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Protecting The Mahakam Lakes In East Kalimantan Through An Eco-Regional Development Program For Sustainable Livelihoods

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The Middle Mahakam Lakes area is an area of high socio-economic value for the fishing industry and a water-catch and river regulatory system. Moreover, this area has a high biodiversity potential and also hosts the symbol species of East Kalimantan, the Critically Endangered Irrawaddy dolphin. Major identified threats involve sedimentation and species habitat loss through logging and forest fires, pollution by pesticides, land conversion and over-fishing through unsustainable fishing techniques. The main goal of RASI Conservation Foundation is to establish a community supported and law-enforced zonation design for critical wetlands, lakes and river habitat in the Middle Mahakam Area (MMA) with regards to extractive, restricted and prohibitive use of natural resources and bird, fish-spawning, and freshwater dolphin protected areas. The design will be developed through bio-ecological and socio-economic assessment surveys, awareness campaigns and district workshops.

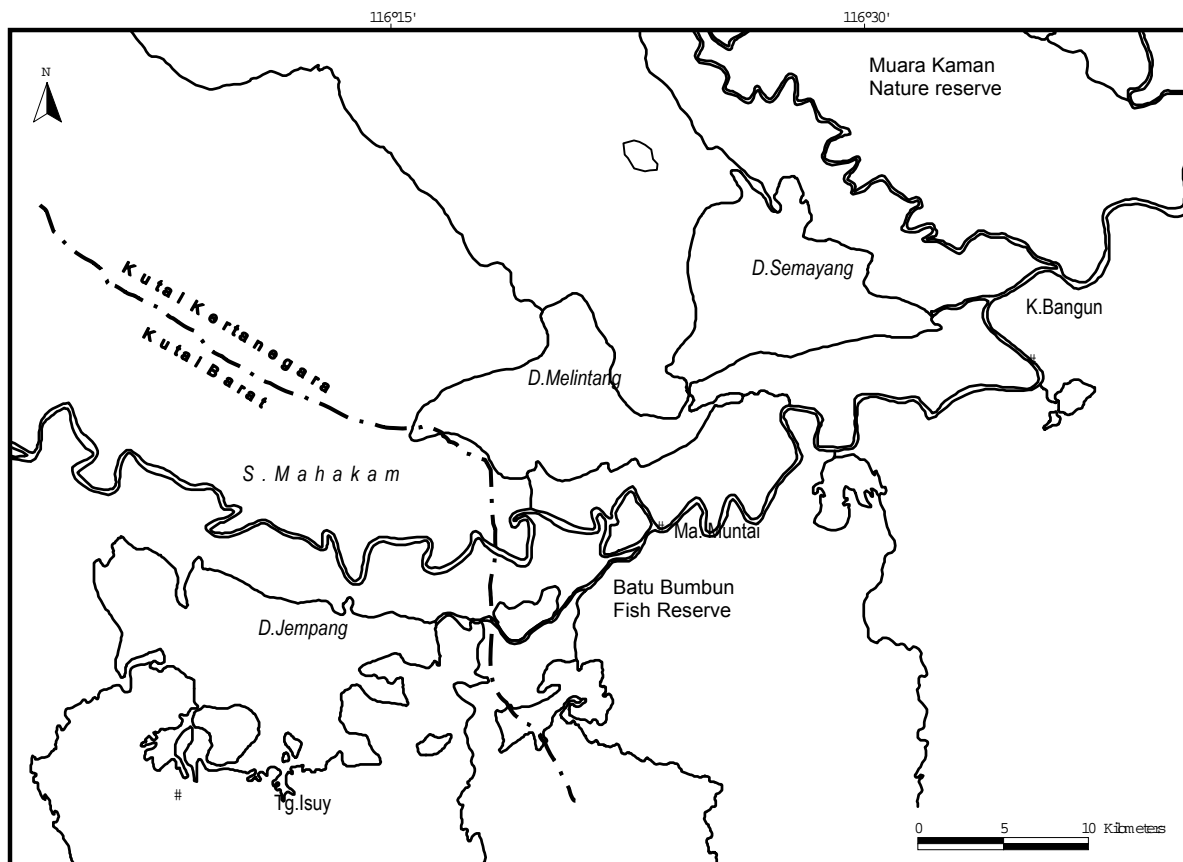
Introduction

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swamp forests in order to reduce sedimentation and recover habitat for wildlife species.

Middle Mahakam Lakes

The area of the Middle Mahakam Lakes (MML), which is situated between 116° - 117° E, and 0°00' - 0°30' S, covers about 400,000 ha. The area is located in East Kalimantan in the Sundaland ecoregion and is part of the Mahakam River, which is one of the major river systems of Kalimantan. The three largest lakes are Danau Jempang (about 15,000 ha), Danau Melintang (11,000 ha) and Danau Semayang (13,000). Due to alternating water levels the size of the lakes's water surface ranges from zero in extremely dry years (1982/83, 1991, 1994, 1997/98) to more than 60,000 ha. Their maximum depth is about 6-7m. Annual fluctuations can reach more than 6m. The vegetation of the lakes is dominated by floating weeds (mainly *Salvinia sp.* and *Eichhornia crassipes*, *Mimosa pigra* and *Polygonum barbatum*) (Gonner, 2000). Previously vast swamp forests have been severely affected by forest fires in 1998. The swamp area of the lakes is surrounded by freshwater swamp forests, peat swamp forests and lowland dipterocarp rain forests. On a landscape level, the area has an important buffer role for the natural regulation of the Mahakam and downstream settlements.



Importance of Area Preservation

The lakes and wetlands areas in the Middle Mahakam are one of Kalimantan's most important wetlands areas. It has been identified as a crucial breeding and migration site for a total of 90 bird species, including important breeding populations of various herons and the Lesser Adjutant. Fish diversity, and the presence of endangered mammals such as Proboscis Monkeys, wild Banteng, False Gavia and Siamese Crocodile, as well as the critically endangered Irrawaddy dolphin indicate the importance of preservation of these areas. The preservation of these wetlands and lakes have not only a national but also international biodiversity importance in terms of migrating and breeding bird species in these areas.

The MML also has a national economic importance with an annual catch of 25.000 to 35.000 metric tons since 1970 (Christensen, 1998). At present, this area is the largest single supplier of dried freshwater fish. However, up to now no official protection status was given to the MML. Although Semayang Lake was proposed as National Park in the early 1980s by the Directorate General for Forest and Nature Conservation of the Forestry Ministry of Indonesia, until present (2005) no official protection status has been given to any open water body within the Mahakam River ecosystem. With regards to protected fish reserves, nine out of a total of 11 fish sanctuaries were identified during a survey conducted by the Indonesian Institute of Sciences (LIPI) in 2003 (pers. comm., Dr. Dede Irving Hartoto) to be destroyed as a result of sedimentation because of upstream logging. Two fishery conservation areas, the first one encountered upstream near Kota Bangun (Loa Kang), which is 930 ha in size and the second one near Muara Muntai 450 ha in size (Batu Bumbun) are still relatively intact. Both reserves have been set up during the Kutai Moslim Sultanate some 500 years ago and have been managed under Kutai Regency since 1978 (*Perda Kabupaten Kutai No. 18, 1978*).

Effects of human settlements on the lakes

A study on land use modeling and restructuring landscape of the lakes conducted in 2002 (Sumaryono, 2005) indicated that communities surrounding the lakes of Semayang and Melintang have a main livelihood as fishermen, whereas in Jempang Lake, they mainly subsist on farming. This is due to differences in landscape of the areas surrounding the lakes, which consist of freshwater swamp (forest) for Semayang and Melintang Lakes and is unsuitable for agriculture. For these last lakes measurement studies on sedimentation in the lakes, as a result of devegetation of surrounding lakes shores and upstream logging, have been conducted by Mulawarman University between 1998 and

1999 (Hardwinarto, 2000). The results show that sedimentation is largely due to erosion caused by forest exploitation upstream of Enggelam River connecting with Melintang Lake and Kahala River connecting with Semayang Lake. Forest fires to open areas for fisheries or agriculture also increase this sedimentation. Besides causing an increase in shallowness, it also causes an increase in aquatic weeds. Pollution occurs in these lakes as a result of fishing techniques, which use poison of different chemical composition, especially during the flood season when fish is more scattered. In Jempang Lake most farmers open forest areas for swifiting land cultivation. Besides, opening extensive forested areas for oilpalm plantations (covering over 100,000 ha) and coal-mining causes sedimentation to be much higher in this lake compared to the other lakes. Pesticides used in these land-use activities may form a considerable threat to the lakes, but no data are available on the concentrations in the lakes. Ammonium levels, which are derived from domestic and agricultural waste products, were found to exceed the maximum levels of the B rank for water quality at the mouths of both Jempang and especially Semayang Lake according to a study conducted between 1996 and 1999 by the Environmental Impact Controlling Body of East Kalimantan (Bapedalda I, 1999). Also, phosphor, which is derived from fertilizer and soap products and may cause eutrophication, was 3 to 4 times higher than the standard concentration of 0,5 mg/l, at which already increase of vegetation occurs, in both mouths, and highest for Jempang Lake. Faecal pollution from husbandry and villages was relatively low and entered in the B rank for water quality.

Impacts on human settlements on wildlife in the lake areas occurs through:

- Direct catch of protected and endangered species (e.g. herons, storks, hornbills, crocodiles, turtles). Most recently thousands of wandering whistling-ducks (*Dendrocygna arcuata*) have been caught between August and October 2004. Firstly, by nets but now pesticides are being used. Pond herons are also being poisoned by cyanide to catch and sell them for food in Jempang Lake;
- Habitat and species diversity loss through forest fires and (illegal) logging.
- Overfishing (cf. Christensen 1988) and unsustainable fishing techniques such as electro-fishing and using poison;
- Boat traffic (noise and fuel pollution) disturbing breeding bird populations and freshwater dolphins;
- Direct mortality of freshwater dolphins through gillnet entanglement. Present mortality rate is 5 dolphins per year on average and PVA analysis revealed that the population can only survive if 2 to 3 individuals can be saved yearly (Kreb, 2004).

Conservation Activities Proposed and Undertaken

RASI's first inventarisisation of the Middle Mahakam Area and Lakes was made between 1999 and 2002 during a Ph.D study of Kreb (2004) on the conservation

of the freshwater Irrawaddy dolphin, which appeared to concentrate in the connecting confluence areas with the lakes and was also a regular visitor the lakes (Kreb & Budiono, 2005). In 2001, RASI conducted a survey on the status of several bird species and in particular lesser adjutants and crocodile species in cooperation with the Global Nature Fund (Budiono, 2001).

Present and future activities of RASI focus on habitat protection of wetlands and lakes and important river areas and are part of a larger program to protect the freshwater dolphin population. This program has started since 2000 with the help of several (inter)national sponsors and mostly focused on increasing awareness of schoolchildren and fishermen with regards to the dolphins' protection and sustainable use of natural aquatic resources.

Some specific objectives and activities have been proposed and are currently being undertaken such as:

1. Maintain biological diversity with particular reference to the freshwater Irrawaddy dolphin through protection and upgrading of its habitat and prey resources in the main river and lakes.
2. Build community commitment to a sustainable use of natural resources of the aquatic (related) environment by conducting socio-economic and biodiversity assessment surveys, and education awareness campaigns focusing on the sustainable use of natural resources and conservation status of several wildlife species, especially birds and freshwater dolphins.
3. Organize a workshop in each district (i.e. on site) in which the results of the socio-economic and bio-diversity assessment studies are presented and discuss a preliminary zonation design of area usage with a suitable panel of all stakeholders with overlapping landuse interest. Prepare a final design, which is approved by a majority of community representatives and develop local or national legislation.
4. Active promotion of this area as an (inter)national tourism site to enforce political and societal support for the preservation of this area.

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