Managing Trade-Offs in Agroforestry

From Conflict to Collaboration in Natural Resource Management[1]

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Abstract

Scientific and lay conceptions shape recommendation domains, no less so for agroforestry than for other areas of natural resource management. The belief that trees are by definition ecologically-benign and socially-neutral has led to the unqualified promotion of certain fast-growing and economically profitable tree species in the eastern African highlands. Yet ethnobotanical research in the eastern African highlands highlights a number of negative social and environmental impacts from trees. Following a brief introduction to the nature of these impacts, the chapter is dedicated to a discussion of approaches being developed under the umbrella of the African Highlands Initiative to make explicit and to manage the trade-offs inherent in species selection. It also highlights some promising avenues through which a more nuanced and socially-informed agroforestry may evolve.

Introduction

AGROFORESTRY IN EASTERN AFRICA

Common Conceptions of Trees and the Shaping of Institutionalized Agroforestry

The fields of political ecology and critical theory have generated a much better understanding of how institutions are shaped not just by objective understandings of the world but by institutionalized philosophies and political agendas, how these agendas shape concepts, and how concepts shape practice (Hoben, 1995; Keeley and Scoones, 2000). They can also be credited with enhancing our understanding of how certain presumed "truths" become reified, appropriated uncritically by multiple actors in the public domain with widespread impacts on practice (Brosius et al., 1998). Three common assumptions with far-reaching impacts on agroforestry practice are identified here, as a backdrop to research findings that illustrate the need for a more nuanced and socially-informed agroforestry.

The rise of the environmental movement has seen a rather uncritical supposition that tree planting is synonymous with environmental protection. This simplified form of environmentalism is behind the tree planting campaigns on Earth Day, and the common conceptions about the linkage between forest cover and rainfall. While trees can be objectively credited with a number of environmental services (ICRAF, 2004), not all tree species hold up under scrutiny (Saxena, 1994). The second misconception is that tree management is a predominantly asocial practice. While some recent scholarship points to the gendered dimensions of trees and tree management (Madge, 1995; Rocheleau and Edmunds, 1997; Schroeder, 1993), others show agroforestry to be a predominantly individualized management domain. In a conceptual framework to illustrate the role of property rights and collective action in natural resource management, Knox et al. (2002) place agroforestry in the realm of other technologies fully operationalized at the plot level and requiring low levels of collective action. Each of the above assumptions has contributed to a third reification, namely that agroforestry is a

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predominantly technical enterprise consisting mainly of matching species demand with supply (or creating demand through supply, as it were). Here, enhanced adoption of trees – primarily exotics – becomes the objective of institutionalized agroforestry practice. This chapter illustrates the limitations within each of these conceptions of agroforestry, illustrating the need for new concepts, new approaches, and expanded institutional mandates.

Evaluation of Trees

Institutionalized forestry in eastern Africa is rooted in a productivist logic reflective of its origins in a Western institutional model. Scientific evaluations are therefore not value-free, but rather reflective of the goals of plantation forestry: maximizing timber yield while ensuring favorable growth characteristics (straight poles with few branches suitable for industrialized processing) and timber quality (predominantely for construction). Such a model is ill-suited to support forestry practice of smallholder farmers living within the densely-populated highlands of eastern Africa where farming systems are highly integrated to optimize multiple production goals. In these areas, not only are farmers' evaluations reflective of the desire to optimize production of diverse tree products (timber, fruit, fodder, medicine, fuel and income), but also a tree's compatibility with broader production and livelihood systems. In such a diverse system, scientific evaluations emphasizing timber characteristics and yield alone will be too limited in scope to be of any real utility to farmers. The field of agroforestry is rapidly growing in the region, largely through the efforts of the World Agroforestry Centre. Agroforestry practice emphasizes an expanded basis for tree evaluations, encompassing the provision of diverse tree products as well as tree-crop compatibility (Franzel and Scherr, 2002). However, this expanded scope of forestry science is still limited in practice. Nowhere is this tension more clearly illustrated than in the current debate over the suitability of Eucalyptus in the region. While the debate rages on (one camp vociferously toting its conventional virtues and the other its negative social and environmental impacts), forestry departments continue to hold fast to their belief in the species and to widely promote it.

While farmers in the eastern African highlands also recognize the economic virtues of Eucalyptus and other fast-growing exotics, local evaluations of trees point to the need to question some of the fundamental assumptions guiding forestry and agroforestry practice in the region. Ethnobotanical research points to the negative impacts of some tree species and the trade-offs between individual and collective, economic and environmental goals; to strong social interactions that must be managed (moving beyond the technical realm); and to the need for more comprehensive evaluation and management systems. Agroforestry concepts and practice must expand to encompass the strong systems interactions and stakeholder independencies present in these highlands ecosystems (Munk Ravnborg, 2002; Meinzen-Dick et al., 2002).

INSTITUTIONAL SETTING: THE AFRICAN HIGHLANDS INITIATIVE

Research was conducted under the rubric of the African Highlands Initiative, and eco-regional research and development program under the Consultative Group for International Agricultural Research (CGIAR) and the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA). The program's core objective is to enhance livelihoods in densely-settled highland areas through improved agricultural productivity and natural resource management. AHI operates through a series of benchmark sites in each of four countries, where site teams composed of national agricultural research and extension systems pilot new methods and approaches for assisting rural farmers. Methods are developed through an iterative process of planning, field-testing, reflecting and re-planning at community, site and regional levels. While some methods are largely empirical, emphasizing technology evaluation or system characterization, others have an action research orientation in which the key ingredients to an effective change process are understood by implementing and observing such processes in practice. This paper presents findings of methods developed in the area of agroforestry, emphasizing the results of the action research phase. For more details on empirical research findings, touched on briefly in Section III, please see German et al. (2004).

Methodology

Following site selection, the methodology consisted of two steps which may be roughly characterized as diagnosis and intervention.

SITE SELECTION

Research took place in two sites in the eastern African highlands: Lushoto, in the East Usambara Mountains of Tanzania and Galessa, in Western Shewa Zone, Ethiopia. These sites were selected in the 1990s as AHI benchmark sites due to properties characteristic of large areas of the highland in their respective countries. High population density, natural resource degradation and declining agricultural productivity were minimal conditions for site selection.

Galessa is a high-altitude mixed crop-livestock system consisting of several land use zones: homestead plots, where multi-purpose trees and shrubs are grown and livestock parked at night; infields, where high-value crops are grown in highly fertile patches of soil; outfields, where staple crops on individual property are seasonally rotated with open access grazing periods; and year-round communal grazing areas. Major enterprises in this system include barley, enset, irish potato, garlic and livestock (cattle, small ruminants and equines). Despite its greater distance from centralized markets, farming systems in Lushoto are more linked into the market economy. A diverse mix of staple and cash crops (maize, beans, banana, tea) is grown on the hillsides, while high-value vegetable crops (tomato, cabbage) are grown year-round in the moist and fertile valley bottoms. While population pressure has all but eliminated communal grazing areas, many households hold livestock in more intensive management systems ranging from seasonal grazing on private plots to zero-grazing.

Trees in each system are integrated with other farm enterprises and selected for the multiple benefits they provide: fuel, income, timber, food and fodder. In Lushoto, however, trees are much more abundant. Cultivated in woodlots, along property boundaries, in communal forests and government forest reserves, both indigenous and exotic trees feature prominently in the East Usambara landscape. Strongly influenced by afforestation programs that initiated as early as the 1930s (Terje Iversen, 1991), Lushoto landscapes have much more forest cover than in Galessa. While afforestation programs have also encouraged on-farm tree cultivation in Galessa, they have only operated in the area since the early 1990s and their effects are much less visible on the landscape. It is widely believed that Ethiopian land tenure policies which place the rights to land ownership in the hands of the government, and shifting political regimes that have made forest tenure insecure, have contributed to depletion of the country's native forest cover and undermined incentives for long-term investments in the land (Melaku, 2003; Omiti et al., 2000). Scattered woodlots may nevertheless be found with fast-growing exotics (primarily Eucalytpus) and multi-purpose trees and shrubs along homestead and infield boundaries.

DIAGNOSIS: EMPIRICAL RESEARCH

Problem diagnosis was carried out in two distinctive phases: a general watershed diagnostic phase to identify problems facing each component of the system, and a second diagnostic phase emphasizing the agroforestry component to assess the compatibility of trees with different landscape niches. Focus group discussions with diverse social groups (selected by gender, age, wealth and landscape location) were used for the overall watershed diagnosis. Key informant interviews with groups of farmers knowledgeable about native and exotic tree species were then utilized for the niche compatibility study. For the latter, farmers were first asked to first identify niches where trees are or could be grown. They were then asked to identify a robust list of tree species by free listing in response to each of the following questions:

1. Which species are most culturally important?
2. Which species have harmful effects?
3. Which species are most compatible and incompatible with each landscape niche?

Cognitively salient tree properties were elicited by asking farmers to qualify the responses given to these questions by asking "why?". This resulted in a list of tree properties or features that together summarize local reasons for trees' perceived cultural importance, harmful properties and niche compatibility. Identified species were then ranked by farmers according to the degree to which they exhibit each identified tree feature. Results of ranking were contrasted with the focus group results to identify discrepancies, which were in turn taken back to farmers for clarification. For more details on the methodology and results, please consult German et al. (2004).

INTERVENTION: ACTION RESEARCH

The second phase of research seeks to field-test approaches for addressing the trade-offs in species selection through a participatory action research mode, and is ongoing. It follows a process of stakeholder identification, negotiation and planning to increase the niche-compatible species and reduce the niche-incompatible species in two benchmark sites. The action research may be broken down into an iterative series of steps aimed to enable change, including participatory problem identification, planning, implementation, monitoring and re-planning. It is essentially a process of adaptive management that seeks to understand, through implementation, what works where and why.

Results

EMPIRICAL RESEARCH FINDINGS: SOCIAL AND ENVIRONMENTAL TRADE-OFFS IN SPECIES SELECTION

During the watershed diagnosis, several problems stemming from incompatible tree selection were identified throughout the eastern African highlands. These include the depletion of groundwater by fast-growing tree species, competition of boundary trees with neighboring crops, negative impacts of trees on soil, and enhanced run-off from an impermeable layer of leaf litter. Following further exploration through the niche compatibility study in two sites, a number of specific problems were found by niche (Table 3). These data demonstrate that trees are not always environmentally benign, and that consideration of social and environmental impacts should accompany agroforestry practice in the region.

In addition to these negative impacts, those trees found to have the greatest economic benefits in Lushoto exhibited a strong inverse correlation with the (largely indigenous) species exhibiting a number of important environmental benefits (German et al., 2004). Similarly in Galessa, there was an inverse association between those species seen as best for income on the one hand, and species that are fast-growing and good for soil fertility on the other (Ibid). Clearly, there are strong trade-offs in species selection. This means that if more optimal solutions are to be found, cultivation of the most harmful species may need to be curtailed despite their economic advantages, and the management of different niches may need to be negotiated among diverse stakeholder groups. The findings also have implications for agroforestry science, in that tree evaluations must move beyond growth characteristics to encompass not only multiple production goals (compatibility of trees with crops and soil) but also broader livelihood goals (compatibility of trees with a reliable water supply, for example) and cultural values (sacred trees and forests).

ACTION RESEARCH FINDINGS: MANAGING TRADE-OFFS

In designing strategies to foster more optimal integration of trees into agricultural landscapes, it is useful to know the primary barriers farmers face in doing so spontaneously. In other words, it is useful to understand why farmers continue to grow species widely recognized as harmful. In AHI benchmark sites, there are at least three reasons for this apparent contradiction. The first is the limited opportunity to cultivate more niche-compatible species, either due to a lack of technical knowledge on how to propagate desirable alternatives or to institutional biases that place emphasis on those species exhibiting favorable characteristics according to scientific rather than local evaluations. The second reason is the properties of the tree species themselves, which exhibit highly favorable characteristics when evaluated according to some parameters yet are highly detrimental according to others. Third, and related to the second, is the tendency to treat tree-planting as an individual activity both by farmers and outside actors, for which benefits to the individual landowner rather than the collective good (socially- and environmentally-optimal choices) drive species choice.

Within AHI, we are experimenting with three different approaches for managing the trade-offs that may accompany species selection. While the first emphasizes enhancing the availability of more benign species, the last two strive to balance individual with collective interests. Preliminary experiences with the application of each approach are presented here.

ENHANCING THE AVAILABILITY OF NICHE-COMPATIBLE SPECIES

Recent research by Brandi-Hanson et al. (2004) illustrates most clearly how seed supply dictates species selection in East Africa. According to these authors, species-site matching is done by hardly anyone, much less matching tree species to particular landscape niches. Furthermore, species selection by CBOs and local NGOs is based almost exclusively on availability of seed and only to a limited degree on the knowledge of possible useful species that could be grown. Of all the reasons cited for species selection by CBOs, only one reflects positive selection criteria (i.e. suitability of the species) (Table 1). Furthermore, this criterion was cited by only 11% of CBOs as a reason for species choice (Table 2).

Table 1. Tree Features Causing Niche Incompatibility in Lushoto and Galessa

Niche	Problematic Tree Features	Sites where Found	Affected Parties
Farm Boundaries	Competes with crops	Galessa, Lushoto	Landowners and neighboring farms
	Has a negative effects on soil	Galessa, Lushoto	
	Creates a large shady area	Lushoto	
	Arrests undergrowth	Lushoto	
	Depletes soil moisture	Lushoto	
	Out-competes other tree species	Lushoto	
Forest Boundaries	Arrests undergrowth	Lushoto	Farms bordering protected areas
	Depletes soil moisture	Lushoto	
	Competes with other tree species	Lushoto	
Roadsides	Roots break the road	Lushoto	Farms bordering roadsides; all road users
	Competes with crops	Lushoto	
	Branches break in the wind	Lushoto	
Springs and Waterways	Is a heavy feeder on groundwater	Galessa, Lushoto	All local residents, irrigating farmers
	Has an aggressive root system	Lushoto	
Farmland	Leaves hinder infiltration, increase runoff	Lushoto	Farmers cultivating these species
Valley Bottoms	Dries valley bottoms	Lushoto	Downstream residents

Table 2. Reasons for Species Selection among Ugandan CBOs (from Brandi-Hansen et al., 2004)

Reason for Species Selection	% of CBOs Citing Reason
Species selected were the only available	45
Promotion dictated species choice	16
Cannot explain	29
Superiority of the species	*11*
Lack of knowledge of alternatives	8
Expense	8

Poor seed supply has led to a very reduced number of species being propagated by NGOs and CBOs in the region. The single most important source of tree seeds currently disseminated by CBOs in Uganda, for example, is collected from tall trees, followed by collected fruit seeds and gifts from local government representatives. Furthermore, fully 50 % of all seed collected form tall trees is Eucalyptus, a genus accounting for fully 23% of trees propagated by CBOs. This emphasis on Eucalyptus is indicative of a wider trend to propagate exotic timber and agroforestry species over fruit trees and indigenous species, which accounted for

58.9, 30.1 and 11.0% of the species being propagated by CBOs, respectively (Brandi-Hansen et al., 2004). It is also remarkably reflective of scientific biases in species evaluation.

The first attempt to address the negative impacts of trees in certain niches was predominantly technical. A tree niche analysis was first carried out in which farmers were asked to identify tree species that are most and least compatible with different landscape niches. Farmers' demand for niche-compatible species was then assessed through a simple inventory of demand by niche, conducted at hamlet (sub-village) level. In this inventory, farmers were asked to identify how many seedlings they would like from of a list of compatible species for each of four niches: springs (out of 10 compatible species), waterways (6 compatible species), farm boundaries (10 compatible species) and within farmland (10 compatible species). From this simple exercise, demand was assessed at 45,513 seedlings for only 3 villages! This demand illustrates the high potential for enhancing the compatibility of trees grown within these densely settled agricultural landscapes. Following this assessment of demand, farmers' knowledge of species propagation was determined. Out of an original list of 24 species, seedlings of 22 different species were requested by farmers. While farmers know how to propagate the majority of these species (64%), technical assistance is nevertheless required to propagate 41% of desired seedlings (Table 3). Farmers are now organizing themselves at hamlet level for nursery management so that the demand for niche-compatible species can translate into more optimal land management practices on the ground.

Table 3. Knowledge of Tree Propagation among Farmers, Lushoto District, Tanzania

	% of Species	% of Requested Individuals
Lack knowledge	36.4	41.4
Have knowledge	63.6	58.6

An important implication of these findings is that with minor external assistance, farmers are capable of integrating substantial numbers of more compatible species into their farming systems and landscapes. What it does not tell us is how to minimize the number of species identified as harmful from private property (farms, missions, private estates). It is to this challenges that the next two sections now turn.

MULTI-STAKEHOLDER ENGAGEMENT BY NICHE

In addition to enabling wise species choices among individual landowners by enhancing the availability of more compatible species, trade-offs embodied in species selection often require that land management practices be negotiated between individual landowners and other stakeholders negatively affected by their management decisions. This is often complicated by the fact that where afforestation policies are absent, *de jure* property rights often lie with only one of the stakeholders (the landholder). Where policies exist but are poorly enforced, *de facto* property rights still favor exclusive rights of the landholder. "Negotiation" therefore implies a group with more bargaining power to cede some of their rights in favor of the collective good.

Stakeholder Identification

The first step in multi-stakeholder engagement is stakeholder identification. A common misappropriation of the term "stakeholder" depoliticizes it, aligning its meaning with all the different actors present in an area rather than specific interests as implied by the term ("holders" of "stakes"). This tends to give all parties equal legitimacy in negotiation, when in fact the key actors with a stake are those managing a natural resource (often with some form of property rights) and those negatively affected by these actions. Other actors with claims to knowledge or decision-making authority may claim a stake due to their legitimacy vis-à-vis the state or civil society, yet might be considered secondary stakeholders with respect to their relationship to the problem (being one step removed).

For problems stemming from niche-incompatible agroforestry practices, it has been useful to define stakeholders by niche. This is due to the unique features of the niche, the unique compatibility criteria of stakeholders, and questions of economy (calling together only those parties with a direct stake in outcomes).

An example from Lushoto District, Tanzania, illustrates the merits of a niche-specific approach to stakeholder engagement (Table 4).

Table 4. Niche-Specific Stakeholders, Lushoto District, Tanzania

Niche	Stakeholders and Niche	Compatibility Criteria by Stakeholder
- Farm boundaries	- Owners of boundary trees (individuals, institutions, estates)	- Provision of household needs, crop compatibility
	- Neighboring farmers	- Compatibility with neighboring crops and trees, effect on water resources
- Forest buffer zone	- Ministry of Natural Resources and Tourism	- Secures boundary against farmer encroachment
	- Neighboring farmers	- Compatibility with neighboring crops and trees and water resources, secures boundary against state encroachment
- Roadsides	- Ministry of Public Works	- Road stabilization
	- Neighboring farmers	- Compatibility with neighboring crops and trees, effect on water resources
- Springs	- Individual landowners	- Tree income or exploitation of area for crops and livestock
	- Water users	- Impact on water resources
- Within farmland	- Individual household members (by age, gender)	- Priorities reflect gender- and age-specific activity domains (cooking, building, livestock rearing) and property rights (i.e. to tree income)

Local-Local Negotiations: The Case of Spring Management

Solving problems of tree management in the last two niches (springs, farmland) requires that a compromise be reached between different *local* interest groups or stakeholders themselves. Yet all too often, conflicts of interest remain latent – breaking down communication between the different interest groups rather than bringing much-needed dialogue to the fore. Conflict over spring management was found to be common across all AHI benchmark sites, indicating that the problem is extremely widespread throughout the highlands of eastern Africa. In each site, the problem assumes a similar character: an individual landowner wishing to exploit the property rights perceived to be theirs, and water users having increasing difficulty accessing a reliable supply of clean water. Where fast-growing exotic tree species are grown, the problem is invariably one of water quantity. Where the area is deforested for crop or livestock production, the problem becomes one of both water quality and quantity. A case study from the Ethiopian highlands helps to illustrate the potential for bringing these two stakeholder groups together to negotiate more socially-optimal outcomes where minimal harm is done to both parties.

Ameya village is located in Western Shewa Zone in the highlands of central Ethiopia, in one of AHI's benchmark sites. Farmers from the village extract water from a single spring located on an individual's farmland. When Eucalyptus was introduced to the area, the landowner planted a woodlot immediately adjacent to the spring just over the area where groundwater flows into the spring. Ever since Ameya residents observed the effect on their dwindling water supply, they had tried to convince the landowner to remove the Eucalyptus from the area. The owner consistently refused, feeling he had full rights to use the land as he pleased. The villagers were threatening to take him to the local government (Peasant Association) court to resolve the case. In recognition that cases resolved through the PA often result in long-term conflict between families, an AHI facilitator tried to intervene to resolve the case locally. Unsuccessful attempts to bring the landowner to a change of heart or to bring him to a village meeting to discuss the case, he took the case to the newly formed Watershed Committee. After some debate about the best approach to follow, it was decided to first attempt to resolve the case informally by involving the village elders. The elders first visited the landowner on an individual basis, encouraging him to consider the legitimacy of the villagers' complaints. This attempt at

rapprochement prior to open negotiations turned out to be a decisive factor in the landowner agreeing to attend the scheduled village meeting.

Following brief introductions to the problem by PA, Watershed Committee and AHI representatives, each party was asked to present their view. When the Eucalyptus owner expressed his views on what he would lose in labor and cash if he were to cut down the woodlot, others began to attack him openly. The facilitator intervened to legitimize the landowner's position and right to speak. Debate over the ultimate consequences of a dried up spring on current and future generations brought the landowner to offer a concession: to remove the Eucalyptus in exchange for one tree planted elsewhere on his property by each household. The proposal was initially rejected by Ameya residents. After one farmer stood up and agreed to the conditions, stressing the importance of water supply to their livelihood, others followed. The case was resolved in such a way that all parties had gained (villagers the right to water, and the landowner a reduction of conflict), while no party suffered much harm (the landowner's losses being minimized through others' investments in reforestation). All parties, the landowner included, left the meeting in high spirits.

This case study illustrates some general principles that can be employed in other cases where stakeholder negotiation is required to address natural resource management problems among local stakeholders. First, a third party both knowledgeable of and respected by each stakeholder (in this case, village elders) played a crucial role in minimizing the problem in the minds of each party prior to face-to-face dialogue. Secondly, while the facilitator mediating multi-stakeholder negotiations did not maintain a neutral stance toward the desired outcome (Eucalyptus removal), he openly legitimized all stakes to avoid marginalizing any party. This helped lend legitimacy to the mediator, and to keep both parties engaged in seeking a middle ground. A third lesson is the importance of compromise. In this case, the dispute was only resolved when each party agreed to make a concessions for the benefit of the other – the spring owner to remove Eucalyptus if Ameya residents agreed to assist in re-planting. Finally, local (informal) negotiations can have a more lasting effect in putting conflicts to rest than government (PA) enforcement mechanisms, as they allow each party to set the conditions under which they will concede (see also Raj Upreti, 1999). This in effect minimizes harm to both parties (both legal and inter-personal), enabling a deeper sense of resolution to take root between them. It also represents an implicit support for endogenous structures and processes for natural resource governance.

Local-Institutional Negotiations: The Case of Boundary Trees

Resolving disputes between local residents and outside institutions – be they religious, educational or commercial – follows a different set of principles due to the power dynamics involved. In Lushoto District, a diagnosis of watershed problems faced by local communities produced a list of problems stemming from tree management practices of a host of institutions: churches, missions, tea estates, the Ministry of Natural Resources and Tourism (MNRT), and the Ministry of Public Works (MPW). Churches, missions and tea estates were identified by farmers as stakeholders in boundary tree management; tea estates in valley bottom management (most notably the drying of valley bottoms from Eucalyptus plantations); the MNRT for the negative effects of forest boundaries; and the MPW for negative impacts from trees planted for roadside stabilization. A case study from Lushoto helps to illustrate some of the principles involved in multi-stakeholder engagement involving farmers and outside institutions.

One of the key stakeholders identified by farmers for boundary tree management was the Sakharani Mission. In 1946, the mission bought a farm where they grow high-value trees and crops. Eucalyptus trees were planted in 1970 to secure the farm boundary from encroachment, and neighboring farmers had noticed negative effects of these trees on neighboring cropland and springs. This was the main reason that multi-stakeholder negotiations were pursued between Sakharani and three neighboring villages.

Action research consists of an iterative series of steps at program and community levels including planning, implementation, reflection and re-planning, in a process combining both experiential learning and adaptive management. In line with these steps, an original plan for multi-stakeholder engagement was formulated based on our expectations of what would work. This plan can be summarized in 2 basic steps: meetings with individual stakeholder groups to communicate the problem and elicit their positions as well as their proposed

strategy for multi-stakeholder engagement, and multi-stakeholder negotiations. The latter would consist of several sub-steps, as follows:

Planned Steps for Multi-Stakeholder Meeting

1. Feedback findings:
    a) watershed problems identified in the area, with an emphasis on agroforestry,
    b) niches identified as needing improved management, and
    c) results of the tree niche analysis, including species found to be most and least compatible with different landscape niches and the reasons why (tree features);
2. Elicit reactions from participants;
3. Share the niche compatibility criteria of farmers and Sakharani:

Farmers' Criteria	Sakharani Criteria
- Produces good timber	- Secures the boundary
- Produces few seeds	- Fast-growing
- Adds nutrients to the soil	- Coppices
- No edible fruits	
- Compatible with crops	
- Makes good fuel wood	
- Limited shade/branching	
- Does not deplete soil moisture	

4. Negotiate "binding" niche compatibility criteria (the most important criteria to both parties, which would together guide species selection);
5. Identify species that fit the compatibility criteria of both parties (eliminating "binding" criteria if needed to find a species which encompasses the concerns of both parties); and
6. Final work plan with activities, responsibilities and timeline.

Implementation of the proposed plan caused us to modify these steps in several ways. During our preliminary meeting with the Sakharani manager, one of the team members introduced the problem voiced by farmers – namely the negative impact of boundary trees on neighboring cropland and springs. Use of language that unnecessarily polarizes interests ("stakeholder") and presupposes compromise on behalf of the landowner ("negotiation") was our first mistake, as it provoked an understandably defensive reaction in the mind of the farm manager. Furthermore, having diagnosed watershed problems through the minds of farmers alone in effect marginalized a host of issues faced by Sakharani in its dealings with neighboring villages. These issues – including deforestation and its effect on rainfall and water supply, and damage caused to tree seedlings from free grazing – were promptly brought to our attention in this first meeting.

Other nuances were well handled during this preliminary meeting. The first was to accept the farm manager's invitation to visit the areas that illustrate problems he was having with water supply despite our tight schedule. These included the area beyond the farm boundary (where hillsides are largely deforested, limiting water flow into the farm) and two reservoirs that were almost dry due to the decline in rainfall and surface water. In addition to showing empathy to problems faced by the Mission, it enabled us to explore more deeply some opportunities for more optimal boundary management. This walk pointed out to us that the main use of Eucalyptus, for example, was not for income generation but for boundary demarcation. The few trees harvested for timber were mainly used to manufacture bridges for use by local communities, and could be easily substituted with timber from another source. It also bound us to the issues facing the Mission, opening a space for dialogue by agreeing to balance the attention given to each stakeholder's concerns. A second success was to give the farm manager the right to accept the meeting, propose a date and venue for the meeting, and comment on the meeting's agenda. Contributions to the meeting's agenda included the inclusion of local leaders from neighboring villages and non-polarization of the issues facing each party. The latter led us to develop materials for feedback that emphasized the commonalities rather than the differences in the interests of each stakeholder (Table 5).

Table 5. Format for Feedback Emphasizing Commonalities among Stakeholders

Problem	Problem Faced By:	
	Farmers	*Sakharani*
Competition of boundary trees with neighboring crops	√	
Eucalyptus degrading water sources	√	√
Decline of rainfall	√	√
Degradation of water sources	√	√
Damage caused to crops and trees from free grazing	√	√

By accommodating the interests of the Mission, the proposed meeting for multi-stakeholder engagement was now seen as an opportunity by the farm manager to dialogue with his neighbors toward more optimal natural resource management practices for the benefit of both parties.

Changes were also introduced to the plan for conducting the multi-stakeholder meeting itself. First, niche compatibility criteria fed back to the participants were reduced in number. When first solicited, farmers were asked to identify niche compatibility criteria by niche independent of their "stake" (whether farm owner or neighboring farmer). When identified criteria were being compiled for feedback, it was important to match the compatibility criteria with the particular role assumed by each party in this particular instance. While participating farmers can make logical claims for the use value of trees grown on their own farm boundaries, in this case the only realistic claims are those associated with the negative impacts they face as neighbors of Sakharani. We therefore minimized the criteria of farmers (who otherwise have no use rights) to those that could be realistically requested as non-landowners. Second, and related to the first modification, the wording of some criteria was modified to minimize excessive claims by farmers on the landowner's rights. The criterion "adds nutrients to the soil" of farmers, for example, was changed to "no harmful effects on soil fertility" to express a request to minimize harmful effects rather than maximize personal benefits from neighboring property. This is in accordance with a principal of "no appreciable harm" as a rule of thumb in multi-stakeholder negotiations. A third change was introduced due to the greater ease participants had in negotiating *tree species* than *niche compatibility criteria* (tree properties). As different species were proposed by the farm manager and rejected, we took care to ask the reason for their decisions so that a final list of niche compatibility criteria could nevertheless be maintained. The criterion "no edible fruits", for example, was added to the list of Sakharani criteria after farmers proposed a species whose fruits would have attracted many people to the boundary area. The final list of criteria agreed upon by both parties encompassed the following, for which only one species, Mtalawanda (*Markhamia obtusifolia*) was found to be suitable (Table 6).

Table 6. Boundary Compatibility Criteria by Stakeholder

Stakeholder	Niche Compatibility Criteria
Sakharani Mission	- Long lifespan - High canopy (tall) - Has limited branching and shade - No edible fruits
Neighboring Farmers	- No harmful effects on soil fertility - Does not interfere with crop growth - Has limited branching and shade - Does not dry water from the soil and springs

Finally, rather than ask both parties to jointly identify species that fit the niche compatibility criteria of each other, it was decided at the beginning of the meeting to have the landowner take the lead in proposing acceptable species. While this role was shared throughout the course of discussions, asking the landowner first whether he/she can accommodate the interests of neighboring farmers in their management choices is a way of acknowledging their property rights and encouraging their continual participation in the process.

As with the first case study, a number of general principles can be extracted from the case to illustrate how such local-external stakeholder negotiations might be conducted. First, it is important to acknowledge the greater rights of the landowner in final decisions on boundary management. This is true not only when negotiating niche-compatible species ("*Can the criteria of neighboring farmers be accommodated in your species selection?*"), but also when capturing niche compatibility criteria of farmers (specifying whether they are answering as landowner or affected farmer) and setting an agenda for multi-stakeholder dialogue. A second principle is to minimize the polarization of interests where shared objectives exist, which can be done through language (using the term "party" and "dialogue" rather than "stakeholder" and "negotiation", for example) and in problem representation (emphasizing common positions or shared problems when possible). Third, it is important to capture equally the interests of each stakeholder prior to initiating multi-stakeholder negotiations, to establish trust in the process and credibility on the part of the facilitator (which is borne largely out of a position of empathy toward the concerns of each party). A fourth principal is the critical importance of prior meetings with individual stakeholder groups to encourage prior rapprochement and identify important opportunities for mutual benefit, in particular where communication between the parties is strained. Fifth, the importance of prior visits to the affected areas should not be underestimated as a means of furthering dialogue and rapport with each party. It is also a means through which the facilitator can gain a deeper understanding of the positions of each party, as well as of the opportunities for mutually-beneficial solutions – two critical ingredients to effective facilitation of multi-stakeholder engagement. Finally, the role of historical (afforestation programs that have passed through the area, institutional biases toward certain species, etc.) and biological (the ease with which different species may be locally propagated) influences on species selection implies that one cannot assume the mere presence of a particular species on the landscape to imply a strong rationale on the part of the land user. Where species choice has been influenced by these historical and biological influences, a certain degree of arbitrariness in species selection implies an important opportunity for stakeholder rapprochement – in that the landowner may also be motivated to identify a more compatible species.

PARTICIPATORY POLICY FORMULATION

Effectively addressing the trade-offs inherent in species selection may require additional policy support that goes beyond case-by-case negotiation. In effect, the principles behind negotiation support (i.e. stakeholder-based equity in decision-making) must be scaled up and institutionalized for more widespread benefit. One way we are facilitating such change is through participatory policy formulation. While in preliminary stages of implementation, several insights for such processes can be distilled from the gaps emerging through action research at lower levels.

Enhancing By-Law Enforcement: Governance of Springs and Waterways in Lushoto

A number of natural resource management problems facing highland communities in eastern Africa already benefit from policies at diverse levels designed to improve governance of these resources. Water is one of the most regulated resources in these areas, given the high stakes of mismanagement to the society at large. In Lushoto District, there are a number of by-laws governing the management of springs and waterways. Springs were once governed by a by-law requiring a 30-meter radius of indigenous forest, a specification that has since been reduced by half (15 meters). Surface water is governed by a policy specifying that 20 meters on either side of waterways must be protected. Yet in reality, both policies are often ignored to the detriment of both local and downstream water users.

The inability to enforce a policy designed to balance individual with collective interests is due to several factors, among these: a) the break-down or legal abolishment of tribal systems, and the failure of modern systems to fully compensate for the consequent loss in governance functions, b) selective enforcement of policies by local leaders (who as local landowners have their own stakes in water management and face social consequences from enforcement), and c) policies that are poorly targeted to site-specific conditions, resulting in overly detrimental to impacts on livelihood. The ineffectiveness of modern systems of governance in filling the gap left from the erosion of tribal system in Tanzania and elsewhere has had far-reaching implications for which only a sustained long-term effort at improved governance will be able to address. However, participatory policy formulation processes working to better target policies and minimize the burden of

regulation on local livelihoods has proven to be a viable vehicle for improved cooperation in NRM (Sanginga, personal communication). An example from Tanzania helps to illustrate how site-specific modification of policies can help to enhance compliance by balancing the social need with the social cost of regulation.

In the Tanzanian highlands, valley bottoms currently play a crucial role in securing rural livelihoods through the cultivation of high-value vegetable crops. As a consequence, farmers cultivate up to the very edge of streams, nearly eliminating any riparian vegetation that might otherwise enhance water quantity and quality. If respected, the policy on the protection of riparian areas would nearly eliminate this important economic resource (see Figure 1). The policy is applied irrespective of location; whether in the highland or lowlands, valley bottoms or hillsides, the 20-meter ban on cultivation and use applies. Undoubtedly, the sharp contrast between the policy's strict specifications and the high use value of valley bottoms in this particular highland region contributes to the high rates of non-compliance. It would seem that livelihood and conservation goals would be more easily balanced if the policy were adapted to the economic situation. Along these lines, farmers in one watershed village have proposed a 3-meter buffer of water-conserving grasses and perennials along waterways, making the policy more implementable by balancing livelihood and conservation goals and enabling farmers to derive other benefits from boundary vegetation (food, fodder) while contributing to water conservation. Following such a "principal of adapted specification," in which policies are adjusted to site-specific socio-economic realities, would not only increase the possibilities of compliance – but minimize the burden on local leaders of policy enforcement. This principal, together with the principal of no appreciable harm, provides an avenue for greater compliance with policies designed to safeguard springs and waterways. Multi-stakeholder negotiations might be a means through which alternative uses which bring certain economic benefits to the landowner could be negotiated while also ensuring that water resources are conserved.

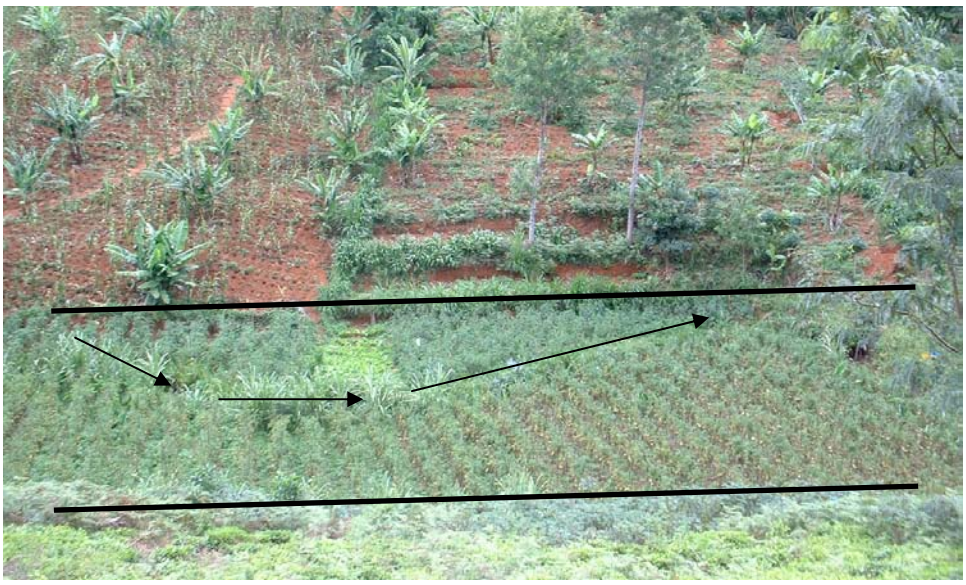

Figure 1. Cultivation of High-Value Crops in Valley Bottoms, Lushoto District, Tanzania[a]

[a] Solid lines bound the valley bottom; arrows indicate the orientation of the stream bed.

Enabling By-Law Formulation: The Case of Boundary Trees

Some natural resource management problems involving multiple stakeholders will be characterized by poor governance due to a lacuna in traditional norms or policies. Yet several countries have provisions for local policy formulation in the form of by-laws, enabling locally-driven policy formulation. An example from Lushoto, Tanzania illustrates such a policy gap hindering niche-compatible agroforestry.

One of the key problems affecting farmers is the effect of boundary trees on neighboring cropland. These problems seem to intensify in more densely settled areas, as the species identified as culprits expand in scope with increased population density (from fast-growing timber species to fruit trees and perennial food crops). A

key challenge lies in regulating boundary tree cultivation to minimize the negative impacts on neighboring farms, in particular for districts or households characterized by small land size (where the impact of these negative interactions on household welfare are exacerbated). Criteria seen by farmers as important for a tree to be compatible with farm boundaries, and the number of species seen as niche-incompatible by each criterion, are summarized in Table 7 for two AHI benchmark sites.

Table 7. Tree Compatibility Criteria for Farm Boundaries in Two AHI Benchmark Sites

Site	Boundary Compatibility Criterion	No. Species Implicated
Lushoto	Does not create a large shady area	10
	Leaves do not negatively affect crops or soil	8
	Is not a heavy feeder on groundwater	7
Ginchi	Does not have a negative effect on soil fertility	2
	Does not have an adverse effect on adjacent crops	2
	Leaves do not easily decompose	6

As mentioned above, to foster cultivation of more compatible tree species on farm boundaries it is necessary to balance the interests of individual landowners and neighboring farmers. Increasing the availability of niche-compatible species is one approach, but is likely to be insufficient for minimizing the cultivation of harmful species. While policies for spring protection are widespread, few locations in the eastern African highlands have policies on boundary management. It appears as if this situation is changing in isolated locations as farmers begin to perceive the costs of this policy lacuna. While in Galessa this is taking the form of a total ban of tree cultivation on farm boundaries and cash compensation for the estimated produce lost to boundary trees (Agajie et al., 2004), there are many forms that these policies can take that would be less burdensome on landowners. One village in Lushoto District has proposed two such options: a total ban on certain tree species known to be niche-incompatible (in this case, *Eucalyptus* spp.), and regulations on the density at which certain tree species may be grown (in this case, a minimum distance of 15 meters between individuals of the species *Acrocarpus fraxinifolius* when grown on farm boundaries). Other options might include a minimum distance at which certain species may be planted relative to the boundary or a cap on the number of individuals of harmful species that may be grown by any given household. In line with the principle of adapted specification proposed above, identifying such policy options is a means by which the burden of new policies on productive potential of landowners may be minimized, thereby enabling compliance.

A final note of caution is needed when entering into local-level policy dialogue. In AHI's experience, local leaders and their constituents are often all too eager to propose harsh policies in addressing identified natural resource management problems. Examples include total bans on *Eucalyptus* species and enforcement of spring protection policies with limited consideration of the rights of the landholder. While this may be seen as a positive outcome among project personnel, the ease with which harsh policies are formulated is likely to correlate with the ease with which these new policies are ignored. New policies are proposed despite high levels of non-compliance toward existing policies among the leaders themselves, and widespread knowledge of how over-specification of policies hinders compliance. Whether the ease with which strict policies are proposed results from a culture of autocratic decision-making in colonial and post-colonial contexts, the desire to please outside agencies, a simple failure to give due consideration to the viability of proposed solutions or each of these factors is likely to vary by context. Most important for facilitators of multi-stakeholder negotiation processes is to recognize such processes for what they are, openly question the viability of proposed policies during planning stages, and closely monitor compliance so that deficiencies in the proposed policies and policy enforcement mechanisms can be identified and addressed early on.

Balancing Formal and Informal Governance: Niche-Compatible Afforestation in Galessa

The appropriateness of local (informal) and government (formal) forms of governance varies by context. While local residents in some countries stress the need for higher-level policy enforcement in enhancing compliance at the local level (Sanginga, personal communication), more informal mechanisms are preferred in

other countries due to the more authoritarian nature of policy formulation and enforcement or the effectiveness of endogenous local institutions in resolving conflicts (Raj Upreti, 1999). Striking a balance between these two systems should depend on the effectiveness of informal systems of governance – where gaps are filled through formal enforcement only as needed, in particular where there is a limited sense of ownership of public policy and the potential for spontaneous forms of collective action is strong.

Ethiopia has a long history of a highly centralized government penetrating into many aspects of rural life, and limited mechanisms for civil society to help shape forms of governance (Lanz, 1996; Melaku, 2003). As a consequence, farmers demonstrate a strong preference for informal means of conflict resolution and negotiation, as illustrated in the case study on spring management in Galessa. Farmers in Galessa have also demonstrated the ability to organize spontaneously for collective activities, as illustrated by the ease with which they have organized diverse contributions (labor, materials, cash) for communal projects with minimal outside facilitation. At the same time, outfields in Galessa are notoriously impoverished from the standpoint of longer-term natural resource investments. Soil conservation structures and trees are rare, and soil fertility is in a continuous state of decline as farmers invest in the more tenure-secure infields. While this is in part due to a policy making all lands government property (Bereket, 2002; Omiti et al., 2000), it is a problem that could to a large part be addressed through spontaneous forms of collective action designed to regulate resource exploitation in the outfields.

Part of the watershed work plan in Galessa is to increase the number of trees in their appropriate niches, to enhance access to tree products as well as diverse environmental services (water discharge, soil stabilization, etc.). Toward this end, tree nurseries are being established. However, if left unmanaged, the problems already perceived from limited stands of niche-incompatible species (drying of springs, competition with crops) are likely only to increase as demand for fast-growing tree species is met with increased supply. It is therefore necessary to regulate afforestation activities so that expansion of tree cultivation does not occur at the expense of other livelihood needs (reliable water supply, crop yield). Toward this end, we will be working with farmers to regulate the management of certain niches where problems are already apparent – namely, springs, farm boundaries and outfields. The emphasis of this regulation will be to minimize the propagation of niche-incompatible species and to identify appropriate niches where broadly incompatible but economically-important species like Eucalyptus may be grown. Experience has yet to show whether this regulation can be accomplished through an informal form of negotiation among local interest groups or will require more formalized legislation and enforcement. However, given preliminary evidence of effective grassroots organizing and informal conflict resolution in Galessa, the likelihood that more informal mechanisms will succeed is high. And given Ethiopia's political history, we owe it to farmers to give them the benefit of the doubt.

Conclusions

This chapter illustrates the need to move beyond the technical realm when promoting tree cultivation in smallholder agricultural systems, to make explicit and to manage the social, political and ecological ramifications of agroforestry. Failure to adapt agroforestry practices to the particular systems in which tree cultivation is embedded results in a number of negative social and agroecosystem spin-offs that must be managed. Lay and scientific assumptions that trees are by definition good for the environment are hindering actions to identify and address these negative impacts. This chapter summarizes some of the methods being developed for identifying and minimizing the negative impacts of trees within densely-settled agricultural landscapes, and for forging more socially- and ecologically-optimal outcomes.

Three approaches are proposed as a means of managing the social and biophysical trade-offs inherent in species selection: a) identifying and increasing the availability of niche compatible species, b) multi-stakeholder engagement by niche, and c) participatory policy evaluation and formulation. Case studies illustrate some of the more general principles and pitfalls that should be considered when implementing each of these approaches. Evidence that species selection has been governed as much by historical factors and knowledge gaps as by a strong rationale on behalf of the land user suggests that with minor external assistance, farmers are capable of integrating substantial numbers of more compatible species into their farming systems and landscapes.

However, multi-stakeholder engagement and participatory policy formulation processes are also needed to foster social responsibility among neighboring land users and minimize the cultivation of harmful species.

The case studies presented in this chapter illustrate a number of important principles guiding multi-stakeholder engagement. In local-local stakeholder negotiations, careful selection of mediators well respected by each party, openly legitimizing the interests of each stakeholder, and seeking a middle-ground in which concessions are offered by each party are principles that can be applied across a wide range of cases. Additional principles are illustrated by the case study illustrating negotiations between smallholders and external institutions, which also have widespread applicability. These include a need to acknowledge the rights of the landowner to final decisions on land management (where there are no policies limiting use rights), to capture equally the interests of each stakeholder prior to initiating multi-stakeholder negotiations, and the importance of prior meetings with individual stakeholders groups to encourage rapprochement, identify opportunities for mutual benefit and enhance rapport with each party. The chapter also highlights several issues that should be taken into consideration when embarking on participatory policy formulation processes. First, care should be taken to balance local-level policy formulation processes with higher-level enforcement, to avoid the pitfalls of top-down policy formulation and enforcement. Second, policies should be adapted to local realities so as to minimize the negative impacts of policies on livelihood and enhance compliance. Finally, *realistic* policy formulation should be encouraged by questioning the viability of propositions and monitoring for people's acceptance of and compliance with policies early on. Together, these approaches will help to minimize the social and biophysical costs of tree cultivation in densely-settled agricultural landscapes and enable a more nuanced and socially-informed agroforestry to evolve.

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