



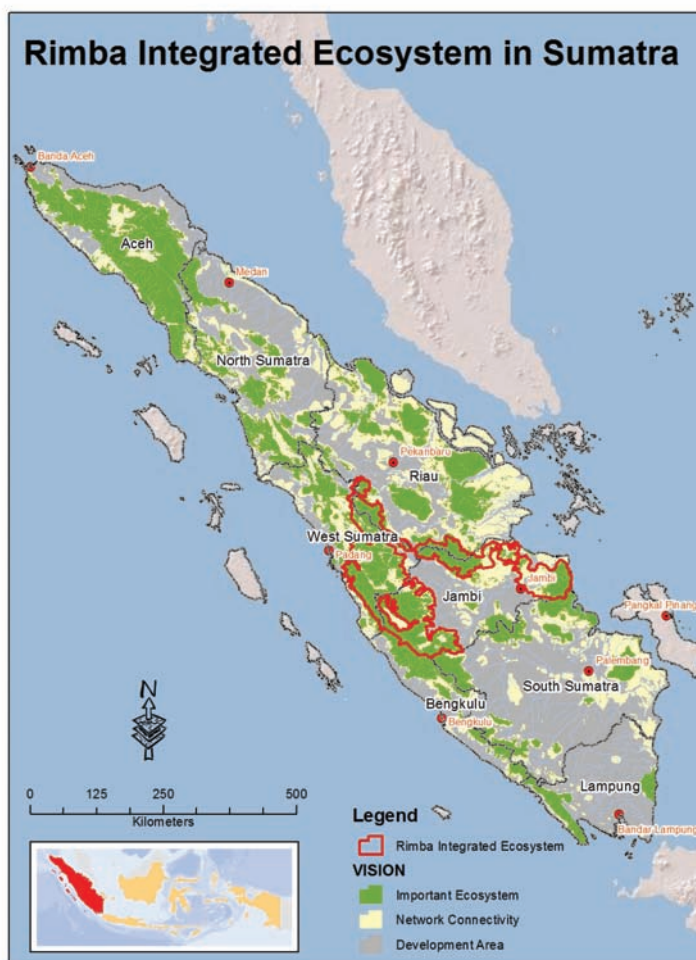
WWF

FACTSHEET

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Integrated Valuation of Ecosystem Services and Tradeoffs Application in RIMBA Integrated Ecosystem Area, Sumatra, Indonesia



Introduction:

This paper / brochure describes the use of the Integrated Valuation of Ecosystem Services and Trade-offs (InVEST) tool in a region of central Sumatra covering six watersheds, containing 18 out of 19 districts overlapping the RIMBA area . Application of InVEST in RIMBA is one of the actions specified in the Sumatra Roadmap Action Plan . Following a request by Indonesian government decision-makers, InVEST was applied by the WWF, as part of a forum of NGOs assisting with land-use planning in Sumatra (Sumatra (Forum Tata Ruang Sumatera-ForTRUST). InVEST was used to assess the quantity and location of high quality wildlife habitat and four ecosystem services: carbon storage and sequestration, annual water yield, erosion control, and water purification.

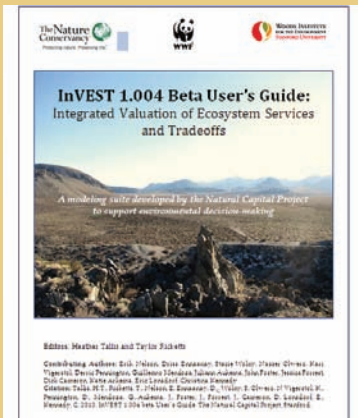
The resulting analysis and report aims to enable 19 district governments in the provinces of Riau, Jambi and West Sumatra to integrate ecosystem services and biodiversity into their land-use plans. The 19 districts were selected because of their location in important watersheds for central Sumatra and the high levels of biodiversity they contain, including charismatic megafauna, such as tigers, elephants, rhinos and orang-utans.

About RIMBA Integrated Ecosystem Area

RIMBA is an abbreviation of the names of provinces, namely Riau, Jambi, and West Sumatra. RIMBA Integrated Ecosystem Area is the official name given to this area, which is also the early implementation area of the Sumatra RoadMap Document, and has received approval from the three provinces. RIMBA Integrated Ecosystem Area located in central of Sumatra Island with total area 3866 million hectares.

RIMBA area are important because these provinces has a high level of threat to biodiversity as habitat destruction that would lead to the existence of key species of Sumatran tigers and elephants as well as other environmental damage caused by the switching function of forest land into oil palm plantations and industrial plantations forest.





About the InVEST tool

The results in this report are based on application of an ecosystem services modeling, mapping and valuation tool called InVEST. InVEST provides mapped information on the quantity and location of ecosystem services supplied on the landscape, and how these patterns are likely to change under future land use scenarios. It can be overlaid with biodiversity information to see where ecosystem service and conservation priorities overlap. InVEST was developed by a partnership of Stanford University, the University of Minnesota, World Wildlife Fund and the Nature Conservancy. It has been applied in more than ten pilot projects globally, and downloaded by 1,400 users thus far. InVEST is helping governments around the world develop land-use plans that conserve nature, not only for its own sake, but for the benefits it provides to people.

About Sumatra

Logging and forest conversion to agricultural and pulp plantations in Sumatra have affected the natural services and systems that people rely on for their livelihoods and well-being. Although forest conversion provides short-term income to small holders and agro-forestry corporations, it also reduces water quality for drinking and, hydropower. It also increases erosion leading to greater risk of landslides and depletes forest products that are important for local livelihoods. Deforestation, particularly of peat swamps, also affects the world's climate by releasing globally significant amounts of carbon that are stored in forest vegetation and soils. However, there are currently few payment mechanisms to reward those who provide ecosystem services through sustainable land management.

The loss of forest 'ecosystem services' – along with the loss of Sumatra's biodiversity - has raised concern in Indonesia and abroad, as these costs are typically not accounted for in land-use decisions. For these reasons, the Sumatra Governors committed to "restoring critical areas to protect ecosystem services."

5 Programmes

To describes those plans in Sumatra RoadMap Document, the Government of Indonesia selected five programmes for implementing and financing ecosystem-based spatial planning in Sumatra. These programmes are: forest restoration; forest carbon payments; payments for watershed services and improved watershed management; and best management practices for forestry and plantations. The InVEST analysis was used to identify areas within each district where the programmes can be implemented based on the ecosystem service benefits which would result in the maintenance or improvement of these services. This 5 Programmes implementation is being carried out in RIMBA Integrated Ecosystem Area.

Preliminary results

Analyses reveal that implementing the Sumatra Roadmap Action Plan would result in substantially higher carbon stocks, reduced sedimentation, cleaner water, and enhanced forest habitat for biodiversity across the landscape, as compared to the government spatial plan. We are now comparing districts with respect to the potential ecosystem service gains from implementing the vision, historical deforestation rates, and land value based on expected returns from plantations. These analyses will help to recommend specific programmes that individual districts can implement to realize the Sumatra Vision while also maintaining and enhancing their ecosystem services and gaining associated financial benefits.

Analyses of ecosystem services in Central Sumatra: Early Results

In the last 20 years, Sumatra has lost about 50 percent of its forests, which has not only caused the loss of carbon stock and reduced ecosystem services, but also caused a decline in Sumatra's charismatic species such as tigers, orangutans, rhinoceros and biodiversity in general.

In 2009, Indonesia voluntarily committed to reducing its carbon emissions to 26 percent and eventually up to 41 percent with help from external financing by 2020. Since then, the government has been developing a national REDD+ strategy which covers activities in the forestry, agriculture and mining sectors. The strategy will provide the guidance for formulating, implementing, monitoring and evaluating programmes and activities related to REDD+. It also outlines Indonesia's future strategy in entering the international carbon trading market. The Government of Indonesia recognizes that to achieve this vision, it will require an advancement in spatial planning, greenhouse gas emission reduction, carbon sink enhancement, improvement of people's welfare, conservation of natural resources and capability building of key government institutions for supporting policies and regulations.

In a demonstration pilot for assisting the government in meeting these large commitments, WWF is using a software tool called Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) to map the distribution of wildlife habitat and natural ecosystem services provided by the RIMBA (Riau, Jambi, and West Sumatra) priority landscape in Central Sumatra, and to assess how their provision could change in future under two alternative scenarios of land use: (1) the “Sumatra Roadmap Action Plan” developed by Ministry of Internal Affairs, Ministry of Public Works, Ministry of Forestry, State Ministry for Environment, National Development and Planning Board, Coordinating Ministry of Economy Sector Sumatra Spatial Planning Forum (FoRTrust), and WWF Indonesia as a facilitators (2) the existing spatial plan proposed by the District and Provincial governments. These analyses will provide guidance on the alternative land-use planning scenarios that district and provincial governments could implement within their jurisdictions to ensure a sustainable future for their constituencies.

Tiger Habitat Quality Alternatives

Using InVEST, wildlife habitat quality in the RIMBA area was modeled under both scenarios, specifically considering the habitat requirements for tigers. Different land cover types were assumed to provide varying levels of habitat quality. For instance, some types of plantations were assumed to be intermediate in habitat quality between natural undisturbed forest and built infrastructure. Habitat quality was also assumed to degrade with increasing proximity to sources of threat such as plantations, roads, agricultural fields, settlements and other human-modified areas, with each threat type affecting nearby habitat quality with varying levels of severity. Thus, a large road or a mine might pose a higher threat than a plantation to nearby forested habitat. These indices of habitat quality are also relevant for other large forest-dwelling mammals and other biodiversity found in the region.

Difference in habitat quality of Biodiversity between A) vision and 2008 and B) government plan and 2008 in RIMBA area

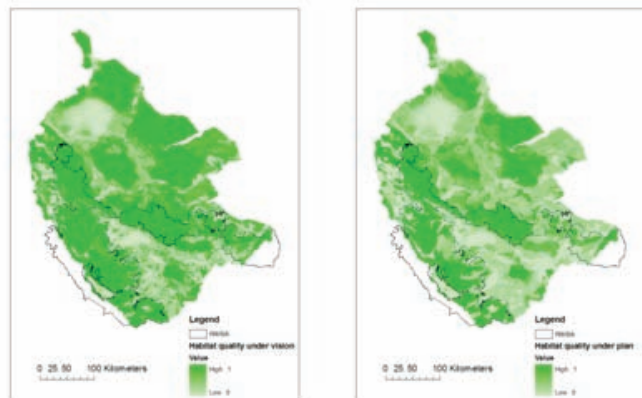
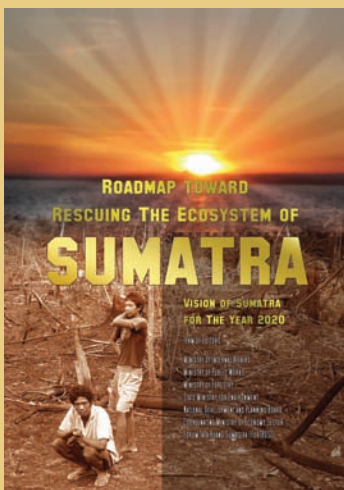


Figure 1. Difference in habitat quality of Biodiversity between A) Sumatra vision and B) government plan and 2008 in RIMBA area

The two scenarios proposed for Central Sumatra have profound implications for the maintenance of high-quality natural habitat necessary for the persistence of endangered wildlife species found in the RIMBA area. Our analyses demonstrate that under the Sumatra Roadmap, large tracts of contiguous high-quality habitat would exist across Central Sumatra, with the priority RIMBA area being almost entirely restored to high habitat quality. Under the government spatial plan, high quality habitat would be greatly reduced in area, and more fragmented than in the Roadmap.

Next steps: Over the next few weeks, we will identify areas of high quality wildlife habitat that are near existing or proposed plantations or logging concessions. These extractive areas should be prioritized for best management practices. We will also overlay habitat quality with the other outputs from InVEST to identify areas where programmes based on ecosystem services (such as payments for carbon storage and sequestration, and watershed management schemes) could best benefit conservation.



About RoadMap Towards Rescuing The Ecosystem Of Sumatra (Sumatra RoadMap Document - Vision of Sumatra for The Year 2020)

Central Government through State Ministry for Environment, Ministry of Internal Affairs, Ministry of Public Works, and Ministry of Forestry intend to execute the rescuing ecosystem of Sumatra. This has been enthusiastically welcomed by all Sumatran governors who signed Rescuing the Ecosystem of Sumatra Agreement. This includes three major issues: (a) Ecosystem-based spatial planning; (b) Critical areas restoration for maintaining buffer system; and (c) Protection for areas containing high values of the buffer system, biodiversity, and climate changes.

As further details of the three issues of that agreement, a Roadmap Action Plan for Rescuing the Ecosystem of Sumatra has been developed. The Action Plan identifies potential measures to be taken, until the year of 2020, in order to avoid additional degradation on the remaining ecosystem. Apart from that, the roadmap also serves as guide to the local governments to implement and maintain efforts that should be done as long as relevant to numerous alternative options given, in accordance with local characteristics and conditions, and it is not impossible if they can obtain incentives from the ecosystem management they will do.

Carbon Storage and Sequestration Alternatives landscape

InVEST has also been used to map carbon stocks in Central Sumatra in 2008, and to assess how these might change under the two alternative future scenarios described above. While the highest carbon stocks are found in peat areas, carbon-rich areas also exist elsewhere in the landscape, including non-peatland but forested portions of Central Sumatra as in the map (Figure 2).

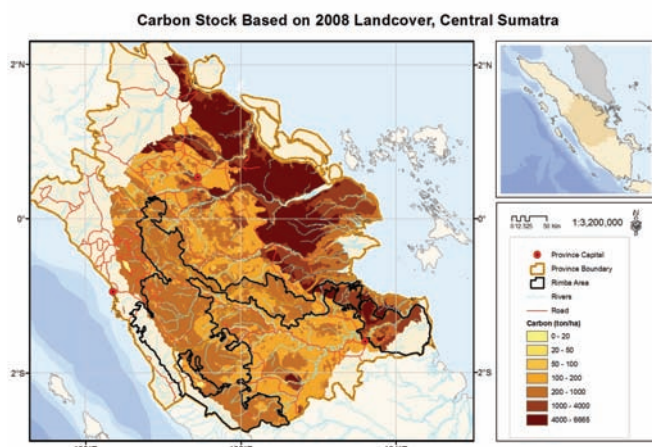
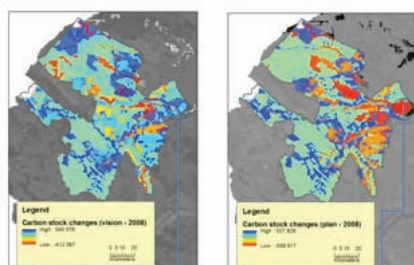


Figure 2. Map of Carbon Stock Based on 2008 Landcover, Central Sumatra

If the Sumatra Roadmap were to be implemented, over a 50 year time frame the forest carbon stock gains on the landscape would be twice that obtained from implementing the government spatial plan, with 5,700 MtC₂ as compared to 2,800 MtC respectively as in the map. We are now comparing 18 districts overlapping the RIMBA area with regard to potential for investment in carbon projects based on the following criteria: (i) forest carbon stocks, (ii) historical (2000-2008) deforestation rates, and (iii) land values based on revenues from plantations.

We are also working to identify areas within districts where forest carbon storage and sequestration projects might deliver substantial avoided carbon emissions benefits for REDD+. For example, in the northeastern region of Kampar district (Figure 2), the Sumatra Roadmap would restore the peat swamp forest, while under the government plan existing plantations would persist. These areas would experience substantial gains in forest carbon stocks and reduced peat emissions under the Roadmap, whereas under the government plan they would continue to see significant carbon emissions from peat decomposition. The models have estimated that under the Sumatra Roadmap an estimated additional 78 MtC over 50 years as gained for the whole district, compared to the government plan. To obtain these carbon storage and sequestration benefits offered by the Sumatra Roadmap, these regions should be prioritized for reforestation.

Difference in carbon stocks between A) vision and 2008 and B) government plan and 2008 in Kampar district, Riau province



These areas currently have oil palm on peat. They stand to gain up to 100 tons/ha of carbon under the vision (where they would be replaced with forest), and lose about 1000 tons/ha under the partial plan (where they would remain as oil palm) over 50 years

Figure 3. Difference in carbon stocks between A) vision and 2008 and B) government plan and 2008 in Kampar district, Riau province

There is additional potential for forest carbon projects elsewhere, especially in the eastern and northwestern parts of Tebo district (Figure 3). Here, restoration of current oil palm and other plantations to forests would lead to carbon sequestration both under the Roadmap and the government plan, but with larger gains obtained under the Vision. We estimate that total carbon stocks in Tebo under the Roadmap would exceed those under the government plan by 13 Mt over 50 years.

Next steps: These analyses demonstrate broad differences in carbon stocks under the two alternative policy scenarios. However, additional analyses have to be done to a) get more precise estimates of carbon stocks and b) determine what types of carbon projects (i.e. to generate offsets for compliance or voluntary markets) might be the most appropriate in different locations. To actually design and implement carbon stock or forest carbon payment programmes, other required actions include: determining

financial feasibility of forest conservation or restoration programs, assessing and developing necessary regulations and institutions to ensure fair and equitable distribution of benefits; building capacity; ensuring clear, strong property rights; building a monitoring, reporting and verification system; and identifying sources of finance. Developing more carbon friendly scenarios is only the beginning of a long process that will ultimately lead to a more sustainable future.

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