World Agroforestry Centre
TRANSFORMING LIVES AND LANDSCAPES

Economics versus conservation: a case study of Tripa peatland

Tripa Series

Indonesia is ranked as the third-largest emitter of greenhouse gases in the world, after the USA and China. However, at a meeting of the G20 nations in September 2009, Indonesia announced its commitment to reduce its emissions by 26% from the 'business as usual' level by 2020. With the support of developed countries, the emissions level would be further reduced by 15%, reaching a total of 41%.

Since that commitment, reducing emissions from deforestation and degradation (REDD) has been taken seriously. According to national regulations—for example, forestry ministry regulations (*Peraturan Menteri Kehutanan*)—REDD can only be conducted in forest areas, such those designated as 'production', 'protected', 'conservation', 'customary', 'authorized' and 'village' forests. There is no consideration for REDD outside the 'forest' area, although REDD covers woody vegetation, such as agroforests and mixed gardens.

A 'forest' in Indonesia, as established by Law 41/1999, is determined by ownership of the land, while internationally, definition of forest as given by the Food and Agriculture Organization of the United Nations disregards ownership of land. 'Forest area' is defined as an area that has been *designated* as a forest, with or without trees. An unstocked forest can revert to stocked forest. Indonesia's definition of 'forest' has become a critical issue for the Government's policies and institutions, in international agreements, and in common parlance and understanding. There are considerable differences between the various concepts of

Highlights

1. The Tripa peat swamp forest is one of the few remaining Sumatran orangutan habitats. Its situation is conflicted: it is designated as part of the Leuser Ecosystem Zone but also as non-forest use (Area Penggunaan Lain, APL) and experiences persistent development of oil palm plantations.
2. Local people tend to establish smallholding oil palm plots because the crop's profitability is very high compared with other commodities in Tripa.
3. The high profitability of oil palm creates a correspondingly high opportunity cost for avoiding forest conversion with a REDD+ scheme in Tripa.
4. Strategies for balancing habitat conservation and economics include carbon offsets and land swaps.

Cover photo: Tripa forest has been cleared and converted into oil palm plantation (Rahayu Oktaviani/World Agroforestry Centre)

'forest' [1], which range through 'forests with trees', 'non-forests without trees', 'forests without trees' and 'non-forests with trees'. Such land can include mixed and multi-strata agroforestry (intermediate land uses) that can store significant quantities of carbon but are outside of the institutional mandate of Indonesian forest authorities. Significantly, these agroforests do—or could—fall within the internationally agreed concept of 'forest' [2].

Tropical peat swamp forests are a unique and important wetland ecosystem and natural resource. Indonesia has the largest area of peat swamp forest in the world, covering an estimated area of 20.7 million hectares [3,4,5,6], which are distributed mainly across Sumatra, Kalimantan and Papua [4,5,6].

The Tripa peat swamp forest is one of the few remaining Sumatran orangutan habitats. Its situation is conflicted: it is designated as part of the Leuser Ecosystem Zone but also as non-forest use (*Area Penggunaan Lain*) and experiences persistent development of oil palm plantations

In Aceh province, Sumatra, there is a remnant peat swamp forest in the Tripa area (Figure 1) that is an important habitat for Sumatran orangutan *(Pongo abelii)*, an endangered species on the International Union for the Conservation of Nature (IUCN) Red List.

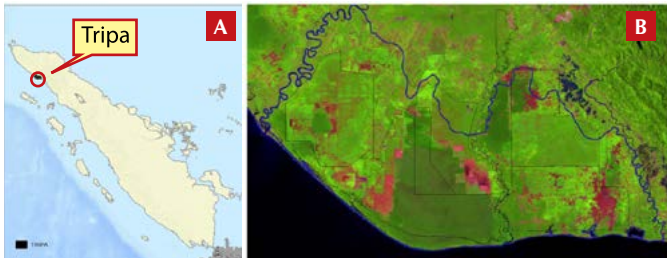

Figure 1. Location of Tripa in Sumatra (A), Coverage of study area on Landsat TM image (B)

Tripa peat swamp is well known for its deep peat soil [7], even though the forest is not designated as 'forest' but instead is categorised as non-forest (*Area Penggunaan Lain*).

Owing to its function as a nature reserve and a nature conservation area, enacted by presidential decree in 1998, Tripa was classified as part of the Leuser Ecosystem Zone (*Kawasan Ekosistem Leuser*).

However, Tripa has continued to experience heavy pressure for conversion of its forests to oil palm and other agricultural production. The average rate of oil palm expansion since most of the *Hak Guna Usaha* (HGU) or concession rights were issued in the mid-1990s (1995 observation) to the most recent date of observation (2009) reached 1500 hectares per year. The highest loss rate of forest to oil palm plantations was 3300 hectares per year, during the last observation period (2005–2009) [8].

Local people tend to establish smallholding oil palm plots because the crop's profitability is very high compared with other commodities in Tripa

Cultivation of oil palm increased quickly in the area owing to a robust global market for palm oil as vegetable oil and biofuel. A steep increase in the amount of smallholding oil palm in Tripa was primarily caused by the high profitability of the crop and several accessible mills in the area.

The return to labour (Internal Rate of Return/IRR) of oil palm was about IDR 139 881 (±USD 15.21) per day, while the return to land (Net Present Value/NPV) at private prices (25-year production scenario at 6.5% discount rate) was about IDR 88 000 000 (±USD 9824) per hectare (Table 1). This high profit is very attractive for smallholders, on top of a policy from the local government to expand smallholders' oil palm plantation areas.

Table 1. Profitability in Tripa land-use systems

Land-use system	Return to labour (IDR/pd*)	Return to land (IDR 000/ha)	Labour requirement (pd/ha/yr)
Cocoa agroforestry	46 934	20 521	93
Smallholding oil palm	**139 881**	**88 134**	**57**
Home garden	56 804	5 972	77

*Note: Prices based on 2010 prices and expressed in June 2010 Indonesian rupiah (IDR 9199 = USD 1). *pd = person day*

The high profitability of oil palm creates a correspondingly high opportunity cost for avoiding forest conversion with a REDD+ scheme in Tripa

The high profitability of oil palm causes a high opportunity cost for avoiding forest conversion.

'Opportunity cost' is one of three cost categories for REDD+ schemes. It is a ratio of changes in profitability (USD per hectare) and a change in carbon stock, which can be expressed as emissions (tonnes of carbon-dioxide equivalent per hectare or tCO_2e/ha) [9].

Cumulative emissions in Tripa show different amounts and patterns that entail different levels of opportunity costs for avoiding forest conversion. The cumulative emissions in Tripa for all of the periods of observation (1990–2009) show that the average annual emission from Tripa was 5.7 tCO_2e.

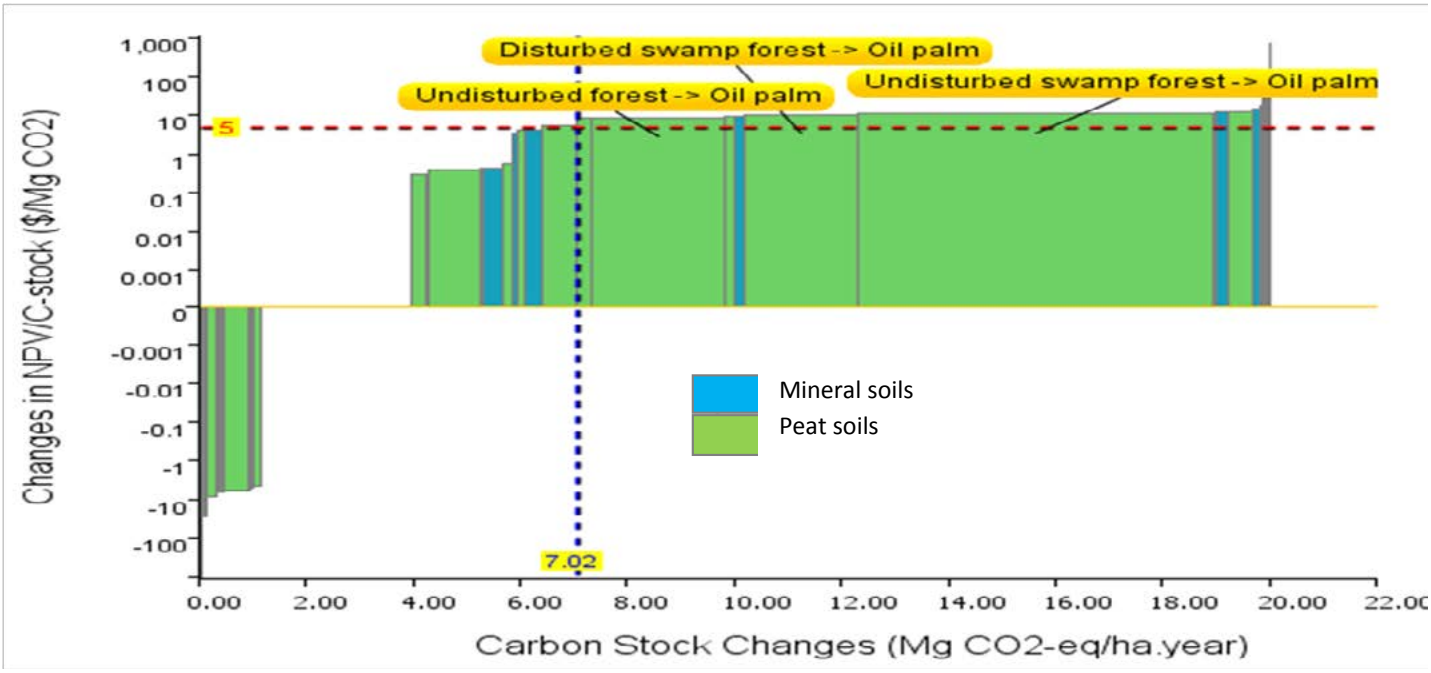

Figure 2. Abatement-cost curves for CO_2 emissions of peat and mineral soil throughout the entire period of analysis (1990-2009) in Tripa

If belowground emissions from peat swamp areas were taken into account (Figure 2), the average emission rose by up to 20 tCO_2e per hectare per year, which is 25% higher than if only aboveground emissions are taken into account.

The amount of aboveground emissions plus peat emissions that could be compensated is higher (7.02 tCO_2e per hectare per year) compared to aboveground emissions only (3.7 tCO_2e per hectare per year). As a fraction of the total emissions, 'aboveground plus peat' is smaller (only 35% of 20 tCO_2e per hectare per year) compared to 'aboveground only' (65% of 5.7 tCO_2e per hectare per year).

Strategies for balancing habitat conservation and economics include carbon offsets and land swaps.

If a comprehensive approach is adopted to land-based emissions that does not depend on institutional forest definitions, a feasible reduction can be achieved in Tripa that fits with international rules for REDD+ and the 'forest plus peat' interpretation that has been used for the 2010 Letter of Intent between Norway and Indonesia (to assist with reducing emissions).

With total cost levels at USD 5–15 per tCO_2e, depending on the type of intervention, we conclude that REDD+ schemes could be feasible but require a commitment to top-up the purely efficiency-based carbon-market prices.

Contributing to the survival of the Sumatran orangutan (especially in the more costly corridor options for Tripa) might be sufficient reason for the voluntary carbon market but requires that biodiversity and reduction of emissions are seen as equally important (rather than one as a 'co-benefit' of the other).

There might be a partial 'internal offset' of lost income opportunities from avoiding further oil palm expansion through buyouts, conservation agreements and development of alternative livelihoods [10]. Such offsets are indicative of (and dependent on the correct representation of) cross-sectoral links. The results so far show that beyond opportunity costs, the issue of 'in-landscape' employment opportunities is the key to any success in conservation. Alternative employment in Tripa may have to be created.

Ecosystem services provided by the forests that we examined were quantified only as carbon stock and tree diversity. Water, which is measureable and has economic value as an energy source and for drinking and other domestic and industrial uses, has not been evaluated. If this is taken into account, it challenges the 'additionality' of reducing emissions. 'Additionality' means that the REDD mechanism must result in forest conservation that would not occur otherwise.

The last possible option of the solution is oil palm land swaps. If this is part of the solution, further analysis is needed of the areas to which oil palm could be moved and how this would interact with the rest of the landscape.

Conclusion

Tripa is a complex situation where current practices involve multiple actors and interests that contradict conservation imperatives. Even though, on paper, the Tripa area is already protected, the situation shows that existing public policy commitments to support conservation in the Leuser Ecosystem Zone have not had tangible impact and a strong case can be made for 'de facto additionality' of new efforts to reduce emissions.

Even after the moratorium on issuing of new concession rights on peatland was declared by the president in 2011 (INPRES 10/2011), a new permit was issued by the Governor of Aceh over a forest block in Tripa in August 2011. The company holding the permit cleared about 90% of the 1862 hectares of forest by burning. Given that this was against the law, the case is now before the court of state administration of Banda Aceh [11].

Contributors

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Primary Source

Tata HL, van Noordwijk M, eds. 2010. *Human livelihoods, ecosystem services and the habitat of the Sumatran orangutan: rapid assessment in Batang Toru and Tripa*. Bogor, Indonesia: World Agroforestry Centre (ICRAF) Southeast Asia Regional Program.

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