Negotiation-support toolkit for learning landscapes

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19 | Trade-off matrix between private and public benefits of land-use systems (ASB Matrix)

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The Trade-off Matrix between Private and Public Benefits of Land-use systems (ASB Matrix) provides in one table an overview of key characteristics of land-use systems that coexist in a landscape and form alternatives to each other. The rows form the land-use systems and the columns hold key characteristics that are of local, national and/or global concern, such as employment, profitability, sustainability, biodiversity and carbon stock.

Introduction

Policy-makers need accurate, objective information on which to base their inevitably controversial decisions. The ASB Matrix can help them consider the difficult choices they must make. In the ASB Matrix, natural forest and the land-use systems that replace it are scored against different criteria reflecting the objectives of different interest groups. To enable results to be compared across locations, the systems specific to each are grouped according to broad categories, ranging from agroforests to grasslands and pastures (Tomich et al 1998).

The ASB Matrix is a key example of a 'boundary object' (Clark et al 2011). It is the result of 'boundary' work at the interface between science, policy and local concerns and reflects the effort to jointly define knowledge products and a legitimate pathway to derive them.

Objectives

The objective of the ASB Matrix is to summarize and synthesize information about the multiple functions that land-use systems fulfil in a landscape, combining economic and environmental perspectives, and to allow quantitiative trade-offs between the functions to be explored (with true win-win solutions as a rare exception). The method of deriving the matrix is aimed at two types of boundary work: between the various disciplines of science; and between science, policy and local stakeholders.

Steps

Construction of the table relies on the use of methods for a consistent classification of land-use systems (see RAFT) that is compatible with spatial analysis (ALUCT), profitability analysis (LUPA) and the derivation of time-averaged carbon stock (RaCSA). The final choice needs to be made in an interdisciplinary team where categorization of initial classifications that are based on various disciplinary preferences and limitations is jointly considered. The resulting list must be explicit in all distinctions that are important in current public discourse and policy debates, as well as reflecting local knowledge and concerns.

Before beginning, it will be good to discuss with policy-makers (through in-depth interviews and participation in meetings where policy issues are being discussed) which columns and possibly new indicators are relevant. The list for the sample matrix can be taken as a starting point.

Data collection for the various cells in the matrix will, to the degree possible, have to be based on co-location of socio-economic and ecological sample points to ensure that the system properties are aligned, and trade-off estimates are unbiased.

Example of application

The ASB Matrix was first used in the Alternatives to Slash and Burn (ASB) project phase 2 synthesis report for Indonesia in 1998 (Figure 19.1). The numbers and indicators have subsequently been refined.

In 2005, the increasing interest in reducing greenhouse gas emissions led to the profitability and carbon stock data of the matrix becoming the basis of the opportunity cost method (see REDD Abacus).

Table S1. The ASB matrix as a boundary object

	Global environmental concerns		Agronomic sustainability			National policymakers' concerns		Smallholders concerns/ adoptability by smallholders	
	Carbon storage	Biodiversity	Plot-level production sustainability			Potential profitability	Labor requirements	Returns to labor	Household food security
Land use system	Aboveground tC/ha (time-averaged)	Aboveground (plants), species per standard plot	Soil structure	Nutrient export	Crop protection	Returns to land (private prices), $/ha	Labor person, d/ha/y	Dollars per person-day (private prices)	Entitlement path (operational phase)
Forest	306	120	0	0	0	0	0	0	NA
Community-based forest management	120	100	0	0	0	5	0.2–0.4	4.77	$ + consumption
Commercial logging	94	90	−0.5	0	0	1,080	31	0.78	$
Rubber agroforest	79	90	0	0	−0.5	0.70	111	1.67	$
Rubber agroforest with clonal material	66	60	−0.5	−0.5	−0.5	878	150	2.25	$
Oil palm	62	25	0	−0.5	0	114	108	4.74	$
Upland rice/bush fallow	37	45	0	−0.5	−0.5	−62	15–25	1.47	Consumption
Continuous cassava/imperata	2	15	−0.5	−1.0	−0.5	60	98–104	1.78	$ + consumption

ASB created the ASB Matrix to show the relationship between alternative land uses (including natural forest) and key evaluation criteria. The matrix served as a "boundary object" at the interface of a variety of information users (who defined the rows and columns of the matrix) and scientists (who devised the metrics and conducted the measurements that fill the cells). Reproduced here is the original version of the matrix as reported in an internal ASB report in 1998 (1). A fuller discussion of the matrix and its uses, together with the final version of the matrix for a number of ASB cites, has been published in the project's final report (2).

1. Tomich TP, et al. (1998) *Alternatives to Slash-and-Burn in Indonesia, Summary Report of Phase II. No. 8* (International Center for Research in Agroforestry, Bogor, Indonesia).
2. Tomich TP, et al. Balancing agricultural development and environmental objectives: assessing tradeoffs in the humid tropics. *Slash-and-Burn Agriculture: The Search for Alternatives*, eds Palm CA, Vosti SA, Sanchez PA, Eriksen PJ (Columbia Univ Press, New York), pp 415–440.

Figure 19.1. ASB Matrix for humid lowlands of Sumatra as represented in Clark et al (2011)

Key references

Tomich TP, Lewis J, eds. 2003. *Balancing rainforest conservation and poverty reduction*. Policybrief 5. Reprinted July 2004. Nairobi: Alternatives to Slash and Burn. http://www.asb.cgiar.org//PDFwebdocs/Policybrief5.pdf.

Clark WC, Tomich TP, van Noordwijk M, Guston D, Catacutan D, Dickson NM, McNie E. 2011. Boundary work for sustainable development: natural resource management at the Consultative Group on International Agricultural Research (CGIAR). *Proceedings of the National Academy of Sciences of the United States of America*. DOI:10.1073/pnas.0900231108.

Tomich TP, van Noordwijk M, Vosti S, Whitcover J. 1998. Agricultural development with rainforest conservation: methods for seeking best bet alternatives to slash-and-burn, with applications to Brazil and Indonesia. *Agricultural Economics* 19:159–174.

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