

Satellite Images and Aerial Photos from the Tropical Peat Swamp Forest in Central Kalimantan- Analysis of the 1997 Fire Disaster

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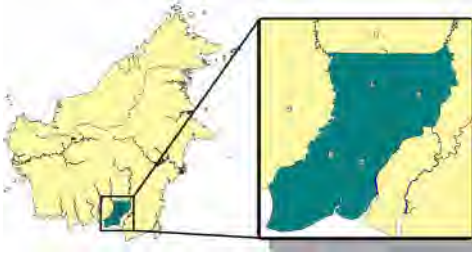


Figure 1: Kalimantan/Borneo, Indonesia. The magnified section shows part of the Central Kalimantan province that was allocated for the Mega Rice Project. The project was divided into five work stages: block A, B, C, D and E. P indicates the remaining pristine peat swamp forest area.

Abstract

The overall aim of this research programme (began in 1995) is to investigate the evolution and the economic potential of the peat swamp forest (P.S.F.) resource in Central Kalimantan by remote sensing techniques. A multispectral and multitemporal image analysis was used to monitor the environmental importance and agricultural potential as well as wildlife conservation aspects.

The natural vegetation of most tropical peatland is rain forest containing trees of commercial value, e.g. Ramin. Selective forest logging is probably the most sustainable use of this resource, but it is also the principal reason when more destructive developments take place. The current status of forestry on tropical peatland needs to be determined, especially the different categories of designation, e.g. production forest, conversion forest, protection forest together with the policies which govern these and control logging and other activities.

A land-use conversion 1 Million ha (Mega)-Rice-Project for rice cultivation including transmigration was started by the Indonesian government with a feasibility study and, in April 1996, with the digging of the irrigation channels into the peat swamp. The development of an area of one million hectares in Central Kalimantan, situated between River Sebangau in the west, River Kahayan, River Kapuas and River Badito in the east and the Java Sea in the South was planned and partly realised. The total area of impact is 14 million hectares. The project faces problems at peat domes with a height up to 10m between the main rivers. Satellite-images of heavy forest fires in Autumn 1997 in Central Kalimantan has been processed too.

To undertake global monitoring/survey in a short time, it was essential to use Landsat Thematic Mapper, SPOT and ERS1/2 Radar images, linked to a programme of field checking of forest, peatland development and peat condition. Remote sensing technology was used for all survey, monitoring and planning tasks. Further evaluation will take place in the next three years (1999 - 2001) within the framework of a European Union project with 6 international partners. The project title is: Natural Resource Functions, Biodiversity and Sustainable Management of Tropical Peatlands.

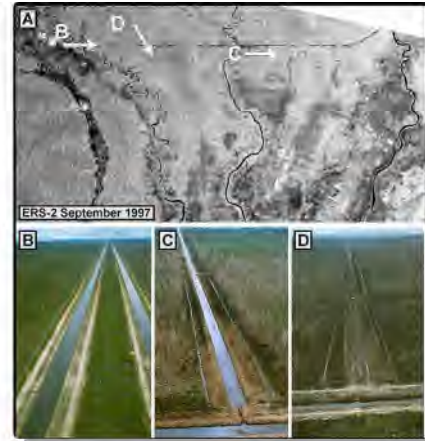


Figure 2: Irrigation channels of the 1 Million hectare rice project. A: Gamma map filtered ERS-image mosaic showing irrigation channels (PPC, MPC, SC, TC) of the "Mega-Rice-Project" at the river Kapuas region. (ERS images acquired 18 Sept 1997 and 2 Sept 1997) Aerial Photos B: Main Channel, 110 km long, C: Side channel filled with water near Kapuas river, D: Dried out side channel in the centre of the peat dome between Kahayan and Kapuas river. Burnt scars are visible along the channels.

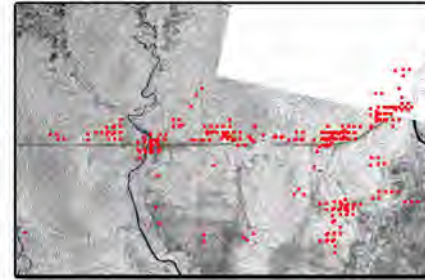
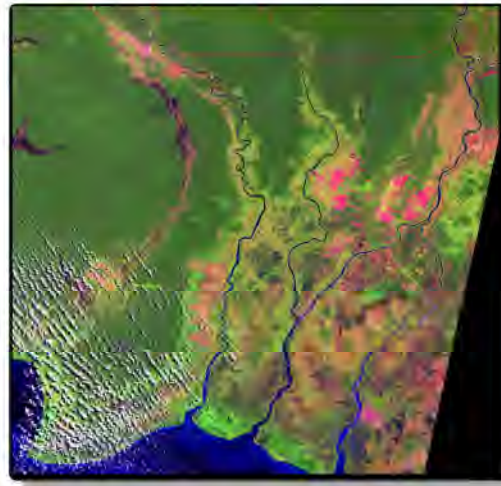
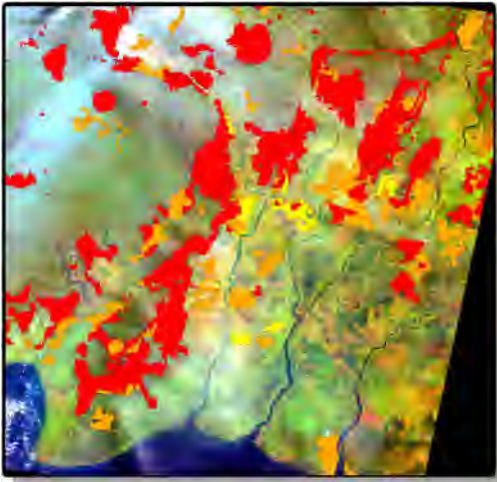


Figure 3: ERS-image mosaic taken on 2 and 18 Sept 1997, showing the Mega-Rice Project Area with Parent Primary Channel between Kapuas and Barito and NOAA AVHRR Hot-Spots from acquired between January and April 1998 by IFFM (GTZ), Samarinda

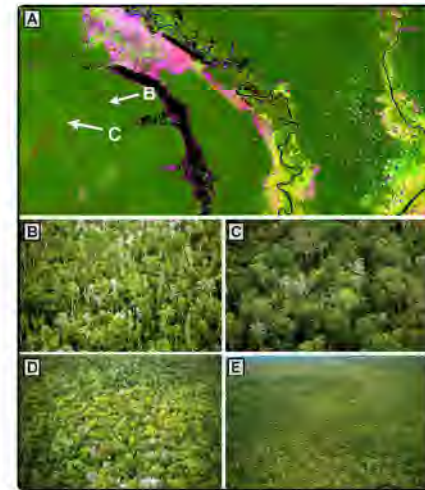
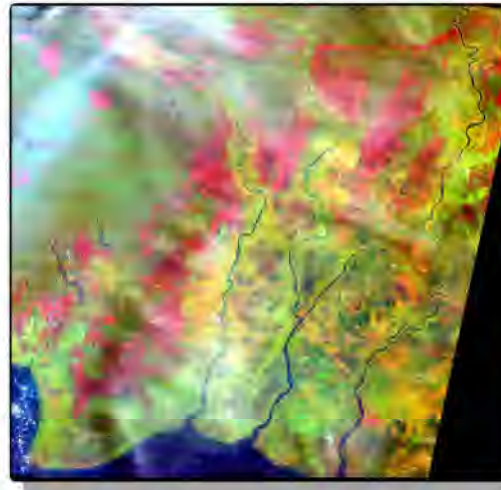
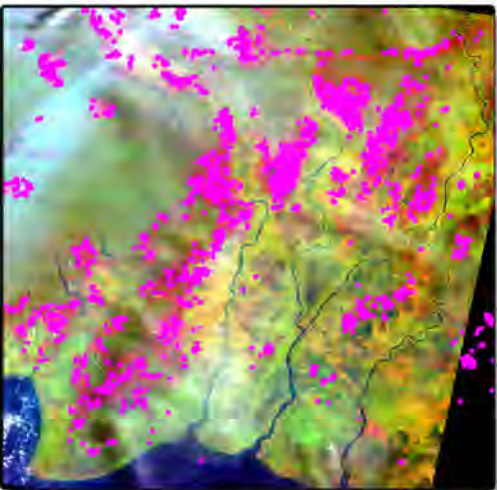


Figure 7: Different peat swamp forest types (P.S.F.). A: Landsat-TM image (118-62, 10 May 1996, RGB = 543) showing Palangkaraya and the surrounding peat swamp forests. A close look reveals different shades of green within the peat swamp forest, which can be related to different types of forest and likely to peat thickness. The arrows designate the location of the aerial photographs. Aerial Photos B: Low pole forest (-20m high) near the catchment area of Sungai Sebangau C: High peat swamp forest (-40m high) near the centre of the peat dome, a Heath forest (-20-30m high), E: Mixture of peat swamp forest and heath forest to the north of Palangkaraya.

Figure 4 (top picture): Landsat-TM image (RGB=543) from 29 March 1998 of Central Kalimantan, showing the Mega Rice Project after the fires. Three level classification of burnt scars of the 1997 fires (red = severe burns, orange = medium burns, yellow = low burns) Figure 5 (bottom picture): Fire hot spots taken from ATRS (ERS) Satellite showing same area as Figure 4, in the period of August to November 1997.

Figure 6: Landsat images (118-62) from Central Kalimantan with RGB-bands 543 res. 542 from 30 June 1991 (top), 29 May 1997 before the fires (middle), 29 March 1998 after the fires (lower picture). Heavy burnt scar can be monitored (compare with Figure 4).