



Integrating Ecosystem Services into Spatial Planning in Sumatra, Indonesia

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Short title: Integrating ecosystem services into spatial planning in Sumatra, Indonesia

Key Message: District and provincial government policy makers in Sumatra, Indonesia are integrating ecosystem services and biodiversity into Sumatra's next land-use plan. This ecosystem-based spatial plan guides local government planners in decisions on whether, and where, to award concessions for economic activities, such as oil palm and pulp and paper plantations. An ecosystem service mapping and modeling tool called InVEST was used to assess the quantity and location of high quality habitat, carbon storage and sequestration, annual water yield, erosion control, and water purification under two scenarios, representing implementation of the current government spatial plan and an 'Ecosystem Vision' of sustainable land use that better balances environmental, social and economic considerations. This information is helping to design and locate the best areas for conservation activities such as forest restoration, sustainable finance mechanisms such as payments for carbon and watershed services, and best management practices for forestry and plantations.

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What is the problem?

Sumatra has abundant biodiversity; it is the only place on earth where tigers, elephants, orangutans and rhinos all reside. Local communities rely on many ecosystem services, particularly the provision of a clean, regular water supply for drinking, hydropower and irrigation, protection from floods, droughts, forest fires and landslides, regulation of air pollution and maintenance of fertile soils for agriculture. However, deforestation and forest conversion, mostly for palm oil, pulp and paper plantations and illegal logging, are causing losses of biodiversity and degrading many ecosystem services. In particular, conversion of lowland deep peat forests – mostly in the province of Riau in eastern Sumatra – is a major contributor to global carbon emissions, creating adverse climate change impacts globally. Existing and prospective forest concessions threaten to have even greater adverse impacts.

The current lack of incentives to sustain ecosystem services is one of several root causes of these problems. The opportunity costs, in terms of profits from palm oil and other economic sectors, are currently more lucrative than conservation. There are few payment mechanisms to reward those who provide ecosystem services through sustainable land management. It is commonly overlooked that forests provide a range of valuable ecosystem services, beyond standing timber, that contribute to the livelihoods, security and wellbeing of local communities.

What is being done to solve it and what is the role of national and provincial policy?

In October 2008, the ten provincial governors of Sumatra and four Indonesian government ministers made a historic commitment to protect the remaining forests and critical ecosystems of Sumatra. Local land-use planning is critical for achieving this commitment. Indonesia's national spatial planning process operates on a 5-year cycle. Spatial plans guide decisions about whether and where concessions are granted for economic activities, such as oil palm development and pulp and paper plantations, and where is reserved for conservation and restoration. Spatial planning has been undertaken in Indonesia for many years, but has only had a legal basis for measures to enforce compliance since 2007, following the Spatial Planning Law 26/2007 (see Hudalah and Woltjer, 2007). Strategic Environmental Assessments (SEAs) are mandatory under the new law.

Having developed national, and several island-wide, spatial plans in 2009, the Indonesian government is working to design spatial plans at province and district levels in 2010. Much decision-making power resides at this local scale since decentralization. District and provincial governments are integrating ecosystem services and biodiversity into spatial plans, through a Roadmap Action Plan, which sets out an 'Ecosystem Vision' for conserving Sumatran ecosystems. The Vision was launched in May 2010, and developed by a number of government departments (Internal Affairs, Public Works, Forestry, along with the Ministry of Environment, National Development and Planning Board and Coordinating Ministry of Economy Sector). It maps areas for protection and restoration based on critical biodiversity and habitat, and outlines measures to be taken to avoid additional ecosystem degradation. Decision makers are also considering how spatial planning affects ecosystem services that support the well being and livelihoods of local communities.

A final spatial plan for Sumatra will be developed by the end of 2010. The RIMBA ecosystem has been selected as a demonstration location to model best practice for sustainable spatial planning and development with low carbon emissions, eventually to be scaled up elsewhere in Sumatra and beyond. RIMBA is an area in Central Sumatra that spans 19 districts in the

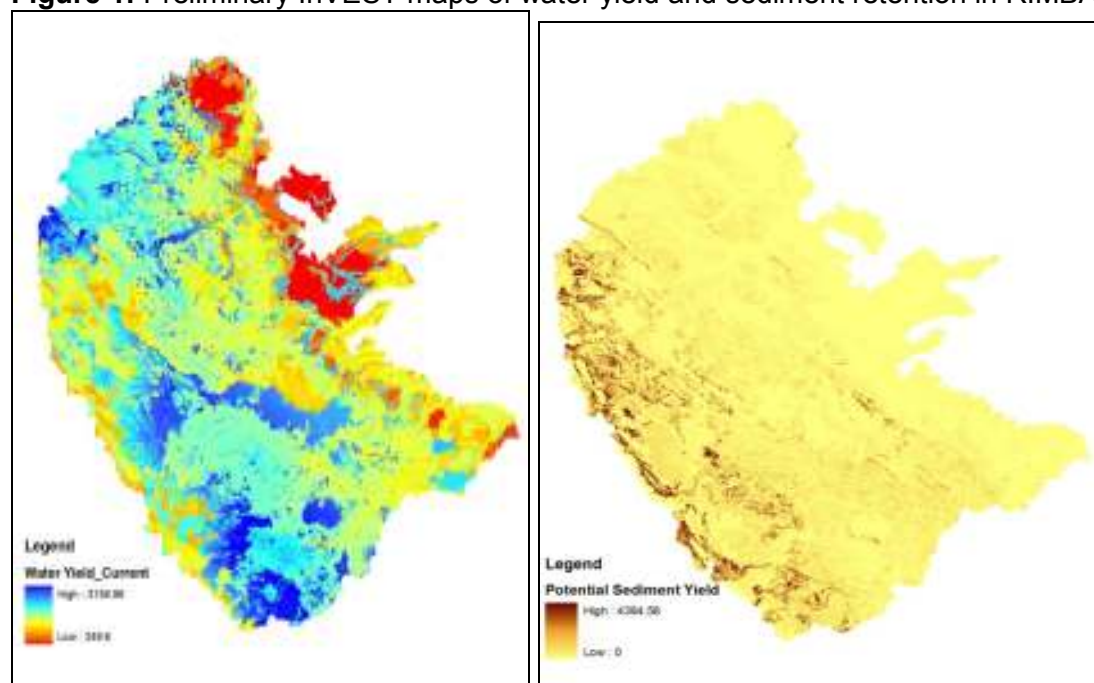
provinces of Riau, Jambi and West Sumatra. It encompasses the remaining high-biodiversity montane, lowland, and peat swamp forest, and degraded areas prioritized for restoration.

Given the high levels of carbon emissions from conversion of peatlands in Riau, this spatial plan has the potential to make a major contribution to the commitment by the Government of Indonesia to reduce green-house gas emissions by 26% by 2020 from the 2005 level. It can also support the 2-year moratorium on new permits to convert natural forests and peatlands, announced in May 2010. Building on partnerships forged between the Indonesian Government and the Governments of Norway and Australia, forest carbon projects are being planned in the RIMBA ecosystem, particularly in carbon rich peat land areas. Local communities may access new sources of income from these emerging markets and payments.

What has been achieved?

A tool developed by the Natural Capital Project for mapping and valuing ecosystem services, InVEST (Integrated Valuation of Ecosystem Services and Trade-offs – see Tallis et al. 2010), is being used to inform the Sumatra spatial plan. Application of InVEST is one of the actions specified in the Roadmap Action Plan to help integrate ecosystem services into land use decisions. Following a request by government decision-makers, InVEST is being applied by the World Wildlife Fund, as part of a forum of NGOs who are assisting with land-use planning in Sumatra, known as Forum Tata Ruang Sumatera (ForTRUST). InVEST provides mapped information on where, and how much, ecosystem services are supplied on the landscape, and how these patterns might change under future land use scenarios. It can be overlaid with biodiversity information to see where ecosystem services and conservation priorities overlap. The Sumatra InVEST analysis focuses on the RIMBA ecosystem because it was selected as a demonstration site for sustainable spatial planning. Figure 1 shows early results for two important ecosystem services in RIMBA – water yield and sediment retention.

Figure 1: Preliminary InVEST maps of water yield and sediment retention in RIMBA, Sumatra



InVEST was used to model the quantity and location of high quality habitat, carbon storage and sequestration, annual water yield, erosion control, and water purification under two scenarios:

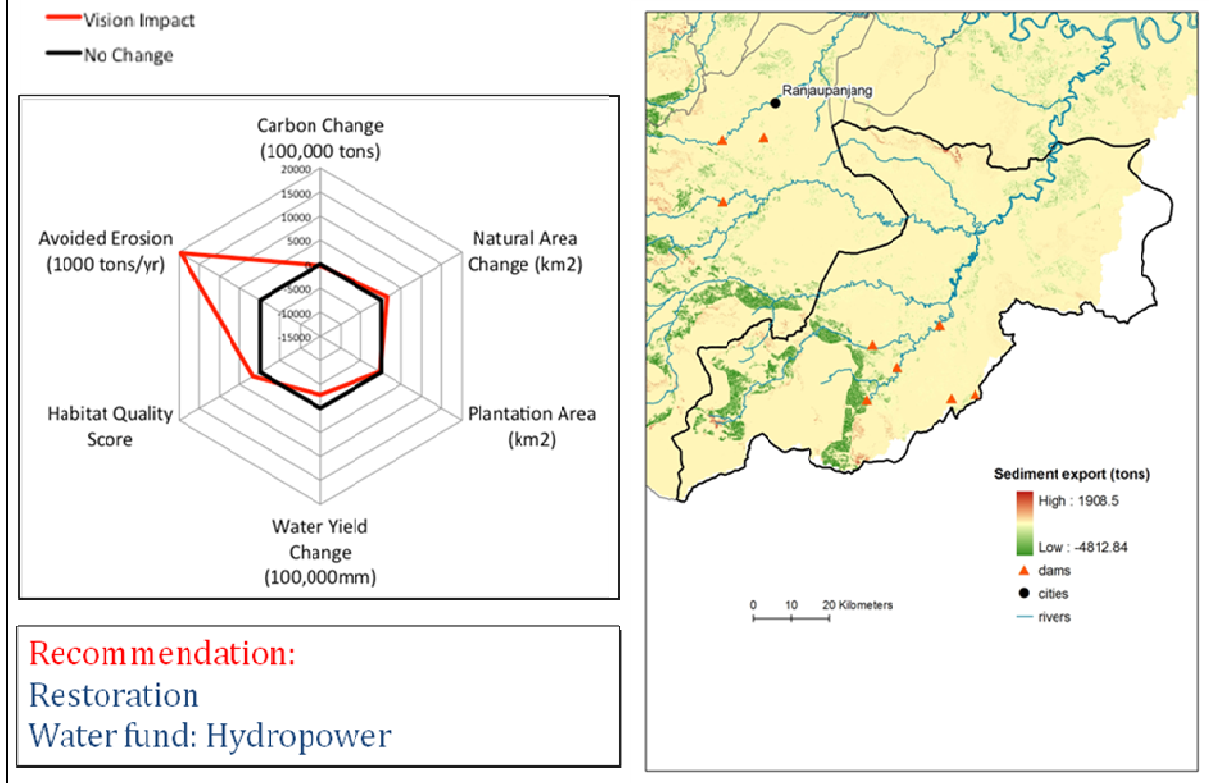
- the Sumatra ecosystem vision of sustainable land use as proposed in the Roadmap Action Plan
- a business as usual scenario corresponding to the government's current spatial plan

In June 2010, the results were disseminated to government representatives from nineteen districts in the RIMBA ecosystem. Preliminary recommendations on specific actions were offered for 18 districts (one district had insufficient data available) based on the potential gains or losses in ecosystem services if the ecosystem vision (as outlined in the Roadmap Action Plan) were implemented. For example, on the basis of InVEST results, recommendations were made on how to prioritize areas for forest restoration based on habitat quality and the potential for reducing erosion. Information on ecosystem services can also be used to advocate for, and help implement, commitments by local government policy-makers to establish incentive mechanisms that reward sustainable land use and conservation, such as forest carbon projects, payments for watershed services, certified forestry and agriculture, and ecotourism. InVEST results informed discussions of forest carbon projects by identifying where carbon storage and sequestration potential is high. Future analysis will also look at opportunity costs and related threats of deforestation. Results were also relevant to the design of payments for watershed services, by identifying where the services of water yield and avoided erosion are provided, and where beneficiaries are located who could pay to ensure continued service delivery. For instance, a district that gains in sediment retention if a sustainable spatial plan is implemented, and has a town or dam downstream from the sediment retention area, could be a potential location for a payment for watershed services scheme to control erosion.

In this way, information on ecosystem services is helping to inform important decisions in the spatial plan, such as where restoration takes place, where concessions for oil palm and forestry are awarded, and where payment schemes for carbon and watershed services could be piloted. InVEST and other ecosystem service tools can also be used in the future to strengthen the scientific information within Strategic Environmental Assessments, which are mandated to support spatial planning in Indonesia.

Figure 2: Preliminary results showing gains and losses in ecosystem services, wildlife habitat and plantation area in the district of Sarolangun, Jambi province, under the Sumatra 'Ecosystem Vision'

SAROLANGUN



Follow-up actions will include further revision of these preliminary analyses to culminate in a final report. There will also be capacity building for local universities to enable verification of initial results, plus continued use of InVEST and additional socioeconomic analyses in other locations. Data and the InVEST software will be provided to province and district level government officials to enable regular, updated applications in the future.

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