

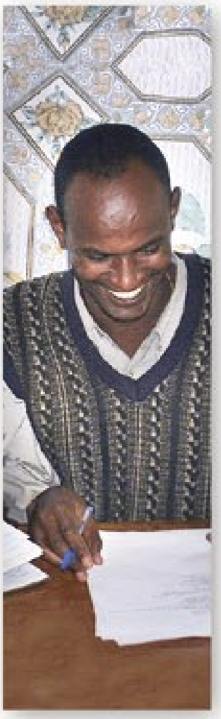


AHI Methods Guides

AHI METHODS GUIDES No. C1

NICHE-COMPATIBLE AGROFORESTRY: A Methodology for Understanding and Managing Trade-Offs in Tree Species Selection at Landscape Level

Laura German, Berhane Kidane and Sarah Charamila with
Waga Mazengia, Shenkut Ayele and Tesema Tolera

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The AHI Methods Guides

The AHI Methods Guides series was developed as a medium for AHI staff and partners to synthesize the innovative methods and approaches developed, tested and validated in AHI benchmark sites and from institutional change work carried out in the region. Contributions to the series include methods for system diagnosis and planning; targeting intervention strategies; facilitating change at farm, watershed, district or institutional level; monitoring and evaluating change or impacts; and structuring the innovation process overall. AHI Methods Guides are organized under five thematic areas:

- *Theme A* – Strategies for Systems Intensification (with an emphasis on the farm level)
- *Theme B* – Participatory Integrated Watershed Management
- *Theme C* – Collective Action in Natural Resource Management
- *Theme D* – Policy and Institutional Reforms
- *Theme E* – Improving Research-Development Linkages

The targets of these papers include agricultural research, development and extension organizations and practitioners with an interest improving their practice and impacts; and policy-makers interested in more widespread application or institutionalization of methods in their areas of jurisdiction.

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INTRODUCTION

The integration of trees into smallholder farming systems has been extensively promoted in recent decades as a means to enhance farmer incomes through increased access to diverse tree products as well as a means of reducing the degradation of soil, water, biodiversity and related environmental services (Ardayfio, 1986; Arnold, 1992; Becker, 1986; FAO, 1986; Gutteridge and Shelton, 1993; Larsson, 1990). Yet the interactions between trees and other system components are significant and can be both positive and negative, as illustrated by recent experiences in watershed diagnosis and management in the African Highlands Initiative. While there is great potential for fostering positive rather than negative interactions between components (tree-crop-water-livestock-soil) and users (tree cultivators and others) in agroforestry, many researchers emphasize timber yield in trials and development organizations continue to disseminate planting material irrespective system compatibility. Lessons on how to more optimally integrate trees into farming landscapes are therefore sorely needed.

This AHI Methods Guide describes a methodology for identifying niche incompatibilities in agroforestry and engaging stakeholders to jointly forge solutions. Niche incompatibilities are problems resulting from the planting of certain tree species in certain landscape locations, as reflected by their negative social and ecological consequences – including reduced yield of crops, drying of springs, increased run-off and social conflict, among others. In any given niche, these incompatibilities generally involve more than one interest group or stakeholder. The problems tend to prevail despite the problems they cause because the status quo is often perceived to be better than the solution for one or more stakeholder groups (in which case the consequences are often borne largely by *other* stakeholders). The methodology acknowledges these divergent interests in two ways. By building upon local knowledge of tree species and of the characteristics that make trees compatible or incompatible with different landscape niches, it enables landscape problems to be defined by local residents who are most affected by them. Secondly, by identifying divergent local interests in the management of identified "problem niches," the methodology helps to forge collaborative solutions from situations of latent or overt conflict. Experiences from two sites in the eastern African highlands (Ginchi, Ethiopia and Lushoto, Tanzania) are presented to illustrate how the methodology is applied in practice. These experiences suggest that by breaking a problem down into its component parts – including problem identification, tree niche analysis and stakeholder engagement – solutions to identified problems become much more manageable.

JUSTIFICATION

QUESTIONING OUR ASSUMPTIONS

Four common assumptions ground current research and development initiatives in the forestry sector. The first is that trees are ecologically-benign, and that more trees are by definition better for "the environment." While trees can be objectively credited with a number of environmental services (ICRAF, 2004), not all tree species hold up under scrutiny (Saxena, 1994). Certain species are known to contribute to the drying of water sources, to compete with crops for water and nutrients or through allelopathic effects, or to increase run-off. The second assumption guiding current forestry practice in the region is that tree management is a predominantly asocial practice. While some recent scholarship points to gender dimensions of trees and tree management (Madge, 1995; Rocheleau and Edmunds, 1997; Schroeder, 1993), others show agroforestry to be a predominantly asocial (individual) management domain.

Recent experience diagnosing and managing landscape-level NRM problems illustrate that strong stakeholder interactions characterize forestry and agroforestry practice. In some cases, farmers with larger plots of land may plant woodlots to save labor and because they are capable of foregoing short-term returns to their investments, while neighboring farmers with smaller plots suffer the consequences through declined crop yield (Nair, 1993). In another scenario, farms relying heavily on springs and rivers for drinking and irrigation water may suffer from the hydrological impact of water-demanding trees on private property.

A third assumption is that agroforestry is a predominantly plot- or farm-level activity. 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. However, the "significant interaction (positive and/or negative) between the woody and non-woody components of the system" which define agroforestry (Lundgren, 1982) not only apply to a single farm, but to the interactions among neighboring landscape units. Trees grown on private property affect common property resources such as water, while (agro)forestry practices within certain landscape units (smallholder farmers, government-managed forests, missions, estates) influence yields of diverse products (trees, crops, livestock, water) on neighboring landscape units.

Each of the above assumptions has contributed to a fourth assumption – namely, that agroforestry is a predominantly technical enterprise consisting primarily 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 forestry practice. This AHI Methods Guide illustrates the limitations within each of these conceptions of (agro)forestry, illustrating the need for new concepts, new approaches, and expanded institutional mandates.

THE CASE FOR ENHANCING NICHE COMPATIBILITY

A number of current incompatibilities characterize the integration of trees into agricultural landscapes in eastern Africa, providing a strong justification for an explicit emphasis on niche compatibility in (agro)forestry. The first are negative interactions between trees and crops, where the latter are affected through competition for sunlight, nutrients and water or allelopathic effects. The second incompatibility relates to tree-water interactions, where certain tree species affect the taste of water, consume a great deal of groundwater, or enhance sedimentation of springs and waterways. Finally, some cases may be found of negative tree-soil interactions. These include enhanced erosivity through the suppression of understory vegetation and negative influences on nutrient cycling, for example for species whose leaves have very high lignin content.

Two scenarios require increased attention to niche compatibility in agroforestry. In the first, prior afforestation efforts may have caused a number of unintended negative spin-offs (system incompatibilities) that need to be corrected. In this case, integrated technological and policy interventions may help to ameliorate well-known problems in the system. The second scenario involves heavily deforested landscapes, where attention to niche compatibility from the outset can help to minimize future problems resulting from afforestation efforts.

BUILDING ON LOCAL KNOWLEDGE IN AGROFORESTRY

Organizations working for improved natural resource management are increasingly recognizing the critical role of traditional ecological knowledge in program success. Through the interaction with local landscapes over generations, local people have a vast store of knowledge – some of which can be easily articulated to others, and other knowledge that is encoded in traditional land use practices and propagated through habit, social norms or belief systems. This knowledge base has a fundamental role to play in forestry and agroforestry, as in other areas of natural resource management.

Where afforestation efforts have been ongoing, local knowledge is of two types. The first is a store of traditional knowledge on indigenous tree species resulting from centuries of interaction of local peoples with the environment. This has led to a vast understanding of the benefits (economic, cultural, medical, environmental) as well as the impacts of native tree species. The second type of local knowledge will be more recent, and result from close interaction with exotic species or cultivation practices introduced in recent history. Recent experience shows that the second type of knowledge builds up quickly, even after only a decade or so of interaction with new species.

In places where afforestation programs have been absent and exotic species are largely unknown to local people, local knowledge from the locale can be used to assess the feasibility of indigenous tree species alone. However, local knowledge from other locations, and scientific findings on the positive and negative attributes of different species when grown in different landscape niches or ecological zones, can be shared with farmers and used to assess the feasibility of exotic tree species prior to their cultivation. This will minimize the negative impacts of these introductions and serve to foster system compatibility in these efforts.

THE NEED FOR MULTI-STAKEHOLDER ENGAGEMENT IN AGROFORESTRY

The above discussion demonstrates the importance of discrediting the common misconception that more trees on the landscape is automatically better for both livelihoods and environment, and questions the individual or farm-level bias of (agro)forestry. Farm management decisions, in this case decisions on which trees to grow and where, have important implications for other stakeholders (neighboring farmers, down-slope or downstream users). They also have implications for other components of the farming system or landscape, whether crops, soil, water or livestock.

At landscape level, stakeholders may often be defined by those affecting, and those negatively affected by, any given land use practice. In this case, we are referring to agroforestry practices (species selection, density and management) in a particular landscape niche. In the case of negative tree-water interactions, stakeholders include water users (for domestic use and irrigation) and those cultivating incompatible trees around springs and waterways. While owners of land around springs and waterways are also negatively affected by the effect their practices have on water availability, the economic incentive to plant trees where these grow fastest (i.e. near springs where water is abundant) often causes them to continue these practices despite their understanding of the negative consequences. For negative tree-crop or tree-soil interactions, stakeholders include the landowner (those cultivating trees on farm boundaries, whether individual farmers or institutions) and those affected (neighboring farmers). In this case, the only consequence to the land owner is generally the conflict these practices induce.

This conflict may be overt (acknowledged by both actors) or latent (not manifested overtly, but nevertheless causing discomfort to one or both stakeholders). These divergent interests or "stakes" are the reason why many problems remain unresolved despite people's awareness of them. This makes (agro)forestry a problem of governance, which may in turn be understood as the rules that guide human behavior. These problems generally persist because rules guiding tree planting in "problem niches" do not exist, are poorly designed (do not solve the problem, are overly harmful to livelihoods when enforced, etc.), or are poorly enforced. Ultimately, the concerns of each local stakeholder or interest group need to be brought into solutions, whether afforestation programs, multi-stakeholder engagement processes or policy reforms.

OBJECTIVES

The overall aim of this methodology is to reduce social conflict, and the negative socio-economic and environmental effects of trees on landscapes, through improved design and governance of forestry and agroforestry practices. This is achieved through two primary objectives:

Objective 1. To identify and understand landscape-level problems resulting from failure to match tree species (and their unique properties) with landscape niches where they are most compatible. This includes the following specific objectives:

- To identify landscape-level problems as perceived by local land users, and the extent to which niche incompatibilities in (agro)forestry are of concern to farmers; and
- To identify problem niches and species, and tree species characteristics that define compatibility (and incompatibility) with each niche.

Objective 2. To foster equitable solutions to identified niche incompatibilities, specifically:

- To identify stakeholders within each "problem niche";
- To identify stakeholder interests and perceptions about the problem and possible solutions; and
- To generate solutions that equitably capture the interests and concerns of each stakeholder group.

RESEARCH QUESTIONS

The following research questions were designed to operationalize the above objectives:

1. What landscape-level NRM problems are of concern to local residents? To what extent do these result from niche incompatibilities in (agro)forestry?

2. What species are considered "harmful" to local residents, and why?

3. What are the characteristics of trees that make them compatible with different landscape niches, and which species are good 'fits' for each niche?

4. Who are the local stakeholders for each problem niche, and what are their perceptions of the problem and possible solutions?

5. What are effective solutions to the problem that equitable balance the concerns of identified stakeholder groups?

SCENARIOS

The methodology may be applied to any context in which trees are perceived to be part of a problem, or a solution, in the context of landscape-level concerns of local residents. While the methodology was developed in response to issues emerging out of participatory landscape diagnoses in the densely settled highlands of eastern Africa, it is likely to be a problem to other regions and agroecological zones where landscape niches (i.e. springs), edges (i.e. property boundaries) or flows (i.e. upstream-downstream) involving trees are characterized by stakeholder interactions and conflict. While it is most easily applied in landscapes with a deep history of forestry and agroforestry extension that has created a few problems in the process of solving others, it may also be used in areas experiencing problems related to too few trees on the landscape. The latter might include loss of seed, fertilizer and soil from excess run-off, heavy labor burden from limited access to fuel wood, nutrient depletion from the use of dung and crop residues for fuel (in the absence of fuel wood), limited feed and shade for livestock, or any number of related problems. In each case, the idea is to manage existing problems, or problems that may ensue, from failure to match trees with their appropriate niches and failure to match technological with governance innovations in (agro)forestry.

TARGET GROUPS

This methodology is designed for use by research and development organizations and professionals involved in forestry, agroforestry and watershed management who wish to maximize the positive and minimize the negative outcomes of land use and foster equitable approaches to technology innovation.

KEY STEPS IN THE APPROACH

The methodology has been distilled into five sequential steps that enable each research question to be answered and each objective to be achieved.

STEP 1: PARTICIPATORY DIAGNOSIS OF LANDSCAPE-LEVEL PROBLEMS

To identify local motives for improved NRM at landscape level, focus group discussions with diverse social groups (men and women, resource-endowed and poorer households, elders and youth, households with landholdings in upper and lower parts of the landscape) were used. Semi-structured interview techniques within each focus group discussion are used to identify the key concerns of participants. Based on findings, a single list of concerns is then compiled at village or watershed level by combining issues raised by different focus groups. If problems related to the prevalence of trees in unsuitable niches are identified through this process, or from field-based experiences within your own organizations, then the remainder of this methodology may be utilized to address these problems. Otherwise, the methodology is probably not necessary for the locations where you are working.

STEP 2: IDENTIFICATION OF NICHE INCOMPATIBILITIES FROM THE PERSPECTIVE OF FARMERS

The next step consists of key informant interviews with farmers knowledgeable about indigenous and exotic tree species. Participants are asked to identify landscape niches where trees are or could be grown; tree species that are important due to their use value (cultural or economic importance), their harmful effects or their compatibility with different landscape niches; and the properties of trees that make them culturally-important, harmful or niche-compatible. This "niche compatibility study" generates information on niches requiring improved management, species that are compatible and incompatible with each of these niches, and species which require special attention due to their harmful effects but cultural or economic importance.

STEP 3: STAKEHOLDER IDENTIFICATION & CONSULTATION BY NICHE

The first step in fostering equitable solutions to identified niche incompatibilities is to identify stakeholders for the niche in question. For most niches in AHI benchmark sites, this has generally involved the land owner and those negatively affected by their actions. Once these local stakeholders are identified, each is consulted to understand their perceptions of the problem, possible solutions, and their preferred approach to multi-stakeholder engagement. The last of these means that stakeholders are consulted on who should facilitate the negotiations, and how the negotiations should be conducted. When conflict is acute, it generally means that 'stakes' are high – namely, that people fear what they may lose through dialogue. This may require engaging a third party highly respected by all stakeholders to convince one or more parties that negotiations are opportunities rather than threats, and to help design and conduct the negotiation itself.

STEP 4: FACILITATION OF MULTI-STAKEHOLDER NEGOTIATIONS

The fourth step involves the negotiation event itself. This event involves, minimally, the different local stakeholders and the facilitator. It may also involve local leaders, representatives of local government and personnel from government line ministries (i.e. forestry, agriculture, water). However, these individuals must participate largely as observers, to lend credibility to the event and to provide technical information (on the properties or availability of different tree species, legislation, etc.), but not to make decisions. The decision-making should focus on the stakeholders who interact directly around the niche in question. This might include only two parties (the stakeholders interacting around a single landscape niche), or stakeholder groups (stakeholders interacting around similar types of niches and experiencing similar types of problems at village level or higher).

The negotiation support event involves a series of steps. Following introductions (if needed), feedback is given in plenary on the steps taken thus far and the findings. These include the landscape diagnostic work, niche compatibility study and prior consultation with stakeholders. Next, each party in the negotiation (landowner, affected parties) is asked to present their perspective on the issue. The negotiator next encourages each party to identify tree species or management practices that will solve the problem while ensuring the needs of both stakeholders are met. This is done by identifying compatibility criteria of most importance to each stakeholder and identifying species and/or management practices that will ensure most, if not all, of these are met. Once a solution is agreed upon, a detailed implementation plan is developed, including technologies (new species and management practices) and by-laws (new rules to ensure agreements are put into practice), and a detailed action plan (including activities, responsibilities, timeline and plan for monitoring implementation).

STEP 5: IMPLEMENTATION OF STAKEHOLDER AGREEMENTS

The final step involves implementation of stakeholder agreements. This step consists of monitoring implementation of work plans, ensuring different parties are complying with agreements and adjusting work plans as needed to ensure the ultimate objectives (niche compatibility, reduced conflict) are met. Implementation of technological innovations may include capacity building, propagation or dissemination of new tree species and/or management practices in the target niche (pruning of roots and branches, spacing, etc). Implementation of policy interventions, on the other hand, involves endorsement of by-laws by local government, monitoring compliance, and imposing sanctions (appropriate punishments) on those who do not comply. Close follow-up is most crucial in early stages of implementation, since failure to comply with agreements early on can undermine any future efforts to solve the problem.

DETAILED DESCRIPTION OF THE METHODOLOGY

STEP 1: PARTICIPATORY DIAGNOSIS OF LANDSCAPE-LEVEL PROBLEMS

As mentioned above, to identify local motives for improved natural resource management at landscape level, focus group discussions with diverse social groups (men and women, resource-endowed and poorer households, elders and youth, households with landholdings in upper and lower parts of the landscape) were used. Semi-structured interview techniques within each focus group discussion helped to identify the key concerns of different actors. These can be ranked by compiling a single list of issues at village or watershed level, and asking key informants (again stratified by gender, wealth, age and landscape position) to rank these issues according to their relative importance. Alternatively, you can stop after simply identifying landscape problems. If problems related to the prevalence of trees in unsuitable niches are identified through this process, or from field-based experiences within your own organizations, then the remainder of this methodology may be utilized to address these problems. Otherwise, the methodology is probably not necessary for the locations where you are working.

An important component of the methodology was to fine-tune and triangulate questions asked to farmers, so that diverse types of issues could be effectively identified. The following elicitation frame captures diverse dimensions of landscape-level NRM and cooperation: the primary livelihood impacts of land use and landscape change, trans-boundary influences between neighboring farms and villages, issues that could benefit from collective decision-making and solutions, problems associated with the management of common property resources (CPR), and existing sources of conflict. The following list of questions was used to identify watershed problems in AHI:

Elicitation Frame for Focus Group Discussions:

1. How have changes in the landscape and land use over time influenced livelihood?

2. Do on-farm management practices of your neighbors' have any influence on your livelihood? How about the management of resources by neighboring communities?

3. Are there any natural resource management problems that could benefit from collective action?

4. Are there any problems associated with the management of communal resources?

5. Are there any conflicts associated with land or natural resource management (within or between villages)?

Problems related to agroforestry for two AHI benchmark sites are summarized in Table 1. These include niche incompatibilities, as well as problems related to limited access to tree products and services. Clearly, trees are in demand for the products and services they provide, but this demand must be managed in such a way that more trees do not exacerbate existing problems related to tree species selection and management.

Table 1. Watershed Problems Related to Agroforestry in Ginchi, Ethiopia and Lushoto, Tanzania (adapted from German et al., 2006)

Identified NRM Problems	**Ginchi**	**Lushoto**
Problems Related to Niche Incompatibilities in Agroforestry:		
Negative impact of boundary trees on (neighbouring) crops and soil, soil, reducing available cropland and yields	√	√
Impact of exotic trees (primarily Eucalyptus) on springs	√	√
Enhanced run-off through impermeable layers of leaf litter		√
Impact of certain trees on water taste	√	
Drying of watering points & spin-offs (conflict, labour burden)	√	√
Periodic drought & drying of valley bottoms	√	√
Declining access to irrigation water	(√)[a]	√
Individual ownership of land around springs	√	√
Problems Related to Limited Access to Tree Products & Services:		
Deforestation and loss of indigenous tree species	√	√
Theft of crops, trees	√	√
Shortage of fuel wood	√	
Soil fertility decline resulting from decreased availability of fuel wood and use of dung for fuel	√	

[a] Parentheses are used to denote problems not identified by farmers during diagnostic activities, yet nevertheless known to be true for the site.

For more details on this methodology, please refer to AHI Methods Guide B2, "A Socially-Optimal Approach to Participatory Watershed Diagnosis" (German et al, in press).

STEP 2: IDENTIFICATION OF NICHE INCOMPATIBILITIES FROM THE PERSPECTIVE OF FARMERS

Identification of Niches, Species and Niche Compatibility Criteria

Once (agro)forestry-related problems have been identified by local residents, focus group discussions are held with key informants knowledgeable about both native and exotic species. It is preferable to carry out discussions with both men and women, who may identify different compatibility criteria as a function of gender divisions of labor at household and community level. Once key informants have been gathered, there are 3 steps to the interview:

1) Identification of different niches or locations where trees are currently found or could be grown on the landscape. Farm boundaries, springs, communal land, forest boundaries, within farmland, valley bottoms are some examples, but niches of relevance to other sites need to be identified on a case by case basis.

2) Identification of a list of important tree species, which is done by asking participants to list: a) culturally- and economically-important tree species, b) tree species with harmful

effects, c) species compatible with each of the niches identified above, and d) species incompatible with each of the niches identified above.

3) Identification of the *properties* of trees that make them culturally-important, harmful or niche-compatible. To do this, each time a species is mentioned in a), b), c) or d), above, you ask the group, "why?" ("Why is this tree important?," "Why is this tree harmful?," "Why is this tree (in)compatible?").

For each of these questions, it is necessary to follow a "free listing" technique in which you ask the question, wait for a response, and then continue probing by asking, "are there any others?" until the list is complete. The research protocols in Box 1 and Table 2 illustrate how Step 2 is conducted in the field.

Box 1. Identification of Niches, Tree Species and Species Characteristics[a]

Approach
Gather focus groups of farmers knowledgeable about both native and exotic trees by gender (men and women separately). Do exercise in each sub-location, calling people from at least 3 villages. This makes 4 focus group discussions total (women of Demesi, men of Demesi, women of Ebunangwe, men of Ebunangwe).

Niche Identification
1) Please name the different parts of the farm or landscape where trees are currently grown or could be grown (can give example of farm boundaries). Probe (any others?).

2) Are there any other locations where trees are causing problems? What are they?

Species Identification
1) Which trees are most culturally or economically important to you? Probe (any others?) For each one, why is it important?

2) Are there any trees that are harmful? Probe (any others?) For each species mentioned, in what ways is it harmful?

3) For each of the niches identified above, ask: a) Which trees are most compatible with the niche?, and b) Are there any trees that cause problems when grown in this niche?

Tables 2 and 3 can be used to organize the information in the field. For questions 1 and 2, please see Table A. For question 3, place identified niches in the left-hand column of Table 2 and fill in the table.

Table A. Identifying Culturally Important and Harmful Trees and Related Properties

Tree Species	**Tree Properties**
Culturally/Economically-Important Species:	*Reasons for their Importance:*
Harmful Species:	*Reasons for their Harmful Properties:*

[a] These characteristics are related to the cultural and economic importance of the tree species, as well as the properties that make them compatible and incompatible with different landscape niches.

Table 2. Determining the Niche Compatibility and Compatibility Criteria of Different Species

Village: ______________________ Gender (focus group): ______________________

Niche	**Most Compatible Species**	**Least Compatible Species**	**Reasons (compatibility criteria)**
1. Springs and waterways	Local Name:		- -
	Local Name:		- -
		Local Name:	- -
		Local Name:	
2. Farm boundaries	Local Name:		- -
	Local Name:		- -
		Local Name:	- -
3. …	Local Name:		- -
	Local Name:		- -
		Local Name:	- -
4. …	Local Name:		- -
		Local Name:	- -
		Local Name:	- -

Participatory Ranking of Species According to Identified Niche Compatibility Criteria

While qualitative methods (focus group discussions) for generating lists of compatible and incompatible species by niche were already described above, it is possible to make the analysis more robust by interviewing other groups of people and comparing responses and by doing participatory ranking of species according to identified tree features. The latter consists of the following steps:

1) Compile a single list of species from step b) and a single list of tree features from step c), above, in matrix form within MS Excel (as in Table 3, below);
2) Interview key informants knowledgeable about both indigenous and exotic tree species, asking them to rank each species according to the degree to which it exhibits each identified tree feature. The number "2" is entered if the answer is "yes, the species exhibits this characteristic"; "0" if the answer is "no, the species does not exhibit this characteristic"; and "1" if the answer is somewhere in between (exhibiting the feature only sometimes or only to a certain degree) (see example in Table 3); and

Table 3. Sample Tree Species-Tree Feature Matrix, Ginchi Benchmark Site, Ethiopia

Code	Characteristics (Features)	S1	S2	S3	S5	S6
	Scientific Genus: Scientific Species: *Amharic:* *Oromifaa:*	Hagenia abyssinica *Kosso*	Dombeya torrida *Welkafa* *Danisa*	Buddleja polystachya *Anfar* *Anfari, Adado*	Eucalyptus Globules *Bargamo* *Baharzaf*	Vernonia auriculifera *Ch'och'inga*
F1	Positive affect on soil fertility	2	2	2	0	2
F2	Adversely affects adjacent crops	0	0	0	2	0
F3	Is a good source of fuel wood	2	2	2	2	2
F4	Is a good source of income	2	2	1	2	0
F5	Is a good food source	0	0	0	0	0
F6	Serves as feed for livestock	2	2	2	0	0
F7	It is fast growing	2	2	2	2	2
F8	Helps control soil erosion	2	2	2	2	2
F9	Is good for shade	2	1	1	1	0
F10	Leaves decompose easily	2	2	2	0	2
F11	Causes drying of springs	0	0	0	2	0
F12	Has a negative effect on soil	0	0	0	2	0
F13	Branches can be cut for fuel	2	2	2	2	2
F14	Has a shallow root system	2	2	2	0	2
F15	Enhances spring discharge	0	0	0	0	0
F16	Survives browsing at young age	2	2	2	2	2
F17	Makes good furniture	2	1	0	2	0
F18	Changes the taste of water	0	0	0	2	2
F19	Makes a good fence	2	2	2	2	1
F20	Has deep root system	1	1	1	2	0
F21	Serves as ornamental	1	2	1	1	0

3) Grouping features by niche so that niche compatibility may be assessed according to the particular features determining compatibility with each niche.

In this step, compatibility criteria originally identified by key informants for each niche are grouped by niche. As some criteria were mentioned for more than one niche (for example, "good for soil fertility"), these are used more than once (see Table 4).

Table 4. Sample Quantitative Analysis of Niche Compatibility of Different Tree Species

Folk Genus:	Agrocarpus	Mkosoghoo	Msongoma	Mlobe	Mikaratusi	Mikuyo
Compatibility Criteria by Niche	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**
I. Farm Boundaries						
Creates limited shade	1	0	1	2	2	0
Good for soil fertility	1	0	1	0	0	2
Has positive effect on crops	2	2	1	0	0	2
Makes good firewood	2	2	2	2	2	2
Makes good timber	2	2	2	0	2	0
Does not produce edible fruit	2	0	2	0	2	2
Produces few seeds	-	0	0	2	0	0
Is not a heavy feeder on water	2	1	2	2	0	2
Leaves not bad for crops, soil	2	1	2	2	0	2
Average:	*1.8*	*0.9*	*1.4*	*1.1*	*0.9*	*1.3*
II. Watering Points						
Conserves water	1	1	1	**0**	**0**	**2**
III. In Farmland						
Good for soil fertility	1	0	1	0	0	2
Has positive effect on crops	2	2	1	0	0	2
Is not a heavy feeder on water	2	1	2	2	0	2
Makes good firewood	2	2	2	2	2	2
Makes good timber	2	2	2	0	2	0
Canopy holds rain, releasing it slowly	0	1	0	0	0	2
Average:	*1.5*	*1.3*	*1.3*	*0.7*	*0.7*	*1.7*
IV. Forest Margins						
Does not arrest undergrowth	2	1	2	2	2	2
Leaves not bad for crops or soil	2	1	2	2	0	2
Is not a heavy feeder on water	2	1	2	2	0	2
Does not out-compete other tree species	2	2	2	2	0	2
Is not indigenous	2	2	2	0	2	0
Average:	*2.0*	*1.4*	*2.0*	*1.6*	*0.8*	*1.6*
V. Roadsides (for stabilization)						
Does not arrest undergrowth	2	1	2	2	2	2
Leaves not bad for crops or soil	2	1	2	2	0	2
Branches do not break in wind	-	-	-	-	-	-
Average:	*2.0*	*1.0*	*2.0*	*2.0*	*1.0*	*2.0*

Identification and Clarification of Discrepancies

If the quantitative approach to validating focus group results is used, discrepancies will undoubtedly arise between the results of focus group discussions and systematic ranking (namely, those species considered vs. ranked to be most and least compatible for each niche). These discrepancies can be due to one of 3 factors: failure to adequately capture all niche compatibility criteria during focus group discussions, failure to weight the different compatibility criteria, or failure of farmers to consider all viable species. A protocol for clarifying these discrepancies with key informants is illustrated in Box 2.

Box 2. Sample Protocol for Clarifying Discrepancies with Farmers

In a tree niche analysis conducted in Ginchi Benchmark Site, Ethiopia, discrepancies were found in the answers derived from the two methods – ranking species according to different compatibility criteria (and averaging ranks of different criteria by niche) and open-ended interviews. This protocol was used to identify the reasons behind observed discrepancies, guided by the following questions:

1. Why are there discrepancies? Is it due to: a) Failure to adequately capture all niche compatibility criteria?, b) Failure to weight the different compatibility criteria according to their levels of importance to local land users?, or c) Failure of farmers to mention all viable tree species during focus group meetings?

2. In cases where all compatibility criteria were not captured, which ones were missed for each of the identified niches?

3. If discrepancies resulted from the failure to weigh the different compatibility criteria, what is the order of importance of the different niche compatibility criteria for each identified niche?

To answer these questions, a focus group approach was used and guided by the following steps:

1. Proceed niche by niche, telling participants the species they had mentioned during earlier meetings, and those that were identified by researchers through participatory ranking. Going species by species, ask them whether the additional species identified by ranking (those ranked highly) are as good for the niche as those first identified through open-ended interviews.

2. If any of the species not mentioned by them but ranked highly is eliminated (considered by farmers to be not as good in this niche), proceed to Step 3. If the additional species is accepted as viable within the niche, then you know that farmers had simply failed to mention these other species during open-ended interviews. These species are then added to the list. If no new niche criteria are added, proceed to Step 4.

3. Ask farmers, "*Why* is this species not as good as the other tree species for [niche x]?" This will enable you to identify new niche compatibility criteria that were left out of the original analysis. Upon returning from the field, add the new niche compatibility criteria to the matrix. Proceed to Step 5.

4. To explore whether discrepancies result from failure to assess the relative importance of different compatibility criteria, ask participants whether all criteria are equally important in determining a tree's compatibility with the niche. If they are not felt to be equally important, ask them to rank each one according to its relative importance (5 being "highly important" and 1 being "not very important"). Fill in Table B, and repeat this step for each niche where discrepancies were identified. When finished, proceed to Step 5.

Table B. Sample Format for Ranking Compatibility Criteria

I. Farm Boundary Niche	**Rank (1 to 5)**
Has beneficial effect on soil fertility	
Serves as feed for livestock	
Branches can be cut for fuel wood	
New Criterion 1	
New Criterion 2	

5. Return to the previous step in the methodology (participatory ranking), and rank all species according to the updated list of compatibility criteria.

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 5). 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.

Table 5. Tree Features Causing Niche Incompatibility in Lushoto and Galessa

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

The characteristics that make tree species desirable or undesirable for specific niches were found to differ by niche, offering an opportunity for more optimal integration of locally-important trees in more appropriate niches. Niches identified by farmers where trees are or could be cultivated have similarities and differences as a function of the farming system and the particular species causing problems in each site. While problems associated with farm boundaries (incompatibilities with crops) and springs and waterways (incompatibilities with water) are common across sites, other niches are site-specific. Residents of Lushoto, for example, mentioned protected area boundaries and roadsides as niches requiring improved management due to the incompatibilities of particular species (*Acrocarpus fraxinifolius*, *Eucalyptus* spp. and *Olea europaea*) (Table 6). Residents of Ginchi, on the other hand, mentioned outfields due to the relative absence of cultivated trees in these areas and the role of seasonal open access grazing in hindering tree establishment and incentives for investment (Table 7). They also mentioned degraded areas due to the need for trees to halt soil fertility decline and gulley formation, and the need to find an appropriate niche for *Eucalyptus* – a genus that is economically important but seen as incompatible with most niches.

Table 6. Perceived Compatibility of Different Tree Species with Different Locations on the Landscape, Lushoto Site

Landscape Location	Compatibility Criteria	Least Compatible[1]	Most Compatible	
1. Farm Boundaries	· Compatible with crops · Adds nutrients to the soil · Does not take much water from the soil · Creates small shady area	· *Allanblackia stunlamannii* · *Eucalyptus* spp. · *Persea americana* · *Olea europaea* subsp. *africana* · *Ocotea usambarensis* · *Solanecio mennii*	· *Acrocarpus fraxinifolius* · *Albizia schimperiana* · *Cyanthea manniana* · *Ficus benjamina* · *Gravillea robusta* · *Markhamia obtusifolia*	· *Morus* spp. · *Prunus persica* · *Psidium guajava* · Unkn. (local name Mapofo)
2. Springs and Waterways	· Keeps the area wet (conserves moisture) · Does not take much water from the soil	· *Acacia mearnsii* · *Eucalyptus* spp. · *Ocotea usambarensis* · *Olea europaea* · *Mangifera indica* · *Parinari curatslifolia*	· *Albizia harveyi* · *Allanblackia stunlamannii* · *Cyanthea manniana* · *Ensete ventricosa*[3] · *Ficus benjamina* · *Ficus thonningii*	· *Hallea rubrostipuleta* · *Myrianthus holstii* · *Plectranthus laxiflorus*[3] · *Solanecio mennii* · Unkn. (local name Mapofo)
3. Forest Boundaries	· Does not inhibit growth of trees or crops · Does not take much water from the soil · Not indigenous · Branches may be cut for fuel	· *Eucalyptus* spp. · *Olea europaea* subsp. *africana*	· *Acrocarpus fraxinifolius* · *Eriobotrya japonica* · *Gravillea robusta* · *Mangifera indica* · *Markhamia obtusifolia* · Unkn.(local name Mapofo)	
4. Roadsides	· Not harmful to crops · Branches don’t break in wind · Strong roots good for road stabilization · Does not break the road	· *Acrocarpus fraxinifolius*[2] · *Eucalyptus* spp. · *Olea europaea* subsp. *africana*	· *Acrocarpus fraxinifolius* · *Azadiracta indica* · *Gravillea robusta* · *Markhamia obtusifolia* · Unkn. (local name Mapofo)	

[1] Underlined species are exotics.
[2] Note that farmers strongly disagree on the suitability of Agrocarpus for roadside stabilization.
[3] While these species are not trees, they are mentioned by informants due to cognitively salient niche compatibility characteristics.

Table 7. Perceived Compatibility of Different Tree Species with Different Locations on the Landscape, Ginchi Site

Landscape Location	Compatibility Criteria[1]	Incompatible Species[2]	Most Compatible Species
1. Farm Boundaries	· **No adverse effect on adjacent crops** · Branches can be cut for fuel wood · Good for soil erosion control · Serves as feed for livestock · Good for shade · Makes a good fence · Good source of income	· <u>*Eucalyptus globulus*</u> · <u>*Cupressus lusitanica*</u> · *Senecio gigas* · *Rahmnus prinoides* · *Podocarpus gracilor* · *Juniperus procera* · *Olea africana* · *Erica arborea*	· *Buddleja polystachya* · *Dombeya torrida* · *Hagenia abyssinica* · <u>*Acacia decurrens*</u> · <u>*Chamaecytisus palmensis*</u> · *Maesa lanceolata* · *Hypericum quartinianum*
2. Springs and Waterways	· **No negative effect on spring discharge** · **Does not change the taste of water** · Has a shallow root system · Creates a good shade	· <u>*Cupressus lusitanica*</u> · <u>*Eucalyptus globulus*</u> · *Olea africana* · *Senecio gigas* · *Vernonia auruculifera*	· *Salix subserata* · *Juniperus procera* · *Hagenia abyssinica* · *Maesa lanceolata* · *Olea africana* · *Podocarpus gracilor*
3. Outfields	· **No negative effect on crops** · Good for soil fertility · Has shallow root system · Good source of income · Has a good shade · Good for soil erosion control · Young trees survive browsing	· <u>*Cupressus lusitanica*</u> · <u>*Eucalyptus globulus*</u>	· *Dombeya torrida* · *Hagenica abyssinica* · *Juniperus procera* · *Podocarpus gracilor*
4. Degraded Areas	· Has beneficial effect on soil fertility · Deep rooted · Fast growing · Not suitable for other niches		· *Buddleja polystachya* · *Dombeya torrida* · <u>*Eucalyptus globulus*</u> · *Hagenica abyssinica* · *Vernonia auruculifera*

[1] Compatibility criteria in italics are those critical to other stakeholders or system components, and therefore the only criteria used to assess incompatibility. The most compatible species were identified through consideration of all identified compatibility criteria.
[2] Underlined species are exotics.

Niche compatibility criteria in similar niches also share similarities across sites. On farm boundaries, farmers stress tree compatibility with crops (nutrient, shade and water interactions) and the provision of diverse tree products. Around springs and waterways, farmers mention only those characteristics influencing species compatibility with water (despite the multiple uses characterizing these areas), demonstrating the critical importance given to water resources. Water compatibility is expressed in terms of the ability of trees to enhance water recharge (Lushoto only), minimize water loss (both sites), or preserve water taste (Ginchi only). In most other niches, compatibility with crops is a major concern of farmers – with the exception of degraded areas in Ginchi, where the niche's unsuitability to crops enables a wider range of criteria to be applied (as illustrated by the lack of incompatible species).

While the divergence in species assemblages makes site comparison of species difficult, several observations can nevertheless be made. First, *Eucalyptus* species tend to be key culprits in niche incompatibility for both crop and water interactions. It is critical that we understand how to manage this species so as to minimize its negative impacts on certain system components (water, soil, crops) and users (neighboring farmers, water users). Second, *Ficus* spp. were identified as having an important water conservation function by farmers in both sites (and are additionally considered sacred in Lushoto), but are not listed in Table 7 (Ginchi site) because *Ficus* are absent at this altitude. Finally, while most negative effects stem from exotic species in Ginchi, negative effects were identified with both indigenous and exotic species in Lushoto. Data from Lushoto nevertheless obscure problems associated with the intensity of effects from different species, such as species-specific impacts or densities. Here, *Eucalyptus* spp. and Black Wattle (*Acacia mearnsii*) are most salient in their detrimental effects due to economic forces (high market price for both species and a local processing plant for Wattle) encouraging their cultivation.

Clearly, managing trees is not a "plot-level" issue requiring minimal collective action, as depicted by some authors (Knox et al., 2002). Rather, it requires an understanding of the impacts of individual behavior on other users, and multi-stakeholder negotiations and policy reforms to ensure that individual goods are not the sole operating motive in land use decision-making. Perhaps the biggest barrier to solving identified problems is the strong trade-offs that exist between the economic and ecological benefits of trees. Those tree species found to have the greatest economic benefits were different from the (largely indigenous) species exhibiting a number of important environmental benefits (German et al., 2006). This is really the crux of the matter. While farmers have detailed knowledge on the negative tree-niche interactions, they have incentives for continuing to cultivate harmful tree species where these grow best (around springs) and where the negative effects on their *own* farmland are minimized (farm boundaries). 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. While farmers have a clear understanding of the characteristics that trees in different landscape niches *should* have, those perceived to be causing the problem (land managers) often lack the incentives to adopt less harmful practices. Similarly, those negatively affected and local government lack the policy and organizational mechanisms to hold land owners accountable to the interests of other stakeholders and ensure that positive synergies exist between landscape components (tree-crop, tree-water) and users.

STEP 3: STAKEHOLDER IDENTIFICATION & CONSULTATION BY NICHE

The first step in multi-stakeholder engagement is stakeholder identification. Stakeholders in this context refer to *local* residents with divergent interests around a particular landscape niche or problem. This differs from common usage of the term "stakeholder," which is used to mean all actors present in an area with a relevant mandate, rather than actors with specific *interests* who are directly affected by outcomes – as implied by the term ("holders" of "stakes"). The former usage tends to de-politicize an inherently political term, and the inherently political nature of landcape-level natural resource management practices (in which there are often winners and losers). For this application, the key actors holding 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 to 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 8. Niche-Specific Stakeholders, Lushoto District, Tanzania

Niche	Stakeholders	Compatibility Criteria by Stakeholder and Niche
- 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 (i.e. cooking, construction) and property rights (i.e. to sell, use)

Stakeholders may be identified by asking the questions, “who benefits?” and “who is affected?” for any given problem. A host of more formal approaches also exist. In AHI, we have experimented with an approach used by CIAT in which a land user is selected at random and asked to identify the different interest groups for the niche in question. To identify other possible perspectives on this, they are then asked to identify individuals or categories of land users who are likely to think most differently from them. These individuals are then consulted in a similar way. New individuals or perspectives are identified in a similar way until you find substantial repetition in responses and can confidently rely on the information acquired. In our experience, this approach may be most useful for landscape issues that may not be easily characterized by the questions, “who benefits?” and “who is affected?” However, stakeholders for niche incompatibilities in agroforestry tend to be easily defined by these questions – making the task of stakeholder identification somewhat simpler than for other landscape issues.

The next step involves consultations within individual stakeholder groups. Such meetings can be instrumental for several reasons. The most important is perhaps the opportunity to create rapport between the facilitator and each interest group or stakeholder. This rapport helps the facilitator understand the interests of each party in more depth, and to consult them on their preferred approach to dialogue with other stakeholders. This is particularly crucial for situations of conflict, whether latent or overt, as one or more stakeholders may view multi-stakeholder dialogue as a threat to their interests. This can either cause them to fail to participate in follow-up negotiations altogether, or refuse to accommodate any efforts at consensus-building upon arrival. By consulting these stakeholders about their unique concerns, and demonstrating empathy for these concerns, they begin to trust your neutrality as either facilitator or convener (in cases where elders or other locally appointed individuals are brought in to facilitate negotiations). These preliminary stakeholder consultations also enable the facilitator/convener to gain additional knowledge that may assist them in helping to forge creative solutions to the conflict. Box 3 provides an example from Tanzania where the importance of prior dialogue with stakeholders, in particular accused parties, is illustrated. Finally, these preparatory meetings can be used to identify the most appropriate authority for decision-making on land management. This lesson was acquired in Tanzania (in the Sakharani case, Box 3), when the farm manager of a Mission agreed to substitute Eucalyptus with other species during stakeholder negotiations, only to be reprimanded by his superiors afterwards.

It is important to note that the terminology and body language expressed by outside parties during these preliminary meetings is crucial for either building or undermining confidence (in particular for the party perceived to be causing the problem, who will tend to feel threatened by dialogue). It is crucial to tune into the body language of those being consulted, to be acutely aware of how your own words and behaviors are making them feel – whether closing down or opening up to a spirit of reconciliation. During our preliminary meetings with the manager of the Sakharani Mission, one of our team members introduced the problem voiced by farmers (the negative impact of their boundary trees on neighboring cropland and springs) using the terms “stakeholder” to refer to each party, and “negotiation” to refer to the proposed multi-stakeholder meeting. This language made the farm manager noticeably uncomfortable. When reflecting back on this afterwards, we realized that the term “stakeholder” unnecessarily polarizes the interests of the two parties, while the term “negotiation” presupposes a compromise on behalf of the landowner. Clearly, these words created a tone of conflict and provoked fear of what might be lost through negotiation, provoking an understandably defensive reaction in the mind of the farm manager. When another team member stepped in to adjust the terminology (from “stakeholder” to “party,” “negotiation” to “dialogue”), the farm manager became more open to dialogue.

Box 3. The Role of Prior Stakeholder Consultations in Multi-Stakeholder Engagement: The Case of the Sakharani Boundary, Lushoto, Tanzania

During the participatory watershed diagnosis in Lushoto, Tanzania, farmers identified negative effects of boundary trees as a priority problem. One of the key stakeholders identified by farmers for farm boundary niche was the Sakharani Mission. In 1946, the mission bought land and established 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 their cropland and springs. This was the main reason that multi-stakeholder negotiations were pursued between Sakharani and the three villages neighboring Sakharani.

The first step following participatory watershed diagnosis consisted of visiting the Mission to convey the concerns of farmers to the Mission's farm manager. This visit was instrumental in moving multi-stakeholder negotiations forward in several ways. First, watershed problems had only been diagnosed in the minds of smallholder farmers, failing to capture the views of other land users like Sakharani. These preliminary meetings were instrumental in highlighting concerns that the Mission had with regard to land use practices of neighboring households. These included the destruction of tree seedlings from free grazing livestock and decline in the Mission's water supply from upstream land use practices. Despite our tight schedule, we accepted an invitation to visit areas on the farm that best illustrate the problems he was having with water supply to illustrate our empathy toward *his* concerns – and not only those of neighboring farmers. 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. Yet in addition to showing empathy to problems faced by the Mission, this visit gave us additional information that enabled us to identify some opportunities for more optimal boundary management. For example, we discovered that the main use of Eucalyptus 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. The impartiality expressed by the facilitators for the concerns of the Mission in addition to those already expressed by neighboring farmers encouraged the farm manager began to view the dialogue as an opportunity rather than a threat.

A second outcome of this preliminary stakeholder consultation was to enable the farm manager to make suggestions on how the multi-stakeholder engagement itself would be facilitated. The farm manager was asked to contribute his suggestions on the date and venue for the meeting and the agenda. Contributions to the meeting's agenda included the inclusion of local leaders from neighboring villages and efforts to de-polarize the concerns of each party. The latter led us to develop materials for initiating dialogue that emphasized the commonalities rather than the differences in the interests of each stakeholder, as illustrated by the following table:

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	√	√

While the first two concerns were the main reason for approaching the Mission, new concerns raised by the Mission were also included as farmers' concerns. As these been identified in the watershed exploration (but not in the context of community-Mission interactions), this was a fair representation of reality and the common concerns of both parties. By emphasizing shared concerns rather than polarized interests, the table helped set the stage for collaborative dialogue. The proposed meeting for multi-stakeholder engagement was now seen as an opportunity rather than a threat by the farm manager, who now had a space for dialogue with his neighbors toward more optimal natural resource management for the benefit of both parties.

In cases of more overt and long-lasting conflict, one or more parties may refuse to come to the negotiation table altogether. In such cases, more creative and locally-informed strategies will be needed. In the Galessa highlands of Ethiopia, for example, watershed representatives were consulted on the best way to convince the landowner – perceived to be causing the problem and therefore reluctant to enter into dialogue – to the negotiating table (Box 4). Consulting local residents on culturally-appropriate ways to deal with conflict is an essential step in resolving conflicts related to niche incompatibilities.

Box 4. Engaging a Highly Respected Third Party to Break the Communication Impasse in Galessa, Ethiopia

For several years, farmers from Ameya village had tried to convince the farmer owning land around Ameya spring to remove his Eucalyptus woodlot from the area adjacent to their only water source. The water was seen to be increasingly depleting their supply of drinking water, creating great hardship in the dry season. The land owner, feeling he had invested too much in the woodlot to simply eliminate it, consistently refused. The villagers had been threatening to take him to the Peasant Association (local government) to resolve the case in court. As part of watershed management activities in the area, an AHI team member also tried without success to convince the landowner to come to a multi-stakeholder dialogue to discuss the issue. He then took the issue to the Watershed Committee, asking them to inform us of the most appropriate way forward. 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 were encouraged to talk to the landowner on an individual basis. This meeting was effective in breaking the communication impasse, and bringing the landowner to a village meeting.

A number of important lessons may be distilled from AHI experiences in stakeholder consultations:

- The crucial role of a third party both knowledgeable about the issue and respected by each stakeholder to help bring the each party closer to dialogue;
- The importance of diagnosing problems from the perspective of *each* party prior to multi-stakeholder negotiations, to enable identification of opportunities for "win-win" solutions that address the problems of both parties simultaneously;
- The fundamental role of terminology that diffuses conflict (i.e. "party" rather than "stakeholder", "dialogue" rather than "negotiation"), and body language that exhibits empathy in the stakeholder's concerns, in creating trust in the facilitator / convener of multi-stakeholder dialogue;
- The importance of exploring all opportunities for deepening knowledge of the situation or of each stakeholder's views, for example visits to the areas affected by conflict and non-collaboration (i.e. Sakharani's reservoirs);
- The need to demonstrate both empathy and neutrality toward each stakeholder, for example by freely exploring their concerns during stakeholder consultations (through open and exploratory dialogue or field visits) and giving them a say in how to structure multi-stakeholder dialogue;
- The importance of grounding efforts in cultural norms by consulting local residents on the best approaches to fostering multi-stakeholder dialogue and consensus-based decision-making.

STEP 4: FACILITATION OF MULTI-STAKEHOLDER NEGOTIATIONS

The fourth step involves the multi-stakeholder negotiation event itself. This step involves, minimally, the different local stakeholders and the convener. Depending on whether the convener is also facilitating, and whether stakeholders expressed a desire to have other parties present, the meeting may also involve customary leaders, representatives of local government and personnel from government line ministries (i.e. forestry, agriculture, water). However, technical personnel and authority figures must participate largely as observers, to lend credibility to the event and to provide technical information (on the properties or availability of different tree species, legislation, etc.), but not to make decisions. The decision-making should focus on the stakeholders who interact directly around the niche in question. This might include only two parties (the stakeholders interacting around a single landscape niche), or stakeholder groups (stakeholders interacting around similar types of niches and experiencing similar types of problems at village level or higher). While the former facilitates more tailored solutions, the latter is more efficient and facilitates the implementation of local by-laws to enforce agreements.

The negotiation support event involves the following steps:

1. Introductions
2. Feedback steps taken thus far and the findings:
   a) Watershed problems identified in the area, with an emphasis on agroforestry;
   b) Niches identified as needing improved management;
   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); and
   d) Stakeholder consultations[1] (during which time the facilitator must openly acknowledge the legitimacy of each party's interests and concerns).
3. Elicit reactions from participants;
4. Share the niche compatibility criteria of each stakeholder, as illustrated in the Sakharani case, and ask stakeholders to identify the *most important* ones:

Farmers' Criteria	Sakharani Criteria
- *Produces good timber*	- Secures the boundary
- Produces few seeds	- Fast-growing
- *Adds nutrients to the soil*	- Coppices
- Compatible with crops	- Does not produce edible fruits
- *Makes good fuel wood*	
- Limited shade/branching	
- Does not deplete soil moisture	

5. Identify species and/or management practices that will ensure that most, if not all, of the priority criteria of each stakeholder are met (it no agreement can be reached, encourage each party to concede ground on some of their criteria and re-negotiate solutions); and
6. Develop detailed implementation plan specifying technologies and policies, the activities, responsibilities and timeline required to implement each, and a monitoring system.

[1] Findings can be presented by the facilitator, or by asking each stakeholder to briefly share their perspective on the issue. If the second option is taken, step 2 should come first, followed by a request for each stakeholder to briefly share their views on the issue.

While all niche compatibility criteria mentioned by farmers and Sakharani are presented above, as a facilitator or convener, it is important to consider only those criteria that represent rightful claims by non-landowners. When soliciting niche compatibility criteria of farmers during the niche compatibility study, for example, no effort was made to divide these by stakeholder (i.e. owners of boundary trees vs. neighboring farmers). When identified criteria were being compiled for feedback, as facilitators it was important to consider how identified compatibility criteria relate to the particular *role* or stake assumed by each party. While participating farmers can make claims for maximizing the use value of trees grown on their own farm boundaries, affected farmers cannot rightfully request that boundary trees owned by Sakharani be good for timber, fuel wood or soil fertility (see farmers' criteria in italicized font, above). Their only rightful claim is a claim to non-harm, for example to minimize the negative effects of their neighbors' boundary trees on their property (i.e. soil, crops) and livelihoods (i.e. minimizing the labor burden associated with uprooting seedlings). Such a distinction should be made during the niche compatibility study itself, by asking key informants to identify those niche compatibility criteria most important to the landowner and those most important to neighboring farmers. If you fail to capture this information ahead of time, it is best to eliminate those criteria that place excessive claims on the property of the other stakeholder (i.e. those in italics). Otherwise, sharing these criteria will tend to further polarize the conflict by making the landowner feel like his or her rights are infringed upon. Alternatively, the wording of some criteria can be modified to reflect the principle of "non-harm" rather than claims to use rights. For example, the criterion "adds nutrients to the soil" can be changed to "no harmful effects on soil fertility." This expresses a request to minimize harmful effects rather than to maximize personal benefits from another stakeholder's property.

Compatibility criteria of the two stakeholder groups also be modified (reduced or expanded) during the negotiation event itself. Reductions in the criteria of one or more stakeholder groups occur in the process of negotiation should no species meet the combined criteria of both parties. In this case, less important criteria are eliminated. Expansion of compatibility criteria occurs as different species are proposed by one stakeholder but rejected by the other. When this occurred, we took care to ask the reason for these rejections so that the list of niche compatibility criteria for each stakeholder could be updated. 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 is presented in Table 9. You will note that this list includes additional criteria for Sakharani while reducing several criteria earlier stated by be important by each party. Only one species, *Markhamia obtusifolia*, adequately reflected the combined criteria of both parties. It was therefore agreed to substitute the Eucalyptus with this species.

Table 9. 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

The importance of keeping a running record of compatibility criteria as the negotiation progresses is to remind people of the claims they have given up (criteria earlier mentioned, but nevertheless eliminated for the sake of compromise), as well as the criteria that are of most importance to the other group (so that new species proposed take into considerations the specified priorities of the other stakeholder).

It is important to note that solutions may differ according to the issue at hand. In Galessa, the solution to the Ameya spring problem did not lie in identification of an alternative species, but rather the identification of new management practices. As there is no suitable alternative to Eucalyptus for income generation, no suitable species could easily be found. In this case, it was agreed during the first negotiation that the farmer would remove the Eucalyptus woodlot from the area around the spring, provided all other community members would raise a substitute seedling and plant them elsewhere on his farm. While implementing this agreement as planned proved to be difficult in practice, this example is presented to illustrate the wide variety of potential solutions. Other types of solutions have included minimium distance between trees of certain species when cultivated on farm boundaries (i.e. minimum of 15 meters between *Acrocarpus fraxinifolius* trees in Lushoto), a minimum distance from farm boundaries for the cultivation of species valuable for timber (to minimize ownership and management conflicts in Lushoto), or total bans on certain species on farm boundaries and within buffer zones of springs and waterways.

A few additional comments on approach merit mentioning at this time. The first concerns the politics of negotiation in the context of imbalanced rights to make decisions over property. In our experience, it is much easier to keep landowners engaged if their rights to make decisions about the property are duly acknowledged in the negotiation support process. This can be done when capturing niche compatibility criteria of farmers, by specifying whether the criteria pertain to landowners or affected farmers, and sharing only those which pertain to affected parties and emphasize minimizing harm. It can also be done by consulting the landowner when setting an agenda for multi-stakeholder dialogue. The final strategy lies in the art of negotiation support itself, in which language is crafted to acknowledge the rights of the landowner in tree species selection. 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 by asking him / her, “Can the concerns of your neighbors be accommodated in your species selection?” 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. Despite the delicate “dance” that must be done to keep landowners engaged, the ultimate objective is to seek *balanced concessions* by both parties (each party giving something up) so that the needs of each stakeholder may be met while minimizing harm.

Another important issue well-documented in the conflict management literature is the need to emphasize interests (concerns or criteria) over positions (specific solutions). If one party starts to emphasize a particular position, the negotiation generally breaks down because other possibilities are effectively shut down. If specific solutions are avoided at early stages of dialogue, this helps to open up the dialogue to creative solutions that involve “middle grounds” acceptable to both parties. This principle is built into the steps mentioned above by first identifying niche compatibility criteria (i.e. income from trees, improved spring discharge) before moving to solutions that try to integrate these criteria. As this may also come up in other aspects of the negotiation, it is therefore important to keep in mind at early stages of dialogue.

Once a solution is agreed upon, a detailed implementation plan is developed. This plan generally must move beyond technologies (new species, new management practices, tree nurseries) to the development of rules to govern cooperation if implementation of agreements is to be effective. During methodology development in AHI, we explicitly tested whether agreements would be implemented in the absence of local rules and their enforcement. In a few cases, local leadership was highly effective in generating an attitude of cooperation. This was the case in Lushoto, where most spring owners in villages with effective leadership agreed to demarcate a buffer zone around springs where no cultivation would be done and planted water-conserving vegetation. However, in villages without effective leadership, it proved to be much more difficult to reach and/or enforce agreements. Furthermore, even in those villages where leadership was effective, some landowners still refused to cooperate, leaving a certain number of springs unprotected. This undermines morale by those owners of land near springs who sacrificed for the common good. By analyzing outcomes from informal and formal resolutions across AHI benchmark sites and across diverse niches within each site, it became clear that formal by-laws and mechanisms for their enforcement are needed to enhance cooperation and implementation of informal agreements. Technologies and by-laws are therefore *complementary* in improving niche compatibility in agroforestry practice, and in reducing conflict through improved landscape governance more broadly. Technological and policy solutions proposed by watershed residents in Lushoto and Areka benchmark sites are summarized in Tables 10 and 11, respectively. While the examples in these tables are summarized across villages, the actual by-laws must specify the exact distance around springs or near waterways to be conserved, specific species which are banned or allowed, etc., in order to be effective. They should also be accompanied by sanctions (appropriate punishments) for non-compliance, and mechanisms for identifying non-compliance and bringing offenders to justice. Examples of sanctions are illustrated in italicized font in Table 10.

Following identification of appropriate technologies and policies, participants are asked to generate detailed action plans for their implementation. This includes specific activities to be carried out and their sequencing; key responsibilities (for disseminating or propagating technologies, endorsing by-laws, monitoring implementation of technology and by-law agreements, and by-law enforcement); and a timeline. Failure to specify means of implementation *in detail* has invariably led to problems during implementation. This step is fundamental, and time must be taken during the first negotiation support event, or through follow-up meetings, to ensure that the implementation plan is both feasible and sufficiently detailed that everyone knows what they will be doing and when, and mechanisms are in place to ensure the accountability of others. It is also important to pay attention to the *timing* and *sequencing* of technology and policy interventions. Most land owners will tend to refuse solutions that create too much risk, for example felling trees without establishing new woodlots elsewhere or felling all trees before replacement species are mature. Solutions will often require gradual implementation processes which need to be spelled out at the planning phase (total time taken to complete the process, and the intervals at which activities will be implemented and monitored). Technological solutions will also need to be sequenced with by-laws, so that new by-laws are not overly detrimental to livelihoods. This might entail by-law endorsement by local government and awareness raising (announcing by-laws and the dates when these will be enforced), followed by technological solutions which enable people to put alternative practices (i.e. new woodlots) into place prior to by-law enforcement.

Table 10. Proposed Solutions to Identified 'Watershed' Problems in Lushoto Benchmark Site, Tanzania

Problem	**Technological Solutions**	**Governance Solutions**
1. Reduced discharge from springs	(i) Plant compatible vegetation, including: • Grasses – Ngugu, Zia; • Plants – Tambwe (*Ensete ventricosa*), Jeni (*Plectranthus laxiflorus*), Maong'e (*Cyanthea manniana*), Muanzi (Arundinaria alpina); • Trees – Bokoboko (*Entandro phragmadeiningeri*), Gaagaa, Mieti (*Rauvolfivia caffra*), Mikuyu (*Ficus sycomorus*), Mishai mamba (*Albizia gummifera*), Mishai nemawe (*Albizia schimperiana)*, Mitughutu, Mivumo (*Ficus thonningii*), Msongoma (*Gravillea robusta*), Mtalawanda (*Markhamia obtusifolia*), Muombeombe (*Hallea rubrostipuleta*), Mvuta maji (*Aschinusmolle* sp.), Tete. (ii) Build water collection structures to collect rainwater, as an alternative to springs.	(i) Ban further deforestation around springs; (ii) Areas around springs to be owned by local government (hamlet level, Kwalei village); (iii) Ban on thirsty trees and harmful activities (cultivation, illegal cutting of trees, grazing) within certain radius of water sources *or* implement a total ban on Eucalyptus (solutions varied by village); **(iv) A fine of 5000 Tshs per goat and 10000 Tshs per cow caught grazing on water sources (Kwadoe).**
2. Reduced water in irrigation canals	(i) Planting water-conserving vegetation, as follows: • Grasses – Dokoi, Kuakusi, Ngugu, Zia; • Perennials – Banana, Leucaena.	(i) Ban cultivation and water-demanding trees in buffer zone of irrigation canals; (ii) Vegetation along waterways restricted to water-friendly vegetation, with acceptable species including: Kuakusi and Dokoi (Kwadoe), Ngugu (Kwekitui, Kwadoe) and Zia (Kwadoe), Banana and Leucaena (Kwadoe).
3. Competition of boundary trees with adjacent cropland	(i) Plant crop-compatible trees that substitute and supplement the functions of Eucalyptus: • Timber and firewood – Mfufu (*Carissa edulis*), Msongoma (*Gravillea robusta*), Mtarawanda (*Markhamia obtusifolia*) • Securing Boundary – Ving'wee (*Dracaena usambarensis*) • Income – Msongoma (*Gravillea robusta*), Mtarawanda (*Markhamia obtusifolia*) • Food – Msongoma (*Gravillea robusta*), Milobe (*Morus* spp.) • Fodder – Milobe (*Morus* spp.) (ii) Establish tree nurseries in every hamlet or household; (iii) Replace valuable timber trees with trees like Milobe (Kwekitui).	(i) Ban Eucalyptus on farm boundaries; (ii) Minimum of 15 meters between Acrocarpus trees on farm boundaries to minimize competition with crops *or* total ban on Acrocarpus (solutions varied by village); (iii) Establish a minimum distance from farm boundaries for the cultivation of species valuable for timber; **(iv) Anyone caught planting harmful trees on farm boundaries will pay a fine of 5,000 Tanzania shillings.**

Table 11. Proposed Solutions to Identified NRM Problems in Areka Benchmark Site, Southern Ethiopia

Problem	Technological Solutions	Governance Solutions
1. Incompatible trees on farm boundaries	(i) Propagate substitute species for farm boundaries that provide similar benefits to Eucalyptus (construction and fire wood, income) and are niche compatible. Species include: *Gravillia robusta, Cordia Africana*, avocado, bamboo.	(i) By-law specifying the minimum distance of new Eucalyptus plantations from farm boundaries (with distance to be determined by research). (ii) By-law specifying pruning and felling requirements to manage shade effects of Eucalyptus (felling at 3 years maximum). (iii) By-law requiring the pruning of Eucalyptus roots affecting adjacent farmland (ditch digging 1m from trees located near boundaries).
2. Water degradation (improving quantity and quality of water)	(i) Tree seed / nurseries for substitute species that are profitable but also niche compatible (Gravelia, bamboo, Ficus); (ii) Afforestation and soil and water conservation in areas above springs to reduce run-off and increase infiltration for improved water quality and quantity; (iii) Concrete structures to protect spring water quality.	(i) By-law banning Eucalyptus within a certain radius of springs and farm boundaries (to reduce aggregate effect on springs); (ii) By laws specifying household contributions to the development, management and use of water sources.

As with the first case study, a number of general lessons may be derived from AHI experiences in multi-stakeholder negotiations, as follows:

- The crucial importance of a third party seen as impartial and respectable by all stakeholders;
- It importance of acknowledging the property rights of the landowner in the way negotiations are facilitated and the language used;
- The importance of identifying the appropriate authority for land use decision-making within each stakeholder group, so that agreements may be honored;
- The need to avoid further polarizing the issue by focusing on interests over positions, emphasizing commonalities over differences, and identifying opportunities for balanced concessions (each party giving up in order to gain something);
- The need to identify complementary technological and policy interventions and their appropriate sequencing, and sanctions to ensure compliance with stakeholder agreements;
- The importance of compromise, in the form of balanced concessions, so that each party concedes relatively equal ground for the sake of the common good;
- The critical importance of planning *in detail* for the implementation of resolutions (technological, policy) and monitoring of implementation to hold stakeholders accountable.

STEP 5: IMPLEMENTATION OF STAKEHOLDER AGREEMENTS

The final step involves implementation of stakeholder agreements. This step consists of monitoring implementation of work plans to ensure different parties comply with agreements and responsibilities, and at times adjusting work plans to deal with unexpected challenges or ensure the ultimate objectives (niche compatibility, reduced conflict) are met. Implementation of technological innovations may include capacity building, propagation or dissemination of new tree species and/or management practices in the target niche (pruning of roots and branches, spacing, etc). Implementation of policy interventions, on the other hand, involves endorsement of by-laws by local government, monitoring compliance with these by-laws, and imposing sanctions (appropriate punishments) on those who do not comply. Please note that as sanctions are agreed upon by the stakeholders themselves during negotiations, they are therefore part and parcel of bottom-up governance reforms more than a form of government control. Close follow-up is most crucial in early stages of implementation, since failure to comply with agreements early on can undermine any future efforts to solve the problem.

CONCLUSIONS AND IMPLICATIONS

Results of the watershed diagnostic activity carried out in AHI benchmark sites clearly illustrate the problems emerging from the lack of niche-compatible afforestation strategies and policies. The negative impacts of agroforestry are similar across the eastern African highlands, and may be summarized by three basic interactions: a) interactions between trees and water, b) effects of trees on soil, and c) interactions between trees and crops or other tree species, due to either competition or allelopathic effects. While most actors benefit from the cultivation of tree species known to have negative environmental repercussions, emphasis on landowners' use rights within regulatory schemes obscures the impacts that individual land use practices have on others. Negatively affected are farmers whose crops neighbor woodlots and tree lines of incompatible species on adjacent farms, and downstream users whose water supply is degraded from the cultivation of water-demanding species in valley bottoms and upper catchments.

Causal factors behind these negative interactions are also similar across sites. The properties exhibited by certain tree species are themselves a cause, given the significant trade-offs they embody (i.e. trees with high growth rates or income generating potential tending to be those with negative impacts). If landowners aim to maximize their income from trees, then negative economic, social and environmental impacts will follow. A second cause is the tendency to emphasize individual over collective goods and immediate over long-term benefits in the absence of an effective regulatory environment (Meinzen-Dick et al., 2002; Ostrom, 1990; Pandey and Yadama, 1990) and when traditional governance functions break down, as evidenced a tendency to maximize household income from trees and crops over the community's long-term water supply. The prevalence of negative interactions between components (trees and crops, trees and water), stakeholders (land owners and others) and tenure regimes (individually-owned farmland vs. communal springs) suggests that mechanisms to improve the governance of (agro)forestry practices are sorely lacking.

This AHI Methods Guide outlines step-wise approach for identifying negative social and environmental effects of trees in different landscape niches, and fostering equitable solutions that take into account the interests and concerns of different local interest groups. While identified problems may seem intractable to local users due to the strong trade-offs that exist and the divergence between individual and common interests, solutions to identified problems become much less elusive when broken down into their component parts. These include: (i) diagnosis of landscape-level NRM problems; (ii) identification of tree niches and niche-compatible species; (iii) consultation of stakeholders in each "problem niche"; (iv) multi-stakeholder negotiations to enable more socially-optimal solutions; and (v) monitoring of implementation. This five-step process is designed to expand (agro)forestry practice by ensuring the negative properties of trees are adequately identified and managed, so that the benefits of integrated land use practices in densely settled landscapes may be fully realized. It is ultimately an approach to improved landscape governance for which technologies and by-laws become a means to promote more harmonious interactions among stakeholders while ensuring the livelihood needs of *all* local stakeholders are met.

This methodology can be applied in one of two ways – in the design of afforestation programs (to anticipate so as to manage potential future problems), or for addressing these problems once they occur by guiding stakeholder engagement and local-level policy reforms around identified problems. In landscapes where no substantial agroforestry is currently practiced, the open-ended tool for diagnosing landscape-level NRM problems (Step 1) can be used to understand the current concerns of local residents (i.e. spring recharge, soil conservation, fodder production), and the potential role of trees in addressing these. The tree niche analysis (Step 2) can then be carried out on species already known to farmers and integrated with scientific or ethnoscientific knowledge on the properties of species from similar agroecological zones. This would require evaluation of species' compatibility in different landscape niches from sites with similar agroecological characteristics. This would provide farmers with a robust list of tree species adaptable to the area, and information on the potential of these species to address farmers' concerns and to be compatible with existing landscape niches. In landscapes where trees are already prevalent, the open-ended diagnostic tool for participatory identification of natural resource management problems beyond the farm level (Step 1) and tree niche analysis (Step 2) can be jointly used to understand where regulatory interventions are needed. The first can be used to target niches for intervention, and the latter for generating a list of species compatible and incompatible with this niche.

In either scenario – whether anticipating negative consequences ahead of time or managing these once they occur, negotiation support for technology selection and by-law reforms will be required to maximize the benefits and minimize the costs of (agro)forestry in practice. Steps 3 through 5 can be used to agree how to manage species or environmental processes (deforestation, water resource degradation) considered harmful by at least one stakeholder, and to encourage individual stakeholders to take decisions that consider the interests of other affected parties. For the few species causing or likely to cause widespread concern across a range of stakeholders and landscape niches (for example, the species identified as most incompatible from the third column of Tables 6 and 7), participatory by-law reforms that help to balance the needs of the landowner with collective goods (i.e. reliable water supply) are likely to be needed.

Ultimately, the most efficient means of implementing this methodology would be a District-wide strategy involving diverse stakeholders. NGOs, extension personnel and local leaders or elders would play a role in facilitating multi-stakeholder processes; local communities and stakeholder groups would help to monitor implementation; local government would help to endorse by-laws and bring offenders to justice; and local courts would punish offenders. By implementing at a larger scale than a single niche, the approach becomes more cost-effective as stakeholders sharing interests around similar types of niches are brought together to form negotiation blocks rather than negotiating on a one-to-one basis. Furthermore, by-laws are harmonized and gain force through their endorsement by local stakeholders district-wide, as well as by diverse levels of local government. For this to take place, capacity for bottom-up governance reforms must be built in the areas of facilitation and negotiation support, participatory by-law reforms, and strategies to balance technological and governance reforms.

To conclude, the tendency to view trees as environmentally beneficial *by definition* tends to blind us from some of the negative livelihood and environmental consequences of trees. These consequences are far from trivial. They address crucial environmental services and basic human rights (i.e. safe and reliable source of water for domestic use), as well as unjust land use practices which benefit some stakeholders to the detriment of others (i.e. loss of limited farmland due to harmful boundary trees). Ultimately, these failures are a failure of governance – namely, the absence of regulations on certain land use practices which have negative outcomes to certain land uses and users. The solutions therefore come down to the integration of governance interventions (equitable rule-setting and enforcement) with technological alternatives. By facilitating improved governance bottom-up, through supporting negotiation of rules with involved parties, the solutions tend to emphasize *balanced concessions* and *minimize harm to* any given stakeholder. Such outcomes would not be possible from top-down policy generation processes, should these policies be enforced.

The implications of the more widespread application of this methodology are many. The most important are reduced conflict, the livelihood needs of diverse local stakeholder being more equitably met, and land use decisions that minimize harm to environmental services of local importance. The methodology can also help forge more ethical approaches and practices to forestry and agroforestry in the eastern African highlands and beyond.

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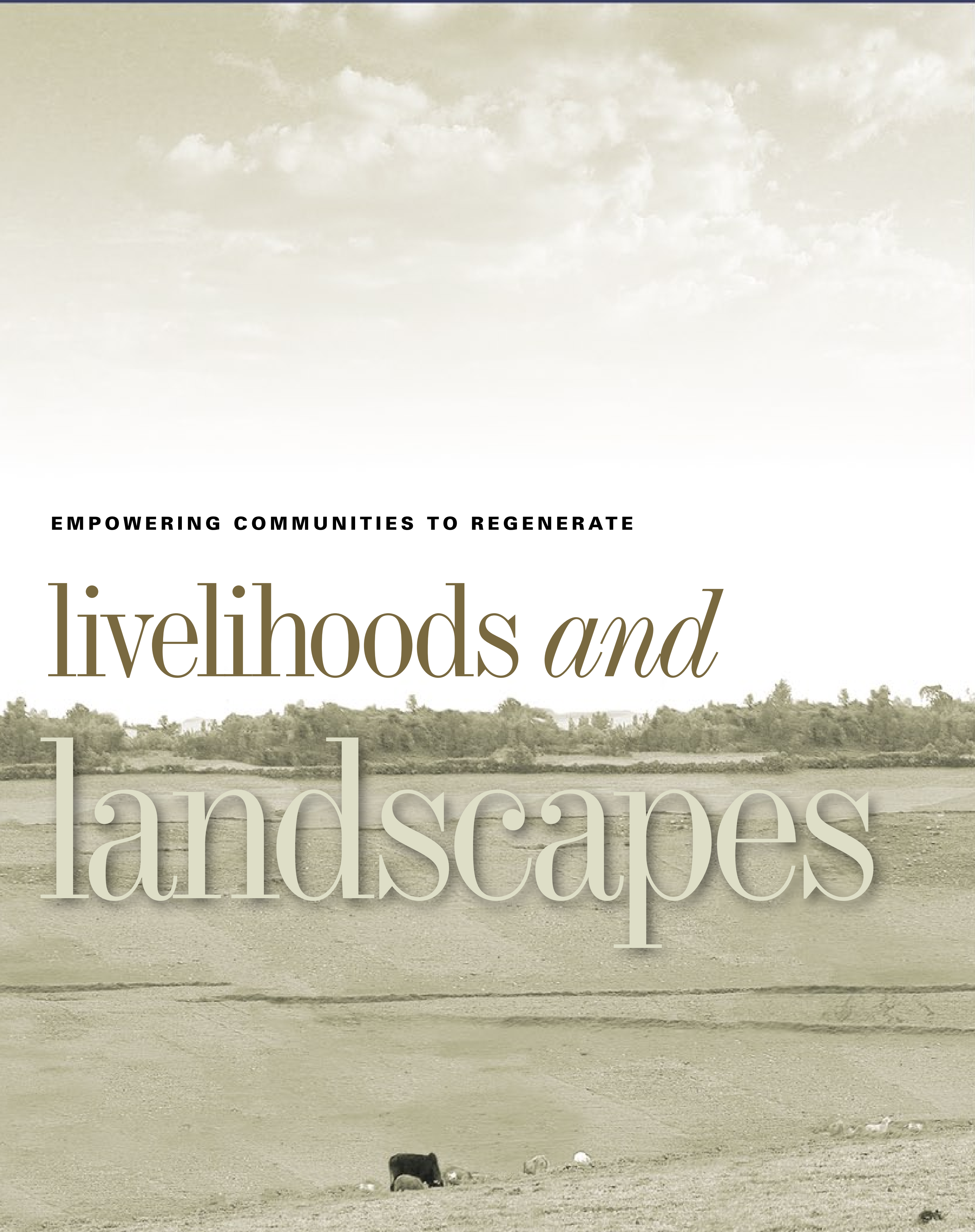
African Highlands Initiative
P.O. Box 26416
Kampala, Uganda

www.africanhighlands.org
email: ahi@cgiar.org



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