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Abstracts Received

A – L

Sustainable Local Community for Sustainable Forest Management Project Pengembangan Lahan Gambut and After in Central Kalimantan

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Abstract

The development of peat lands was formulated as a Mega-Project. In 1995, the then President Suharto launched the Project Pengembangan Lahan Gambut in Central Kalimantan, with the aim to convert one million ha of peat swamp forest into paddy fields. The participants/immigrants were initially provided with personal living necessities and agricultural materials such as rice seeds, a hoe, sickle, chemical fertilizer and insecticides. However, following the first harvest, the new settlers were obliged to buy materials from a certificated company at fixed prices. The company leased tractors to pull tilling and threshing machines, and bought the harvested rice. The participants thus became laborers working for a rice plantation rather than independent farmers.

From the very beginning, the threat of environmental destruction and the economic costs of running this Mega-Project were obvious to critics. Peat is, for example, chemically oligotrophic, lacking mineral nutrients. Crop yields on peat land drop suddenly after the initial nutrients are exhausted. To achieve sustainable land-use, the peat land inevitably requires large quantities of fertilizer and other agro-chemicals.

Major problems dogged the projects, however. The construction of the infrastructure, for example, was not well coordinated. Canals were built but no dams were constructed, making the canals useless for washing the acid water away from peat. On top of these problems, most of which had been concerns prior to the project, came the economic crisis of 1997 and, without financial support, the Mega-Project was suspended.

The vast project site, however, had been deforested for cultivation. Moreover thousands of participants were already settled on the site. They are still receiving limited official services and support from local governments, which were not originally planned or promised. The allocated lands have turned out to be insufficient, both quantitatively and qualitatively, for sustaining their livelihood. Some settlers have had no choice but to leave the project site, but others remain. How do they survive in these unfamiliar surroundings far from their own *kampong*?

Firstly, present economic conditions of ex-participants are analyzed. Then the possible strategies of sustainable development in left-over peat area are to be discussed.

Effect of Agricultural Land Development of Peat Swamp on the Limnological Environment in Central Kalimantan, Indonesia

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Abstract

Human activity on tropical peat swamp forest, especially destruction of peat soil due to agricultural land development leads not only to global warming by emission of green house gases but also to various serious regional environmental problems. One of the regional environmental problems caused by the destruction of tropical peat is the oxidation of pyrite within the sediment underneath the peat layer in the coastal area. Objectives of this study were to evaluate the acidification process of limnological system by sulfuric acid and to estimate the area of the basin which is chemically affected by the sulfate produced by pyrite oxidation under the peat layer.

In order to estimate the range of area that is affected by the sulfuric acid pollution, water chemistry of two rivers in Central Kalimantan, Indonesia was surveyed in September 2003 (dry season) and March 2004 (rainy season). Water discharged from canals (Paduran, Pangkoh and Besarang) into the mainstream of the Sebangau River and the Kahayan River showed lower pH compared to the mainstream water of the rivers, implying sulfuric acid loading from the canal to the mainstream of the rivers. The ratio of concentrations of sulfate ion/chloride ion, which was used as a parameter for estimating the contribution of pyritic sulfate to the river water chemistry, showed that the sulfuric acid loading from pyrite oxidation appeared from the river mouth up to 135-148 km upstream in both the rivers. Water of the mainstream of the rivers as well as water discharged from canals into the mainstream in the rainy season showed much higher acidity and higher ratio of sulfate ion/chloride ion than those in the dry season. This implies that discharge of pyritic sulfate from peat soil to the limnological system is much higher in the rainy (high water table) season than the dry (low water table) season.

Water in the canal in the rainy season showed highly acidic (pH = 2.0-3.0) and the water should affect the inhabitants in the area. Pyrite oxidation after peatland development causes not only acidification of soil but also acidification of limnological ecosystem. Control of pyrite oxidation should be indispensable for the sustainable land use of the tropical peat peatland.

Oral (S-1)

Ambul, a Traditional Farming System on Open Water in Kalimantan

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Abstract

Ambul, a floating tightly aquatic hyacinth that has been decomposed is a term used by local fishermen in the Lake Bangkau, a hypertrophic lake located in South Kalimantan province-Indonesia to grow various crops such as watermelon, pumpkin, cucumber or even rice. The size of ambul is approximately 10 m^2. So during water-hyacinth (*Eichhornia crassipes* and *Monochoria* sp.) bloom or flood-season where there is no land to be planted, there are numerous of crop islands on the lake which provide additional income for local fishermen. The other benefit of this activity is to control the rapid expansion of water hyacinth covering the lake surface hence reducing lake productivity and accessibility. A phenomenon of water-hyacinth expansion has recently occurred also in Central Kalimantan lakes. Since most lakes in this area are "oxbow lakes" that connected to the main river, these water-hyacinths usually reach the lake when they are transported from city canal by river during rainy season and grow rapidly in the lake due to the high loads of domestic wastes to the river system.

In the case of expansion of water-hyacinth in Lake Sabuah, it has been frequently occurred and normally reduced manually by local people. However, because of the rate water hyacinth expansion is higher than the human power in reducing it There has been no successful effort to control water hyacinth expansion in the lake. In addition to time consumption, the local people is also reluctant to do action, due to the lack of direct economical benefits from water hyacinth. Thus, the aim of this study was to control the expansion of water-hyacinth in Lake Sabuah by introducing the Ambul system to local people. Further, ambul was possible as appropriate alternative farming system on the flood-plain land along side of rivers in Central Kalimantan, which is normally flooded between 6 and 8 months within a year.

By constructing ambul with the size of 10 x 4 m from June to October 2004 and with the assistant by one family of local people, we have successfully developed an ambul-model in Lake Sabuah. Some of crops grown were pumpkin (*Cucurbita moschata*), cucumber (*Cucumis sativus*), bean (*Vigna sinensis*) and the green bitter vegetable (*Momordica charantia*) and have already borne fruits. Amount of water hyacinth mat to develop the ambul were approximately 3 times of it's size. So this was potential reducing expansion of water-hyacinth in Lake Sabuah. After crops harvesting, the ambul is usually renewed by putting in order the other water-hyacinths on it and it will be available to be planted again on the next season.

On October 2004, the socialization of ambul innovation to local people was carried out. A five families of Sigi village and four families of Tuwung Baru village were invited to the field where ambul was established. As result, they were interested to do and would like to adopt it for agriculture. In mean time, we have encouraged the local people that ambul is a possible alternative farming system in the flood-plain land. As for, overcoming the expansion of water-hyacinth in lake, it will be evaluated future when ambul has already adopted and done.

Keywords : ambul, crop, water hyacinth.

Landuse Evolution of Peatland in Rawa Lakbok, West Java

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Abstract

Recently, talking on peatlands of Indonesia is always dealt with peatlands of Sumatra and Kalimantan because the peatlands in those areas have been developed and produced many problems. Actually, the Indonesian peat has been introduced since seven decades ago by Polak (1933), and the introduced peat was from Rawa Lakbok, West Java. Since than, there is no further research on peatland of Java, even many people believe that there is no peat soil anymore in Java.

Dealing with the above background, the objective of this study is to trace back the existence of the peat soil in Rawa Lakbok and to describe the landuse evolution in that area. The results indicate that the peat soil in Rawa Lakbok is still exist, however the peatsoil is mostly covered by new mineral sediments. There are two modes of mineral soil coverages, these are fluvial sedimentation and antropogenic sedimentation. Those two modes of mineral coverages are related to the landuse evolution in the Rawa Lakbok area.

Key words: Java peatland, landuse evolution, fluvial and antropogenic sedimentation.

A New Paradigm in Characterization in Tropical Peat

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Abstract

Peat developed in tropical region, like in Indonesia, obviously show different characteristics compare to that of peat developed in temperate region. Tropical peat is not only composed of relatively homogeneous fine organic debris but significantly consist of coarse woody organic materials originated from roots, branches and trunks of trees. Despite significance differences between tropical and temperate peat, characterization of peat in Indonesia made in the past, of many soil surveys prior to the reclamation of the land, is never been done with methods those were set based on the nature of the tropical peat. An inappropriate tropical peat characterization has led to the great failure of peat land reclamation in Indonesia so far.

The contrasting characteristics of tropical peat, the false data derived from inappropriate characterization methods of the respected characteristics and the misleading impact to the land management plan and practice, as well as the consequences on the need of the true methods for tropical peat characterization are discussed in this paper. Some new characterization methods are proposed and some chemical and physical data of Indonesian peat obtained with newly proposed methods are shown as well. Choices of better tropical peat land management based on reliable data of the peat and the land is illustrated.

Keywords: Peat characteristics, peat reclamation, tropical peat.

Effect of Forest Fire and Agriculture on CO_2 Emission from Tropical Peatlands, Central Kalimantan, Indonesia

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Abstract

Tropical peatland ecosystems have important role in in the cycle of global Carbon as the Carbon storage. This study is to know about CO_2 flux on tropical peatland on various conditions and water table both on dry and rain season, on tropical peat forests and arable lands in Kalampangan, Palangka Raya, Central Kalimantan.

To estimate about the CO_2 emissions in forest and arable lands in Kalampangan near Palangka Raya are measured to natural forest, regenerated forest (before and after burnt), waste land and four arable lands.

The highest emission of CO_2 was obtained on dry season when the layer of peat become thick because the water table lowered and the tree roots proportionated the rate of CO_2 emission to the water table inside the layer of the peat. The emission of CO_2 generally are connected to the temperature, water table and the humidity of the soil.

State of the Art of Inland Fishery Reserve Management in Indonesia

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Abstract

Inland water fishery reserve as a tool in management of capture fishery. It is a kind of fish sanctuary that was expected to function as a water body that is capable in supplying natural fish brood stock and fingerling to sustain capture fishery in adjacent waters. In Indonesia, the existence of fishery reserve system is legal sanction under the Republic Indonesia Act No. 9 Year of 1985 on Fishery that was renewed by the Act Number 31 Year of 2004 on Fishery. The existing records indicated that the oldest fishery reserve was Lake Loa Kang Fishery Reserve (Kota Bangun District, East Kalimantan) that was managed by local Kingdom Kutai Kertanegara since 500 years ago. A survey in 1986 showed that the total area of inland fishery reserve reached up to 200.000 hectares, but the scientific foundation on the selection and development of those reserve was not clear. More scientific development of inland fishery reserve was started in 1995 in Jambi Province. Variation of management style of several inland fishery reserve is described. Changes from centralized to decentralized adaptive co-management system in day to day maintenance of fishery reserve was briefly discussed.

Yield Variations of Extreme High Yield of Tropical Rice Grown Without Fertilizer on Acid Sulfate Soil in South Kalimantan

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Abstract

Local varieties are commonly grown by the farmers located in acid sulfate soil area of South Kalimantan. In South Kalimantan, more than 100 local rice varieties can be found. In 1999, a farmer found one hill (with 5 tillers) rice plant near a canal. The rice had panicle length of 50 cm. The panicle length of common local rice varieties are 25 cm. Since the finding, the farmer multiplied the seed for 3 years to get a reasonable amount of seeds for nearby farmers to use. In 2004, 25 farmers grow the Padi Panjang by themselve. Their paddocks are widely spread out in Aluh-Aluh and Gambut districts. We take this opportunity to investigate yield variation of the padi panjang as affected by soil chemical properties.

Early results show that without fertilizer, yield of the rice varied 3.8 – 6.7 ton ha^{-1}. The soil pH and EC in the field ranged 3.5-4.5 and 0-8 dSm^{-1}, respectively. Other parameter measurements are still in progress.

Oral (S-3)

Effect of Forest Fire and Agriculture on CH_4 and N_2O Emission From Tropical Peatlands, Central Kalimantan, Indonesia

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Abstract

<Objective>

Degradation of tropical peatland is reported to be due to forest fire and change in agricultural land uses. The peat decomposition is the important emission sources of major greenhouse gases (GHG) CH_4 and N_2O as well as CO_2. This study was conducted to investigate the effect of forest fire and agriculture on GHG fluxes from tropical peatlands near Palangka Raya, Central Kalimantan, Indonesia.

<Methods>

Monthly measurements of CH_4 and N_2O fluxes were carried out (March 2002 to March 2004) in four arable lands (grassland, vegetable-A, B and C), a natural forest (NF) and two fire-destroyed (by 1997 forest fire) forests, one completely burnt forest (BF) with no regeneration since the beginning and the other with regeneration forest (RF), which were burnt again by forest fires in July and September 2002, respectively. Soil temperature and moisture were measured and soil samples were taken along with each gas flux measurement.

<Results and discussion>

The pH, exchangeable Ca^{2+} and NO_3^--N in arable land soils were generally higher than in forest soils, but NH_4^+-N was lower in arable lands than in forests. This result indicated that nitrification activities were higher in arable lands than in forests. Annual CH_4 emissions (unit: kg C ha^{-1} yr^{-1}) ranged from uptake to emission in NF (-0.2 to 0.3), RF (-1.7 to 2.5) and BF (-0.2 to 0.4). In the RF, CH_4 uptake occurred in the dry season (2002) before the forest fire, while, CH_4 emission was found in the dry season (2003) after the forest fire. In the dry season of 2003, precipitation was relatively larger than in 2002, in addition, water uptake by plant decreased due to absence of vegetation. Therefore, soil moisture could remain higher in the dry season of 2003, which could result in larger CH_4 production. CH_4 was found to be emitted from all arable lands (0.25 to 92). The CH_4 emission mainly occurred in a rainy season, while the episodic CH_4 emission was found in the dry season. N_2O emission from both forests and arable lands became higher in rainy season indicating that the N_2O production was strongly affected by the soil moisture condition. Annual N_2O emission (unit: kg N ha^{-1} yr^{-1}) was higher in wet 2003 than in dry 2002, which was highest in vegetable fields (21 to 131 in 2002 and 52 to 259 in 2003), intermediate in grassland no fertilized with N (7.1 in 2002 and 23 in 2003) and lowest in forests (0.39 to 0.97 in 2002 and 1.5 to 4.4 in 2003). It indicates that the agricultural management with respect to N fertilization could have promoted emission of N_2O Consequently, forest fire and agriculture in tropical peatlands could have increased GHG emissions through the change in soil environment.

Key words: tropical peatland, arable land, forest fire, CH_4, N_2O

Oral (S-1)

Present State of Core City for Development - Preliminary Research in Palangkaraya, Kalimantan

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Abstract

Palangka Raya was constructed as a capital city of Central Kalimantan to develop Kalimantan island. After the construction, Palangkaraya as a core city for development has fulfilled large role for development of the wood resource and underground resources such as gold, and promotion of the Mega Rice Project, etc. However, rapid development of the wood resource increased large scale peat fires, and the mercury used in the gold mining will be the source of the pollution. Thus, the above-mentioned development makes the environment worse and worse day by day.

Role of Palangkaraya as a core city for development becomes more important than ever because sustainable development is required also in Kalimantan. To achieve sustainable development, we have to carefully examine various methods and techniques developed not only in advanced countries but also in underdeveloped countries. Because new methods and techniques developed in advanced countries are not always suitable for underdeveloped countries. For sustainable development, all methods and techniques used in Kalimantan should be reexamined.

The authors started to investigate fundamental things found in Palangkaraya from the viewpoint of human dimension. Research items will cover life style, housing environment, water supply, traffics, air pollution, peat, water level, peat fire and so on. This report describes the result of preliminary research carried out in September 2004.

Poster (S-3)

The Study on 1997 and 2002 El Nino Southern Oscillation (ENSO) effect over Tropical Peat Swamp Forest in Central Kalimantan, Indonesia by Satellite Data

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Abstract

During the 1997 and 2002 ENSO event, Indonesia had the most severe fires in the world. Land clearance activities, rampant logging and drought due to ENSO event led to massive uncontrolled fire which burned vegetation of agricultural land and forest in large area, especially severely in the Kalimantan Island, Indonesia.

This study evaluated the ENSO effect for land cover change over tropical peat swamp forest in Central Kalimantan, Indonesia. We employed the Multitemporal Principal Component Analysis (MPCA) methods for processing Landsat TM/ETM+ satellite image and compared the MPCA results with the dynamic change of NVDI by SPOT-Vegetation 10-day Maximum Value Composite (MVC) data.

This research has revealed that MPCA can make valuable contribution to normalizing disparate data sets so that more meaningful comparisons of historical and contemporary data can be made from the study area. Using SPOT-Vegetation 10-day MVC data, we determined a change rate of 5 years NDVI from April 1998 to March 2003. The high values of NDVI were detected as burned areas and this value shows that the NDVI increases because of vegetation recovery after the forest fire event.

This study proved to be effective for identifying land cover changes in the study area that is affected by forest fires, and provides important information to evaluate the spatial and temporal distribution of rapid changes in land surface attributes especially in the fragile tropical peat swamp forest areas.

Key words: ENSO, Landsat TM/ETM+, MPCA, and SPOT–Vegetation 10-day MVC

Oral (S-2)

Seasonal Characteristics Change of Water in The Main Canals of Rantau Rasau Transmigration Area, Berbak Delta, Jambi

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Abstract

Peat swamp areas were normally in assosiation with sulphidic materials. The position of the sulphidic materials could be as the underlying materials of peat material such as in Rantau Rasau, Delta Berbak, Jambi Province. This area was reclaimed in the years of 1970's. The reclamation was carried out by setting up of drainage cannals to drain the excess water. However uncontrol drainage process, such as keeping drainage cannals open, caused many problems. Poblems rose due to the disappearance of peat layer and the underlying materials that contain pyrites were exposed to air and oxidized to sulfuric acid. The impacts were the land became acidic and the agricultural conditions changed drastically. Some areas were still cultivated, however the productions were limited and ultimately many areas were abandoned as indicated by occupation of scrubs. Such condition could be considered as mal-developed areas, because they have unexpected performance.

Efforts to reclaime of the mal-developed have been carried out by performing many projects some years ago, nevertheless the agricultural production was unstable because of the condition of water in the main canals changes seasonally.

This paper will present the seasonal changing of some characteristics of water in the main cannals of Rantau Rasau Transmigration area, such as pH, electrical conductivity (EC), base cations, anions, iron and other micronutrients, and also some heavy metals.

Key words: peat swamp, mal-developed area, seasonal water characteristics.

Peat swamp forest rehabilitation after wildfires: learning from natural process of forest recovery

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Abstract

A 1ha (100m by 100m) plot was established in May 2002 at a forest of 4.5 years after wildfires December 1997 (named PK-plot) in Kelampangan, Central Kalimantan. All trees that escaped from the wildfires 1997 and those trees of naturally newly grown after the wildfires with stem girth at 130cm height of more than 15cm (or about 4.8cm in diameter) within the plot were identified and measured its DBH in May 2002. The PK-plot was consisted of 1158 trees grouped into 103 species. Some of the species were discussed further and proposed as indigenous species for the rehabilitation of degraded peat swamp forest after fire.

The PK-plot was burnt out again in September 2002, and in May 2003 (or about 8 months after the second wildfires) the plot was reconstructed in order to observe the newly grown plants after the second wildfires and re-observed again in August 2004. In May 2003, 2 individuals of *Dyera lowii* were found to produce new leaves after escaped from the second fires, one laid stem of *Co. rotundatus* produced new shoot and one standing dead tree of *Cr. arborescens* produced sprouts from the base of the stem. Other newly pioneer invader species after second wildfires were mostly fern of *Neprolepis* sp., *Nephrolepis falcata*, *Stenochlaena palustris*, *Blechnum orientale.*

At the same period of May 2002, another 1ha (100m by 100m) plot was established at a drained natural peat swamp forest (named HAG-plot) about 300m to the southeast of PK-plot. The HAG-plot was consisted of 3074 trees grouped into 80 species of trees. Those trees were re-measured in May 2003 and August 2004 in order to understand the growth rate of peat swamp species. HAG-plot and PK-plot were separated by artificial canal.

Oral (S-1)

The Importance of Ground Water Control for the Prevention of the Peat/Forest Fire in Tropical Peatland

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Abstract

Tropical peatlands share 10% of total peatland area in the world and have an important role on the global environment with the huge amount of carbon storage in peat. But the wild fire in tropical peatlands increased drastically since the last decade of the 20th century in Southeast Asia. Combustion process of peat fire differs from the forest fire and bush fire above the ground, because the peat was sometimes burned with a smoldering process in the deep layer of peatland. But the peat layer should be dry enough for ignition and continuous burning. Drying processes of peat layer were estimated with a simple bucket model during dry season in the peatlands and the importance of ground water control for prevention of peat fire was clarified.

Oral (S-3)

The Sunda region, a precious world for mammalian fauna: phylogenetic reconstruction and evolutionary perspectives with help of rodent molecular networks

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Abstract

Most of the Indonesian islands belonging to the Sunda region, which lie on a shallow continental shelf projecting from Indochina, represents one of the world's most valuable areas of biodiversity, harboring 12 percent of the world's mammals, for example. To protect the Indonesian natural heritage biodiversity, it is very important to understand the status of the biodiversity including phylogenetic relationships and evolutionary histories. To do so, rodents in particular members of rats and mice, are best animals to detect the inevitable reasons that the faunas have been established, because of the numerous numbers of species and the commonness in their distribution. Of murine rodents, representing one of the largest groups of mammals, more than 100 species occur in the Sunda region. Though, their enormous diversity has always been a controversial topic with respect to their origins, ways of radiation, and times of diversification, our recent molecular phylogenetic work with more than 40 species of murine rodents from Southeast Asia, including Indonesia, have revealed a well structured phylogenetic networks, suggesting several migration events between islands, such as Sulawesi Java and Borneo, and synchronized lineage differentiation in different taxonomic groups and different geographic areas, probably associating with the global environmental changes of the last 10 million years, from the late Tertiary to the present. Our data thus imply that valuable faunas of the Sunda shelf would have emerged through such long and complicated evolutionary histories as well as the spatial heterogeneity.

Estimation of the Impact of a Large-Scale Development on Pond Ecosystems in Central Kalimantan

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Abstract

The so-called Mega Rice Project (MRP) was initiated in 1995 to convert more than one million hectares of peat swamp forests in Central Kalimantan to rice paddies. After the termination of the project, the area nowadays consists of four blocks with different levels of development. The major purposes of the present study were to compare physico-chemical factors and biological characteristics, especially zooplankton community structure, for various ponds in the developed MRP area and undeveloped reference area, and to estimate the impact of such large-scale development on pond ecosystems. We surveyed 58 ponds to determine water quality and to collect zooplankton and aquatic insects.

As for physico-chemical factors in the developed MRP area, the pond depths were significantly shallower, pH values, transparencies and chlorophyll a concentrations were lower, specific conductivities and degrees of canopy gap of riparian forest were higher, and pond surface areas were smaller than those for ponds in the undeveloped area. DO and SS concentrations were not significantly different.

From the zooplankton survey, 21 cladoceran species were identified. The densities of Cladocera, Rotifera and nauplius were significantly lower in the MRP area than those in the undeveloped area. The zooplankton densities were affected by pond depth, pH and transparency according to a stepwise multiple regression analysis. However, the contribution of these parameters to the total variance was 32-49%, indicating that other factors might affect zooplankton densities. The densities of Copepoda and aquatic insects were not significantly different between MRP and undeveloped areas, suggesting that these species were insensitive to land development.

Proposed Approach for Peatland Rehabilitation Using Enriched Bacterial-Inoculated Seedling: Case Studies on Dipterocarps

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Abstract

An important aspect of peatland rehabilitation is a long-term protection of the rehabilitated site against further human disturbance, such as fires or illegal exploitation until the areas become balanced, economically and environmentally, for sustainable production. Hence, from the very early stage of rehabilitation activities, participation of local people living adjacent to the areas is very essential to keep the rehabilitated forest secured from destruction and to provide understanding of the long-term economic benefits from the forests for local and global account. One of the valuable trees, native to Indonesian rain forest, is dipterocarps which is economically valuable and has been threatened due to human activities individually and/or institutionally including massive forest fires and severe exploitation for its wood product. Our findings using *Shorea selanica, S. leprosula* and *S. balangeran* suggested that selective plant growth promoting rhizobacteria (PGPR) were able to not only promote plant growth but also stimulate microfloral diversity in pot conditions in glasshouse. In a field condition, diverse microflora with various functions play role in maintaining nutrient pool necessary for plant growth.

In this paper, we propose an approach of establishing a multiculture man made forest using various indigenous species and incorporating shorea inoculated with PGPR among these species. Species diversity may mimic the original condition of natural peat forest that will also enrich soil microflora, thus accelerate the establishment of the newly established forest. This approach of using shorea-PGPR interaction provides less costly forest input management for long term economic return and more desirable over the conventional, artificial soil conditioning approach, such as liming or fertilizing. A better quality environment may serve as priceless resources in the future for sustainable production as well as environmental functions in respond to global climatic change.

Oral (S-3)

Using Beneficial Soil Microbes in Rice Cultivation to Reduce Agrochemicals Pollution in Swampy Area of One Million Hectares Rice Project in Central Kalimantan

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Abstract

Swampy area is unique and very frigile ecosystems. Using this area for for agriculture land have to be considered very carefully. In Indonesia, millions of hectares of swampy area such as in Kalimantan and Sumatra, had been converted to agricultural land. In some places, using these area for agricultural land had been reported to have a success but not in some other places. Swampy area are mostly less fertile. Using these areas for rice cultivation needs addition of agrochemiclas such as fertilizers and pesticides. Due to the unique and frigile ecosystem in swampy area, the effect of agrochemicals to this environment is more severe.

In relation to this, beneficiasl soil microbes namely nitrogen fixing bacteria (*Azospirillum* and *Azototobacte*r) and phosphate solubilizing microbes were isolated from soils and rhizosphere of rice grown in the swampy area of One Million Hectare Rice Project in Central Kalimantan. The effect of root inoculation of the beneficial microbes on growth and production of rice cultivar IR-64 grown on three soil types with and without inorganic fertilizers were reported.

How are the lake ecosystems maintained in Central Kalimantan? - Implications from the long-term ecological research on oxbow and floodplain lakes

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Abstract

The oxbow and floodplain lakes in Central Kalimantan are categorized according to the degrees of their hydrological connectivity with the main river: The 1st order lakes are those always connected to the river, the 2nd order lakes are those disconnected at the upstream end only during low water level or those connected to the main river through the 1st order lake. The 3rd order lakes are lakes only connected at high water level season or those connected to the main river through the 2nd order lake. The six lakes surveyed so far are therefore classified as the 1st order for Lake Tundai and Lake Bunter, the 2nd order for Lake Tehang, and the 3rd order for Lake Sabuah, Lake Hurung, and Lake Batu, the last of which is not an oxbow. The degree of connectivity to the main river as well as the inter-connectivity of lakes affected the concentrations of chlorophyll *a*, other physico-chemical factors and biological parameters, especially for zoobenthos, since the mixing of water column occurred much more frequently in the 1st order lake than 2nd or 3rd order lake. A 37-day observation of vertical profiles of water temperatures, dissolved oxygen concentrations and turbidity values from low water to high water level periods indicated a complete mixing occurred in the water column in Lake Tehang (2nd order lake) when the highest water level was achieved while partial mixing appeared to occur at the same time in Lake Batu (3rd order lake). These mixing events supplied oxygen to the bottom of the lakes but the anoxic layer near the lake bottom developed within a week after the mixing events. Lowering of water level during the El-Nino years may reduce the number of events of lake water mixing, resulting in a reduced biomass of zoobenthos which serve as important food for fish communities. The present paper discusses further the factors responsible for maintaining plankton communities.

Oral (S-1)

Effect of Leaching on Water Quality of Acid Sulphate Soils

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Abstract

Particular elements or compounds such as iron, aluminum and acid sulphate could be indicator of acid sulphate soils characteristics (Dent, 1986; Focolos and Kodoma, 1981; van Bremen, 1986). Objective of the conducted research is to study the effect of leaching on quality of leached water of acid sulphate soils in laboratory and field.

Submerged soil columns of 20 cm diameter and 50 cm height were leached and its soil water were replaced with aquadest in green house every day. The treatment is period of leaching that is 0, 1, 2, 3, 4 months (C0, C1, C2, C3, C4). Plots of 9x18 sqm were planted with paddy rice and used as units of the field experiments. A wooden stopflow gates were constructed in order to control the irrigated water in leaching the submerged water. The leaching treatment was designed for 3 levels, i.e. tidewater as natural irrigation (L0), submerged-tidewater replaced every 2 weeks (L2), and submerged-tidewater replaced every 4 weeks (L4). The collected leached water were analyzed in the laboratory to determine the content of Fe, Al, and SO_4^{2-} as well as pH. Analysis of variance as statistic tool was applied to identify significance effect of the treatments.

The treatment either in the laboratory or in the field indicated significantly affecting the leached water quality. The C1 treatment decreases Fe-total content in the leached water (115 to 23 ppm), even C4 treatment could markedly decrease to 20 ppm. Meanwhile, L2 can significantly decrease Fe-total content of the water from 0.81 to 0.62 ppm on 8 weeks after planting (WAP) of paddy rice, but it is not significant on 12 WAP.

The aluminum content is significantly dropped (22.2 to 2.7 ppm) due to C1 treatment, it drastically dropped to 1.0 ppm as affected by C4 treatment. The field experiment shows that the L2 treatment significantly decreases aluminum content from 0.97 to 0.66 ppm, however L4 treatment only significantly drops to 0.71 ppm on 12 WAP.

The sulphate content is significantly decreased from 829 to 193 ppm by C1 treatment, while C4 treatment could drastically drop to 7 ppm. The field experiment indicated that the L2 treatment significantly decreased sulphate content from 12.02 to 9.09 mg/l, however L4 treatment only significantly dropped to 9.9 mg/l on 12 WAP.

The leached water pH is not significantly increased from 4.7 to 5.4 ppm by C1 treatment, while C4 treatment could only increase to 4.8 ppm. The experiment in the field indicated that the treatment of leaching was not significantly increasing leached water pH as well, even it decreased leached water pH from 2.47 to 2.43 due to L2 treatment, and L4 treatment dropped the pH to 2.46 on 12 WAP.

Key words: acid sulphate soils, leaching, water quality

Oral

Use and Recognition of Plants by Malay Residents in Sumatran Peat Swamp Forests: Comparison Among Vegetation Types

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Abstract

I studied the relationship among the following three factors on use and recognition of plants by Malay residents in Sumatran peat swamp forests: 1. access to habitats of plants (= chances of observation in daily life or familiarity); 2. use; and 3. manners, detailedness or taxonomic levels of naming of plants.

Usury, access to habitats of plants is difficult to evaluate and treat statistically. In Sumatran peat swamp forests, villages are located on riverbanks, and vegetation zoning is formed according to the distances from riverbanks toward inlands. Thus, vegetation zones can be regarded as the indexes of access to habitats of plants. Such the unique character of peat swamp forests enables numerical ethnobotanic analyses from new points of view.

Three forest types were recognized: I. mixed forests dominated by *Koompassia*, II. mixed forests dominated by *Shorea*, III. padang (low pole) forests dominated by *Palaquium*. I interviewed to five informants about names and uses of plants. The results were cross-checked, and asked again if necessary.

Ratio of used plants was mostly constant among vegetation types. Ratio of plants named at species level was significantly higher in vegetation close to riverbanks. Detailedness of naming was also related with utility. Next, I examined interactive effects of utility and vegetation types against ratio of plants named at species level. As the result, useful plants were evenly named in detail regardless of vegetation types. On the other hand, in useless plants, effects of vegetation types appeared.

The plant naming system of Malay people in peat swamps consists of utility based recognitions and familiarity based recognitions. The utility factor priors to the familiarity factor, which affects detailedness of naming of only useless plants.

Oral (S-2)

Effect of Agriculture and Forest Fire on Water Quality in Tropical Peatland in Central Kalimantan, Indonesia

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In order to clarify the influence of forest fire and agricultural practices on water quality in tropical peatlands, we measured the N and P concentrations in river water and ground water of the natural forest, regenerated forest, burnt forest and agricultural land in Kalampangan, central Kalimantan, Indonesia. We also investigated the water quality of agricultural land in Tangkilin mineral soil area. Water sampling was carried out in November 2001 for both Kalampangan and Tangkilin. For Kalampangan, the water sampling was continued at intervals of 1-3 months until June 2004. A forest fire occurred during August 2002.

The NO_3^--N concentration of river water and ground water in Kalampangan forest sites was very low (0.01-0.06 mg N L^{-1}). Although the NO_3^--N concentration of river water in both agricultural lands of Kalampangan and Tangkilin was similar to that in forests, the NO_3^--N concentration of ground water in the agricultural lands was higher than in forests (0.8 and 0.2 mg N L^{-1}, respectively). The NH_4^+-N concentration of all the water samples was also as low as 0.06-0.10 mg N L^{-1}. The total N concentration of the river water in Kalampangan forests was 1 to 3 mg N L^{-1} before fire occurred. Although it was similar to that of just after forest fire at the end of August 2002, it increased to 14 mg N L^{-1} four months after the fire occurred (December 2002).

The total P concentration of the river water in Kalampangan forests was 0-0.2 mg P L^{-1} before the forest fire. It was also increased to 0.7 mg P L^{-1} four months after the fire, while PO_4^{3-}-P was not detected. On the other hand, total P and PO_4^{3-}-P concentrations of river and ground water in the Kalampangan agricultural land were remarkably high (0.8-4.9 mg P L^{-1} for total P and 0.8-3.5 mg P L^{-1} for PO_4^{3-}-P). They were significantly higher than those in Tangkilin agricultural land (0.01-0.30 mg P L^{-1} for total P and 0.01-0.20 mg P L^{-1} for PO_4^{3-}-P). This was probably due to low phosphate absorption coefficient and high Troug-P content of Kalampangan peat soils compared to Tangkilin mineral soils. The maximum PO_4^{3-}-P concentration of soil solution in Kalampangan agricultural land was found to be 20 mg P L^{-1}. Such kind of high P concentration is not common in Boreal and Temperate peat soils.

In conclusion, forest fire and agricultural practices could significantly change the water quality, especially the increase in P concentration, in tropical peatland.

Key words: water quality, nitrogen, phosphorus, forest, agricultural land, peat soil

Oral (S-1)

The Lost of Local People Income from Beje during the Mega Rice Project in Central Kalimantan

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Abstract

The vast area of inland water in Central Kalimantan has been utilized by local community as a place for fish enterprise. This enterprise has been done traditionally by fisherman using simple materials and fishing gears practiced either individually on by involving their family members. The Beje is one of traditional fishing method that has been applied from generation to generation in Central Kalimantan. Beje is constructed by digging a ditch in a floodplain area. The dimensions of the ditch are : 1-2 m width, 1-2 depth with the size up to 40 m^2.

Management of swamp areas through Beje technique is not only intended catching fishes as much as possible, but also for protecting and managing the environment of swamp areas in other to be sustainable.

Since 1997 the production of beje has drastically decreased. This phenomenon was due probably to the irregular climate change, especially after the construction of drainage channels on peat swamp areas of Mega Rice Project. The project caused trees around beje burned and fallen down into beje area, resulting in the close of the bejes and decreasing its productivity.

The lost of local people income from beje due to the project can be observed from the comparison of people income before and after the project. For example, before the establishment of the project , the average income of local people from beje in Buntoi village was approximately Rp 400,000 – Rp 900,000/beje/harvest, but after the project the average income decreased drastically to only less than Rp 500 000/beje/harvest. Similar impacts were also found in other villages such as Dadahup, Terantang and Lamunti. At these villages before the project fish production from beje was around 500 – 2000 kg/beje/year with total production around 2000 ton/year or equal to 10 billion rupiah. After the project data in 2000 showed that the fish production from remaining bejes decreased drastically to around 5 – 150 kg/beje/year with total production around 10- 20 ton/year or equal to 75 million rupiah. In comparison, good beje condition in Bakung Merang village near Palangka Raya produce economical income to local community around 1- 2 million/year. The above data clearly show that local people income has decreased due to Mega Rice Project.

Key words: Beje, effect Mega Rice Project, income

Poster (S-2)