Integrated Watershed Management

AHI brief

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Environmental Service Rewards in ECA: Using Local Knowledge and Scenario Analysis to Minimize Trade-Offs

Eucalyptus and other fast-growing exotics, potentially valued for their high rates of carbon sequestration, carry strong trade-offs in the form of competition with water and crops and increased run-off, among others (Table 1).

In spite of their emerging popularity as a panacea for reconciling livelihood and environmental goals, environmental service rewards are likely to embody trade-offs that require multi-stakeholder governance.

Strategies for environmental governance and conservation in Africa have focused on *regulatory* mechanisms that further restrict already limited livelihood options by prohibiting certain land uses and isolating people from forest resources. Tensions created through regulation (i.e. conservation *versus* livelihoods, rural *versus* urban interests, local *versus* global services) have made enforcement difficult. Results include encroachment on protected areas and a breakdown in environmental governance and enforcement. Environmental service (ES) reward systems (*incentives*) represent a promising alternative to regulation, enabling livelihood and conservation goals to be more easily reconciled.

The trade-offs between livelihoods and ES functions of highland watersheds are perhaps most acute in Africa, where chronic poverty has contributed to extreme levels of resource degradation. Loss of critical ES is felt by local and off-site (national, global) stakeholders alike. Low levels of household income suggest that modest rewards may catalyze more far-reaching change than in other world regions. These factors combined suggest that a functioning ES reward scheme would help substantially to reconcile livelihood and environmental goals.

While opportunities are apparent, context is likely to have a profound effect on the viabil-

Table 1. Species Identified by Farmers As "Harmful" in Four Sites of the Eastern African Highlands[1]

SPECIES	SITES	REASONS
Eucalyptus spp.	All	Drains the soil of water, competes with crops dries springs and valley bottoms, has negative effect on soil, changes the taste of water
Eucalyptus robusta	Lushoto	Out-competes other tree species
Acacia Mearnsii	Kabale, Lushoto	Drains the soil of water, competes with crops for nutrients, arrests undergrowth, increases run-off, destroys soil for subsequent uses, out-competes other tree species
Persea americana	Kabale	Drains the soil of water
Cupressus lusitanica	W. Kenya, Ginchi	Shallow rooted, dries soil, dries springs, competes with adjacent crops, has a negative effect on soil
Erythrina abyssinica	W. Kenya	Massive root system competes with crops
Albizia gummifera, Albizia schimperiana	Lushoto	Arrests undergrowth, increases run-off
Olea europaea subsp. *africana*	Lushoto	Arrests undergrowth, leaves bad for crops/soil, heavy feeder on water, out-competes other tree species, dries up valley bottoms
Allanblackia stunlammanni	Lushoto	Leaves bad for crops/soil
Solanecio mennii	Lushoto	Leaves bad for crops/soil, heavy feeder on water
Ocotea usambarensis	Lushoto	Heavy feeder on water, dries up valley bottoms
Ficus thonningii	Lushoto	Out-competes other tree species
Markhamia obustifolia	Lushoto	Dries up valley bottoms
Olea africana	Ginchi	Dries springs
Vernonea auriculifera	Ginchi	Changes the taste of water
Senecio gigas	Ginchi	Changes the taste of water

[1] Ginchi site is located in West Shewa Zone, Ethiopia; Lushoto in the Usambara mountains of Tanzania; Kabale in the Kigezi highlands of southwestern Uganda; and the western Kenya site in Vihiga District, north of Kisumu.

ity of ES reward schemes and on the trade-offs or synergies that emerge. Recent research has shown that strong trade-offs exist in tree species selection, both biophysical (i.e. trees vs. water) and social (i.e. land owners vs. affected parties). Carbon rewards applied in isolation from regulations or other incentives may exacerbate trade-offs by stimulating expansion of high-value, fast-growing species known to carry significant social and environmental costs. It is therefore essential that an intimate knowledge of context—including the unique "environmental signatures" of diverse tree species and their likely expansion or contraction under carbon credit schemes—goes into the design of ES reward schemes.

The Trade-Offs in Tree Species Selection

Results of ethnobotanical research conducted in 4 countries of the eastern African highlands illustrate the negative effects of certain tree species (Table 1). The high economic value of many of these species illustrates the trade-offs in tree species selection. As many of these same species are fast-growing, carbon incentives are likely to exacerbate the trade-offs already observed in different sites and landscape niches (springs, waterways, farm boundaries, hillsides). A precautionary approach is indeed needed as the region moves to embrace carbon payment schemes.

Toward a Precautionary Approach to ES Compensation

The approach advocated in this brief is to integrate what local people and scientists already know about the properties and effects of common tree species into anticipatory learning about the likely effects of shifting incentives under the Clean Development Mechanism and other ES reward schemes. While the approach has yet to be tested in practice, each of its elements has been proven through their application to other environmental problems.

Step 1: Identify the environmental "signatures" of prevalent tree species (identification of different landscape niches where trees are grown, species compatible and incompatible with each niche, and niche compatibility criteria)

Step 2: Scientific and participatory scenario analysis to understand the likely consequences and trade-offs of shifting incentives under carbon credit schemes (when applied alone and in combination with other incentive and regulatory mechanisms) (Table 2)

Step 3: Multi-stakeholder negotiations to explore ways to reconcile conservation and livelihood goals at diverse scales

Step 4: Planning, based on negotiated future states and indicators of importance to different stakeholders

Step 5: Implementation and monitoring based on pooled indicators

As illustrated in Table 2, at stake are trade-offs between economic and environmental service functions, economic and governance functions (i.e. income for tree growers vs. water as a collective good), and between local and global environmental service functions (i.e. water vs. carbon). Clearly, a strategy is needed to govern environmental service rewards so that environmental successes at one level to not compromise livelihood and environmental service functions at another.

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Table 2. Illustration of Simplified Output from Scenario Analysis

INSTRUMENTS	COMPLEMENTARY INSTRUMENT		
	None	*+ Regulation*	*+ Water*
Carbon Incentives	• Expansion of fast-growing exotics and their negative effects (run-off, drying of water resources, competition with crops) • ES of global priority supported at the expense of local ES values	• Negative spin-offs of fast-growing species ameliorated through regulation (if enforced) • Increased tension between divergent aims (income vs. equity and local ES functions from improved governance)	• Negative spin-offs of fast-growing species ameliorated through incentives for water-compatible species (if enforced) • Increased tension between divergent aims (local vs. global ES functions)
Water Incentives	• Moderate shift away from fast-growing exotics to water-compatible and indigenous species	• Reduction in conflict and trade-offs from tree cultivation (if enforced)	N/A
Regulation (by-laws)	• Reduction in conflict and trade-offs from tree cultivation (if enforced)	N/A	• Reduction in conflict and trade-offs from tree cultivation (if enforced)

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