PEATLAND ECOSYSTEM MANAGEMENT IN INDONESIA

MINISTRY OF ENVIRONMENT

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I. INTRODUCTION

1. Background

Peat is an organic material formed naturally from plant debris which has been decomposed and accumulated in swamp area or water puddle.

Peatland as a unique ecosystem is a hydrological unit that have interaction among ecosystem factors in forming balance, stability, and productivity.

Peat contains a great portion of Carbon. Carbon content in the form of peat in the world ranges from 329-525 Gt or about 35% of the total global C, whereas Carbon storage in peatland in Indonesia about 46 Gt or about 8-14 % of global Carbon (Maltby and Immirizi, 1993 in Profile of Peatland Ecosystem in Indonesia, 2010).

Degraded or burned peatland may destroy peat material and produce greenhouse gases such as CO_2, N_2O, and CH_4 emission and directly influence global climate change. Therefore, peatland plays a significant role in global climate control.

Apart from its role as global climate control, peatland plays an important role in several functions such as hydrological regulation, production to support successful cultivation. Peat may contain more than 90% water of unit volume, so peat can hold water and supply water to other lower surrounding area.

Peatland also has a production function (economic) from natural as well as cultivation products. Cultivation area of peatland has the potential to be developed for agriculture or plantation.

2. Opportunity

With regards to the potential value and function of peatland in global climate control and ecosystem in the economic development of the community, policy on management and development activities in peatland need to be oriented towards the implementation of sustainable use principle. The policy includes sustainable wood utilization in production forest and sustainable development of commodity in cultivation area.

Non forest products of 'jelutung' latex, rattan, vegetables, fruits, honey, and fish have important value and role for local community.

In addition to production function, peatland has other function that is to provide environmental services (flood control/water source) and research.

3. Challenge

In relation to sustainable peatland role in global climate control and the opportunity in natural resource utilization in peatland cultivation area, challenge will be to have successful in the sus- tainable development in the peatland ecosystem, so that all development activities in the area do not disturb the sustainability of peatland.

4. Contraints

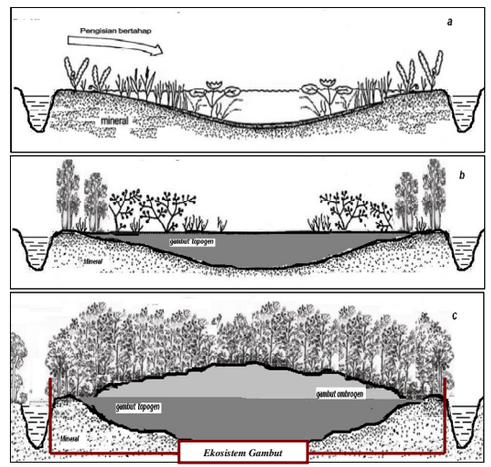
Contraints in peatland ecosystem management include:

1) Lack of knowledge, awareness, and commitment among the relevant stakeholders and the local community regarding the sustainable value of peat and the sustainable utilization form/pattern of peatland;
2) The presence of various utilization activities in peatland that are not oriented towards sustainable principle;
3) The stress due to the increase in total population and the increase in land requirement for cultivation activities, both within or around the peatland area;
4) Lack of conservation effort of peat ecosystem and sustainable utilization values.

II. PEATLAND ECOSYSTEM PROFILE IN INDONESIA.

The formation process of peat starts from the waterlogged area in backswamp, shallow lake or basin area which was gradually covered by water plant and wetland vegetation. Dead plants, that were partly decomposed, gradually formed peat layers so that the waterlogged area were covered with peat heap (Figure 1). It is also possible for the basin area to be covered by run-off water from the river carrying erosion materials from the upstream area, so that the peat heap is mixed with the mineral material. Peat formed through the above process is called topogen peat, which is relatively fertile (eutrofic peat), due to the influence of mineral soil.

During the next phase, the plants growing above topogen peat will form new peat layer and will gradually form peat dome with dome-shaped surface whose formation process was not affected by water run-off from the river. Peat that developed above this topogen peat is called ombrogen peat that has lower fertility rate (oligotrophic peat) than topogen peat since it was only affected by rainwater without mineral enrichment.



Gambar Proses Pembentukan Gambut (dimodofikasi dari Agus F. dan I.G.M. Subiksa, 2008)
a. Pengisian daerah genangan oleh vegetasi
b. Pembentukan gambut topogen
c. Pemebntukan gambut ombrogen membentuk kubah gambut

The accumulation of organic materials that form topogen and ombrogen peats have different depths, which under favorable conditions, its depth could reach more than 20 meters. The summit of the peat dome is the highest and the thickest point in peat ecosystem.

This process indicates that the dynamic interaction between the river embankment, the backswamp, and the peat dome that constitute peat ecosystem, where biophysical environment, chemical elements and organism interplay with each other to create a balance.

III. BENEFITS OF SUSTAINABLE PEATLAND ECOSYSTEM

1. Sustainable forestry,

Despite that the area of peat swamp forest is rapidly diminished, various timber and non-timber forest products have been utilized for a long time at various degrees and have contributed to the economy of the local community. Commercial timber spesies with high economic value are among others: Ramin (Gonystylus bancanus), Jelutung (Dyera costulata), and Meranti (Shorea spp.). The tendency of decline, both in quality and quantity of peat swamp forest resources has given rise to the requirement of support for the community to seek alternative livelihood sources.

2. Flood and water supply control

1) Flood and water flow control : Peatland serves as an abundant water catchment area during flooding and then release them during dry season.
2) Prevent the intrusion of saline water: Peatland is capable of providing water source for agricultural activity while preventing the intrusion of saline water.
3) Water supply source: In rural areas, peatland perhaps is the sole freshwater source that can be used for daily needs and for agricultural irrigation.

3. Tourism and recreation

The unique characteristic of peatland has potency to be developed for ecotourism, since it has a beautiful and unique scenery, like any other wetland habitat, endemic flora and fauna, and differ water condition from other wetland area.

4. Livelihoods of local community (fishery, agriculture, plantation)

1) Waters in peatland area is a habitat for various typical freshwater fish species including those with commercial value, such as Gabus Chana sp., Catfish Clarias sp., Betok Anabas testudineus, Sepat Trichogaster sp., dan Tambakan Helostoma sp. Fishery in peatland area has the potential as a livelihood source for the surrounding community.
2) Other natural resources such as: jelutung, honey, sago, and rattan can be developed for community livelihoods.

5. Climate stabilization

1) Carbon sequestration: A healthy peat swamp forest is capable of actively accumulating carbon, so as to reduce the effect of greenhouse gas.
2) Carbon storage: Peatland is capable of storing carbon in bulk. Peatland degradation due to peat fire and drainage will trigger a large number of carbon emissions. During 1997 fire in Indonesian, approximately around 0.81 – 2.57 Gigaton of carbon were released into the atmosphere. This is equal to 13 – 40% of average annual global carbon emissions from fossil fuel.
3) Climate regulation: The presence of peat forest and freshwater in such large number will affect the climate at micro scale. Additionally vegetation in peat forest also plays a role as the wind breaker and heat sinker. Forested lowland will likely invite more rain than bare land.

6. Biodiversity

Peatlands encompass 2.5% of the total land area in the world or equal to approximately 400 million ha. They are a unique habitat for various flora and fauna and commonly contain a very high endemic plants. In Sumatra, more than 300 plant species were found in peatlands (Giesen, W. 1991). Among the high value plant species are: Jelutung (Dyera custulata), Ramin (Gonystylus bancanus), Meranti (Shorea spp), Kempas (Kompassia malaccensis), Punak (Tetramerista glabra), Perepat (Combretocarpus royundatus), Pulai Rawa (Alstonia pneumatophor), Terentang (Campnospherma spp), Bungur (Lagestroemia spesiosa), and Nyatoh (Palaquium spp) (Wibisono, I. T. C et al. 2004). Peatlands also provides a habitat for various fauna including Sinyulong Crocodile (Tomistoma schlegelii), Sumatran Tiger (Panthera tigris sumatrae), Honey Bear (Helarctos malayanus), Tapir (Tapirus indicus), Mentok Rimba (Cairina scutulata), Bangau Tongtong (Leptoptilos javanicus). The latter is an endangered species listed in Appendix I of CITES and is classified as vulnerable in the Red Databook of IUCN. Peatlands are also a very suitable habitat for various fish species, namely Channa sp, Wallago leeri, Anabas testudineus, Trichogaster pectoralis and Trichogaster trochopterus. Nevertheless, the most important fish in peatlands is the 'arowana' (Scleropagus formosus), which is endangered due to over exploitation for its ornamental value (Wahjunto et al. 2004).

7. Education and Research

Various uniqueness of peatland functions and characteristics become interesting object for education and reserach from various diciplines.

IV. PEATLAND MANAGEMENT POLICY IN INDONESIA

Peatland management policy is oriented towards the implementation of the principle of sustainable utilization, namely:

1) Peatland ecosystem management based on **Peat Hydrological Unit.**
2) Peatland ecosystem utilization according to the functions and carrying capacity.

This policy emphasizes that pealand management must be implemented in a multi-discipline manner, among the stakeholders, including community participation.

1) Laws and regulations:
   a. ASEAN level
      (1) ASEAN Peatland Management Initiative (APMI),
      (2) ASEAN Peatland Management Initiative (APMS).
   b. National level
      (1) Laws No .32 year 2009 on Environmental Protection and Management,
      (2) Government Regulation No. 27 year 1991 on Swamp area,
      (3) Government Regulation No. 26 year 2008 on National Spatial Planning
      (4) Presidential Instruction No. 1 year 2010 on Acceleration of National Development Priority Implementation.
      (5) Ministry of Agriculture Regulation No. 14/Permentan/PL.110/2/2009 on Guidelines on peatland utilization for oil palm
      (6) Ministry of Environment decree No.5 year 2000 on Guidelines on EIA for development activities on wetland
      (7) Government Regulation Plan on Environmental Degradation Control on peatland ecosystem
      (8) Presidential Regulation No. 61 year 2011 on National Action Plan for Reduction of Green House Gases Emission
      (9) Presidential Regulation No. 71 year 2011 on Inventory for Green House Gases Emission.
2) General Peatland Management Strategy
   a. Human resource and institutional developments;
   b. Adaptive commodity selection and technology use;
   c. Community participation improvement and empowerment;
   d. Provision of data and information;
   e. Peat fire and damage control;
   f. Funding mechanism and source.

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