Water Management: The Key for Sustainable Management of Tropical Peatlands

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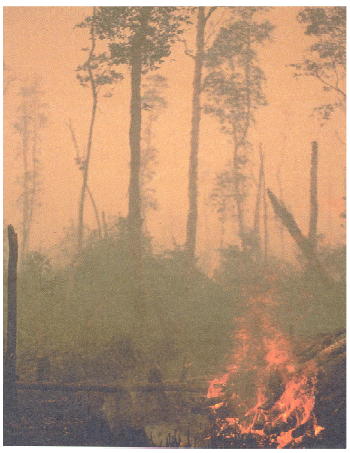
Abstract
Through a combination of research, education and advisory projects, Alterra-ILRI with a number of partner organisations in Europe, Indonesia and Malaysia is promoting the wise use of tropical peatlands

Tropical peatlands



Peat Swamp forest on fire in Central Kalimantan (Courtesy Susan Page, UNLEI)

The majority of the world's tropical peatlands (11 million hectares) occur in South-east Asia, mainly in the coastal regions. Many of these coastal regions are identified as major regions for development with agriculture as its driving force. Agricultural development includes oil palm, sago and forest plantations, aquaculture, paddy and miscellaneous crops including pineapple and vegetables. Peatlands in these coastal regions, however, have also global ecological significance, being some of the largest remaining areas of lowland rainforest in SE Asia that provide the habitat of many endangered species. In addition, they are large stores of carbon and water and also play an important regional economic role, providing forest products and land for settlement. Owing to a lack of awareness and understanding about sustainable land management practices, however, many peatland development projects fail, resulting in serious environmental degradation and impoverishment of local communities. Peatlands are waterlogged most time of the year and need drainage to make them suitable from agriculture or other land use. Compared to mineral soils, peat has a much higher infiltration capacity, drainable pore space and hydraulic conductivity, but a lower capillary rise, bulk density and plant-available water.Another major difference is the subsidence behaviour of peat: it is never-ending and partly caused by oxidation. This oxidation leads to CO_2 emissions, which under Borneo conditions, is estimated to be in the order of 26 tonnes per hectare per year. In dry years, CO_2 emissions are considerable higher because of the very serious peat fires caused by illegal logging, careless land-clearing and farming practices, etc. To reverse this devastating trend, Alterra-ILRI with various partner organisations in Malaysia, Indonesia and Europe, addresses issues of the wise use of tropical peatlands, through research, education and advisory services projects. In the paper three of these projects are discussed. The projects are funded from various sources, i.e. the Governments of Indonesia, Malaysia and The Netherlands and the EU.

Applied research

In the research project "Strategies for implementing sustainable management of peatlands in Borneo/STRAPEAT" strategies for implementing improved sustainable management of tropical peatlands are formulated and the research and institutional capability of Indonesian and Malaysian partner organisations are strengthened (www.strapeat.alterra.nl). The STRAPEAT project aims to promote wise use of tropical peatlands by integrating biophysical, hydrological and socio-economic data within strategies for sustainable management. To assist planners, farmers, managers and other stakeholders in wise use of these tropical peatlands a decision support system (DSS) is being developed. This DSS, which is based on a GIS application, combines the

Groundwater Modelling Computer Programme PMWIN with expert knowledge on subsidence, land use and water management. The DSS consists of three components:

- A groundwater model to simulate the impact of reclamation on groundwater levels;
- A model to calculate the corresponding soil subsidence, and
- A GIS component to visualise the results.

Curricula Development

In the project "New educational Tools for Sustainable Management of Peatlands in the Humid Tropics/PEATWISE" the research results are also used to development new university curricula by a multilateral network of South East Asian and European Universities (www.peatwise.alterra.nl). Using innovative educational tools, six training modules are developed:

- Ecology and natural sciences;
- Water resources and hydrology;
- Integrated Land Evaluation (Soil and land use);
- Human dimensions and resource economics;
- GIS and Remote Sensing;
- Field course and research projects.

Control structure in oil palm plantation in Central Sarawak to maintain high water levels.

Advisory services

For the Government of Sarawak, Alterra-ILRI in cooperation with PS Konsultants from Kuching has developed water management guidelines for the agricultural development in the coastal lowlands of Sarawak, Malaysia (www.ilri.nl). The proposed integrated water management approach shifts from an exclusive emphasis on drainage of excess water, to water conservation emphasising drainage in wet periods and water storage in dry periods. These guidelines provide advice on best practices in planning, assessment, design, implementation and management of water management systems for agricultural activities in coastal peat swamps of Sarawak.

Combining research, education and advisory services is a major step in the promotion of the wise use of tropical peatlands. It is, however, is a process of optimisation that will take years. And only when all organisations working in tropical peat swamps join hands the implementation of the recommended approach will lead to a success in sustaining one of Borneo's precious resources: its lowland peat swamps.