Negotiation-support toolkit for learning landscapes

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36 | REDD abacus SP

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REDD Abacus SP is the short name for Reducing Emissions from Deforestation and Forest Degradation Abatement Cost Curves and Simulator for Scenarios of Policies, a tool to estimate emissions from land-use and land-cover changes, which takes into account the dynamic heterogeneity of soil types, elevations, climate and other biophysical characteristics in a landscape. The tool can easily produce abatement cost curves and the resulting opportunity cost analysis of trade-offs between emission reduction and economic benefits.

Introduction

Carbon emissions' reduction and storage incentive schemes, such as the United Nations-mandated Reducing Emissions from Deforestation and Forest Degradation plus Conservation (REDD+), are part of climate-change mitigation in the agriculture, forestry and other land-uses sector. Implementing such schemes has been high on the agenda of many forest-rich developing countries. Some countries, like Indonesia, have made specific emissions-reduction commitments. As the mechanism takes shape, the question of how to relate national commitments to local contexts and effective implementation is more important than ever. Implementation at the sub-national level needs to be equipped with an appropriate planning platform. The platform must allow development of a multiple stakeholder decision-making process to establish land-use plans for sustainable development, which can reduce greenhouse gas emissions from land-based activity while simultaneously maintaining economic growth.

REDD Abacus SP can assist such a platform by simulating emissions-reduction scenarios within specific zones or across an entire landscape in order to produce ex ante emissions-reduction and opportunity-cost forecasts. REDD Abacus SP is one suite of tools that can analyze emission-related components, including historical and projected emissions and economic trade-offs. In REDD Abacus SP, intermediate and final results are easily extracted so that the process is not a 'black box' and information can easily be traced. The tool uses Java programming language and can be run in any operating system (Windows, Mac, Linux etc). The user interfaces can be easily translated into other languages.

Objectives

- Estimate emissions from land-use and land-cover changes allowing for dynamic heterogeneity of soil types, elevations, climate and other biophysical characteristics in the landscape.
- Analyze trade-offs between emissions and financial gain (opportunity-cost analysis) and produce abatement cost curves to project ex-ante emissions and financial gain of business-as-usual scenarios for setting the reference emission level.
- Simulate zone-specific policies and other emissions-reduction scenarios within landscapes and estimate the potential reductions and opportunity costs.

- Project ex-ante emissions and financial gain of business-as-usual scenarios for setting the reference emission level.

REDD Abacus SP can serve as the main tool for

- developing land-use plans for low-emissions development strategies at provincial or district levels;
- assessing carbon efficiency of a large-scale, land-based enterprise; and
- estimating the abatement cost of emissions from land-use and land-cover changes at a regional level.

Steps

The tool performs four steps.

1. Converts differences in carbon stocks into estimated emissions.
2. Constructs a table of opportunity costs of every type of land-use change from the differences in net present value and carbon stocks.
3. Determines the actual emissions for each cell in the matrix from the area involved and the emissions per unit area.
4. Presents the cumulative emissions total after sorting by opportunity cost.

Together these four steps lead to a two-dimensional graph charting the opportunity costs of avoiding deforesting land-use changes against the volume of carbon-dioxide equivalent emissions.

REDD Abacus SP requires four types of data.

1. A legend that represents land-use changes from the perspectives of economic ('land use') and carbon storage ('land cover') and which allows land-use change data to be compiled by a combination of land-cover-change detection and economic constraints (for example, labour requirements in relation to human population density).
2. Typical carbon-stock data for each legend unit (RaCSA).

   Net present value for each land-use type, typically using private or social accounting (LUPA).
3. A matrix of land-use-change values, which are internally consistent and represent either historical change or a forward-looking scenario (ALUCT).

Example of application

REDD Abacus SP has been used extensively within LUWES activity. It was applied in Tanjung Jabung Barat district, Jambi province, Indonesia, to estimate opportunity-cost curves during the periods 1990–2000, 2000-2005 and 2005-2009 (figures 36.1–3). Using the threshold of USD 5 as the potential price of 1 ton CO_2 equivalent, the curves showed how much emissions could have been compensated or abated. During 1990–2000 (Figure 36.1), emissions below the threshold of USD 5 were 4.49 ton CO_2e/ha/year and increased to 10.28 ton CO_2e/ha/year for 2000–2005 (Figure 36.2) . The increase of eligible emissions demonstrates the higher emissions from conversion to lower net present value land uses. During 2005–2009, the amount of emissions below the USD 5 threshold decreased slightly to 9.53 ton CO_2e/ha/year (Figure 36.3). From the total annual emissions, the proportion of emissions that could have been avoided in Tanjung Jabung Barat district increased

over the period of analysis. For 1990–2000, the proportion was 42%, for 2000–2005 it was 58% and for 2005–2009 the proportion was 64%. These increasing figures demonstrate that emissions reduction efforts could have been successful. A higher proportion of emissions could have been avoided with a similar price of carbon. This also shows potential for future emissions reduction in Tanjung Jabung Barat district.

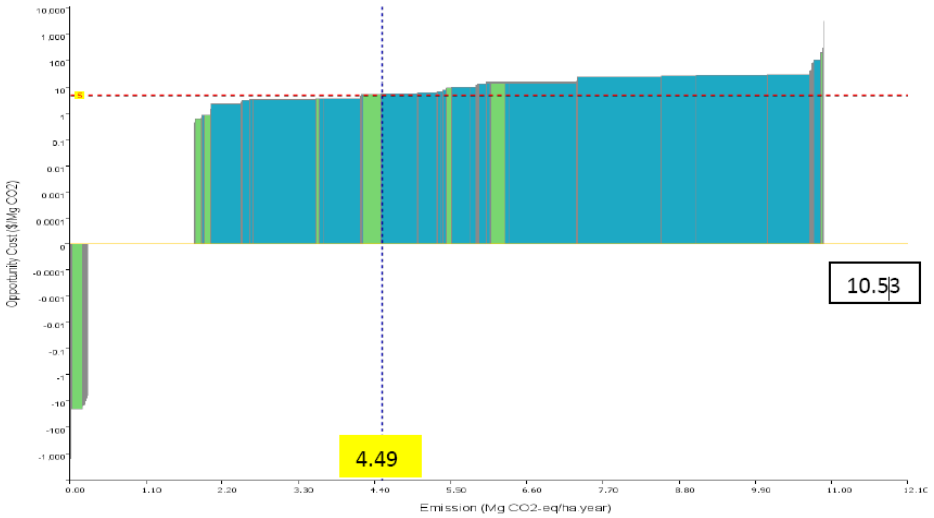

Figure 36.1. Opportunity-cost curve for Tanjung Jabung Barat, 1990–2000

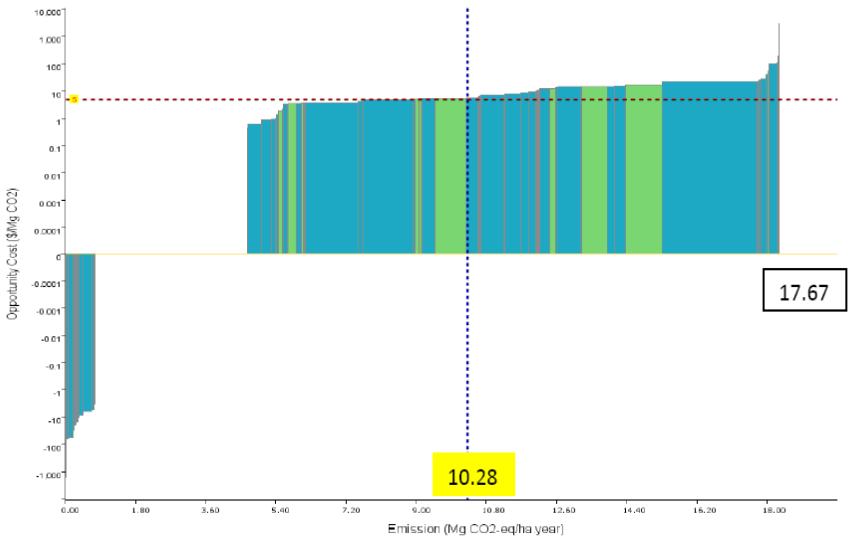

Figure 36.2. Opportunity-cost curve for Tanjung Jabung Barat, 2000–2005

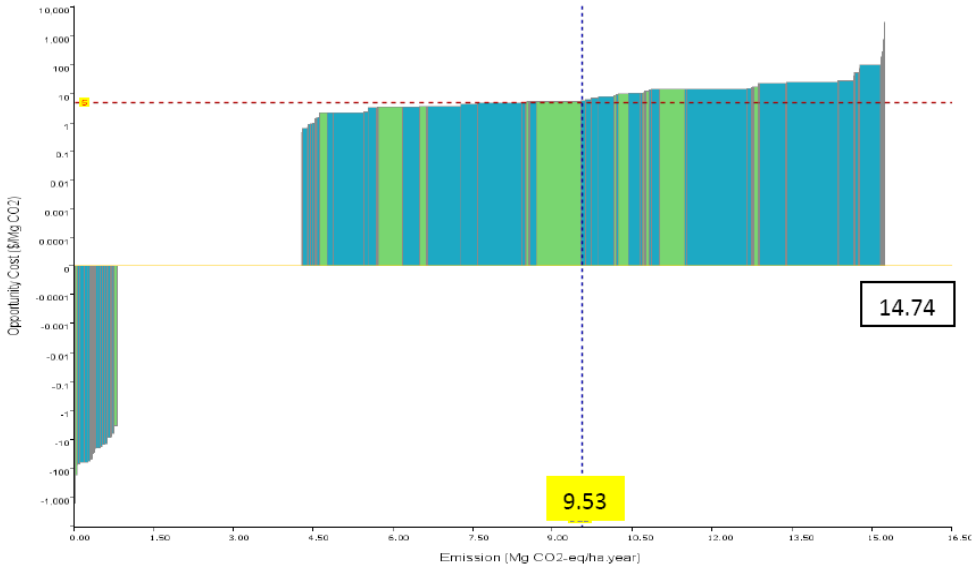

Figure 36.3. Opportunity-cost curve for Tanjung Jabung Barat, 2005–2009

Key references

Harja D,Dewi S, van Noordwijk M, Ekadinata A, Rahmanulloh A. 2011. *REDD Abacus SP: User Manual and Software*. Bogor, Indonesia: World Agroforestry Centre (ICRAF) Southeast Asia Regional Program.

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Tool download: http://worldagroforestrycentre.org/regions/southeast_asia/resources/redd-abacus-sp

The landscape scale is a meeting point for bottom–up local initiatives to secure and improve livelihoods from agriculture, agroforestry and forest management, and top–down concerns and incentives related to planetary boundaries to human resource use.

Sustainable development goals require a substantial change of direction from the past when economic growth was usually accompanied by environmental degradation, with the increase of atmospheric greenhouse gasses as a symptom, but also as an issue that needs to be managed as such.

In landscapes around the world, active learning takes place with experiments that involve changes in technology, farming systems, value chains, livelihoods' strategies and institutions. An overarching hypothesis that is being tested is:

> Investment in institutionalising rewards for the environmental services that are provided by multifunctional landscapes with trees is a cost-effective and fair way to reduce vulnerability of rural livelihoods to climate change and to avoid larger costs of specific 'adaptation' while enhancing carbon stocks in the landscape.

Such changes can't come overnight. A complex process of negotiations among stakeholders is usually needed. The divergence of knowledge and claims to knowledge is a major hurdle in the negotiation process.

The collection of tools—methods, approaches and computer models—presented here was shaped by over a decade of involvement in supporting such negotiations in landscapes where a lot is at stake. The tools are meant to support further learning and effectively sharing experience towards smarter landscape management.

World Agroforestry Centre
ASB Partnership for the Tropical Forest Margins
AARD
Federal Ministry for Economic Cooperation and Development
Norad
IFAD Enabling poor rural people to overcome poverty
CGIAR Research Program on Forests, Trees, and Agroforestry