

Fire Threat Analysis as a tool to improve fire management in South Sumatra Province, Indonesia

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Abstract

The Indonesian island of Sumatra has a history of devastating vegetation and peat fires. These are mainly due to degrading land use practices. Land use changes altered the original land cover and most lowland forests were removed or severely degraded by logging, resource extraction and fire. In the province of South Sumatra, severe wildland fires are frequent, resulting in widespread land degradation, loss in biodiversity, significant greenhouse gas emissions from peat lands and adverse health impacts. In order to improve fire management, a Fire Threat Analysis (FTA) application was developed as part of a Fire Information System within the framework of the EU-Indonesian cooperation project South Sumatra Forest Fire Management Project (SSFFMP).

FTA is a GIS-based approach that tries to map the overall threat by fire in an area; i.e. the risk of fire occurrence as well as the potential fire impacts. FTA generally consists of four components: Risk of Ignition, Potential Fire Behaviour, Suppression Capacities and Values at Risk. FTA serves as an input to several activities such as fire suppression planning, land-use planning, and the definition of fire detection and suppression objectives.

Central to the application developed for South Sumatra is the Risk of Ignition component. It indicates the probability of a fire to start at a certain location. Probabilities were estimated using a Bayesian model based on analysis of historical fire occurrence data from MODIS hotspots in relation to different land use practices and for different fire danger scenarios. GIS input data reflected common fire causes. These are mostly related to land management and land cover/use change, accessibility, land use conflicts and fire history.

As part of the Potential Fire Behaviour analysis, a fuels map was produced from classified Landsat data and soil maps. It shows the main fuel types to be found in South Sumatra, taking into account the special role of peat soils. For mapping fire suppression capacities, accessibility is a key factor and was analysed using GIS-based cost-distance analysis to take into account the difficult accessibility of many fire prone areas and the limited transport equipment available. The values at risk component looks at economic and protection assets (mainly according to protection status) as well as potential carbon release from peat soils.

The project is pioneering in the introduction of the fire threat analysis approach to Indonesia. Effective use of fire information systems in developing countries is often hampered because of lacking institutional readiness on the one hand and poor adaption of imported technologies to local requirements on the other. To best address these issues, the FTA concept and prototype were evaluated with stakeholders when at prototype stage. Results showed that main concerns were the availability of FTA products at local planning levels and the capacitation of stakeholders to produce, evaluate and interpret FTA products and finally use them in decision making. It could also be shown that FTA provides valuable insights for planners as it helps to identify areas under threat and provides a comprehensive understanding of factors affecting fire occurrence probability and potential impact.

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