accessed in form of Web GIS form and other information provided in the website can also be downloaded by users and can be used to support peatland protection and management in field. The website is also linked to other related website, among other SIPONGI, Windy.com, Sesame Web, SISULTAN, and ITPC. Thousands visitors from various countries have accessed this website.



Information publication on Peatland Ecosystems protection and management that linked to other related websites

Contribution on GHG Emissions Reduction

The achievement of peatland ecosystem protection and management activities as the above description contributes to the reduction of peatland fire and Greenhouse Gas (GHG) emission. Rehabilitation of peatland hydrological function through peatland ecosystem restoration to keep peatland wet and prevent from potential peatland fire. In parallel, peatland ecosystem monitoring, such as ground water level (TMAT) monitoring, is important stage on peatland fire prevention and early warning system.

Table 5. Number of Hotspot and Burnt Area in 2015 - 2017

Year	Number of Hotspots	BURNT AREA (HECTARES)		
		Peatland	Mineral Soil	Total
2015	70.971	891.275	1.720.135	2.611.411
2016	2.844	97.787	340.576	438.363
2017	2.440	13.555	151.929	165.484
Total	76.255	1.002.617	2.212.640	3.215.258

Source: MoEF 2018

Table 5 above demonstrate significant reduction on number of hot spot in last 2 to 3 years from forest fire from 2015 to 2017 at 93.6 percent (from 70.961 hotspot in 2015 to 2.440 hotspots in 2017). In 2015, it was recorded that burnt area at about 2,611,411 hectares, 438,363 hectares in 2016, and 165,484 hectares in 2017.

Reduction of greenhouse gas (GHG) emission can be calculated from the reduction on number of hotspot and burnt area on peatland, at 803 million tons CO₂ equivalent in 2015 and change to 12.5 million tons CO₂ equivalent in 2017. From the calculation, Greenhouse Gas emission in 2017 was at 1.56 percent of greenhouse gas emission in 2015.



**Greenhouse Gas Emissions in
2017 was 1.56% of Greenhouse
Gas Emission from Peatland Fire
in 2015**



The rewetting of peatland ecosystems contributes significantly to the reduction of GHG emissions

Reduction in greenhouse gas emissions on peatlands can be measured from restoration activities or rewetting of peatlands. Achievement of GHG emission reductions is measured by comparing of emissions before and after peatland restoration activities. Rewetting of peatland may reduce the potential decomposition of peatland and prevent the emission of GHG. The following table demonstrate the achievement of peatland restoration until 2018, in area of 3.1 million hectares of restored peatland, either in concession or community area. The activities potentially contribute to the reduction of emission at 190,602,794.29 ton CO₂ equivalent. This emission reduction is calculated from the emission before and after restoration activities from 304,105,620.00 ton CO₂ equivalent to 113,502,825.71 ton CO₂ equivalent. Further validation and review of this calculation is indeed necessary.

Table of CALCULATION OF ACHIEVEMENT IN REDUCTION OF GHG EMISSION
A. Data and Methodology for Calculation of Achievement in Reduction of GHG Emission

Mitigation Action	Data of Activity (DA)	Source of DA	Emission Factor	Method
Peatland restoration (reduction of peat decomposition by construction of rewetting infrastructures)	Result of peatland water level monitoring (m) in concession and community area (ha) Year 2016-2017	Processed data from DG of PPKL & Dit. PKG)	<ul style="list-style-type: none"> • EF of CO₂ emission for every peatland water level • CO₂ emission = 91 × peatland water level [R² = 0,71; n = 8], expressed in CO₂ emission ton ha⁻¹ year⁻¹ • Data source: A. Hooijer et al., 2010: CO₂ emissions from drained peat in Southeast Asia, Biogeosciences, 7, 1505–1514, 2010 	<ul style="list-style-type: none"> • Calculation of activity data before (baseline) and after construction of rewetting infrastructure • Emission Reduction (ER) = Baseline Emission (BE) – Action Emission (AE)

B. Result of Calculation in Reduction Achievement of GHG Emission Year 2017

Mitigation Action	Baseline (tCO ₂ e)	Actual (tCO ₂ e)	Mitigation (tCO ₂ e)
Peatland restoration (reduction of peat decomposition by construction of rewetting infrastructures)	304.105.620,00	113.502.825,71	190.602.794,29

Contribution to SDG's


The achievement of peatland ecosystem protection and management contribute to the achievement of Sustainable Development Goals (SDGs) particularly on Goal 1 (no poverty), Goal 2 (no hunger), Goal 13 (climate action), and Goal 15 (life on land). It is demonstrated from various activities that have been carried out, with restoration in community area and concession area shows that flora and fauna grow along the restoration implementation. For example fish breeding in canal that has been blocked with or without spill way enable further resource utilization by cultivation

by communities for economic self-sufficient. Meanwhile, the implementation of agroforestry and utilization of peatland ecosystem services from the growth of biota and endemic plant along the peatland ecosystem restoration are also utilized by communities economically. In measuring the contribution of peatland ecosystem protection and management to SDGs, the Ministry of Environment and Forestry is currently developing quantitative indicators.



 Peatland rewetting restores the biodiversity of peatland ecosystem



 Cultivating pineapple to enhance the welfare of people in Peatland Ecosystem



 Agroforestry in Peatland Ecosystem

Recognition and Development of International Tropical Peatland Center (ITPC)




 Soft launching of International Tropical Peatland Center (ITPC) interim secretariat in Jakarta

The ITPC is established to support countries with tropical peatland in implementing the sustainable management on peatland. The ITPC is expected to be a media to support the human resources capacity development, encourage collaboration among various stakeholders (international organizations, private sector and research institutions) on peatland management, and promote development of interdisciplinary research integrated and focused on advancing sustainable peatland management.

Various achievements that have been accomplished by the Government of Indonesia on peatland protection and management as described above have been recognized by other countries, among other the Republic of Congo, the Democratic Republic of Congo, Peru, and other ASEAN Countries. In the end of October 2018, the Ministry Environment and Tourism, the Democratic Republic of Congo, and representative of Republic of Congo visited Indonesia to learn on peatland protection and management from Indonesia. Together with UNEP and representative from the two Congo countries, the Ministry of Environment and Forestry Indonesia has launched the International Tropical Peatland Center (ITPC) in October 30th in 2018 in Jakarta.



 Peatland ecosystems have the potential to become ecotourism objects







**THE MINISTRY OF ENVIRONMENT
AND FORESTRY REPUBLIC OF INDONESIA**

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